Private Equity Leftovers?

– A study on the operational performance of Nordic secondary buyouts

Master's Thesis

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Abstract

The phenomenon of a private equity firm acquiring a portfolio company from another private equity firm – known as a secondary buyout – raises questions regarding the value creation in modern private equity. Using a proprietary data set on Nordic secondary buyouts, we analyze and compare the abnormal operating performance of consecutive buyouts. We find that secondary buyouts generate lower abnormal operating profitability measures in both absolute and relative terms compared to primary buyouts in the same company. Furthermore, we find that secondary buyouts, on average, exhibit higher abnormal debt multiple expansions than primary buyouts in the same target company. These findings suggest that that private equity firms engaging in secondary buyouts are, on average, less motivated by operational performance improvements than by opportunities to utilize leverage in the portfolio company. To qualify our analyses on the operating performance of secondary buyouts, we examine drivers of operating performance changes. We find that pre-buyout profitability levels significantly explain the profitability increases achieved by the second sponsor.

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All errors in this thesis are our own.

List of Abbreviations

AOP	Abnormal operating performance
AOP ME	Abnormal operating performance margin expansion
CVR	Det Centrale Virksomhedsregister
DK	Denmark
EUR	Euro
IFRS	International Financial Reporting Standards
KPI	Key performance indicator
LBO	Leveraged buyout
ME	Margin expansion
NO	Norway
NWC	Net working capital
PBO	Primary buyout
PE	Private equity
SBO	Secondary buyout
SE	Sweden
SIC	Standard Industrial Classification
VC	Venture capital

Table of contents

Figures

Tables

1. Introduction

Imagine that you are the manager of a pension fund's alternative investments division. You get a phone call from a general partner that manages a fund you have invested in. "Good news, we just sold ABC Corporation. We will be distributing the returns shortly." You put the phone to your shoulder, open the door to the open plan offices, and enthusiastically call for the student worker to "get the *Dom P* – we're closing a home run[1]!"

The next day, while fiddling with the Aspirin, you open your inbox and find an unread email from another private equity fund you have invested in. The subject line of the email is "We happily announce the acquisition of ABC Corporation".

Do you wish you could get your champagne back?

The hypothetical scenario outlined above is less of a curiosum today than it was 20 years ago. Secondary buyouts, the phenomenon of one private equity fund acquiring another private equity fund's portfolio company, are increasing in frequency and volume[2]. From an investor perspective, the phenomenon is met with skepticism and scrutiny, usually over concerns of transaction costs, misalignment of interest between private equity firms and their investors, and possible lack of value creation possibilities due to the private equity toolbox having already been utilized once. Essentially, investors fear that the only opportunities for value creation in secondary buyouts are the "leftovers" of the primary buyout.

The value creation in secondary buyouts is the problem area of this thesis, where we examine the operational impact of secondary buyouts on the target companies. Based on proprietary data, we analyze and compare operational key performance indicators of primary and secondary buyouts in the same target company. Furthermore, we examine the explanatory power of hypothesized drivers of operational performance in secondary buyouts.

[1] A "home run" in private equity terminology means an investment with a large return, usually above 3x (Degeorge, Martin, & Phalippou, 2016).

[2] According to Degeorge et al. (2016), secondary buyouts have increased in frequency from practically 0% in the 1990's to 40% of private equity exits in recent years. Based on our own research from the M&A database Mergermarket, we find that 27% of all private equity exits in the Nordic region from 1998-2016 are financial sales, i.e. secondary, tertiary, quaternary (…) buyouts.

This thesis contributes to the ongoing academic discussion on the phenomenon of secondary buyouts and its economic rationale.

1.1. Problem area and motivation

In the academic literature, leveraged buyouts are believed to generate value through the implementation of superior governance structures, utilization of financial leverage, and improvement of the operational performance (Kaplan & Strömberg, 2009). Following that logic, secondary buyouts should, theoretically, be impaired in their ability to create value, as the target firm in a secondary buyout has already been subject to the mechanisms of value creation used in the private equity business model. Despite this theoretical inferiority, private equity practitioners increasingly engage in secondary buyouts, suggesting a lack of detail in the theoretical prediction.

In this thesis, we examine one of the key aspects of value creation in leveraged buyouts: the operational value creation. We do so by compiling and analyzing data on the operational performance of Nordic secondary buyouts and compare them to their respective primary buyouts. This shows if residual operational performance improvements are, empirically, a motivation for engaging in secondary buyouts. We qualify our analysis with a complementary study on hypothesized drivers of operating performance in secondary buyouts.

1.2. Research question

The problem area outlined above leads to the following research question:

Do Nordic secondary buyouts create less operational value compared to primary buyouts?

Later in the thesis, we develop testable hypotheses that help us answer the research question. We qualify our answer by examining the effects of hypothesized drivers of operational performance in secondary buyouts.

1.3. Definitions

In this thesis, we use the following definitions:

I) We define *value creation* as the mechanisms by which private equity firms increase the value of their investors' committed capital. Operational value creation is consequently the

mechanisms by which private equity firms create value on the operational level of their portfolio companies.

II) We define *operational performance* as the measurable effect of an operational value creation process.

III) If not otherwise stated, we use *private equity funds*, *private equity firms,* or *private equity sponsors* interchangeably.

IV) The *primary buyout* is defined as the first buyout in the sequence of at least two buyouts, whereas the *secondary buyout* is defined as the second buyout. Occasionally, we denote the private equity owners in the first and second buyout rounds as the primary buyout firm/fund or secondary buyout firm/fund, respectively.

V) We use the terms *target company*, *buyout company*, and *portfolio company* interchangeably. These terms refer to a company owned by a PE firm.

1.4. Scope and delimitations

In this thesis, we examine the following:

I) Operational performance of private equity-owned secondary buyout companies in the Nordic region from 1998-2015.

To do so, we recognize the following delimitations:

I) We will not examine returns to investors. The data needed to conduct a study on operational performance is found in the financial statements. To estimate the returns on private equity investments, we need additional information, most notably the enterprise value of the deals. This information is usually not publicly available.

II) We will not include venture capital-backed companies. Venture capital firms have a significantly different business model. For instance, they are often minority shareholders and enter their investments at a much earlier stage than private equity firms.

III) We will not examine value creation mechanisms relating to implementation of governance structures. In the literature, the alignment of interest between management and owners that follows the implementation of the leveraged buyout model is a source of value creation (Jensen, 1989a; 1989b; Kaplan S. , 1989b).

IV) Although our study includes some debt measures, we will not examine the intricacies of the changes in capital structure following a secondary buyout. Instead, we delimit ourselves to use the debt measures as sources of inference on possible motivations for secondary buyouts.

V) We will not be examining the operational performance improvements over the entirety of the holding period of either the primary or secondary buyout rounds. We elaborate the reasoning for this delimitation in the methodology.

2. Basics of Private Equity and Leveraged Buyouts

In this chapter, we present a brief introduction to the PE industry, its business model, and the mechanics of a leveraged buyout. This serves as a primer to the literature review on LBOs which follows. To familiarize the reader with the current state of the PE industry in the Nordic region, we present some basic regional industry statistics, which also serve to illustrate why the PE market in the Nordics is important to the economy and, consequently, important to study.

2.1. Fundamental mechanics of PE and LBOs

Etymologically, *private equity* implies unlisted capital, as opposed to listed or public equity (i.e. stocks). While one might think the industry only deals with investments in equity, that is not strictly the case, as PE investors also invest in real estate, debt, infrastructure, etc.

The archetypal PE transaction is when a PE firm (the general partner, GP) agrees to acquire a significant or majority equity stake in either a publicly traded or privately held company. If the target company is publicly traded, the PE firm usually try to acquire a large enough stake allowing them to delist the company. As implied by the name *leveraged buyout*, part of the business model is to finance the acquisition with a significant share of leverage. The portion of debt available to the PE firm varies across economical states, industries, and company-specific characteristics, but usually accounts for around 30% to 60% of the company price (Cendrowski, Petro, Martin, & Wadecki, 2012). However, prior the financial crisis, deals were sometimes levered with up to 90% debt (Kaplan & Strömberg, 2009). Historically, PE firms have primarily generated returns by leveraging its portfolio companies and service the debt using the free cash flow. While the mechanics of this business model is still the same, the price on targets has risen, making the business model

unsustainable on its own. Hence, the modern PE firms also add value to the company during the holding period to make the investment profitable (Cendrowski, Petro, Martin, & Wadecki, 2012; Kaplan & Strömberg, 2009).

The remaining part of the purchase price is equity. The primary source of equity is capital from the PE firm's investors, the limited partners (LPs), which invest through a fund structure. To align interests between the involved stakeholders, the GP and the management team of the target company also contribute with equity (Kaplan & Strömberg, 2009).

When the transaction is finalized, the GP actively monitor and manage the company. In doing so, the GP attempts to enhance the value of the portfolio company by implementing different strategies (Cendrowski, Petro, Martin, & Wadecki, 2012; Kaplan & Strömberg, 2009). When it is time to realize the investment, also known as exiting, the GP can liquidate the asset by:

I) Taking the company public via an initial public offering (IPO)
II) Selling the company to a competitor or other strategic players (known as a trade sale)
III) Selling the company to another financial sponsor (i.e. a secondary buyout)
IV) Declaring bankruptcy

We now proceed to introduce the parties involved in the PE business model and discuss the implications of the fund structure most commonly used in the industry.

2.2. LPs and GPs

As mentioned, LPs are the main investors, i.e. equity contributors, in an LBO. The LPs only provide capital to invest and are usually not allowed to interfere the daily work of the PE firm (Cendrowski, Petro, Martin, & Wadecki, 2012). There are different types of LPs investing in PE funds, the most common types being institutional investors (e.g. pension funds, insurance companies, or endowments) and high net-worth individuals (Kaplan & Strömberg, 2009).

The GP is the entity which employs the PE professionals. It is the GP who finds the companies to invest in, manages them, and later divests the companies. Since GPs invest in private and not public companies, a key differential factor that distinguish good GPs is the ability to find investment opportunities that generates returns which satisfy investors. Furthermore, literature suggests that

persistence in high-performing GPs may be explained by proprietary access to deals (Kaplan & Schoar, 2005). Figure 1 below provides an illustrative funnel to shed light on the extent of deal sourcing that is necessary to make a deal.

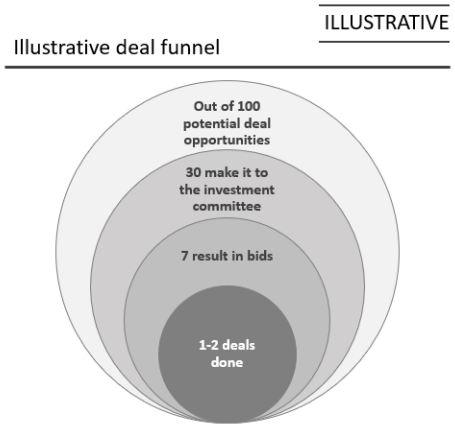


Figure 1: Illustrative deal funnel. Source: Authors. Data: Bain & Company (2017)

The GP earns different types of compensation for investing and managing the LPs capital, mainly: I) management fee of approximately two percent of committed capital during the fund's investment phase, and then on invested capital during the exit phase, and II) carried interest, which is a cut of the fund's profit. The carried interest is usually 20% of the profits remaining after the LPs have received their committed capital plus a hurdle rate. The hurdle rate commonly amounts to six to eight percent per annum of the committed capital. To align interest between the LPs and the GP, the GP usually contributes with at least one percent of the fund's total capital (Cendrowski, Petro, Martin, & Wadecki, 2012; Kaplan & Strömberg, 2009).

The fund vehicle, which LPs contribute with equity through, typically has a limited lifetime of ten years (Kaplan & Strömberg, 2009). In practice, the LPs do not deposit money in a fund. Instead the GP "*draws*" or "*calls*" on LPs committed capital when a suitable investment opportunity is found. There are also funds that have an open-ended structure, called evergreen-funds. These funds are, by definition, more liquid than a close-ended structured fund, and consequently, some are publicly traded.

Figure 2 below is an illustrative timeline of a PE firm that manages three close-ended funds.

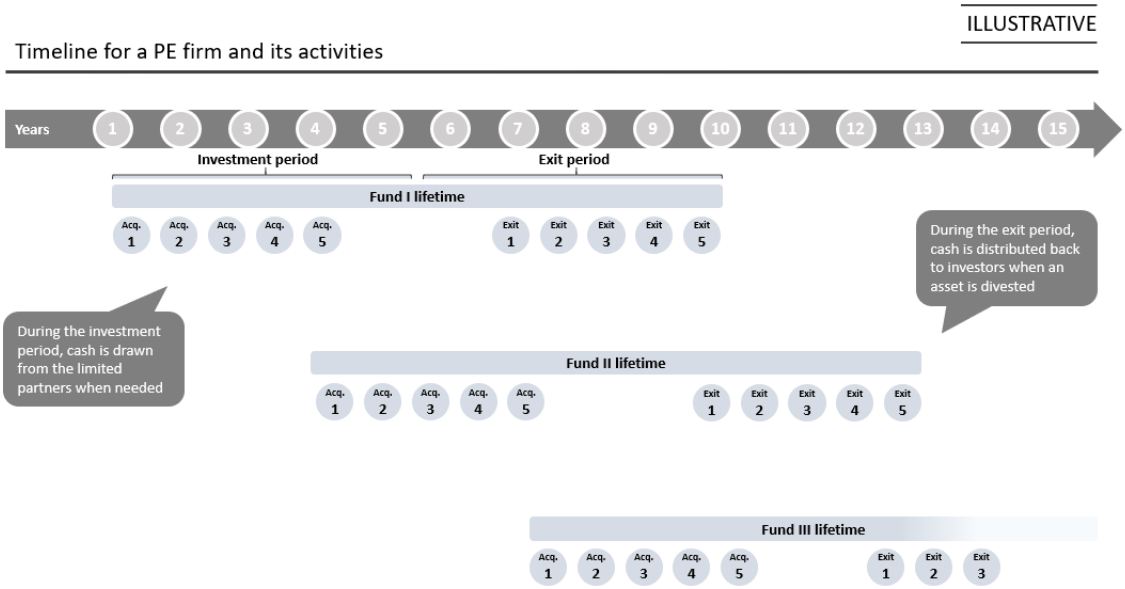


Figure 2: Illustrative timeline of a PE firm.

As shown in Figure 2, the investment period of a fund's lifetime is the first five years, and the last five years is the exit period, also called the divestment period. During the investment period, the GP earns management fees on the fund's total committed capital. During the last five years, however, the GP only receives management fees on capital employed, i.e. money that is invested in companies. In the literature review, we present the commonly held hypothesis among academic scholars that the change in the fee structure between the investment and exit phases may be a source of misalignment of interest between the parties, resulting in an agency problem.

Also shown in Figure 2, PE firms manage several active funds at the same time. This implies that they periodically need to raise new funds. Unsurprisingly, research has shown that high-performing PE firms find it easier to raise new and larger consecutive funds (Kaplan & Schoar, 2005).

2.3. The Nordic PE market

As outlined previously, we now present some basic regional industry statistics on the Nordic PE industry. Even though the Nordics is a small market in a global context, the market is attractive for PE firms due to the many mature companies and well-functioning capital markets. Figure 3 below shows the number and volume of LBOs in the Nordic region since 2011. We note that over 100 annual LBOs have taken place in the Nordics since 2014, and that the total deal value for the 128 LBOs in 2017 amounted to EUR 8bn. According to Bain & Company (2018), the global buyout deal count in 2017 was just over 1.500, implying the Nordics counts for approximately 8%.

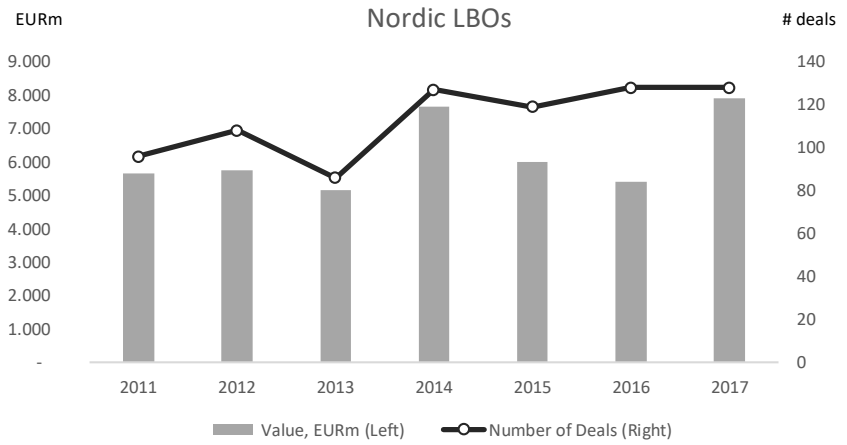


Figure 3: Nordic LBOs by value and number of deals. Source: Authors. Data: Argentum (2017)

Figure 4 below shows the value of Nordic buyout funds' fundraising since 2011. The Nordic fundraising scene is characterized by rather high volatility due to few GPs raising very large funds. For example, EQT VI raised EUR 4,75bn in 2011. In 2013, Nordic Capital VIII raised EUR 3,5bn, and in 2015, EQT VII raised EUR 6,75bn (accounting for 88% of the total Nordic buyout fundraising in that year).

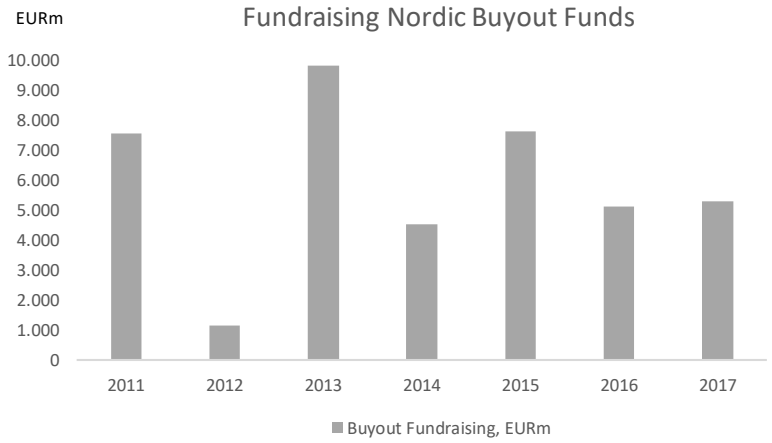


Figure 4: Nordic fundraising for buyout funds. Source: Authors. Data: Argentum (2017)

3. Literature review

We previously presented the fundamental business model of the PE industry: GPs create returns on their LPs investments by identifying target companies, buying the most promising target companies using leverage, creating as much value as possible within the target companies, servicing the debt using the free cash flow, and ultimately, divesting the target companies, thus realizing the profits. Returns are then distributed to LPs, and GPs earn carried interest in addition to any management fees earned throughout the process, and a new fund is raised, repeating the process.

While any one of the steps in the process can be subject to their own independent study, the focus of this thesis is on the operational performance of SBOs, which itself is a function of value creation. As SBOs are fundamentally follow-on LBOs, the same value creation mechanisms are theoretically available to SBO sponsors. As the literature review will show, however, there are significant differences in the value creation options available to SBO funds compared to PBO funds.

Following a brief literature review on the mechanisms of value creation in LBOs, we review the academic literature on value creation in SBOs specifically and highlight the empirical findings on SBO operating performance. We also present findings on determinants of LBO exit routes (SBOs being one of them).

3.1. Value creation in LBOs

The classical framework for value creation in LBOs, widely attributed to Jensen (1989a; 1989b) and Kaplan (1989a; 1989b), describes governance engineering and financial engineering as the fundamental mechanisms of value creation in LBOs. Later, in 2009, Kaplan expands the framework to include operational engineering (Kaplan & Strömberg, 2009). Since the financial and governance engineering mechanisms are closely related, and significantly less relevant to the subject of this thesis than the operational engineering mechanism, we cover the academic literature on governance and financial engineering briefly and concisely.

Governance and financial engineering

Based on his earlier academic research in the oil industry (Jensen, 1986), Jensen (1989a) identifies the misalignment of incentives between management and owners as the "central weakness of the public corporation". According to Jensen (1989a), managers of public corporations are incentivized to facilitate growth to increase the resources under their management, thus increasing their personal power at the expense of shareholder value. This *empire building* phenomenon is facilitated by the free cash flow under manager control: managers (ab)use the free cash flow by initiating negative net present value projects that grow the corporation but does not generate value to owners (Jensen, 1986; 1993).

The LBO company structure emerges as a solution to the agency problem: superior performance relative to the public corporation is achieved by I) using options and equity to align management incentives with owners, and II) using debt to discipline the management of free cash flow[3] (Jensen, 1989a; Kaplan S. , 1989b). Additionally, Jensen (1989b) argues that highly levering companies results in earlier distress signals (if companies fail to service debt) relative to public corporations, while simultaneously putting pressure on debt-financiers and shareholders (due to concentration of financing and ownership, respectively) to save the company in case of distress. This phenomenon, which Jensen calls "*privatization of bankruptcy"*, solves the free-rider problem implicit to the governance structure of dispersed ownership in the public corporation, and disciplines management.

[3] Debt servicing is a "hard promise" on how to spend free cash flow, whereas "soft promises" such as a dividend-paying policy is non-committing.

Lastly, the concentrated ownership of LBO companies, which is enabled by the use of high amounts of debt, results in smaller and more active boards that show less hesitation in removing poor-performing managers than public company boards and more decisiveness in implementation of new strategies (Kaplan & Strömberg, 2009). This is supported by Cornelli and Karakas (2012), who found LBO sponsorship associated with reduction of board size, replacement of outside directors, and intensive LBO sponsor presence on boards when supervision is needed.

While the above is achieved in a mix of governance and financial engineering, optimization of the capital structure is a result of financial engineering alone. This exercise minimizes the LBO company's cost of capital by utilizing debt, which is cheaper than equity, in the capital structure. While Kaplan & Strömberg (2009) estimate that the value of the tax shield resulting from debt-financing was 10%-20% of firm value in the first wave of LBO in the 1980's, they note that value captured from debt-financing has since decreased due to lower tax rates and lower leverage levels. Additionally, the financial engineering aspect of value creation covers the mitigation of investment constraints that target companies may be subject to (Chung, 2011).

17 Since Jensen and Kaplan's seminal works on the advantages of the LBO organizational structure, the public corporation has undergone significant changes. Modern public corporations have widely adopted management incentive alignment policies such as the use of options, equity, and bonusses (Ciccotello, 2014; Kaplan & Strömberg, 2009). This may in part explain why Jensen's prediction of the LBO organizational structure to "*eclipse*" the public corporation has not entirely materialized.

In the literature, there is some opposition to the idea of recognizing financial engineering as a value creation mechanism. For instance, Bergström et al. (2007) argue that the tax shield resulting from highly levering a target company is not a value creation mechanism from a societal perspective, but rather a redistribution mechanism.

In summary, the academic literature describes how LBO transactions create value by initiating financial and governance engineering that: I) align management incentives with owners, II) discipline the use of free cash flow and provide earlier distress signals via debt, and III) increase the monitoring of the company and the decision-making power of the board via consolidation of ownership.

Operational engineering

Early academic literature on operating performance in LBOs, such as Kaplan (1989b), Lichtenberg & Siegel (1990), and Smith (1990), found significant improvements following the LBO event. These performance increases originated from many different sources, e.g. cost reduction initiatives (Muscarella & Vetsuypens, 1990), improved working capital management (Smith, 1990), or downsizing investments[4] and selling off assets (Kaplan S. , 1989b).

The early academic literature largely attributes the improved operating performance of LBO companies to the alignment of incentive structures between management and owners following the governance and financial engineering of the LBO target company (Kaplan S. , 1989b).

Recent academic literature, in contrast, identifies the initiatives undertaken to improve operating performance as an entirely separate vector of value creation in LBOs:

"Today, most large private equity firms have added another type [of engineering] that we call "operational engineering", which refers to industry and operating expertise that they apply to add value to their investments". (Kaplan & Strömberg, 2009)

The application of "industry and operating expertise" implies that the modern PE firms have extended the scope of active management of their investments. For instance, PE firms often hire professionals with strong financial or operational skills. The human capital of these GPs is then applied in identifying attractive target companies and developing value creation plans on the strategic and operational level for portfolio companies (Kaplan & Strömberg, 2009).

Operational engineering is one of the subjects in the research of Acharaya, Gottschalg, Hahn, & Kehoe (2013), who find that GPs with experience in banking or accounting outperform in deals focused on inorganic growth strategies, while GPs with experience in consulting or industry management outperform in deals focused on internal value creation.

[4] Downsizing investments may be a sign of myopic management if the focus is on improving the short-term cash flow at the expense of the long-term cash flow (Kaplan and Strömberg, 2009).

While the slightly expanded classical framework presented by Kaplan & Strömberg (2009) broadly covers the mechanisms of value creation in LBOs, a more elaborate framework of value creation in LBOs is suggested by Berg & Gottschalg (2003). They identify three dimensions for classification of value generation mechanisms: I) phases of buyout value generation, II) causes of buyout value generation, and III) sources of buyout value generation.

In the first dimension, they distinguish between the *acquisition phase* (negotiation and due diligence, development of business plan, and valuation of target), the *holding period* (implementation of plans and initiatives, iterative updating of business plan), and the *divestment phase* (choice of exit mode and divestment valuation).

In the second dimension, they distinguish between *value creation* and *value capturing*. The former type of value generation relates to fundamental changes in the underlying economics of the company, whereas the latter is linked to value increases occurring without changing the underlying economics of the firm. This distinction is particularly interesting, as it separates value creation originating from "pure" operational performance improvement (increase in margins, sales growth, improvement of working capital etc.) from other sources of value (e.g. negotiation skills, exploitation of undervaluation, changes in market valuation multiples). In addition, they introduce a sub-level of value creation "levers": *primary levers* of value creation directly impact the bottom line through improvements in financial engineering, operational engineering, and strategic distinctiveness. *Secondary levers* affect the primary levers and include e.g. reduction of agency costs, expansion of human capital, or support from new investors. The secondary levers are, in other words, *how* the value creation is facilitated.

In the third and last dimension, Berg & Gottschalg (2003) distinguish between value generation stemming from fund-specific characteristics on the one extreme (*extrinsic value generation*), and value generation stemming exclusively from within target company characteristics on the other (*intrinsic value generation*).

Heel & Kehoe (2005) argue that most value creation in LBO portfolio companies is associated with improvement of operating performance, and yet, Guo et al. (2011) finds empirical evidence that shows significantly smaller gains in operating performance from LBOs in the US dating 1990-2006 compared to the first wave in the 1980s, implying that improvements in operating performance of

target companies is not the primary driver of LBO activity. Despite these findings, Guo et al. (2011) describe operating performance as one of the key value creation drivers in private equity. We conclude that operating engineering and value creation in LBOs is an iteratively updated and continuously reexamined topic of research in the academic literature.

In summary, the academic literature describes the mechanisms by which *value creation* is achieved in LBO transactions. The mechanism of primary interest to this thesis is *operational engineering*: initiatives that increase the margins, decrease the costs, improve the working capital management, etc. These improvements are achieved through *secondary levers*, such as investing in human capital and applying the skills on a broad level of activities, ranging from formulation of business plans to execution in operational and strategic initiatives (e.g. internal value creation plans or inorganic growth strategies). *Value capturing,* in contrast, is achieved by applying the skills of the GP on a wide array of activities that do not relate to the underlying economic activities of the firm, among others: identification of mispriced targets, negotiation advantages, and exploitation of under/overvaluation.

3.2. The LBO exit choice

A PBO investor must, by definition, have exited for an SBO to happen. The body of academic literature studying the determinants of LBO exit routes is consequently a source of insight to our study. This branch of academia has expanded over the past decade as SBOs have increased in popularity. In the literature, SBO exit choices are associated with debt and equity market conditions (Plagborg-Møller & Holm, 2017), selling fund pressure (Arcot, Gaspar, Fluck, & Hege, 2015), low portfolio company performance in the PBO round (Plagborg-Møller & Holm, 2017; Ewelt-Knauer, Knauer, & Thielemann, 2013), and “windows of opportunity” (Jenkinson & Sousa, 2015). Additionally, high seller reputation and large selling syndicate size is found to decrease the likelihood of SBO as exit channel (Ewelt-Knauer, Knauer, & Thielemann, 2013).

In terms of performance between exit channels, the empirical results are inconclusive over time: Some articles find IPOs to be the best performing exit channel (Jenkinson & Sousa, 2013; Nikoskelainen & Wright, 2007), whereas others find no significant difference in returns between exit choices (Achleitner, Bauer, Figge, & Lutz, 2012). In recent academic literature, a more nuanced picture of the performance of exit channels has emerged: selling firms look for “windows of

opportunity" when divesting (Jenkinson & Sousa, 2015), implying that SBOs are not a result of desperate sellers, but rather a result of value (capturing) maximization behavior on the behalf of the selling LBO fund. Additionally, the larger and better-performing LBO companies are empirically associated with IPO exits (Plagborg-Møller & Holm, 2017)[5]. These LBO companies are characterized by high profitability, which indicate high prospects for future performance. *Ceteris paribus*, this leads to higher IPO valuations, which inevitably results in an increase in IPO frequency for those LBO target companies (Plagborg-Møller & Holm, 2017). High-performing LBOs are additionally less levered, as they have repaid debt over the holding period, and consequently, the need for refinancing is smaller. Since cheap refinancing is one of the comparative advantages offered by SBOs, this further decreases the attractiveness of selling high-performing target companies to another PE fund (Plagborg-Møller & Holm, 2017).

We conclude, based on recent academic literature, that the choice of exit channel is a value capturing mechanism subject to value maximization of the selling fund: some SBOs happen because they offer a superior value capturing proposition relative to IPOs. This interpretation is consistent with the classical value creation framework of Jensen (1989a; 1989b) and Kaplan (1989a; 1989b), which assumes alignment of interest between GPs and LPs. Conversely, the literature suggests that IPOs are often the exit channel of choice when favorable conditions are present, e.g. favorable equity market conditions, low need for refinancing, high reputation of selling party, or high profitability of target company. However, we note that the choice of SBO as an exit channel is also associated with pressured sellers, exiting at lower multiples (Arcot, Gaspar, Fluck, & Hege, 2015), which is inconsistent with the classical value creation framework of aligned incentives between GPs and LPs.

3.3. Differences between SBOs and PBOs

In the previous section, we argued that SBOs are fundamentally just a secondary LBO, and that LBO literature consequently describes the fundamental mechanics of SBOs. However, there are differences in the SBO deals that make the transaction type unique from PBO transactions.

[5] The same empirical evidence is found in Venture Capital exit literature, cf. Bienz & Leite (2008).

Unlike in PBOs, the selling party in an SBO is always a sophisticated investor. The implication of this difference is that the buying party should not be able to get significant discounts to fair value, as residual growth or other performance trajectories should be priced into the transaction (Bonini, 2015).

In addition, it is unique to SBOs that LPs can simultaneously be indirect buyers and sellers. In the academic literature, this phenomenon is known as the "LP overlap[6]" (Degeorge, Martin, & Phalippou, 2016). The implication of the LP overlap in terms of LP returns is somewhat contested. Jenkinson & Sousa (2015) consider it a cause of concern for LPs:

"… when an LP is an investor in both the selling and acquiring fund, they continue to hold a stake in the target company, but have paid often significant transaction fees and, in some cases, will have crystalized a profit share (or "carried interest", which is typically 20% of the profits) for the exiting private equity manager." (Jenkinson & Sousa, 2015)

Meanwhile, Degeorge et al. (2016) argue that the "*widespread view*" presented by Jenkinson & Sousa (2015) is wrong. They argue that the alternative to the SBO is two separate transactions which also incur transaction costs, the only difference being accelerates the timing of the transaction costs. Furthermore, they suggest that LPs form an investment strategy that leverages on the complementary skills of PE funds. By doing so, LPs stand to gain when they are on both the selling and buying side in a transaction.

Finally, SBOs differ from PBOs in the fundamental mechanics of value creation. In PBOs, all value creation tools are available: governance engineering, financial engineering, and operational engineering. Academic articles widely consider the first two, which in tandem reduce the agency problems implicit to public corporations (Jensen, 1989a; 1989b), to be largely exhausted following the "shock treatment" [7] of the initial LBO (Wright, Gilligan, & Amess, 2009), leaving operational engineering as the only meaningful source of value creation:

[6] The hypothetical scenario outlined in the introduction is an example of the "LP overlap".
[7] "Shock treatment" is a term used by Rappaport (1990) to describe the effect of the LBO organizational structure being applied on public corporations.

"As argued in Wright et al. (2009), resolution of agency problems is likely to generate a steep one-off change in performance. As a consequence, SBOs can be expected to generate little, if any, incremental improvements in operating performance." (Bonini, 2015)

This opinion echoes throughout the academic literature on SBOs (Wang, 2012; Achleitner & Figge, 2014a; Freelink & Volosovych, 2012). Consequently, operating performance is a key subject in the study of SBOs.

3.4. SBO operating performance

In the following section, we present the academic research on SBO operating performance. To the best of our knowledge, the articles reviewed in this section are the primary articles in the body of academic research on SBO operating performance. Note that Bergström et al. *(2007)* only briefly cover the operating performance of SBOs[8]. In contrast, the other academic articles listed predominantly focus on the operational performance of SBOs.

The first subsection presents the empirical findings on SBO operating performance. In the second subsection, we highlight the motivations to engage in SBOs found in the academic literature.

Empirical evidence on SBO operating performance

The empirical evidence on SBO operating performance is inconsistent. Bonini (2015) finds that, on average, PBOs outperform SBOs on operating performance measures, and Freelink & Volosovych (2012) come to a similar conclusion on the median level. In contrast, other academic articles find no significant difference in the operating performance of SBOs relative to PBOs (Achleitner & Figge, 2014a; Bergström, Grubb, & Jonsson, 2007; Jenkinson & Sousa, 2013). Wang (2012) even finds that on one measure, EBITDA/Fixed Assets, SBOs outperform PBOs.

Below, we present a concise review of the methodology, research topics, and findings of each of these primary sources on SBO operating performance. We have chosen to include empirical findings on returns – while return to investors is not a subject of analysis in this thesis, these findings add nuance to our literature review on SBOs.

[8] We also considered adding Alperovych, Wright, and Amess (2013) to this literature review. They also briefly cover SBO operating performance, however, their sample only includes eight or nine SBOs.

Bergström et al. (2007) find no evidence of significantly lower operating performance in SBOs using a regression model where the operating impact on EBITDA margin is controlled for changes in wage-levels, changes in labor force, management incentives (in the form of ownership), leverage, and a dummy for secondary buyouts. While the regression output does yield the expected negative sign, the p-value is 0.66, making the result insignificant.

Wang (2012) collects data from 485 SBOs and 1053 PBOs from the UK and categorize them into multiple subsamples. The categorization is based on whether the financial statements are consolidated, whether the company changes subsidiaries over the horizon of interest, and industry (based on Fama French 10 Industry classification). For these samples, operating performance is measured over an event in a window from three years prior to three years after the SBO transaction, and SBO operating performance is compared to PBO operating performance. Wang (2012) tests SBOs on both sample level, i.e. all SBOs compared to all PBOs, and on a matched level, i.e. SBO compared to PBO in matched companies based on Fama French 10 Industry classification. Furthermore, Wang (2012) reports industry-adjusted, as suggested by Barber & Lyon (1996), and non-industry adjusted measures. When measuring matched SBOs, the only measure significantly outperforming PBOs, regardless of horizon, is EBITDA/Fixed Assets. Wang (2012) concludes that the findings are inconsistent with SBOs being motivated by efficiency gains, i.e. increasing operational performance. Instead, liquidity-based market timing is the most likely motivating factor. A third possible explanation is covered by Wang (2012), namely collusion. The hypothesis regarding collusion is that SBO activity may arise from funds exchanging favors between each other and buy/sell companies in a manner that destroys investor value. However, Wang (2012) finds no evidence of such behavior.

Bonini (2015) uses an event-study approach where company-level data is compiled over multiple windows. For every SBO, data from one fiscal year prior to two years after both the SBO and PBO events is recorded. This panel data approach ensures that SBO performance is measured relative to the same company, which provides the most precise measurement of performance changes. Bonini (2015) also follows the suggestions of Barber & Lyon (1996) and perform industry-adjustment to calculate abnormal operating performance. Additionally, the operating performance measures are adjusted for industry volatility by using peer sample volatility in the given operating performance measure. Finally, each operating performance measure is calculated as a change-based measure,

following the suggestion of Barber & Lyon (1996). Bonini (2015) robustness tests the findings by using regressions. Bonini (2015) finds that PBOs show significant improvements in operating performance, whereas SBOs on average underperform the PBOs in the same company. Additionally, Bonini (2015) examines the returns to investors following SBOs: returns are positive for SBOs, but significantly lower than that of the PBOs in the same company. Finally, Bonini (2015) examines some alternative drivers of SBO activity, and remarks that SBOs activity is driven by credit market conditions PE reputation factors.

Jenkinson & Sousa (2013) compares the operating performance of SBOs to IPOs. The implication thereof is that this article is primarily related to the body of academic research on exit channels. However, it still measures the operating performance of SBOs, which is why we consider it a primary source on the operating performance in SBOs. Their methodology is based on comparing the operating performance of a sample of SBOs to the operating performance of a sample of IPOs by regressing operating variables, such as EBITDA margin, on various financial and accounting items as exogenous variables. They find that the IPO sample outperformed the SBO sample on EBITDA and revenue during the first three years after the exit, after controlling for investments, divestments, and economy and industry effects. SBOs are found to be associated with cutting or postponing of value-increasing investments. Lastly, they find that IPOs increase their total assets more than SBOs, and simultaneously improve their EBITDA margin more than SBOs.

In earlier research, Sousa (2013) found that in SBOs, the selling PE investor is older, on average, than the buying PE investor. In this article, they find that this effect is not evident between different exit routes. Consequently, they conclude that lower experience of buying PE firms can explain the underperformance of SBOs.

There may be a sample selection bias in this study, as recent studies have found that LBOs exiting via IPOs are generally more profitable, have lower need for the refinancing that SBOs have a comparative advantage in offering, and are less levered following substantial repayments of debt during the LBO (Plagborg-Møller & Holm, 2017).

Freelink & Volosovych (2012) studies the value creation and returns in UK-based SBOs over the entire duration of the holding period. In that aspect, they separate themselves from Bonini (2015) and Wang (2012), who focus on windows centered on the buyout events. Freelink & Volosovych

(2012) compare the operating performance achieved during the SBOs to the pre-buyout performance of the same company. They find that operating performance change is largely unchanged following the SBO and consequently infer that operational performance improvements are not the primary driver of value creation for SBO sponsors.

SBOs in their sample are characterized by high leverage levels, shorter holding periods, and more expensive transactions. The authors find that improved governance, prior performance levels under in the PBO, and to a smaller extent higher leverage and monitoring are significant explanatory variables of variation in the operating performance of their SBO sample. Additionally, Freelink and Volosovych (2012) examine returns, and find significantly positive returns for SBOs in their sample.

Achleitner & Figge (2014a) provide a detailed review of the academic discussion on SBOs in addition to their study of operational performance in SBOs. Firstly, they describe what they call *conventional wisdom* on SBOs: I) that the PBO sponsor has picked the "*low-hanging fruit*", i.e. initialized the most easily realizable value creation measures, and that SBO sponsors consequently have less options for value creation, as they rely on the same mechanisms as the PBO sponsor, II) that SBOs may largely be attractive due to debt-market conditions, implying that they are only attractive if the SBO sponsor can increase the financial risk to make up for the loss of improved operating performance potential, iii) that SBOs are empirically found to be more expensive due to the market timing and negotiation skills of the sophisticated selling PBO fund. They acknowledge that the large increase in SBOs in 2010-2011 may be a side effect of "*tremendous overhang*" following uninvested committed capital in the PE industry (which other academics, such as Jenkinson & Sousa (2015), refer to as the "*dry powder*" effect). However, they also suggest that SBOs may be able to create value as the selling PBO fund approaches the end of its lifetime and needs to generate results for future fundraising (which we later define as the "*forced sell*" effect). This, theoretically, can result in unrealized operational improvements. Additionally, Achleitner & Figge (2014a) suggest that different skills between PBO and SBO funds may allow different value creation strategies, ultimately providing opportunities of value creation that the *conventional wisdom* does not recognize.

Their study is based on a compiled database from three European funds of funds, which contains deal-level data from 1990-2010. This extensive database is subject to a series of multivariate regressions with EBITDA growth, sales growth, and changes in EBITDA margin as response variables

for all realized deals. They find that secondary buyouts do not show significantly different scope of operating performance improvements.

3.5. Motivations to engage in SBOs

In the previous sections, we presented a value creation framework for LBOs, how SBOs are innately different from PBOs, and empirical evidence on the operating performance of SBOs.

In this section, we highlight the motivations to engage in SBO activity found in the academic literature previously reviewed. These motivations form the basis for the hypothesis development on drivers of operating performance in this thesis.

While this list is not exhaustive, and iteratively updated as more research is added to the body of academic literature, it provides the reader with a clear picture of the determinants and drivers of interest to the academic studies on SBO operating performance, including this thesis.

Dry powder

When a PE fund has unspent committed capital, it is colloquially referred to as having "*dry powder*" (Jenkinson & Sousa, 2015). Due to the management fee structure in PE, which we described in the first section of this thesis, PE funds are incentivized to invest the unspent committed capital before the investment phase of its life cycle ends. We refer to this as being subject to "*buy pressure*".

In the academic literature, the *dry powder* effect has been associated with more expensive deals, less use of leverage, and less syndication (Arcot, Gaspar, Fluck, & Hege, 2015), as well as underperformance in SBOs (Degeorge, Martin, & Phalippou, 2016).

Forced exit

When a selling PE fund is late in its divestment phase or pressured to produce a track record for future fundraising, it is said to be under "sell pressure" (Arcot, Gaspar, Fluck, & Hege, 2015) and the resulting exit referred to as a "forced exit" (Bonini, 2015). This may manifest in residual value creation opportunities for future owners (Bonini, 2015), and is empirically associated with lower trading multiples (Arcot, Gaspar, Fluck, & Hege, 2015).

Inter-fund complementary skills

SBO sponsors may find PE-owned target firms attractive investment objects if they have complimentary skills to the PBO sponsor.

In the academic literature, SBOs between PE funds with complementary skills are found to outperform (Degeorge, Martin, & Phalippou, 2016). Furthermore, GPs with a background in banking and accounting are associated with outperformance in SBOs focused on M&A-driven growth, while GPs with a background in consulting and industry management are associated with outperformance in SBOs focused on intrinsic value creation (Acharaya, Gottschalg, Hahn, & Kehoe, 2013).

Timing of debt markets

As a function of PE firms being skill-driven, they exploit windows of opportunity in equity and debt markets (Plagborg-Møller & Holm, 2017; Jenkinson & Sousa, 2015). When debt markets offer favorable conditions, SBOs increase in attractiveness (Wang, 2012; Achleitner & Figge, 2014a). Conversely, PE firms also utilize windows of opportunities when equity markets have been rising by exiting via IPOs more frequently than SBOs (Jenkinson & Sousa, 2015).

Portfolio risk diversification

Bonini (2015) argues that target companies which have been able to cope with high levels of debt, have implemented the governance and monitoring structures implicit to the LBO organizational structure, and have managers experienced in dealing with PE investors may be attractive for PE sponsors looking for a less risky and more predictable alternative to a PBO.

Collusion

PE funds may trade assets among each other in a Ponzi-like scheme, resulting in artificially high returns or simply trade bad assets between each other (Wang, 2012). This motivation to engage in SBOs is entirely hypothetical; there is no evidence of collusion between PE funds in SBO (Bonini, 2015; Wang, 2012).

3.6. Summary of literature review

Below, we present a table consolidating the findings and characteristics of the primary body of academic literature relevant to the topic of SBO operating performance.

Author(s)	Geographical scope	Benchmark	Results	Data	Horizon
Bergström et al. (2007)	Sweden	PBOs	No significants results that suggest PBO outperformance	14 SBOs	1998-2006 (H1)
Wang (2012)	UK	PBOs	No significant operational performance gains in SBOs. SBOs are motivated by liquidity-based market timing, not effiency gains	485 SBOs (of which 140 have consolidated accounts)	1997-2008
Freelink & Volosovych (2012)	UK	PBOs	Statistical significant decrease in operating performance for a median SBO	101 SBOs	1999-2008
Jenkinson & Sousa (2013)	Europe*	IPOs	PE targets exited in IPOs outperform SBOs on operational measures	194 SBOs	2000-2007
Achleitner & Figge (2014a)	North America and Europe**	PBOs	SBOs offer similar operational performance improvements as those of PBOs	448 SBOs	1990-2010
Bonini (2015)	Western Europe (UK & France accounts for 77% of the sample)***	PBOs	PBOs outperforms SBOs on operational measures	163 SBOs	1998-2008

* Nordic total: 13 (8 Swedish, 1 Norwegian, 4 Finnish)

** Nordic total: 34 (27 Swedish, 1 Norwegian, 6 Danish, 8 Finnish)

*** Nordic total: 16 (9 Swedish, 3 Norwegian, 1 Danish, 3 Finnish)

Table 1: Summary of literature review on SBO operating performance.

The empirical findings on SBO operating performance can largely be grouped into two categories: I) those that find significant underperformance of SBOs, and II) those that find no significant results of underperformance in SBOs. In the first category, we find Freelink and Volosovych (2012) and Bonini (2015). In the second category, we find Bergström et al. (2007), Wang (2012), and Achleitner & Figge (2014a). We place Jenkinson & Sousa (2013) out of categories I) and II) since they are not measuring operating performance of SBOs relative to PBOs, but relative to IPOs. The sentiment of their findings is clear, however, as they find IPOs outperform SBOs on operational measures. As we covered in the literature review, recent literature has found that IPO exits associates with high-performing LBOs, which may in part explain their findings.

Additionally, we have examined the motivations to engage in SBOs presented in the literature. These motivations are concisely covered in the previous section. We consider these motivations explained by the following factors: I) the limited life of PE funds, II) the skills of PE funds, III) misalignment of interests between LPs and GPs. Later, we build hypotheses based on these motivations.

3.7. Positioning of this thesis

Wang (2012) and Bonini (2015) examine the operating performance of SBO target companies by utilizing a two- to three-year window centered on the buyout events. In our thesis, this methodology is necessary, as we are focused on a smaller geographical scope, and consequently have a smaller pool of SBOs to construct our sample from. The approaches of Freelink & Volosovych (2012), Achleitner & Figge (2014a), and Jenkinson & Sousa (2013) rely on data from realized deals, which would further reduce the sample size available to us, given our narrow geographical scope.

Therefore, we align ourselves methodologically with Bonini (2015). We also find his approach of matching the buyout events by target company interesting, as it allows for us to examine the relative performance of SBOs to PBOs on a same-company level. In our case, we believe this approach is superior to that of Wang (2012), as it removes the need to match buyout company to a single peer on company-level. Such a practice would likely cause estimation biases, as noted by Bonini (2015), in addition to putting larger emphasis on suitable companies to match our companies, which may not be possible due to our limited geographical scope.

4. Identification of research gap

Table 1, presented in the summary of the literature above, illustrates the research gap found in the academic literature.

Firstly, we note that the existing body of literature is largely overlapping in terms of geographical scope. Most of the literature is based on data from the UK (Wang, 2012; Bonini, 2015; Freelink & Volosovych, 2012) and Europe (Jenkinson & Sousa, 2013; Achleitner & Figge, 2014a), with very limited data from the Nordic region. We speculate that a language barrier may exist, as Nordic transactions are heavily underrepresented[9] despite the quality and availability of data from the Nordic region.

Secondarily, we note that the horizon of analysis in the existing body of research largely stops with the financial crisis. There may be valid arguments for examining pre-crisis deals only, as the shock

[9] In our research, we found a gross list of 334 Nordic LBOs that qualified as secondary buyouts, which, when filtered with our set of criteria, results in a final sample of 73 SBO transactions.

of the financial crisis may be problematic to accurately account for, however, this results in a gap in the literature for post-financial crisis transactions.

Consequently, our thesis aims to fill the gap in the existing body of literature on SBO operating performance in the Nordic region using the latest data available.

5. Development of hypotheses

Based on the insights from the academic literature outlined in the previous section, we develop the testable hypotheses designed to help answering the research question. The motivations behind our choice of KPIs and measures used in the hypotheses are discussed and explained in greater detail in the later methodology section.

Hypotheses on abnormal operational performance changes

The first branch of hypotheses in this thesis, H1-H4, are formulated on the supposition that SBOs and PBOs differ in operating performance and are formed with the pessimistic null hypothesis that SBOs achieve lower AOP improvements than PBOs.

H1: Secondary buyouts exhibit lower abnormal operating profitability margin expansions than primary buyouts

Improvements in operating profitability measures reflects in increased cash flows, which PE funds may use to service debt. Consequently, the operating profitability of a target firm is a key metric for PE funds. The first hypothesis in the thesis relates to the operating profitability improvements of SBOs. Academic articles on the operational profitability of SBOs show inconsistent findings: some find no evidence of underperformance in SBOs, e.g. Achleitner & Figge (2014a) and Bergström et al. (2007), whereas others find underperformance in SBOs, e.g. Bonini (2015) and Wang (2012).

To support or reject hypothesis H1, we construct four testable hypotheses of the operating profitability measures. We test EBITDA/Sales (interchangeably used as EBITDA margin), EBIT/Sales (EBIT margin), EBITDA/Fixed Assets, and ROIC. These measures are defined and explained later in the methodology.

Hypotheses H1a and H1b are based on the expectation of SBOs underperforming PBOs with regards to EBITDA margin and EBIT margin. H1c is based on the pessimistic view that SBOs do worse than PBOs in terms of EBITDA/Fixed Assets, despite inconsistent findings in the academic literature: Bonini (2015) finds that SBOs underperform when using a definition of EBITDA/Economic Assets[10], whereas Wang (2012) finds the contrary on EBITDA/Fixed Assets. ROIC is the KPI of interest in the last testable hypothesis, H1d. Based on the empirical findings on operational profitability in SBOs relative to PBOs, we expect SBOs in our sample to underperform PBOs.

H1a. Secondary buyouts exhibit lower abnormal EBITDA margin expansions than primary buyouts

H1b. Secondary buyouts exhibit lower abnormal EBIT margin expansions than primary buyouts

H1c. Secondary buyouts exhibit lower abnormal EBITDA/Fixed Assets margin expansions than primary buyouts

H1d. Secondary buyouts exhibit lower ROIC expansion than primary buyouts

We define "abnormal" and "margin expansion" in the methodology section.

H2: Secondary buyouts exhibit lower abnormal growth rates than primary buyouts

Hypothesis two relates to the growth rates achieved during SBOs relative to the PBOs. Growth rates are important measures, as target company profitability are primarily improved in two ways: increases in margins and increases in revenue (Achleitner & Figge, 2014a). Hypothesis one covered the first, hypothesis two covers the latter. Again, the findings in the academic literature are inconsistent: Wang (2012) finds that SBO outperform on Sales growth and EBITDA growth, whereas Bonini (2015) finds the opposite.

The second hypothesis is rejected or supported based on testable hypotheses on abnormal EBITDA and Sales growth of SBOs relative to PBOs in sample target companies.

[10] Bonini (2015) defines Economic Assets = Total Assets – Cash and Cash Equivalents – Trade and other operating creditors.

H2a. Secondary buyouts exhibit lower abnormal Sales growth rates than primary buyouts

H2b. Secondary buyouts exhibit lower abnormal EBITDA growth rates than primary buyouts

H3: Secondary buyouts exhibit higher abnormal leverage multiple expansions than primary buyouts

Findings from the academic literature suggests that SBOs may be motivated by liquidity-based market timing (Wang, 2012), that SBOs are more highly levered than PBOs (Achleitner & Figge, 2014a; Bonini, 2015; Wang, 2012), and that a comparative advantage of SBOs relative to other exit channels is the SBO sponsors ability to refinance the target company, which increases the attractiveness of SBOs relative to IPOs when refinancing is needed (Plagborg-Møller & Holm, 2017). We hypothesize that SBOs show higher debt multiple expansions than PBOs, which is consistent with the hypothesis that SBOs are motivated by debt.

A larger change in leverage levels of SBOs relative to PBOs could be an indication that value capturing via financial engineering is a motivation of SBOs.

Two testable hypotheses form the basis of rejection or support for hypothesis H3. We test for differences in abnormal NIBD/EBITAD multiple expansion and abnormal NIBD/Fixed Assets between each round.

H3a. Secondary buyouts exhibit higher NIBD/EBITDA multiple expansions than primary buyouts

H3b. Secondary buyouts exhibit higher NIBD/Fixed Assets multiple expansion than primary buyouts

H4: Secondary buyouts exhibit lower abnormal operational efficiency improvements than primary buyouts

Hypothesis four is related to the abnormal operational efficiency[11] improvements achieved in SBOs relative to PBOs. The basis for H4 is a testable hypothesis on the changes in NWC/Sales

[11] By "operational efficiency", we mean net working capital. A broader definition of operational efficiency could include the utilization of asset base or invested capital base, which we tested on in H1c and H1d.

(interchangeably called NWC as percentage of sales). For LBOs in general, Baker and Wruck (1989) find that NWC improvements are often one-time improvements realized in the first two years of PE ownership. For PE funds, a lower NWC/Sales is preferable, as it frees up cash flow for debt servicing.

H4a. Secondary buyouts exhibit lower improvements of abnormal NWC/Sales than primary buyouts

Hypotheses on drivers of abnormal operational performance changes

The second branch of hypotheses in this thesis, H5-H10, relate to the drivers of abnormal operational performance changes. The basis of rejection or support is analysis of output from multiple linear regression models.

H5: The low-hanging fruit effect negatively impacts the scope of abnormal operating performance expansion in the post-transaction state

In the academic literature, the low-hanging fruit effect implies that the scope of operating performance improvements is lower in SBOs than PBOs because much of the potential has been realized by the first fund (Achleitner & Figge, 2014a; Bonini, 2015; Freelink & Volosovych, 2012; Wang, 2012). Alternatively put: greater operational improvements generated in the PBO should translate into lower operational improvements in the SBO. Guo, Hotchkiss, & Song (2011) suggests that the ability to improve operating performance may be greatest for firms that underperform pre-buyout. However, when testing this hypothesis on a sample of US public-to-private LBOs, they find no evidence that firms with lower pre-buyout levels of EBITDA margin perform better or show greater improvement post-buyout. We test operating performance improvements in SBOs as a function of prior operating performance levels on our Nordic sample.

H5. The low-hanging fruit effect negatively impacts the abnormal EBITDA margin expansion during the secondary buyout

H6: High debt multiple levels prior to a buyout event negatively impacts the scope of debt multiple expansion in the post-transaction state

The scope of debt multiple expansions available to SBO sponsors is directly impacted by the debt multiples prior to the buyout.

H6. High debt multiple levels in the primary buyout negatively impacts the abnormal NIBD/EBITDA multiple expansion during the secondary buyout

H7: The size/skills of the acquiring private equity fund positively impact the scope of abnormal operational improvements in the secondary buyout

Academic literature has found a wide array of PE fund characteristics to drive returns in deals (Degeorge, Martin, & Phalippou, 2016; Wang, 2012). We test if fund characteristics manifest in differences in operating performance as well. We use size of the PE fund size as a proxy to desirable fund characteristics such as skills. We discuss this in further detail in the methodology.

H7a. The size/skills of the acquiring private equity fund positively impact the abnormal EBITDA margin expansion in the secondary buyout

H7b. The size/skills of the acquiring private equity fund positively impact the abnormal NIBD/EBITDA multiple expansion in the secondary buyout

H8: The dry powder effect impacts the scope of abnormal operational improvements in secondary buyouts

The dry powder effect implies that the PE fund has unspent committed capital. Degeorge et al. (2016) and Arcot et al. (2015) find that funds under pressure to buy (i.e. nearing the end of its investment phase with unspent committed capital) are associated with underperforming SBOs in terms of returns. In addition, Arcot et al. (2015) found that pressured buyers use less leverage.

We hypothesize that the dry powder effect might also manifest in the scope of operational performance improvements. Firstly, if funds under pressure to spend use less leverage, as suggested by Arcot et al. (2015), they may be significantly impaired in their ability to pursue inorganic growth strategies. Secondarily, funds under pressure to spend may be more motivated by the threat of not showing investment activity to their LPs (which damages reputation and impairs future fundraising) than the threat of failing to create value via operational performance increases in their portfolio companies.

H8a. The dry powder effect negatively impacts the abnormal EBITDA margin expansion in the secondary buyout

H8b. The dry powder effect negatively impacts the abnormal NIBD/EBITDA multiple expansion in the secondary buyout

H9: The forced exit effect impacts the scope of abnormal operational improvements in secondary buyouts

Arcot et al. (2015) found that pressured sellers exit at lower multiples. If pressured sellers are willing to exit at lower multiples, we speculate that they may also leave behind residual potential for operational value creation, essentially offsetting the low-hanging fruit effect slightly, and higher debt multiple expansion options.

H9a. The forced exit effect positively impacts the abnormal EBITDA margin expansion in the secondary buyout

H9b. The forced exit effect positively impacts the abnormal NIBD/EBITDA multiple expansion in the secondary buyout

H10: Target firms originally held by private owners offer a larger scope of abnormal operating improvements to private equity investors in subsequent rounds

In the literature, the gains of improving on the governance structure in LBOs is described as a one-time performance increase (Rappaport, 1990; Wright, Gilligan, & Amess, 2009). We have speculated that there may be a difference in the residual operating performance improvements available to subsequent sponsors of target firms previously owned by families or few individuals. The underlying assumption is that the previous owners have managed the company less efficiently and left larger possibilities of improving the operations. To the best of our knowledge, residual operating performance

We test if target companies previously owned by a few private individuals offer higher residual potential for value creation in SBOs. This hypothesis is tested using a dummy for companies fulfilling the pre-PBO criteria.

6. Methodology

In this section, we cover our choices on methodology in the making of this thesis. We present and discuss our choice of observable measures of operating performance, our choice of proxy variables, formulae used, and statistical methods.

6.1. Key Performance Indicators

Table 2 is a summary of the KPIs that are used to analyze and compare the operational performance in SBOs and PBOs throughout this paper. KPIs are categorized as follows, depending on their characteristics: operational profitability, operational efficiency, operational growth, or leverage level. Definitions and discussions on each KPI is presented below.

When selecting KPIs, we chose measures that are used in the academic literature to examine operational performance in LBOs and SBOs, namely margin expansions, growth, and improvements of working capital management, e.g. by Kaplan (1989b), Achleitner & Figge (2014a), Bonini (2015), Wang (2012), and Guo et al. (2011).

Furthermore, we chose KPIs that are readily available from data providers such as Datastream, which we relied on for collecting peer group data. This consideration manifests in simplified definitions of some of the KPIs. For instance, net working capital is defined as current assets less current liabilities. This proved necessary, as the data availability of detailed balance sheet items from Datastream for creation of peer groups turned out to be inconsistent.

Type of KPI	KPI	Definition
Operational profitability	EBITDA/Sales	$EBITDA\ Margin = \frac{EBITDA_t}{Sales_t}$
Operational profitability	EBIT/Sales	$EBIT\ Margin = \frac{EBIT_t}{Sales_t}$
Operational growth	EBITDA Growth	$EBITDA\ Growth = \left(\frac{EBITDA_{t+1}}{EBITDA_t}\right)^{\left(\frac{1}{Periods}\right)} - 1$
Operational growth	Sales Growth	$Sales\ Growth = \left(\frac{Sales_{t+1}}{Sales_t}\right)^{\left(\frac{1}{Periods}\right)} - 1$
Leverage level	NIBD/EBITDA	$Leverage\ multiple = \frac{NIBD_t}{EBITDA_t}$
Operational profitability	EBITDA/Fixed Assets	$EBITDA\ to\ Fixed\ Assets = \frac{EBITDA_t}{Fixed\ Assets_t}$
Operational efficiency	NWC as % of Sales	$NWC\ as\ \%\ of\ Sales = \frac{NWC_t}{Sales_t}$
Operational profitability	ROIC	$ROIC = \frac{EBIT_t * (1 - tax)}{Invested\ Capital_t}$
Leverage level	NIBD/Fixed Assets	$Leverage\ multiple_2 = \frac{NIBD_t}{Fixed\ Assets_t}$

Table 2: List of KPIs.

Operational profitability and operational efficiency

There are several items on the income statement that express company profitability. For studies of LBOs, it is common practice to use operational performance KPIs instead of bottom line earnings as indicators of profitability (Achleitner & Figge, 2014a; Bonini, 2015). The reason for this practice is that bottom line earnings are affected by taxes, minority interests, and capital structure (Barber & Lyon, 1996). The latter is particularly relevant in the context of leveraged buyouts, since changing the capital structure is part of the acquiring fund's value creation plan.

The operational profitability measures used throughout this thesis are EBITDA margin, EBIT margin, and ROIC. We consider EBITDA margin, defined as earnings before interest, taxes, depreciation, and amortization divided by sales, as the most important profitability measure because private equity deals often are valued based on multiples of EBITDA (Cendrowski, Petro, Martin, & Wadecki, 2012; Bergström, Grubb, & Jonsson, 2007). This implies that an increase in EBITDA, ceteris paribus, leads

to a higher valuation of the company. Furthermore, financial sponsors use EBITDA as a proxy to the cash flow characteristics of a company, because the KPI leaves out non-cash expenses such as depreciation and amortization (Cendrowski, Petro, Martin, & Wadecki, 2012). EBIT margin is defined as earnings before interest and taxes divided by sales. ROIC is defined as EBIT after tax divided by invested capital, where invested capital equals fixed assets plus net working capital (Koller, Goedhart, & Wessels, 2010). There are a couple of issues pertaining the introduction of ROIC, which we address below. The issues relate to taxes (I) and recognition of goodwill as part of fixed assets (II).

I) ROIC calculations require a corporate tax rate. This issue creates several sub-issues: i) which tax rate to use, regarding both type of tax rate and which country's tax rate, ii) which year's tax rate to use for every observation, and iii) whether to assign the same or different tax rates to PE target companies and peer groups.

i) We chose to use a marginal tax rate. The main argument is that the effective tax rate is dependent on company specific decisions, e.g. deferring taxes, which will skew the ROIC calculation for the affected years (Damodaran, 2005). Regarding which country's marginal tax rate to use, one solution could be assigning the tax rate of the country where the company is headquartered. However, since we assume that many of the PE targets in our sample have subsidiaries abroad that pays taxes in the countries of operations, we have decided to use the average OECD[12] marginal tax rate.

ii) Since our analysis covers multiple years and countries, we have used the latest available average OECD marginal tax rate, which is 22% (OECD, 2018). According to OECD, the marginal tax rate for Denmark, Norway, and Sweden in 2018 is 22%, 23%, and 22%, respectively.

iii) We use the same tax rate for both peers and buyout companies. It can be argued that a part of the private equity strategy is to utilize the flexibility of the corporate structure to achieve the lowest possible marginal corporate tax rate. On the other hand, using different tax rates for peer groups will inevitably create a bias in ROIC calculations. For the purposes of analyzing operational performance, removing bias in the analysis is more important than capturing the tax-specific strategic options of global private equity companies.

[12] Organization for Economic Co-operation and Development.

II) The second issue pertaining the introduction of ROIC is recognition of goodwill as part of the fixed asset base. Since fixed assets is part of several of our KPIs, the following discussion applies to all of them. Recognizing goodwill as part of fixed assets makes the invested capital asset base larger, which inevitably has a downward bias on ROIC. Alternatively, excluding goodwill creates another bias due to bolt-on acquisitions being recognized in goodwill[13]. Excluding goodwill consequently biases ROIC upwards, if EBIT gains from bolt-on acquisitions is recognized and increases in the invested capital base stemming from goodwill is not. Since future operating performance is likely affected by bolt-on acquisitions, we consider recognizing goodwill superior to excluding goodwill from the fixed assets.

The fourth and last measure of operational profitability we use is EBITDA/Fixed Assets. As in the case of ROIC, recognition of goodwill in the fixed asset base has a downward bias on this measure. EBITDA/Fixed Assets is a measure of the ability to generate cash flow from the fixed asset base. We include this measure to add support to the findings of Wang (2012), who finds that SBOs outperforms PBOs in EBITDA/Fixed Assets, but not in other operational profitability measures.

To measure operational efficiency, we include NWC/Sales, which we define as current assets less current liabilities divided by sales. As mentioned in the introduction to this section, we have deliberately used a simplified definition of NWC due to the reliability and accuracy of the data provided by Datastream. Even though improving NWC management does not necessarily increase profitability, it is often on the agenda of the acquiring PE fund, since it improves the free cash flow available for debt servicing.

Operational growth

To analyze growth and size of companies engaged in PBOs and SBOs, we calculate the compounded annual growth rate (CAGR) on Sales and EBITDA. These CAGRs are calculated relative to PBO -1 and SBO -1, respectively.

To handle our data consistently in terms of recognition of acquired assets, sales, and profits, we have not constructed pro-forma financial statements. For the purpose of examining operational

[13] Goodwill is the difference between the price paid for an acquisition and the book value of the assets and liabilities acquired.

performance, one could argue that it would be more correct to construct pro-forma statements and hence exclude acquired assets, sales, and profits. On the other hand, inorganic growth is a PE strategy and part of the funds value creation agenda. Allowing for both organic and inorganic growth supplements the data from the relative KPIs by showing if growth on e.g. EBITDA was achieved by sacrificing margin (lower EBITDA/Sales).

Leverage level

To measure leverage levels, we analyze net interest-bearing debt (NIBD). We use the KPIs NIBD/EBITDA and NIBD/Fixed Assets. As mentioned earlier, PE deals are often valued based on multiples of EBITDA, implying that NIBD/EBITDA is the leverage level of the deal. Furthermore, NIBD/Fixed Assets is downward biased by goodwill being recognized in the fixed asset base.

NIBD is defined as interest-bearing debt less cash and cash equivalents. While some items are obvious to include in NIBD, some are debatable. The items that primarily has been discussed are I) shareholder and intra-group loans, II) and operational leases. These items will be discussed below one by one.

I) We have chosen not to recognize shareholder loans as a part of the interest-bearing debt, following Bonini (2015). This approach is reasonable with regards to shareholder loans, which can be considered extensions of the equity financing. Furthermore, we only have few and small shareholder loan items in our data. Consequently, we are confident that our approach does not result in significant bias of the debt multiples. Less clear is the implications of including or excluding intra-group loans. This issue is complex as it (in our sample's historical context) involves transfer pricing practices in groups. These practices have changed over the years, and accurately adjusting the NIBD-based KPIs for the changes in intra-group loan practice is out of the scope of this thesis. Consequently, we have simplified our approach: if an intra-group loan is identified on the balance sheet, we have included it as part of NIBD. Our argument is that some observations have substantial (sometimes critically large) intra-group loan items. In the most extreme observations, firms would barely be levered if they did not use intra-group loans, and since we do not believe that PE funds take over firms without the intention to lever them as much as possible (to maximize return on equity), we consider the intra-group loan a form of debt financing.

An example is of the issues imposed by intra-group loan recognition is Inflight Services AB[14]. The company was subject to an SBO in December 2009. In 2011, the balance sheet list a long-term intra-group loan of SEK 288,32m, a bank loan of SEK 149,75m, a revolver of SEK 12,29m, and SEK 0,1m in short-term intra-group loans. In the notes, the interest rate on the intra-group loan is specified at 10%. Meanwhile, the cash and cash equivalents listed under short term assets is SEK 47,22m. Consequently, recognizing intra-group loans results in a NIBD of SEK 403,1m contrasted to a NIBD of SEK 114,82m when not recognizing intra-group loans. Comparing these numbers to the pre-SBO financial statements[15], where NIBD was SEK 231,5m (long-term bank loan of SEK 330m, short-term bank loan of SEK 17,85m, and cash item of SEK 116,35m), we see that not recognizing intra-group loans results in a less levered firm after the SBO compared to pre-SBO. That would be inconsistent with the PE business model of utilizing high leverage and a thin slice of equity.

Note that there are no signs of distress in pre-SBO years, as Sales, EBITDA, and Net Income all increase marginally, making it unlikely that the SBO refinancing of debt has to do with a distressed company.

Reviewing our primary sources in the academic literature, we find that shareholder loans are generally excluded from debt-measures (e.g. Bonini (2015) adds them to equity), but we find no best practice as far as recognition of intra-group loans is concerned.

II) Recognizing operational leases as part of net interest-bearing debt can be valuable, because not taking leasing into account may make companies that lease their assets seem unnaturally low-levered. However, since it is not a legal obligation for a private company to disclose whether the lease is operational or financial in nature, we have excluded leasing items, see e.g. Swedish Accounting Standards Board (2006).

To summarize, we define NIBD as long-term interest-bearing debt (bank debt, bonds, intra-group loans, and other long-term interest-bearing debt) plus short-term interest-bearing debt (bank debt, intra-group loans, revolver facilities, and other short-term interest-bearing debt) less cash and cash equivalents.

[14] The relevant consolidated financial statements for 2011: Ifs Global AB, 556794-0209.
[15] The relevant consolidated financial statements for 2008: Inflight Service Interessenter AB, 556680-2830.

6.2. Proxies for drivers of operational performance

To examine the drivers of operational performance in SBOs, we perform a multiple linear regression model based on exogenous proxy variables to the effects we control for. The model specifications and formulas for the variables used will be presented later. In this section, we present the proxy variables we use in our regression models.

We use pre-transaction AOP level as a proxy for the low-hanging fruit effect, inspired by Guo et al. (2011). The effect implies that higher AOP levels before the buyout negatively impacts the scope of AOP improvements available post-transaction. This effect should translate into a negative parameter estimate for the variable in the regression model.

Like Phalippou & Gottschalg (2009), we use fund size as a proxy to skills. Additionally, academic literature has found that size, experience, and previous performance predicts future performance[16] and fundraising (Kaplan & Schoar, 2005). Hence, we argue that a fund is big because it previously has performed well, and we assume that the fund previously has performed well because it has skilled employees. We define a fund as large if the specific fund's[17] committed capital is over EUR 1,5bn, which represents the top quartile[18] in our data. The dummy variables *Large PBO* and *Large SBO* take the value one if it meets the criteria, otherwise zero.

Besides skills, the fund size proxy captures the gains from economies of scale available to large funds. One could imagine that the fund has some benefits arising from economies of scale, e.g. negotiating power with debt-financiers or discounts for management consulting services (which are paid for by target companies).

We construct proxies for dry powder and forced exits by calculating the age of the fund when an acquisition or divestment takes place. We call these proxies *Buy pressure PBO*, *Sell pressure*, and *Buy pressure SBO*, respectively. *Buy pressure PBO* is a dummy which takes the value of one if the acquiring fund is more than four years old at the time of the acquisition. The proxy *Sell pressure*

[16] Although the predictive power of past performance in private equity is much worse in recent studies (Braun, Jenkinson, & Ingo, 2016).
[17] Note that we mean the specific fund vehicle's committed capital, and not the GP's total committed capital across all funds.
[18] The actual quartile was EUR 1 503m, but for sake of ease we round it down to EUR 1,5bn.

takes the value of one if the divesting fund in the PBO is older than eight years. Lastly, the proxy *Buy pressure SBO* takes the value of one if the acquiring fund in the SBO is older than four years. By using these proxies to the dry powder effect, we aim to capture the partial effect of being under pressure to invest unspent committed capital, i.e. having dry powder. The intuition here is that GPs only receive management fees on invested capital after the investment phase of the fund life cycle has ended (Kaplan & Strömberg, 2009). Therefore, late in the fund's investment period, a GP with dry powder may have adverse incentives to make deals they otherwise not would have done (Arcot, Gaspar, Fluck, & Hege, 2015). On the other hand, by using the proxy to the forced sell effect, we try to capture the partial effect of a PBO fund being under pressure to divest its portfolio companies and distribute returns to LPs. As previously noted, we hypothesize that these companies may leave unrealized residual operating performance gains, consistent with previous findings (Arcot, Gaspar, Fluck, & Hege, 2015).

Academic literature has found that debt market conditions impact the returns in private equity buyouts (Axelson, Jenkinson, Strömberg, & Weisbach, 2013). In our thesis, we construct a proxy to account for debt market conditions when analyzing the leverage level in SBOs compared to PBOs. The proxy variable *LBO Yield Spread* is inspired by Achleitner & Figge (2014a) and is defined as the yearly average of Moody's Baa bond index plus the yearly average of the 10-year German government bond for the year of a given observation. We use Moody's Baa bond index as it includes obligations judged to medium-grade (Moody's, 2017). The purpose of the proxy is to represent the interest rate companies paid if they raised debt capital in the markets in a given transaction year.

Lastly, we use the proxy dummy variable *Private* to capture the partial effect of pre-PBO ownership type. If the target company was owned by private individuals prior to the PBO, the dummy takes a value of one, and zero if not. We speculate that privately held companies may be sub-optimally managed relative to publicly listed or corporately-owned companies.

6.3. Formulas and statistical methods

In the event studies, two events are analyzed and compared: the exogenous shock of the PBO and the exogenous shock of the SBO. For the PBO and SBO event studies to be comparable, we calculate abnormal operating performance (AOP) in each round on margin and growth measures, cf. Barber & Lyon (1996).

In the driver study, we use multiple linear regression to analyze the partial effect of the hypothesized drivers.

In the robustness test, we use an alternative method of analyzing the significant results found in the driver study.

The following section shows the formulas used in the event studies, the driver study, and the robustness tests. Additionally, significance tests are explained in their relevant context.

Event studies: margin-based measures and significance tests

For the yearly AOP calculations of margins, we base our approach on the methodology of Bonini (2015), which is itself based on Barber & Lyon (1996). We perform five calculations for each margin-based target company KPI to find two measures: one for the yearly level of AOP and one for the difference in AOP changes between SBO and PBO rounds. Formula (1) is the level measure on company level. Formula (2) is the level measure on sample level. Formula (3) and Formula (4) are the changes in AOP over each buyout round on company level. Formula (5) is the difference in AOP changes between buyout rounds on company level. Formula (6) is the difference in AOP changes between buyout rounds on sample level.

For a yearly value of a given KPI, x, the AOP level is defined as:

$$AOP(x)_{i,j,t} = (x_{i,j,t} - m_{j,t}) \quad (1)$$

Where,

- x is the observed operating performance-related KPI
- i is the firm observed
- j is the Fama French 10 industry of firm i and its peer group
- m is the median value of x in the peer group[19]
- t is the absolute year of the observation[20]

[19] Cf. Barber & Lyon (1996), median values are preferable over means when peer groups are n>5, as medians are less sensitive to outliers.

[20] i.e. not relative position to the transaction.

The $AOP(x)_{i,j,t}$ values are categorized based on their relative position, T, to a buyout event. The value of T is categorical, and takes the values PBO-1, PBO+1, PBO+2, SBO-1, SBO+1, or SBO+2, depending on the position of the observation relative to each buyout round.

We perform two tests on the sample distribution of $AOP(x)_{i,j,t,T}$. The first is a paired difference test using Student's t-test, which tests the null hypothesis that the sample mean is significantly different from zero. The second is an alternative to the paired difference test, the non-parametric Wilcoxon signed-rank test, which is useful when we cannot assume normal distribution of observations. The null hypothesis in the Wilcoxon signed-rank test is that the median in the paired differences between samples is centered at zero. Significant p-values in these tests indicate that the mean and median values of $AOP(x)_{i,j,t,T}$ are different from 0, i.e. the sample is significantly outperforming the peers. Note that Barber & Lyon (1996) prefer the Wilcoxon signed-rank test due to extreme observations that can skew mean values. The Wilcoxon test statistic is normally distributed when the number of observations is large. Based on the n>20 rule of thumb suggested by Newbold, Carlson, & Thorne (2013), we consider our sample sufficiently large.

We perform both tests for the full sample and the trimmed sample.

The sample mean AOP for KPI x in year T, denoted as $\overline{AOP(x)_T}$, is defined as:

$$\overline{AOP(x)_T} = \frac{\sum_{i=1}^{n} AOP(x)_{i,j,t,T}}{n} \quad (2)$$

Where,

- T is the year relative to a buyout event
- $AOP(x)_{i,j,t,T}$ is the AOP for the KPI x of firm i, operating in sector j, measured in year t, categorized into the event-relative year T
- n is the number of firms in our sample

The law of large numbers applies, such that $\overline{AOP(x)_T} \approx \mu(AOP(x)_T)$ as n approaches infinity.

Inspired by Barber & Lyon (1996), we use a change measure in addition to the level measure. However, instead of a percentage-based change measure, which is sensitive to values close to zero,

we use a margin expansion (ME) measure. This measure captures change but is not sensitive to values close to zero.

For each buyout period, we calculate the company-level $AOP(x)\ ME_i$, defined as:

$$AOP(x)\ ME_{i,PBO(-1;H)} = AOP(x)_{i,PBO+H} - AOP(x)_{i,PBO-1} \quad (3)$$

$$AOP(x)\ ME_{i,SBO(-1;H)} = AOP(x)_{i,SBO+H} - AOP(x)_{i,SBO-1} \quad (4)$$

Where,

- H is the upper limit of the buyout horizon
- $AOP(x)_{i,T}$ is the AOP of KPI x in target company i in year T relative to the buyout event, calculated with Formula (1)

In our study, the upper limit of the post-buyout horizon, H, is either +1 or +2, inspired by Bonini (2015) and Wang (2012). This limited horizon is subject to some scrutiny in the academic literature due to the disregard of improvements throughout the holding period, e.g. Achleitner & Figge (2014a), Freelink & Volosovych (2012). The argument for using it is optimization of number of observations and is supported by the findings of, who found that most operational improvements materialize during the first 2 fiscal years of an LBO (Kaplan & Strömberg, 2009; Guo, Hotchkiss, & Song, 2011; Bonini, 2015).

We use the calculated $AOP(x)\ ME_{i,xBO}$-figures to calculate the difference in $AOP(x)\ ME_i$ between rounds with respect to the SBO, denoted as $\Delta AOP(x)\ ME_{i,SBO}$. This measure shows the company-level relative performance of the SBO compared to the PBO. We define this change measure as:

$$\Delta AOP(x)\ ME_{i,SBO(-1;H)-PBO(-1;H)} = AOP(x)\ ME_{i,SBO(-1;H)} - AOP(x)\ ME_{i,PBO(-1;H)} \quad (5)$$

A positive value of $\Delta AOP(x)\ ME_{i,SBO-PBO}$ indicates that the SBO in target company i has outperformed the PBO with regards to the KPI x, and vice versa.

The distribution of company-level $\Delta AOP(x)\ ME_{i,SBO}$ measures found in Formula (5) is tested using Student's t-test and Wilcoxon signed-rank test with the null hypothesis that the true population value is zero for mean or median, respectively.

The sample-level mean $\Delta AOP(x)\ ME_{SBO}$ is defined as:

$$\overline{\Delta AOP(x)\ ME_{SBO(-1;H)-PBO(-1;H)}} = \frac{\sum_{i=1}^{n} \Delta AOP(x)\ ME_{i,SBO(-1;H)-PBO(-1;H)}}{n} \quad (6)$$

Where,

- n is number of i companies in our sample

Event studies: growth-based measures and significance tests

In addition to the margins, we also calculate and test growth measures in the event studies. Due to growth measures being measured from pre-event to post-event levels, calculation of growth measures is different from calculations of margins. All company-level growth measures are calculated as compounded annual growth rates (CAGR) using Formula (7). Abnormal company-level growth measures are calculated in Formula (8) by subtracting peer group CAGR from company-level CAGR. Sample-level CAGR is calculated as the mean of abnormal company-level CAGRs in Formula (9). Difference in CAGRs between SBO and PBO rounds on company-level is found using Formula (10), whereas (11) is the sample mean difference in CAGR between SBO and PBO rounds.

$$CAGR\left(x_{i,T_{-1}}, x_{i,T_H}\right) = \left(\frac{x_{i,T_H}}{x_{i,T_{-1}}}\right)^{\frac{1}{(H+1)}} - 1 \quad (7)$$

Where,

- $x_{i,T}$ is a given KPI for company i in event-relative year T, where T_{-1} is the baseline year prior to the event (either PBO-1 or SBO-1) and T_H is the upper limit of the horizon.

To find abnormal CAGR on company-level, we adjust for industry and time effects by calculating the abnormal CAGR, i.e. the difference between company CAGR and peer CAGR:

$$Abnormal\ CAGR\left(x_{i,j,T_{-1}}, x_{i,j,T_H}\right) = CAGR\left(x_{i,j,T_{-1}}, x_{i,j,T_H}\right) - CAGR\left(m_{j,t_{T_{-1}}}, m_{j,t_{T_H}}\right) \quad (8)$$

Where,

- m_j is the KPI x for the peer group, operating in industry j
- j is the Fama French 10 Industry match between company i and peer group m
- $t_{T_{-1}}$ and t_{T_H} are the matched years to the event-relative years T

For significance tests, we follow the same procedure as for margins: we perform Student's t-test and Wilcoxon signed-rank test on the company-level distribution of $Abnormal\ CAGR$ found in Formula (8).

Sample-level mean abnormal CAGR is defined as the mean abnormal company-level CAGR:

$$\overline{Abnormal\ CAGR\left(x_{T_{-1}}, x_{T_H}\right)} = \frac{\sum_{i=1}^{n} Abnormal\ CAGR\left(x_{i,j,T_{-1}}, x_{i,j,T_H}\right)}{n} \quad (9)$$

Where,

- n is number of i companies in our sample

Company-level difference between the CAGR of SBO and PBO window is defined as:

$$\Delta\ \text{Abnormal CAGR}_{i,SBO(-1;H)-PBO(-1;H)} = Abnormal\ CAGR_{i,SBO(-1;H)} - Abnormal\ CAGR_{i,PBO(-1;H)} \quad (10)$$

Sample-level mean difference between the CAGR of SBO and PBO window is defined as:

$$\overline{\Delta\ \text{Abnormal CAGR}_{i,SBO(-1;H)-PBO(-1;H)}} = \frac{\sum_{i=1}^{n} \Delta\ \text{Abnormal CAGR}_{i,SBO(-1;H)-PBO(-1;H)}}{n} \quad (11)$$

Finally, we also perform calculations of all measures for medians instead of means. This impacts formulae (2), (6), (9), and (11). Substituting these with the corresponding formulae for calculations of medians will not be elaborated further on, as we believe the reader will understand intuitively how to do so.

Driver study: OLS-based multiple linear regression

For the study on drivers of operating performance, we regress the company-level $AOP(x)_i$ ME_{XBO} measures from the event studies on explanatory proxy variables to the hypothesized drivers using multiple linear regression. We use the OLS method for estimating the unknown parameters.

The primary objective of the multiple regression analysis is to identify drivers and quantify their partial effect on the operational performance. The general model can be formalized as:

$$AOP(x)ME_{XBO} = \beta_0 + \beta_1 AOP(x)_{T_{-1},1} + \beta_2 X_2 + \cdots \beta_p X_p + \beta_{p+1}\left(X_{2\ldots p} * X_{2\ldots p-1}\right) + \epsilon \quad (12)$$

Where,

- x is a given KPI
- $AOP(x)ME_{XBO}$ is the AOP margin or multiple expansion of x over a given buyout horizon
- $AOP_{T_{-1}}$ is the level of x measured in the fiscal year prior to the buyout event
- $X_{2\ldots p}$ is the complete list of explanatory variables in the model
- $\beta_{p+1}\left(X_{2\ldots p} * X_{2\ldots p-1}\right)$ is the interaction term between two explanatory variables
- β_0 is the intercept
- ϵ is the error term

For a complete formalization of every regression specification, see Appendix A.

Each model is subject to normality assumption tests. These are found in Appendix F. Note that all dummies, by definition, fulfill the linearity assumption, since they can only take a value of 0 or 1.

The p-values for all explanatory variables are listed in the regression output. These values indicate the lowest significance level that the null hypothesis[21] can be rejected on. For interpreting output, our definitions of p-value indicator strength are as follows: I) below 1%: Strong significance, II) below 5%: Significant, III) below 10%: Weak significance, and IV) above 10%: Insignificant.

[21] The null hypothesis being that the true parameter estimate is 0; there is no partial effect on the response.

Additional tests

For our robustness test of the low-hanging fruit effect on EBITDA margin in SBOs, we split our sample into two categories based on performance prior to the SBO. Observations in the top 50% of the EBITDA margin distribution prior to the SBO are categorized as *High*, whereas bottom 50% are categorized as *Low*. Because we are non-randomly categorizing the observations, we assume that the two samples may not have equal variance.

The resulting two samples are tested with a two-sample paired difference test using Welch's unequal variances t-test. The null hypothesis of the test is that the means are equal, allowing unequal variances. Significant p-values indicate that the two samples are differently centered in terms of means.

Treatment of outliers

For company-level $AOP(x)_i$ measures, we winsorize the highest and lowest value. This is done to save as many observations as possible. The event studies are based on the winsorized data, and we present both the full sample median (cf. Barber & Lyon, 1996) and the trimmed sample mean values for every KPI (inspired by Bonini, 2015). The regression-based driver study is performed on the full sample with outlier removal on a specification-by-specification basis.

For the event studies, we removed outliers when calculating KPI means because means are sensitive to extreme outliers. In this context, we define outliers as observations more than three standard deviations from the full sample mean.

Trimming the sample for extreme outliers primarily affects pre-PBO observations and, as a trickle-down effect, it manifests in removal of some $\Delta AOP(x)_i ME_{SBO}$ observations. We note that the choice between median values on the full sample and mean values on the trimmed sample is inconsequential to the analysis and conclusion of operating performance in our event studies. We discuss this topic later in our analysis when presenting the data.

For the driver study, the process of outlier removal is based on plotting the model's studentized residuals in a box plot and identify critical outliers (-3 to +3 standard deviations from 0). Large

deviations from zero implies that the model does not explain the variation of the observation, and consequently, the observation is removed.

7. Data

In this section, we cover the process of collecting the data needed for our analyses, including how we constructed our primary sample on SBO target companies and the peer groups sample.

Finally, we present descriptive statistics of the data collected.

7.1. Constructing samples and collecting data

Our proprietary data is constructed from a top-to-bottom approach starting with collecting data on private equity exits from the Mergermarket[22] database. The distribution of our gross sample[23], which comprises 1.714 private equity exits, is shown in Figure 6.

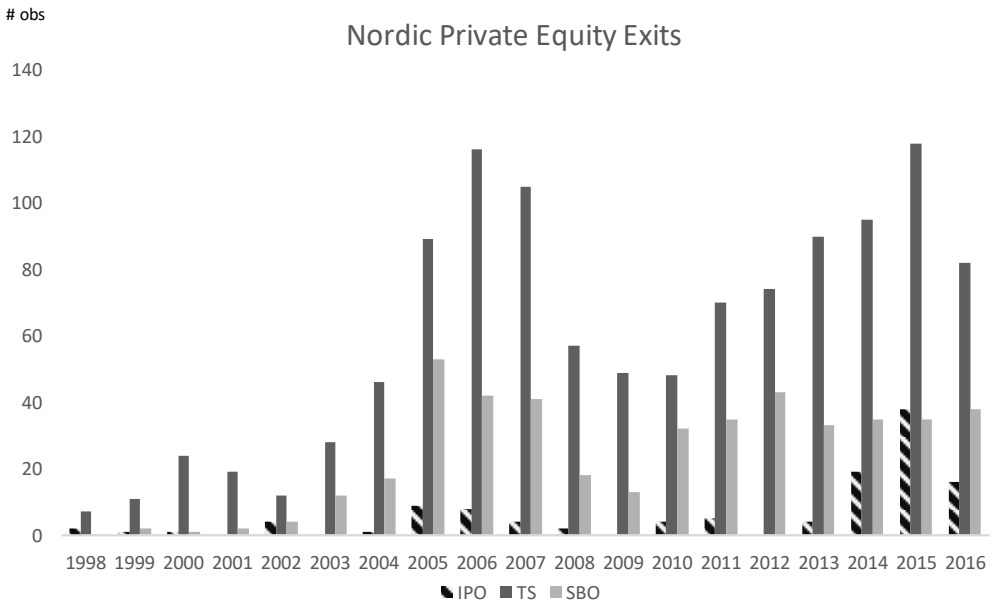


Figure 5: Nordic Private Equity Exits. Source: Authors. Data: Mergermarket.

[22] Mergermarket is a comprehensive M&A database used by both professionals and academics, see www.mergermarket.com.

[23] The search criteria were: private equity exits (IPOs, trade sales, and secondary buyouts) in Denmark, Sweden, Norway, and Finland between 1998-01-01 to 2016-09-30 (including deals with undisclosed value – which Mergermarket otherwise hides by default).

The initial plan was to include Finnish deals in our sample. We quickly realized that there was an unacceptably high risk of making mistakes when dealing with Finnish accounting terminology, and consequently, we excluded observations with Finnish headquarters.

After removing Finnish-based target companies from the gross sample, we construct the first SBO sample by selecting SBOs in target firms based in Denmark, Norway, and Sweden between 1990-2015. Note that the criteria of having headquarters in the Nordic region is only applied to the target firm, i.e. the LBO funds may be global. This sample consists of 334 transactions where both the seller and buyer are private equity funds. Subsequently, we apply a set of criteria that every observation needs to fulfill for inclusion in the final SBO sample. These criteria are presented in Table 4.

Criteria
1. The holding period exceeds 1,5 years for both rounds and PBO +1 is not the SBO year
2. Sponsors in both rounds are PE funds
3. Sponsors have an majority stake in both rounds
4. Consolidated financial statements are available from PBO -1 to SBO +2
5. Sales at the PBO -1 exceed EUR 5m
6. The target's primary sector is not the financial sector
7. The target does not go bankrupt during the SBO
8. The transaction is not a tertiary buyout (or duplicate due to club deal)
9. The target reports revenue (applicable to Danish SMEs)

Table 3: List of criteria.

The set of criteria are applied to ensure our comparable characteristics of companies in the final sample. For example, criteria six, which also is applied by Bonini (2015), ensures that the data is not biased by the different accounting standards used by banks and other companies operating in the financial sector. Criteria two and three ensures that we examining companies exposed by the event we want to study. Criteria seven is included to minimize the survivorship bias implicit in studies of SBOs: the target must survive throughout the PBO to reach the SBO. If we include all SBOs, we inevitably get targets that go bankrupt. To ensure maximum comparability between SBO and PBO rounds, we introduce the survivorship bias to the SBO sample as well. This process does not remove survivorship bias, but we believe it to be minimized with our approach.

One can argue if criteria eight should be applied in an analysis of SBOs, considering that tertiary buyouts probably show similar tendencies as SBOs. Although Bonini (2015) includes "a few" tertiary buyouts, we apply the criteria to isolate the effect of SBOs as much as possible.

Figure 7 shows how many observations are discarded by each criterion. Criteria four is misleadingly big, as it includes 35 observations from 2015 that are discarded because their 2017 annual report are not published at the time of writing this thesis. Regarding criteria eight, only a few of the 58 observations identified are tertiary buyouts – the bulk of these observations are duplicates that Mergermarket reports twice since the SBO is bought by a consortium of PE funds (also known as a club deal). For the purpose of this thesis, we consider the fund with the largest stake the acquirer. We consider it noteworthy that we discarded only two companies due to bankruptcies, even though the financial crisis is included in our data. However, note that we have discarded many companies before we found out if they went bankrupt, meaning that it is fully possible that many more companies went bankrupt than we have recorded.

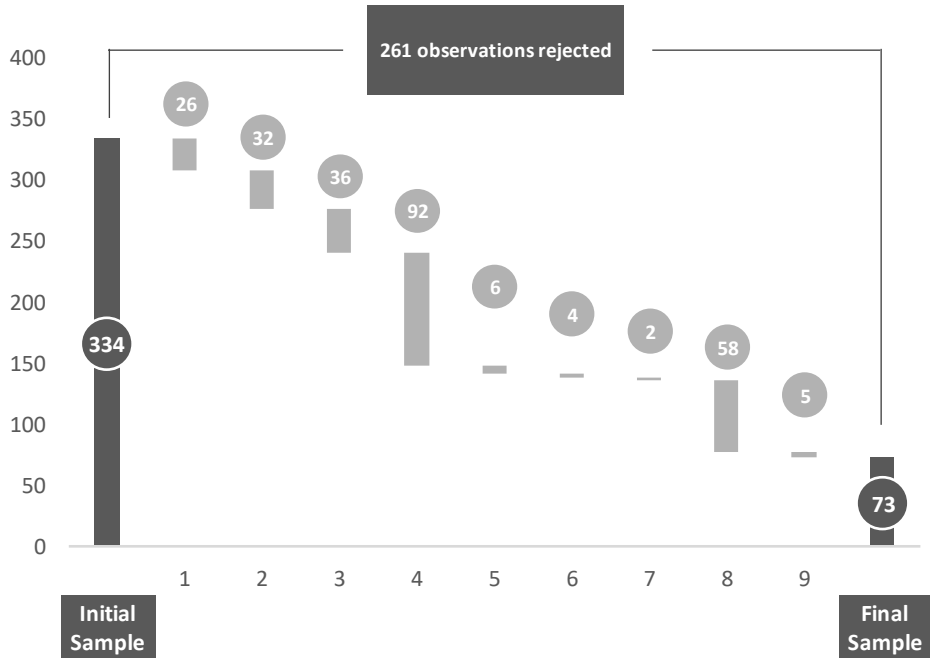


Figure 6: Waterfall by sample selection criteria.

Collecting the financial data on the SBO sample

Before collecting the financial data on our final SBO sample, two central issues need to be addressed: I) which years to collect data from, and II) whether to include the year of the transaction or not.

I) The academic literature suggests that the majority of performance changes are realized during the first two years of the holding period, e.g. Kaplan (1989b), Kaplan & Strömberg (2009), and Guo, Hotchkiss, & Song (2011). Therefore, we are confident in following the methodology of Bonini (2015) and collect financial data for the fiscal year prior to the PBO, denoted PBO -1, and the two consecutive years after the PBO, denoted PBO +1 and PBO +2. For the SBO, we collect data for the corresponding fiscal years, i.e. SBO -1, SBO +1, and SBO +2. The primary benefit of this methodology is that it yields more observations than if we only include observations that are divested by the SBO fund.

II) We choose not to include the year of the transaction. Including the year of the transaction requires an elaborate approach on how to assign operating performance. One must find out how much of the yearly operating performance is consequential to initiatives of the acquiring PE fund relative to the previous owner? On balance sheet items, the issue is arguably less problematic, but omitting the year of the transaction completely prevents any potential mistakes. This methodology is also used by Kaplan (1989b) and Bonini (2015).

We proceed to collect the financial data on our sample by manually downloading[24] annual reports for the years of interest in each SBO observation. We record the financial statement items needed for calculations of the KPIs defined previously. For some observations, we are not able to find useful balance sheet figures for the entire period, as these targets are spin-offs from larger groups, i.e. they consolidate their balance sheet figures in larger groups in PBO -1. In those cases, the income statements were unconsolidated, hence useful for us. We find support for this approach from Bonini (2015), who accept an observation if he can use at least one KPI. Four observations in our sample have no balance sheet items.

[24] We primarily used the service Valu8 to access annual reports, supplemented by datacvr.virk.dk and brreg.no.

When collecting the financial data, we also allocate every PE target to one of the Fama French 10 Industries based on our research on each company. This follows the methodology of Wang (2012). Appendix B presents the allocations of targets to peer groups.

Additionally, we categorize target companies based on pre-PBO ownership structure: private, corporate, or listed. "Private" is defined as few private individuals selling the majority stake in one company. "Corporate" is defined as a group or larger entity selling a business unit or subsidiary. Lastly, "Listed" is used for companies in which the majority equity stake is acquired on a stock exchange. These companies are usually, but not always, delisted from the stock exchange.

We use Datastream[25] to extract the financial statement items for the peer group we created using Orbis. We match the items based on time horizon, such that our peer groups have financial statement items for the entirety of our SBO sample horizon.

Collecting data on funds

We gather data on the funds represent in our data for the operational performance driver study. We record which fund vehicle the PE firm used in the transaction from Mergermarket and use the service Palico to find fund specific data such as vintage date and size of the fund. If only the vintage year is available, we enter 1st of July as the fund's closing date in the given year.

The list of funds in our data is presented in Appendix C.

Constructing the peer sample

We create the peer sample based on the Fama French 10 Industries classification[26], which in turn is based on company SIC-codes[27]. To generate peer groups, we construct a search strategy in Orbis[28] based on the SIC-codes in each of the Fama French 10 Industries. In the search strategy we also include net sales. The search in Orbis is as follows:

- Publicly traded companies

[25] Datastream is a financial database provided by Thomson Reuters.
[26] The Fama French 10 industry classification classifies companies into the following industries based on SIC codes: I) Consumer Non-Durables, II) Consumer Durables, III) Manufacturing, IV) Energy, V) Hi-Tech Business Equipment, VI) Telecom, VII) Shops, VIII) Healthcare, IX) Utilities, and X) Other (French, 2018).
[27] SIC is the Standard Industrial Classification System.
[28] Orbis is a Bureau van Dijk database with company information on over 280 million companies.

- Denmark, Norway, and Sweden
- Active companies

The companies in the peer sample must be publicly traded for us to access their financial statement items with Datastream and ensure a high degree of quality in the measurements of the items. To qualify as an observation in the final peer sample, companies must have net sales within the range of sales of our final SBO sample. We apply this size-matching strategy to ensure that the peer sample is somewhat comparable in size. An alternative strategy, applied by Bonini (2015), is to size match on target company level by assigning peers based on +/- 50% of target company sales. For the purpose of this thesis, this strategy would not be optimal, as the geographical scope limits the number of peers within +/- 50% net sales.

We are aware that our approach creates a survivorship bias in the peer groups. However, the same can be said for the primary sample on PBO targets, as mentioned earlier.

Another possible source of bias in the peers is prior PE ownership. We have not controlled the list of companies from Orbis for prior PE ownership. However, we have ensured that no observations in the SBO sample is present in the peer sample. This implies that we might have peers that have been exposed to the same exogenous chock we are trying to analyze

The peer groups can be seen in Appendix D.

7.2. Descriptive statistics

The final SBO sample consists of 73 observations. The distribution of sample transaction years is shown in Figure 7.

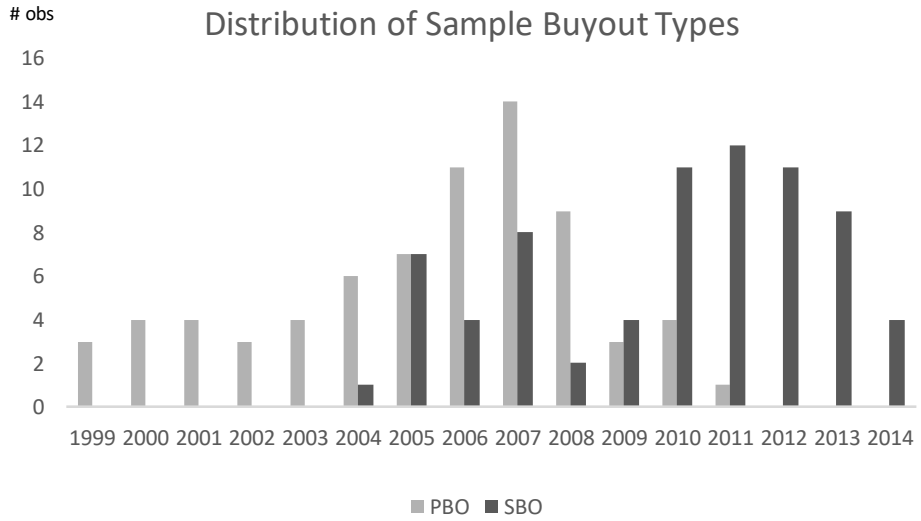


Figure 7: Yearly distribution by buyout type. Source: Authors. Data: Mergermarket.

The first PBO in our sample takes place in 1999 and the first SBO in 2004, while the last PBO is from 2011. We also note that the high level of activity in the PE market immediately prior to the financial crisis is evident in sample. We also note that the majority of our SBOs are from the post-financial crisis years. We discuss the implications of the financial crisis later in the thesis.

Some characteristics of the observations in our data set are presented in Table 4 below. In Panel A, we note that our sample is weighted towards the Swedish PE market, and that the identifier Private is attributed to over half of the sample. In Panel B, we note that the slightly less than half of the SBOs were made by companies identified as Large (42 of 73 observations), whereas funds identified as Large only engaged in 13 of 73 PBOs. A speculative interpretation could be that non-large funds grow the target companies in the PBOs, and large funds take over after the target company has grown into a more suitable investment object for the large fund. Buy pressure is identically distributed on both rounds, with 10 of 73 transactions being conducted by funds under pressure. Additionally, we note that funds on average are approximately 0,5 years older when they do an SBO than when they do a PBO.

Panel A

	Observations	Private	Corporate	Listed
Sweden	40	22	17	1
Denmark	20	9	7	4
Norway	13	7	5	1
Total	73	38	29	6

Panel B

	Large	Buy pressure	Sell pressure	Average fund age at acquisition (yrs)
PBO	13	10	9	1,96
SBO	29	10	n.a.	2,44
Total	42	20	9	n.m.

Table 4: SBO sample characteristics.

Table 5 shows the distribution of sample and peer group observations categorized by the Fama French 10 Industries classification. We notice that our sample is weighted towards manufacturing (18 of 73) and high-tech (15 of 73). We don't know if this distribution is representative of the overall population of companies in the Nordics, but we find no intuitively alarming biases in the sample distribution. Note that while it may seem like an option to compare the distribution of our sample to the distribution of the peer sample, we also do not know if the peer sample is distributed in a representative fashion. That being said, we find both samples weighted towards the same industries.

Fama French Inudstry	Sample observations	Peer group observations
1 - Non-Durables	4	27
2 - Durables	4	14
3 - Manufacturing	18	53
4 - Energy	3	16
5 - Hi-Tech	15	51
7 - Shops	11	17
8 - Health	5	31
10 - Other	13	59
Total	**73**	**268**

Table 5: SBO sample and peer sample distribution by Fama French 10 Industries classification.

Figure 8 below presents the yearly distribution of funds in our data. We notice that the distribution of fund vintages seems correlated with Figure 5 and Figure 7 implying that more funds are raised in highly active years, and vice versa. Note that four evergreen-funds are not included in the graph, due to the open-ended nature of these funds. A list of funds with their respective characteristics can be found in Appendix C.

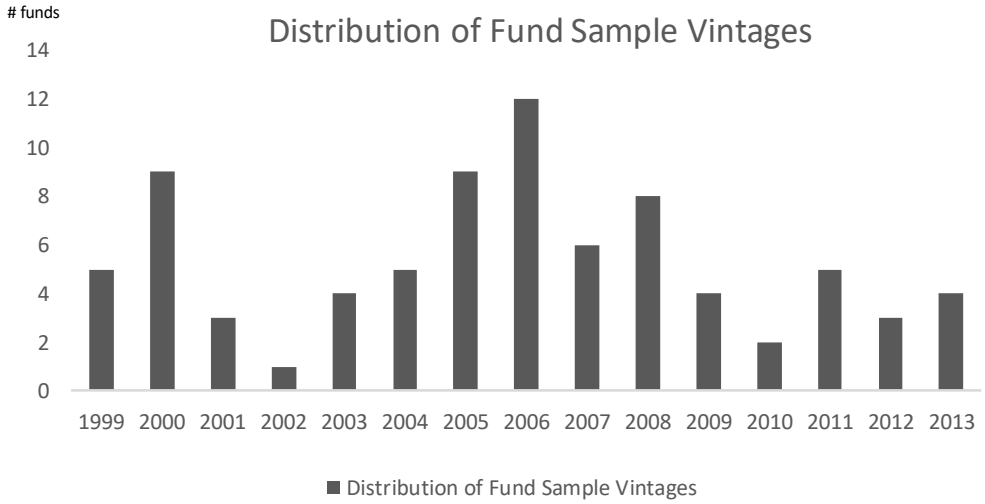


Figure 8: Distribution of fund sample vintages.

Table 6, shown below, lists statistic properties of the funds present in our sample. As mentioned in the methodology, we categorize a fund as *Large* if it is in the (approximate) top quartile of our distribution of fund sizes, corresponding to EUR 1,5bn. We categorize a fund as *Small* if it is in the (approximate) bottom quartile of the distribution, corresponding to EUR 250m. Funds between EUR 250m and EUR 1,5bn are categorized as *Medium*. Note that the median fund size is relatively small, implying that the data is skewed by a few large funds. In Panel B, we have manually categorized four evergreen-funds on the base of our research of deal sizes. Consequently, the total number of funds here exceeds the number of funds graphically represented in Figure 8.

Panel A		**Panel B**	
	Fund size (EURm)	**Size category**	**Number of funds**
Min	24	Small	25
Median	403	Medium	36
Max	10.750	Large	23
		Total	84

Table 6: Fund characteristics.

8. Results and analysis

In the following section, we present and analyze the data collected on operational performance.

Firstly, we dedicate a section to the presentation of each output. This section, found immediately below this introduction, describes the output on the following pages.

Secondarily, we discuss the advantages and disadvantages of using means instead of median measures. The basis for this discussion is the first two outputs, Table 7 and Table 8.

Thirdly, we discuss the "dark side" of our data. As mentioned in the methodology, we use abnormal measures of operating performance in these analyses. To present the reader with a true and fair view of the data that makes up the abnormal measures, we present the abnormal measures decomposed into targets and peers. This demonstrates the mechanics and implications of the abnormal measure-based methodology.

Lastly, we conduct the analyses forming the basis for answering the hypotheses in this thesis.

Presentation of outputs

Table 7 shows the Yearly Median $AOP(x)$ in Panel A and Median $\Delta AOP(x)ME_{SBO}$ in Panel B for the full sample. Due to this being a table on the full sample, the significance levels shown are from the statistical tests on the full sample. The statistical tests conducted are the Student's t-test, denoted by t1-t10, and the Wilcoxon signed-rank test, denoted by w1-10. The number after the identifier t or w indicates the significance level. For the details pertaining each calculation and statistical significance test, we refer to the methodology section.

Table 8 shows the Yearly Mean $AOP(x)$ in Panel A and Mean $\Delta AOP(x)ME_{SBO}$ in Panel B for the trimmed sample. The process of removing outliers has been described in the methodology. As this table shows the trimmed sample, the significance levels shown are from the statistical tests on the trimmed sample. The same tests are conducted for this table as for Table 7.

Figure 9 shows the graphs of Median Peer x and Mean SBO Target x, which are the components that go into the abnormal measures presented in Table 8. We use these graphs to illustrate the partial effect of the peer group on the abnormal measures.

Appendix E shows the graphs of Yearly Mean $AOP(x)$ categorized by Fama French 10 industry classification using the full sample. We use these graphs to identify possible outlier industries. It is evident from the graphs that the *Energy* industry is a large outlier. This may be due to the small number of observations in this industry (see Table 5), but mostly, we believe this is due to the high-variance nature of the oil and gas industry. Note that while we do not trim the sample for outlier industries, we believe that there is merit to showing this potential bias in the data. The process of winsorizing the sample partially solves this issue for the most extreme outliers.

Table 7: Yearly Median AOP(x) for full sample

Formulae used in Panel A: (2) and (9), modified for medians
Formulae used in Panel B: (6) and (11) , modified for medians

*Winsorized on the smallest and largest observations
**Calculated as CAGRs relative to PBO-1 and SBO-1, respectively

	Yearly median AOP(x)* Panel A						Difference in median AOP(x) ME Panel B	
KPI	**PBO**	**PBO**	**PBO**	**SBO**	**SBO**	**SBO**	**SBO - PBO**	**SBO - PBO**
x	**-1**	**+1**	**+2**	**-1**	**+1**	**+2**	**(-1 ; +1)**	**(-1 ; +2)**
		t5, w1	t1, w1	t1, w1	t1, w1	t1, w1		*t10,w5*
EBITDA/Sales	0,02%	3,53%	4,25%	5,31%	3,62%	3,26%	-2,28%	-2,71%
n	*73*	*73*	*65*	*73*	*73*	*71*	*73*	*63*
	t5, w10	t5, w1	t1, w1	t1, w1	w5		t10	w5
EBIT/Sales	1,12%	2,75%	1,75%	5,17%	2,21%	-0,25%	-1,49%	-2,63%
n	*73*	*73*	*65*	*73*	*73*	*71*	*73*	*62*
		t1, w1	t1, w1		t5, w5	t1, w5	t1,w5	t1, w1
EBITDA Growth**	n.a.	21,67%	33,52%	n.a.	7,88%	10,19%	-16,25%	-23,00%
n		*70*	*62*		*71*	*68*	*68*	*59*
		t1, w1	t1, w1		t1, w1	t1, w1	t5,w1	t5,w1
Sales Growth**	n.a.	15,57%	13,39%	n.a.	4,18%	6,15%	-9,83%	-6,56%
n		*73*	*65*		*73*	*71*	*73*	*63*
	t10,w5	t1, w1	t5, w1	t10, w5	t1, w1	t1, w1		w10
NIBD/EBITDA	-0,69x	1,05x	0,96x	0,77x	2,76x	3,25x	0,01x	1,37x
n	69	*70*	*63*	*70*	*70*	*68*	*69*	*60*
	t1,w1	t5	t1, w1	t1, w1	t5	t10	t5,w1	t5,w1
EBITDA/Fixed Assets	25,58%	2,28%	5,84%	10,66%	-1,97%	-2,88%	13,24%	13,14%
n	69	*70*	*63*	*70*	*70*	*68*	*69*	*60*
	w1	t5, w1	t1, w1	t1, w1	w1	t10, w1		
NWC as % of Sales	-6,84%	-7,77%	-9,52%	-7,86%	-7,21%	-5,49%	-1,93%	0,00%
n	69	*70*	*63*	*70*	*70*	*68*	*69*	*60*
	t1, w1	t1, w1	t1, w1	t1, w1	t5		t10	
ROIC	10,08%	2,14%	3,62%	6,09%	0,03%	-1,94%	0,98%	0,85%
n	*67*	*70*	*62*	*70*	*70*	*68*	*67*	*58*
	t5	t1, w1	t1, w1	t1, w1	t1, w1	t1, w1	t5,w5	t5,w10
NIBD/Fixed Assets	0,02x	0,32x	0,42x	0,35x	0,36x	0,45x	-0,19x	-0,15x
n	*69*	*70*	*63*	*70*	*70*	*68*	*69*	*60*

Table 8: Yearly Mean AOP(x) for trimmed sample

Formulae used in Panel A: (2) and (9)
Formulae used in Panel B: (6) and (11)

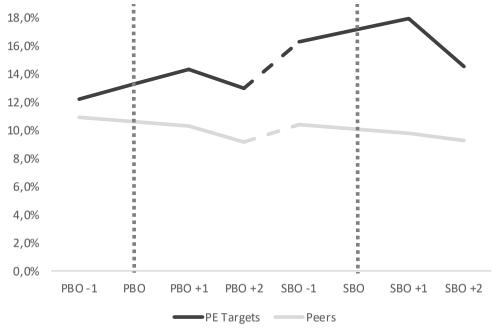
*Winsorized on the smallest and largest observations
**Calculated as CAGRs relative to PBO-1 and SBO-1, respectively

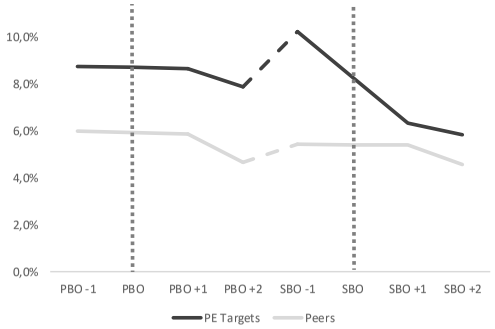
	Yearly Mean AOP(x)* Panel A						Difference in mean AOP(x) ME Panel B	
KPI	**PBO**	**PBO**	**PBO**	**SBO**	**SBO**	**SBO**	**SBO - PBO**	**SBO - PBO**
x	**-1**	**+1**	**+2**	**-1**	**+1**	**+2**	**(-1 ; +1)**	**(-1 ; +2)**
		t5, w1	t1, w1	t1, w1	t1, w1	t1, w1	t10,w10	t5,w5
EBITDA/Sales	1,52%	3,90%	4,44%	5,94%	5,73%	5,55%	-2,41%	-3,27%
n	*73*	*73*	*65*	*73*	*73*	*71*	*69*	*62*
	t5, w10	t5, w1	t1, w1	t1, w1	w5		t10	t5,w5
EBIT/Sales	2,53%	3,25%	3,39%	5,82%	1,37%	1,51%	-2,82%	-3,11%
n	*73*	*73*	*65*	*73*	*73*	*71*	*70*	*58*
		t1, w1	t1, w1		t5, w5	t1, w5	t5,w5	t1, w1
EBITDA Growth**	n.a.	35,78%	52,00%	n.a.	11,40%	15,35%	-16,00%	-35,86%
n		*70*	*62*		*71*	*68*	*63*	*59*
		t1, w1	t1, w1		t1, w1	t1, w1	t1,w1	t1,w1
Sales Growth**	n.a.	19,94%	16,42%	n.a.	10,10%	11,09%	-14,92%	-8,26%
n		*73*	*65*		*73*	*71*	*70*	*59*
	w10	t1, w1	t5, w1	t10, w5	t1, w1	t1, w1		t5,w1
NIBD/EBITDA	-0,37x	1,61x	1,21x	0,96x	3,54x	4,64x	0,25x	1,65x
n	*66*	*70*	*63*	*70*	*70*	*68*	*63*	*55*
	t1, w1	t5	t1, w1	t1, w1	t5	t10		t10
EBITDA/Fixed Assets	27,63%	8,24%	11,63%	18,75%	15,01%	12,41%	11,72%	26,25%
n	*60*	*70*	*63*	*70*	*70*	*68*	*59*	*54*
	w1	t5, w1	t1, w1	t1, w1	w1	t10, w1		
NWC as % of Sales	-9,77%	-10,62%	-14,44%	-13,36%	-6,60%	-8,74%	0,03%	1,30%
n	*69*	*70*	*63*	*70*	*70*	*68*	*64*	*54*
	t1, w1	t1, w1	t1, w1	t1, w1	t5			
ROIC	9,50%	4,93%	5,57%	9,52%	4,10%	2,96%	2,43%	9,84%
n	*60*	*70*	*62*	*70*	*70*	*68*	*59*	*58*
		t1, w1	t1, w1	t1, w1	t1, w1	t1, w1		
NIBD/Fixed Assets	0,15x	0,39x	0,41x	0,36x	0,44x	0,50x	-0,14x	-0,23x
n	*61*	*70*	*63*	*70*	*70*	*68*	*60*	*55*

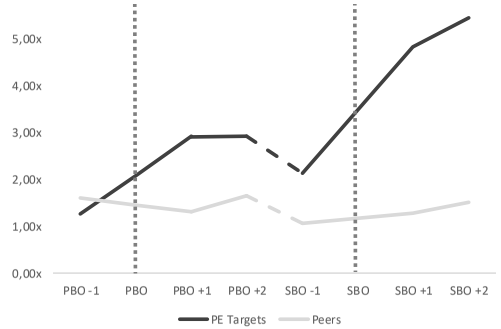
Figure 9: Median Peer and Mean SBO Target by KPIs

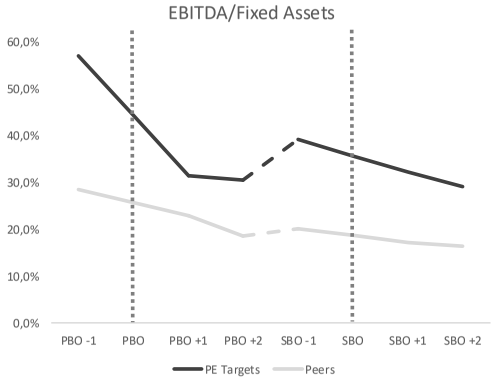
Graphical representation of mean target company and median peer group operating performance on six of the KPIs on full sample

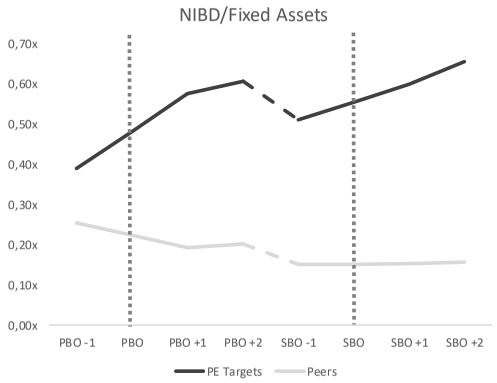
NWC/Sales is shown in the analysis

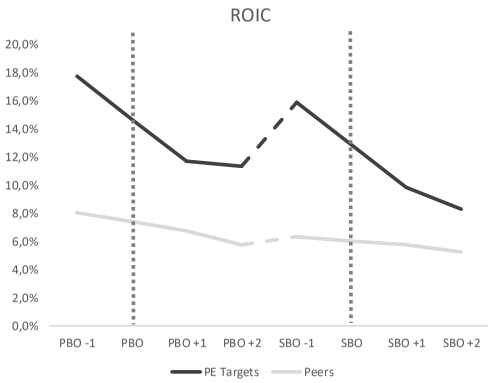












The impact of trimming the sample and choosing means over median measures

Our findings on $AOP(x)$ and $\Delta AOP(x)$ ME are presented in Panel A in Table 7 and Table 8.

The important difference to notice between the full and trimmed samples is the changes in the significance levels of the statistical tests. The Wilcoxon signed-rank test significance levels, denoted by w in the tables, is largely unchanged from trimming the sample of outliers. The significance levels for Student's t-test is however impacted, as this is a test of the means, which are highly sensitive to extreme outliers. It is for this exact reason that Barber & Lyon (1996) suggest using the median values.

There are some differences between the reported measures on means and medians, the largest being found in the Fixed Asset-based measures (EBITDA/Fixed Assets, NIBD/Fixed Assets, and ROIC), which are heavily skewed by outliers. However, the overall story on the operating performance of SBOs relative to PBOs is largely the same for the full sample and the trimmed sample, as seen in the significance levels and reported measures in Panel B of each table.

While using the median values on the full sample for the following analyses does have merit due to the robustness to outliers, we intend to analyze the mean values in the analyses. The argument for doing so is related to the regression analyses we perform later, which have outliers removed. To ensure consistency, we consequently analyze the trimmed sample in our event study analyses, which later forms the basis for the driver study.

Finally, we note that there is no consensus in the academic literature: some favor the use of means, e.g. Bonini (2015), whereas others favor the use of medians, e.g. Wang (2012) and Jenkinson and Sousa (2013) and (2015).

Consequently, the following analyses on the operating performance of SBOs are based on Table 8.

Decomposing the abnormal measure: target companies and peers

Firstly, we notice that the operating performance of peers are relatively level throughout the horizon on all reported measures. This indicates robustness in our peer groups, as there are no alarming systematic developments in the operating performance of our peer groups (a little

systematic development is to be expected, and likely affects both peers and sample). Not shown in the graphical output is NWC/Sales, which we analyze later.

The difference between the graphs for peers and PE target companies at any point is the mean $AOP(x)$ shown in the Table 8. Any discrepancies between the reported measures on Table 8 and Figure 9 is due to one of two reasons: I) the full sample basis of Figure 9, or II) the winsorization of Figure 9 being on target-level, i.e. x_i, whereas Table 8 is winsorized on $AOP(x)_i$ level.

8.1. Analysis of abnormal operating performance in SBOs: Event studies

The balance sheet figures in PBO-1 have been trimmed for observations compared to PBO+1 and PBO+2. This is due to two factors: I) either the trimmed observations were spin-offs in the first round from larger groups where we were unable to find unconsolidated balance sheets, or II) they were alarming outliers pre-PBO.

Panel B in Table 8 shows the difference between SBO and PBO mean abnormal margin or multiple expansion for all operating measures, trimmed for outliers with at least three standard deviations from the mean. This is a change measure in absolute terms. The measures are significance tested in the same manner as Panel A measures.

Also notice that a number of observations seem omitted in the large horizon (-1;+2) when comparing to the small horizon (-1;+1). This is no mistake: for these observations, PBO+2 is identical to the year of the SBO transaction. Following our methodology of removing the fiscal year of each transaction, these observations are removed from the sample.

Indication of PE firm selection bias

A point of critique to the event study methodology applied on post-buyout operating performance changes is whether post-buyout changes are causally related to the operational changes initiated by the PE firm, or if there are significant unobservable endogenous factors. Based on abnormal operating performance data, we cannot say with certainty that changes in operational performance stem from PE firms' operational improvement initiatives or from PE firms' ability to select target firms based on operational performance trajectories (Bernstein & Sheen, 2016). Causal relationship between PE initiatives and changes in operational performance require a detailed company-level of analysis with less endogenous performance proxy variables, e.g. health violation changes in PE

owned restaurant chains as used in Bernstein & Sheen (2016). Such a level of analysis is out of the scope for our study.

For our analysis, this discussion on endogeneity of operational performance changes following buyout events is relevant, but not critically important, as we are comparing operational performance between ownership rounds in the same target company. Any endogeneity in the first round resulting from PE firm selection bias can reasonably be assumed to exist in the second round, which should to some extent control for this potentially endogenous factor.

As an indicator of PE target selection bias, we have calculated abnormal operational performance levels in pre-PBO states. In Panel A, the PE firm selection bias is evident by the pre-PBO abnormal performance levels. We see that the mean abnormal EBITDA margin in PBO-1 is 1,52%. While not statistically significant in our sample, it could be in larger samples, as this measure is closely related to EBIT margin, where the indicator in PBO-1 is 2,53% and statistically significant on 5% and 10% levels for t-test and Wilcoxon signed-rank test respectively. This indicates that PE firms selects target firms that already have achieved abnormal operating performance levels. We find further support for PE selection bias in the profitability measure EBITDA/Fixed Assets, which shows statistically significant abnormal performance in PBO-1. For our debt measures, we find only one indicator of PE selection bias in abnormal NIBD/EBITDA, which has a mean value of -0,37x in PBO-1, barely statistically significant on 10% level for the Wilcoxon signed-rank test.

Based on our data, it is impossible to quantify how much of the operational performance increases over each window that can be attributed to PE selection bias relative to PE firm initiatives.

The overall assessment of our data is that we find some indicators of PE selection bias in pre-PBO states of target firms. Although the indicators are not statistically significant across all KPIs, the implication is that a company- or industry-specific choice of proxy variables to operational improvements could extract better estimates on operational performance changes attributable to PE initiatives. Such a detailed level of analysis is out of the scope for a cross-sector analysis due to time constraints and difficulties in establishing proxies that allow inference on the variables we analyze. We still believe that our results from comparing the two rounds should yield useful information.

EBITDA/Sales

In our data, abnormal EBITDA margin increase from 1,52% to 4,44% over the PBO window and decrease from 5,93% to 5,55% during the SBO window. The difference in abnormal margin expansions, when controlling for outliers, is a statistically significant difference of -3,27% abnormal operating performance between the two largest buyout event windows, seen in Panel B.

Our results support the findings of the academic literature, where EBITDA margin changes are generally found to be smaller in the SBO than the PBO (Wang, 2012) or even reverting towards industry levels (Bonini, 2015). This is an extremely important measure for PE firms, as deals are valued on multiples of EBITDA in practice (Achleitner, Figge, & Lutz, 2014b; Bergström, Grubb, & Jonsson, 2007). The decrease in expansion margin between the two rounds, and the flattening in the level of the absolute EBITDA margin in the second round could be an indicator that value creation through operational profitability increases is not the main motivation behind SBOs. This could be caused by the first PE firm capturing most or all the operational profitability increases available.

Based on the data from Panel B in Table 8, we find evidence that SBOs exhibit lower abnormal EBITDA margin expansions compared to PBOs.

EBIT/Sales

Changes in abnormal EBIT margin levels in our sample shows the lackluster performance of SBO operating profitability clearly. For the first buyout round, the margin expands from 2,53% in PBO-1 to 3.39% in PBO+1, seen in Panel A, whereas abnormal EBIT margin decrease from 5,82% to insignificant levels over the second round. From Panel B, we see that the difference in abnormal EBIT margin expansion in the large SBO window is 3,11% lower than the large PBO window.

We find it noteworthy that while abnormal EBITDA margin remain significantly different from peers over each round, EBIT margin completely loose significance over the second round. We can deduce that abnormal depreciations and amortizations account for much of the abnormal EBITDA margin level in post-secondary buyout years, as abnormal EBIT margin is not significantly different from peers whereas abnormal EBITDA margin is. This eliminates the possibility that abnormal EBITDA is caused by abnormal EBIT.

The convergence to industry levels of EBIT margin in our sample supports the findings of Bonini (2015). This convergence could be another indicator that value creation through operating profitability increases is not the main motivation behind SBOs.

Based on the data from Panel B in Table 8, we find evidence that SBOs exhibit lower abnormal EBIT margin expansions compared to PBOs.

EBITDA Growth

As seen in Panel A in Table 8, abnormal EBITDA Growth[29] is large, positive, and statistically significant for both ownership rounds. The negative abnormal difference seen in Panel B implies that SBOs achieve lower abnormal EBITDA growth rates than PBOs. A high EBITDA CAGR during the PBO is per se not surprising since both organic and inorganic EBITDA growth often is a main objective for a PE fund. However, CAGRs of 50% seems very high, and we believe that a significant portion of that growth is acquisitive. Our data does not allow us to distinguish between organic and inorganic growth. Inorganic growth strategies are a common tool used by PE funds to consolidate fragmented markets, and recent research suggests that secondary PE funds often continue an inorganic growth strategy if such a strategy was pursued by the previous PE owner (Hammer, Knauer, Pflücke, & Schwetzler, 2017). This perhaps explains how the secondary PE funds can generate more than ten percent abnormal EBITDA CAGRs.

Based on Panel B in Table 8, our data suggests that that SBOs exhibit lower abnormal EBITDA Growth rates than PBOs.

Sales Growth

The developments in abnormal sales CAGR[1] tells a similar story as the EBITDA growth with significant two-digit CAGRs in both the primary and secondary round. Furthermore, the second round shows lower abnormal sales CAGRs than the primary round, implying that SBOs exhibit lower abnormal sales growth than PBOs. These results correspond with findings in the literature, e.g. Wang (2012). As mentioned in the EBITDA growth section above, the high growth rates stem from both organic and inorganic growth strategies, but our data does not allow us to distinguish between the partial

[29] Calculated as PE target's compounded annual growth rate relative to PBO-1 for PBO+1 and PBO+2, and relative to SBO-1 for SBO+1 and SBO+2, less the corresponding figures for the peer group.

effect of each strategy. Even though we suggest that SBO sponsors do not experience the same high abnormal growth as PBO sponsors, previous sales growth can contribute positive to profitability in the SBO, as larger companies, ceteris paribus, can utilize economies of scale better.

When analyzing both EBITDA Growth and Sales Growth, it is important to keep in mind that some companies in our sample are relatively small compared to their listed peers, which can cause an upwards bias in the abnormal percentage growth rates.

Based on Panel B in Table 8, we find that SBOs exhibit lower abnormal Sales Growth rates compared to PBOs.

NIBD/EBITDA

When analyzing the NIBD/EBITDA multiple, it is important to stress that we are looking at abnormal figures, i.e. the average NIBD/EBITDA multiples of PE targets less the corresponding median multiple for the peer groups. For instance, the -0,37x figure in PBO-1 does not imply that target company firms have net cash, rather, it implies that target firms on average have 0,37x lower NIBD/EBITDA multiples compared to their peers.

Our data suggests that the targets on average have lower debt than their listed peers in PBO -1, however, this finding is only significant on a 10% level in the Wilcoxon signed-rank test. This is a very weak indicator of PE selection bias, i.e. that PBO funds choose to invest in companies with less debt since they see increase in leverage as a possible value creation tool. However, the negative abnormal debt multiple in PBO-1 could also be a result of non-listed companies in general have lower debt than its listed peers. Furthermore, our findings on the development in the NIBD/EBITDA multiple is very consistent with the PE business model – the debt multiple increases significantly post-PBO, and the PBO fund subsequently repays debt to generate equity returns. The pattern repeats when the SBO fund acquires the target. However, SBO funds use even more leverage than PBO funds, which manifests in the increase from a 0,96x abnormal NIBD/EBITDA multiple in SBO-1 to 4,64x in SBO+2, compared to the increase from -0,37x in PBO-1 to 1,21x in PBO+2.

Table 8 shows the average target company debt multiple in the different years, i.e. these figures are not abnormal. Here we can clearly see how much debt the targets on average take on in the different years across the two rounds.

KPI	PBO	PBO	PBO	SBO	SBO	SBO
	-1	+1	+2	-1	+1	+2
Average PE target **NIBD / EBITDA**	0,79x	2,81x	2,93x	1,68x	4,90x	5,39x

Figure 10: Average PE target NIBD/EBITDA. Winsorized at the highest and lowest observation.

As presented in Panel B in Table 8, SBOs take on 1,65x higher abnormal NIBD/EBITDA multiples when compared to PBOs over the large event window. Our results are in line with the findings of Achleitner & Figge (2014a), who concludes that secondary buyouts obtain 28-30% more leverage than primary buyouts. Note that our measures are not directly comparable to those of Achleitner & Figge (2014a) due to difference in methodology.

EBITDA/Fixed Assets

As seen in Panel B, SBOs in our sample outperform the PBO by 26,25% in abnormal EBITDA/Fixed Assets margin expansion, although barely significant. If neither EBITDA or Fixed Assets are subject to bias due to methodology, this finding implies that abnormal EBITDA growth is higher than abnormal growth in Fixed Assets during the SBO, indicating that the Fixed Asset base is more profitably utilized in the SBO window than the PBO window. Considering our findings on the other operational profitability measures EBITDA margin and EBIT margin, this result is surprising. However, our findings are in line with Wang (2012), who finds the same patterns of lower abnormal EBITDA margin and EBIT margin changes paired with higher abnormal EBITDA/Fixed Assets changes.

We believe that a possible explanation for our result is that Fixed Assets increase relatively more during the PBO compared to pre-buyout levels than in SBO rounds. As we have already accounted for the lower abnormal EBITDA growth in the SBO rounds relative to PBO rounds, we know that SBO rounds can only outperform PBO rounds on abnormal EBITDA/Fixed Assets margin expansion if the increase in abnormal Fixed Assets is relatively much higher in PBO rounds. In short, this implies that PBOs increase the fixed asset base relatively more benchmarked against the pre-buyout level than SBOs.

Interestingly, the abnormal EBITDA/Fixed Assets margin is higher in SBO-1 than in the post-SBO years. This indicates that the PE firm in the first round improves profitability to higher abnormal levels during their ownership. As the secondary PE firm takes over, goodwill is recognized in Fixed

Assets, and the margin expansion of the SBO round becomes negative, going from 18,75% in SBO-1 to 12,41% in SBO+2. SBOs still outperform PBOs, however, since the comparable absolute margin expansion for the PBO is lower, going from 27,63% in PBO-1 to 11,63% in PBO+2.

The barely significant 26,25% difference in absolute margin expansions seem misleading here, because the developments outlined above suggest that it should be roughly 12%, which is closer aligned to the smaller window in Panel B. The explanation can be found in the changes in outliers (particularly in terms of Fixed Assets) from yearly measures and expansion measures: some large observations (i.e. low Fixed Assets) are outliers on a yearly level, but not in expansion measures. Additionally, a lot of observations are dropped from the large event windows (-1;+2) due to PBO+2 being the year of the secondary buyout, which means our model drops them as observations[30]. These observations have higher values of abnormal EBITDA/Fixed Assets (consistent with shorter timespan to realize increases in Fixed Assets), which skews our difference in abnormal margin expansion measure.

Based on Panel B in Table 8 and the issues discussed above we find very weak evidence that SBOs exhibit higher abnormal EBITDA/Fixed Assets margin expansions compared to PBOs. Interestingly, this is contrary to our hypothesis, but in line with results from academic literature (Wang, 2012).

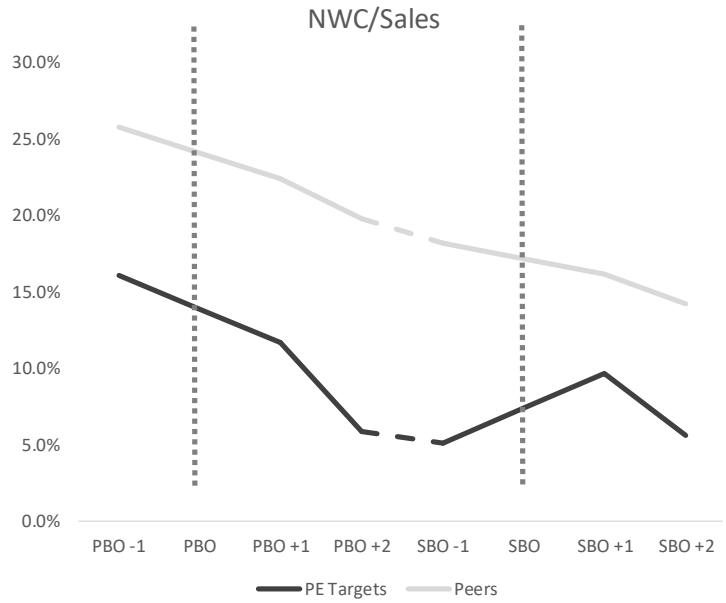
NWC as Percentage of Sales

NWC as percentage of sales is used as a measure of improvements in operational efficiency under the two rounds of private equity ownership. Looking at Panel A in Table 8, abnormal NWC as percentage of sales is negative 9,77% in PBO -1, implying that the PE targets on average demonstrate lower NWC as percentage of sales than its peers. This is possibly an indicator of the previously mentioned PE selection bias. If non-listed companies on average exhibit lower NWC as percentage of sales than listed companies in the same industries, it can also be explained as a cause of our sample selection.

Baker and Wruck (1989) find that the improvements in NWC as percentage of sales is often realized as a one-time improvement during the first two years of PE ownership, which is supported by our findings. Panel A in Table 8 shows that the abnormal NWC as percentage of sales decreases from -

[30] Note that the holding period still exceeds 18 months for both rounds, as outlined in our search criteria.

9,77% to -14,44% between PBO-1 and PBO+2, whereas the corresponding development during the SBO is -13,36% to -8,74%. Figure 11 below clarifies the development by showing the non-abnormal PE target company NWC as percentage of sales over the horizon of analysis. From the table, we see that the measure is improved during the first two years of the PBO and stays close to this level with a bump in SBO+1. However, as shown by Panel B in Table 8, the difference in improvements of abnormal NWC as percentage of sales is not statistically significant between PBO and SBO rounds. Due to this lack of significance on the abnormal expansion measure, we find no evidence of SBOs exhibiting lower improvements in abnormal NWC as percentage of sales than PBOs.



KPI	PBO -1	PBO +1	PBO +2	SBO -1	SBO +1	SBO +2
Average PE target **NWC as % of Sales**	16,10%	11,64%	5,89%	5,06%	9,66%	5,58%

Figure 11: Average PE target NWC/Sales. Winsorized at the highest and lowest observation.

It is important to stress that we have used a simplified definition of NWC which may cause a bias in our data. Nonetheless, we assess that the definition may still provide insight on operational improvements between rounds, despite the flaw of its simplicity and lack of precision.

ROIC

In PBO-1, we again see an indicator of PE selection bias, as the target company sample has a 9,50% abnormal ROIC. Due to our recognition of goodwill as part of Fixed Assets, it is unsurprising that subsequent buyout events show a large decrease in abnormal ROIC as goodwill inflates the asset base. Following the amortizations of the goodwill and increase in EBIT during the first round, abnormal ROIC increases until SBO-1, where it returns to pre-PBO levels. After the secondary buyout, goodwill again affects the abnormal ROIC downwards. Coupled with the decrease in abnormal EBIT margin, the ROIC reaches the point of statistical insignificance relative to peers in SBO+2.

ROIC, like EBITDA/Fixed Assets, is influenced by outliers on Fixed Assets. Consequently, the difference in abnormal margin expansions between rounds again seems misleading, as explained in the analysis of findings on EBITDA/Fixed Assets. Furthermore, none of the measures in Panel B are significant, indicating that we can't show a significant difference between the SBO and PBO operating profitability in our sample on this operational measure.

Unlike the difference in abnormal margin expansions, the yearly abnormal ROIC is significantly different from peers in all years except SBO+2. The implication here is that ROIC for SBO years seems to converge towards industry means, whereas the target sample retains abnormal performance during the PBO round.

Based on the data from Panel B in Table 8, we find no evidence that SBOs exhibit lower abnormal ROIC margin expansions compared to PBOs.

NIBD/Fixed Assets

As a second operating measure on leverage levels, we include abnormal NIBD/Fixed Assets multiples. In PBO -1 we find no statistical significance on the measure. The weak indicator of PE selection bias found on our other leverage measure, NIBD/EBITDA, is complemented by this finding. Based on these two measures, we are not convinced that PE selection bias exists on leverage measures.

In assessing the development in the leverage measure from PBO-1 to PBO+2 and SBO-1 to SBO+2, we stress the implications of our recognition of goodwill as part of the fixed asset base, which leads

to a large downward bias in the leverage measure as a whole. However, even if the goodwill bias affects the measure downwards, we can still see similar tendencies as in the development of NIBD/EBITDA. However, there is no statistical significance in the difference between abnormal multiple expansion between SBOs and PBOs.

We find no indication that SBOs exhibit larger abnormal multiple expansion in NIBD/Fixed Assets than PBOs.

8.2. Analysis of abnormal operating performance in SBOs: Driver study

In the previous analysis, we analyzed operating performance in SBOs relative to PBOs. To substantiate on the analysis, we now test the hypotheses on drivers of operating performance outlined in the section hypothesis development. In the methodology section, we outlined the procedure of analyzing the drivers of operational performance.

Below, we present the results of the analysis. We interpret and analyze parameter estimates for each model specification. For an exhaustive list of specifications, see Appendix A. The parameter estimates quantify the partial effects of the proxies to the hypothesized drivers of operating performance over each buyout round on the leverage and profitability performance measures NIBD/EBITDA and EBITDA margin.

The figures for each model show R^2-values[31], the F-test statistic[32], the response variable Y, the parameter estimates for explanatory variables across all specifications, and the intercept. Parameter estimates are supplemented by notation of standard deviations in parenthesis and significance levels 10%, 5% or 1% represented by *, ** or *** respectively. Finally, each explanatory variable is supplemented by sign expectation, based on our hypotheses.

Models A and B show EBITDA margin expansion over the PBO and SBO horizon, respectively, while Model C and D show NIBD/EBITDA multiple expansion over the PBO and SBO horizon, respectively. Although we are predominantly interested in the results on the SBO horizon, the PBO models supplement the analyses on the SBO by providing a basis of comparison between each round.

[31] Indicating the amount of variability explained by the model.
[32] Indicates the probability that the null hypothesis is true, i.e. that all regression parameter estimates are 0.

Multiple regression analysis: Model A

Model A

Y = EBITDA ME PBO (-1;+2)	Expected sign	(1)	(2)	(3)
Intercept		0,0230*	0,0195*	0,0236*
		(0,0123)	(0,0090)	(0,0119)
EBITDA Margin PBO-1	-	-0,2440***	-0,2468***	-0,2606***
		(0,0738)	(0,0730)	(0,0723)
Large PBO Fund Size	+	0,0337*	0,0344*	0,0265
		(0,0194)	(0,0192)	(0,0192)
Buy pressure PBO	-	-0,0073	-0,0071	-0,0112
		(0,0226)	(0,0225)	(0,0221)
Private	+	-0,0064	-	-0,0064
		(0,0152)	-	(0,0148)
Large PBO Fund Size x Private	+	-	-	-0,0781**
		-	-	(0,0381)
R^2		22,49%	22,25%	27,82%
Adj. R^2		17,14%	18,30%	21,49%
Observations		63	63	63
Prob > F		0,0047	0,0018	0,0019

Table 9. Multiple regression output for Model A, specifications (1)-(3).

In the first specification of Model A, shown above, we use target company pre-PBO EBITDA margin, size of PBO fund, buy pressure and pre-PBO owner category as explanatory variables for EBITDA margin expansion during PBO (-1;+2)[33]. See the methodology for elaboration on each explanatory variable.

The continuous variable EBITDA margin PBO-1 is used as an identifier of the low-hanging fruit effect. The parameter estimate for this variable is in line with our sign expectations and highly statistically significant across all specifications. The negative sign indicates that for every one additional unit of EBITDA margin PBO-1, the predicted value of the response variable EBITDA Margin Expansion PBO (-1;+2) decrease by the value of the parameter estimate. We interpret this as an indicator of the low-hanging fruit effect – the higher the abnormal EBITDA margin is prior to the event, the lower the margin expansion is over the first buyout round.

The dummy variable Large PBO Fund Size is expected to be positive, as we use PE fund size as a proxy to skills and past success (which in turn is a predictor of future performance, cf. literature

[33] We refrain from mentioning explanatory variables for subsequent models and specifications.

review). The sign of the parameter estimate is within expectation across all specifications, albeit at a weak significance level in the first two specifications, and insignificant in the third specification when interacted with Private pre-PBO ownership. This is a weak indication of large funds performing better in PBOs than non-large funds. If the effect is evident in the SBO round, there is support for our hypothesis on the implications of PE fund skill in operational performance improvements.

The interaction term surprisingly makes the partial effect of Large PBO Fund negative if the target company was privately held prior to the PBO. This is highly surprising to us, as we expected the partial effect of Large PBO Fund to be higher in that case. Also noteworthy is the fact that adding the interaction term in specification (3) makes the variable Large PBO Fund insignificant. The parameter estimates for the interaction term being significant implies that the partial effect of Large PBO Fund varies for different values of Private, i.e. the partial effect of Large PBO Fund and non-private is a predicted increase in EBITDA margin expansion of 0,0265, whereas the partial effect for Private and Large PBO Fund is 0,0265 - 0,0781 = -0,0516, i.e. -5,16% lower predicted EBITDA margin expansion value. The fact that the parameter estimate for Large PBO Fund is statistically insignificant in specification (3) means that we cannot say for sure whether the partial effect of this variable is different from 0 when we control for the interaction between Large PBO Fund and Private.

We control for the dry powder effect using the age of the PBO fund at the time of acquisition. The parameter estimate for our dry powder proxy is very low and statistically insignificant but has the expected sign. We find no indication that the dry powder effect has an effect on operational performance in the PBO.

We also control for the pre-PBO type of owner, namely private entities, based on the hypothesis that there could be correlation between ownership type and abnormal operational performance increases in the subsequent buyout rounds. The parameter estimate for this dummy is not significant, very low and has the wrong sign relative to our expectations. The implication of this with regards to our hypotheses is that we find no support for our hypothesis on the impact of pre-PBO ownership on abnormal operating performance increases in subsequent rounds.

We note that the hypothesized effect of pre-PBO owner type on abnormal operational improvements should, if it exists, be most pronounced during the PBO window, as we expect the effect to dilute over multiple PE sponsors. Therefore, since we cannot find evidence of the effect in

the PBO window, we conclude that we cannot find support for this hypothesis based on our data, and consequently discard the explanatory variable in the following SBO analyses.

Multiple regression analysis: Model B

Model B

Y = EBITDA ME SBO (-1;+2)	Expected sign	(1)	(2)
Intercept		-0,0086	-0,0097
		(0,0116)	(0,0116)
EBITDA Margin SBO-1	-	-0,2843***	-0,2794***
		(0,0695)	(0,0691)
Large SBO Fund Size	+	0,0225	0,0224
		(0,0159)	(0,0158)
Buy Pressure SBO	-	0,0511**	0,0530**
		(0,0228)	(0,0226)
Sell Pressure	+	-0,0152	-0,0162
		(0,0232)	(0,0230)
Large SBO Fund Size x EBITDA Margin	+	-	0,1914
		-	(0,1405)
R^2		27,51%	29,83%
Adj. R^2		22,42%	23,57%
Observations		62	62
Prob > F		0,0009	0,0011

Table 10. Multiple regression output for Model B, specifications (1)-(2).

Model B in Table 10 shows our parameter estimates for the model on SBO EBITDA margin expansion. We have added the interaction term between Large SBO Fund Size and EBITDA Margin SBO-1 to control for a change in the partial effect of EBITDA Margin SBO-1 units on the response variable when the SBO fund is large. To illustrate, the partial effect of an extra unit of EBITDA Margin SBO-1 in specification (1) is -0,2843. In specification (2), the partial effect of an extra unit of EBITDA Margin SBO-1 for observations not bought by a large SBO fund is -0,2794. However, the partial effect changes when the acquiring SBO fund is large – in that case, the partial effect of a unit of EBITDA Margin SBO-1 is -0,2794 + 0,1914 = -0,880. To summarize, the partial effect in specification (2) of an extra unit of EBITDA Margin SBO-1 on the predicted value of EBITDA Margin Expansion SBO (-1;+2) changes depending on whether the SBO fund is large or not.

The inclusion of the interaction term adds explanatory power with regards to our hypothesis that skilled SBO PE firms are capable of additional abnormal operational profitability increases, which theoretically should alter the partial effect of EBITDA Margin SBO-1 for different values of Large SBO

Fund on the response variable. In our model, the interaction term is not significant, implying that the effect of EBITDA Margin SBO-1 on the response variable does not change if the SBO fund is large.

Our estimated model shows very significant parameter estimates for the low-hanging fruit effect proxy variable EBITDA Margin SBO-1 for both specifications. This indicates that our model predicts lower abnormal operational profitability improvements during the SBO if the abnormal levels of operational profitability prior to the SBO was high. This supports our hypothesis on the low-hanging fruit effect on SBO operational profitability improvements.

Large SBO Fund Size is insignificant for both specifications and has the expected sign. Based on this parameter estimate, there is no support for our hypothesis on the effect of SBO fund size/skills on abnormal operating profitability increases.

The variable Buy Pressure SBO is significant at the 5% level but has the wrong sign relative to our expectations. Examining our data, we found a possible cause: Fund vintages 2007-2008 make up seven out of 11 identified observations with Buy Pressure SBO. On average, the 2007-2008 vintage funds were 3,27 years old when they acquired a target in an SBO, compared to 1,94 years for non-2007-2008 vintages. If 2007-2008 vintage year funds have been allowed longer investment periods by their LPs due to the financial crisis, it is no surprise that they are older on average when engaging in SBO deals. Longer investment periods should translate into lower buy pressure, not more. This could explain why the sign on the explanatory variable is wrong relative to our expected result. Since we cannot control for this possible bias by removing the seven observations without having a too small sample size (n=4) for inferential purposes, we simply conclude that our findings provide no support for our hypothesis of dry powder negatively impacting SBO operating profitability.

Note that we do not infer from the output that SBO buy pressure increases the operating profitability margin expansion of the SBO despite the positive parameter estimate and the statistical significance. Our argumentation is that there is a large bias for 2007-2008 vintages in our proxy variable that we cannot control for.

The dummy variable Sell Pressure is a proxy to the forced exit effect. Nine observations in our data set is identified by the dummy, and since the parameter estimate is very small and insignificant, we are not concerned that it has the wrong sign relative to our expectations. It seems very likely that

more observations are needed to generate a statistically significant and interpretable result. Therefore, we conclude that we see no evidence of the forced exit effect in our data.

Multiple regression analysis: Model C

Model C		
Y = NIBD/EBITDA ME PBO (-1;+2)	**Expected sign**	**(1)**
Intercept		0,9467
		(0,5616)
NIBD/EBITDA LBO -1	-	-0.5916***
		(0,1478)
Large PBO Fund Size	+	0,7002
		(1,1993)
Buy pressure PBO	-	1,8190
		(1,3717)
R^2		23,07%
Adj. R^2		18,87%
Observations		59
Prob > F		0,0022

Table 11. Multiple regression output for Model C, specification (1).

Table 11 shows the output from our multiple regression model on the NIBD/EBITDA multiple expansion for the PBO. The debt multiple expansion is controlled for prior debt level and proxies to the PE firm skill effect and the dry powder effect.

The explanatory power of the prior debt level is highly significant and with the expected sign. This makes intuitive sense: PBO sponsors achieve higher leverage multiple expansions if the target company was less levered prior to the buyout.

The parameter estimate for Large PBO fund size, the proxy variable to skill effects, have the expected sign, but is insignificant. Tracking our data, we see that 13 PBO deals were made by PE funds identified as large. No systematic trends were found among these PE funds in terms of vintage year, deal years, or types of deals, meaning that we found no concerning problems with the identification strategy.

The proxy variable to the dry powder effect, Buy Pressure PBO, has the wrong sign relative to expectations and is statistically insignificant. Tracking our data, we see that ten observations are identified as being under buy pressure in the PBO. As with the previous explanatory variable, we

found no systematic trends for the observations identified with the variable. Consequently, it is puzzling to us why the parameter estimate is wrong relative to our expected sign.

Multiple regression analysis: Model D

Model D

Y = NIBD/EBITDA ME SBO (-1;+2)	**Expected sign**	**(1)**	**(2)**
Intercept		6,2704	2,6619***
		(3,7259)	(0,5838)
NIBD/EBITDA SBO -1	-	-0,5379***	-0,5579***
		(0,1206)	(0,1188)
Large SBO Fund Size	+	2,1136***	2,0232**
		(0,8943)	(0,8892)
Buy pressure SBO	-	-0,7644	-0,6803
		(1,2700)	(1,2667)
Sell Pressure	+	-0,2574	-0,2911
		(1,2605)	(1,2596)
LBO Yield Spread	-	-33,1917	-
		(33,8477)	-
R^2		35,17%	34,02%
Adj. R^2		29,17%	29,22%
Observations		60	60
Prob > F		0,0002	0,0001

Table 12. Multiple regression output for Model D, specifications (1)-(2).

Note that the residuals in Model D did not pass the normality assumption test for either specification (see Appendix F). Consequently, the significance levels cannot be trusted, but the estimators are still unbiased[34] (Lomborg, 2000). We refer to Appendix F for the assumption test output. In the following section, we comment on the parameter estimates and their signs, but refrain from commenting on the significance levels due to the violation of normally distributed residuals.

In Model D, NIBD/EBITDA margin expansion over the SBO is controlled for prior debt level and proxies the PE fund skill effect, the dry powder effect, the forced exit effect, and debt market conditions.

[34] I.e. the expected value of the estimator is the true population parameter.

In line with previous findings, the level of NIBD/EBITDA in SBO-1 negatively impact the predicted value of the NIBD/EBITDA expansion multiple in the SBO. This indicates that SBO funds achieve lower debt multiple expansions if PBO funds had achieved higher debt multiple levels at prior to the SBO.

The proxy for PE fund skill, Large SBO Fund Size, has a positive parameter estimate. The model predicts more than 2x higher abnormal NIBD/EBITDA multiples for SBOs where the acquiring SBO was large. We consider this partial effect surprisingly high. Minding the violation of normally distributed residuals, this supports the hypothesis of skilled SBO funds achieving higher debt multiple expansions over their holding period.

The parameter estimate for Buy Pressure SBO has the expected sign but is small. Since the parameter estimate is close to zero, a larger sample size is likely needed for robustness of the findings. We find no support for the dry powder effect on debt-multiple expansion potential over the SBO window in this model.

Our proxy variable for forced exits, Sell Pressure, is close to zero and does not have the expected sign. Tracking the data, we find nine observations assigned as under pressure to sell in the SBO transaction. We find no alarming trends, leading us to speculate that the sample size is likely the issue here. Consequently, we cannot show support for the hypothesis of the forced exit effect on our samples NIBD/EBITDA multiple expansion in the SBO window.

The parameter estimate of our proxy to debt market conditions, LBO Yield Spread, has the expected sign. The model predicts a partial effect of -0,33x abnormal NIBD/EBITDA multiple expansion over the SBO window for every percentage point increase in LBO Yield Spread.

As mentioned earlier, the model does not pass the assumption tests required to trust the significance levels of the output. We believe that a cause of the lack of fit might be due to endogeneity. To illustrate, we present a graph plotting LBO Yield Spread, the 10-year German government bond yield rates over columns of NIBD/EBITDA multiples in our sample and Debt/EBITDA multiples in European leveraged buyouts.

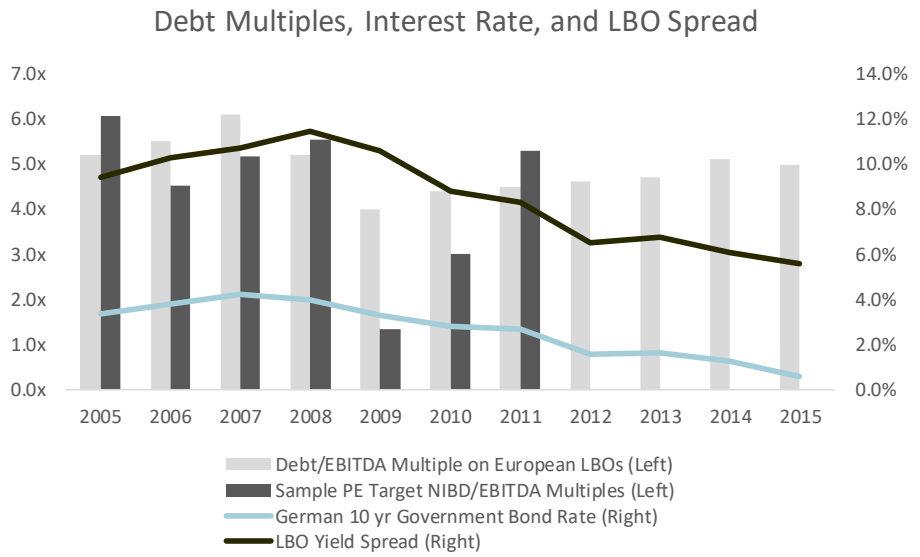


Figure 12. Debt Multiples, Interest Rate, and LBO Yield Spread. Source: Authors. Data: Statista, Moody's, and Bain.

In figure 12[35], we notice that PE funds were able to highly lever their deals prior to the financial crisis, both in our sample and in the European LBO sample. In the wake of the financial crisis, PE firms could not lever their deals to the same extent, even though the LBO Yield Spread falls significantly – mostly due to the lower risk-free rates. Consequently, there are important debt-impacting factors omitted from our model. Some likely factors could be changes in banking policies, risk-willingness of debt-financiers, legislative changes, and the use of interest rates as a tool to stimulate the economy.

All these factors affect the level of leverage PE funds achieve in LBO transactions and are not captured by our model, but impact both the response variable and our explanatory variable (LBO Yield Spread), resulting in problematic endogeneity. From an identification strategy perspective, it is difficult to find proxy variables for all the factors affecting debt multiple expansion.

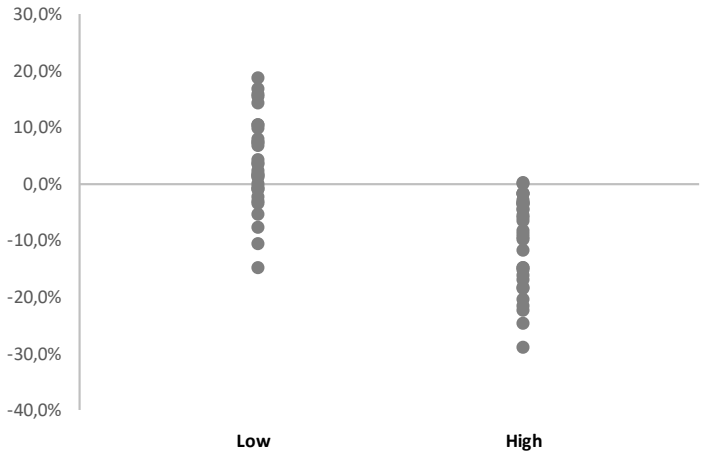
8.3. Robustness testing

In Panel A and Panel B, Table 8, we performed both Student's t-test and Wilcoxon signed-rank tests, where the latter is robust to the assumption of normally distributed samples implicit to the former. The objective of performing both tests is to add robustness in case the assumptions of normally

[35] Note that sample observations from 2012-2015 have been omitted, since the number of observations from these years is very low due to our search criteria outlined in the methodology section.

distributed data is not correct. The figure with median values has not been trimmed, and represents the entire sample including outliers for all measures. Performing the analysis using median values yields the same results as using outlier-trimmed mean values. We consider our findings in section 8.1. sufficiently robust.

To add robustness to the findings in 8.2., where we used multiple linear regression to test for the partial effect of the hypothesized drivers of operating performance increase, we conduct an additional test. We categorize companies based on whether they performed in the top 50% (High) or bottom 50% (Low) in the first round on both operational performance measures tested in 8.2., abnormal NIBD/EBITDA multiple expansion and abnormal EBITDA margin expansion. The output is a scatter plot of SBO minus PBO abnormal operating performance categorized by High/Low first round abnormal performance. The two sub-samples (High and Low) are tested with the null-hypothesis that they are centered at the same mean using Welch's t-test, which is robust to unequal variance between samples. Results are shown below in Figure 13 and Figure 14.



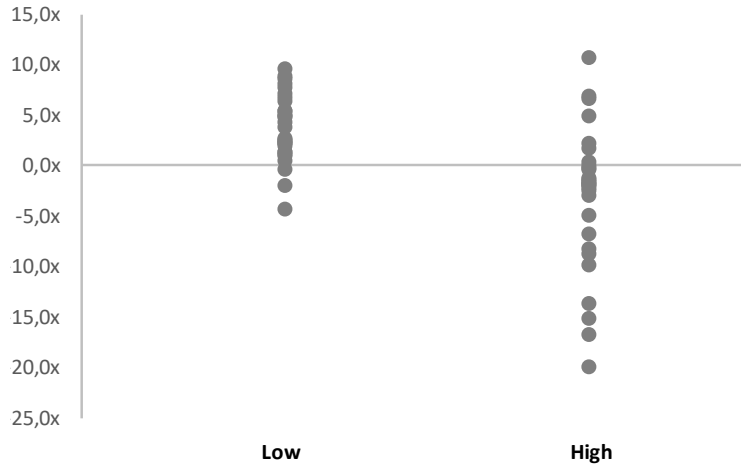
	n	Mean	Std. Dev	Lower 95%	Upper 95%
Low	31	0,0374	0,0812	0,0076	0,0672
High	32	-0,1017	0,0808	-0,1308	-0,0725

	F Ratio	Prob > F
Welch's t-test	46,40	0,001

Figure 13. Scatterplot of Delta AOP EBITDA margin expansion SBO by first round performance with Welch's t-test.

The distribution between the two samples are significantly different when allowing for unequal variances, as evident by the low p-value in the Welch's t-test. We see that the mean SBO outperformance is 3,74% abnormal EBITDA/Sales for target companies that had bottom 50% abnormal EBITDA/Sales in the first buyout window PBO (-1;+2), whereas SBOs underperformed 10,17% in absolute EBITDA/Sales compared to PBOs if the target company was a high performer in the first round.

The conducted test shows the low-hanging fruit effect using a different statistical method than regression but gives the same conclusion: high abnormal EBITDA margin expansions in the first round indicates low abnormal EBITDA margin expansions in the second round, and vice versa.



	n	Mean	Std. Dev	Lower 95%	Upper 95%
Low	30	3,7911	3,3257	2,549	5,033
High	29	-3,0435	7,0729	-5,734	-0,353

	F Ratio	Prob > F
Welch's t-test	39,51	0,001

Figure 14. Scatterplot of Delta AOP NIBD/EBITDA margin expansion SBO by first round multiple levels with Welch's t-test.

We test the difference in abnormal NIBD/EBITDA multiple expansion between rounds using the same methodology and find results that support the conclusion from the regression-based method: Low abnormal NIBD/EBITDA multiple expansions in the first round is correlated with high abnormal NIBD/EBITDA multiple expansions in the second round, and vice versa. The intuitive interpretation

is that SBOs attempt to lever the target companies as highly as possible, and that lower PBO debt multiple expansions create opportunities for high SBO debt multiple expansions.

9. Summary of findings

In this section, we summarize our findings in the analyses, compare the results to our hypotheses, and relate the findings to the academic literature on SBO operating performance and motivations for engaging in SBOs. Firstly, we present a table of the tested hypotheses and findings.

Hypotheses	Result	Significance	Section
1. SBOs exhibit lower abnormal operating profitability margin expansions than PBOs	**Yes**		
1a. SBOs exhibit lower abnormal EBITDA margin expansions than PBOs	Yes	Significantly lower	Table 8
1b. SBOS exhibit lower abnormal EBIT margin expansions than PBOs	Yes	Significantly lower	Table 8
1c. SBOS exhibit lower abnormal EBITDA/Fixed Assets margin expansions than PBOs	No	Significantly higher	Table 8
1d. SBOs exhibit lower ROIC expansion than PBOs	No	Insignificant	Table 8
2. SBOs exhibit lower abnormal growth rates than PBOs	**Yes**		
2a. SBOs exhibit lower abnormal Sales growth rates than PBOs	Yes	Significantly lower	Table 8
2b. SBOs exhibit lower abnormal EBITDA growth rates than PBOs	Yes	Significantly lower	Table 8
3. SBOs exhibit higher abnormal leverage multiple expansion than PBOs	**Yes**		
3a. SBOs exhibit higher NIBD/EBITDA multiple expansions than PBOs	Yes	Significantly higher	Table 8
3b. SBOs exhibit higher NIBD/Fixed Assets multiple expansions than PBOs	No	Insignificant	Table 8
4. SBOs exhibit lower abnormal operational efficiency improvements than PBOs	**No**		
4. SBOs exhibit lower improvements of abnormal NWC as percentage of sales than PBOs	No	Insignificant	Table 8
5. The low-hanging fruit effect negatively impacts the scope of abnormal expansion in the post-transaction state	**Yes**		
5. The low-hanging fruit effect negatively impacts the abnormal EBITDA margin expansion during the SBO	Yes	Significant	Model B
6. High debt multiple levels prior to a buyout event negatively impacts the scope of debt multiple expansion in the post-transaction state	**Yes**		
6. High debt multiple levels in the PBO negatively impacts the abnormal NIBD/EBITDA multiple expansion during the SBO	Yes	Significant*	Model D
7. The size/skills of the acquiring PE fund positively impacts the scope of abnormal operational improvements in the SBO	**Mixed**		
7a. The size/skills of the acquiring PE fund positively impacts the abnormal EBITDA margin expansion in the SBO	No	Insignificant	Model B
7b. The size/skills of the acquiring PE fund positively impacts the abnormal NIBD/EBITDA expansion in the SBO	Yes	Significant*	Model D
8. The dry powder effect impacts the scope of abnormal operational improvements in SBOs	**No**		
8a. The dry powder effect negatively impacts the abnormal EBITDA margin expansion in the SBO	No	Significant (wrong sign)	Model B
8b. The dry powder effect negatively impacts the abnormal NIBD/EBITDA multiple expansion in the SBO	No	Insignificant*	Model D
9. The forced exit effect impacts the scope of abnormal operational improvements in SBOs	**No**		
9a. The forced exit effect positively impacts the abnormal EBITDA margin expansion in the SBO	No	Insignificant	Model B
9b. The forced exit effect positively impacts the abnormal NIBD/EBITDA multiple expansion in the SBO	No	Insignificant*	Model D
10. Target firms originally held by private owners offer a larger scope of abnormal operating improvements to private equity investors in subsequent rounds	**No**	Insignificant	Model A

***** The residuals in Model D did not pass the normality assumption test. Consequently the significant levels cannot be trusted (Lomborg, 2000)

Table 13: Summary of findings.

Our results on SBO operating profitability, H1, are consistent with findings in the academic literature on SBO operating performance. Like Bonini (2015) and Wang (2012), we find SBOs significantly underperforming in EBITDA margin and EBIT margin. As argued by Wang (2012), this implies that SBOs may not be motivated by improvements in operating profitability. Our findings on EIBTDA/Fixed Assets are surprising to us, but consistent with the findings of Wang (2012). With regards to ROIC, we find our results difficult to interpret due to the measuring problems mentioned in the analysis and the methodology. However, our results show no significantly lower ROIC expansion in the SBO compared to the PBO.

Our results on growth rates, H2, are consistent with the findings of Wang (2012) and show lower CAGRs in SBOs relative to PBOs in our sample. We are reluctant to interpret this finding as a sign that SBOs do not utilize growth strategies to the same extent that PBOs do, as our findings merely allow us to suggest that PBOs relatively outperform SBOs. The PBO may simply have had an easier task in generating high growth rates due to large residual growth opportunities left by the pre-PBO owner, consistent with the low-hanging fruit effect.

Our results on leverage multiples, H3, show that the NIBD/EBITDA multiple expansion in SBOs is higher than PBOs. This suggests that SBOs utilize leverage to a higher degree than PBOs, which is consistent with the findings of Achleitner and Figge (2014a), who find that SBOs, on average, utilize more debt than PBOs, and Axelson et al. (2013) who also find that SBO target companies are more highly levered than PBO target companies. This implies that SBOs may be driven by debt-based motivations. Regarding NIBD/Fixed Assets, our results show insignificant difference between SBO and PBO multiple expansions. For the reasons discussed in the analysis and methodology, we are reluctant to interpret on this measure.

Our results on NWC/Sales reduction, H4, are insignificant in terms of the relative performance of SBOs compared to PBOs. However, we find results on the reduction of NWC/Sales in the PBO round consistent with findings of Baker & Wruck (1989): improvements in NWC/Sales for the PBO in our sample is realized in the first two years after the initial buyout. We believe our result in this test to be heavily influenced by outliers.

In our analysis of drivers of SBO operating performance, we examine some of the motivations behind SBOs outlined in the academic literature. Hypotheses H5-H10 in Table 13 above shows our

results. It is our impression that the results of the analyses on Model A, B, and C are substantially more robust than Model D, as residuals of the latter violate the normality assumption. Consequently, the significance levels of Model D cannot be trusted, and we refrain from drawing conclusions based on these. Additionally, we have provided commentary on problems with biases and endogeneity issues with our models in the analysis. We list our results and suggest inferences.

Our results on the impact of the low-hanging fruit effect on EBITDA margin expansions in SBOs, H5, show statistical significance. This is consistent with the hypothesis that the scope of operating performance improvements is lower in SBOs when the PBO fund has already realized much of the residual potential for operating improvements (Achleitner & Figge, 2014a; Bonini, 2015; Wang, 2012).

Our results on the impact of pre-transaction debt levels on SBO debt-multiple expansion, H6, show statistical significance but since the residuals of Model D do not pass the normality assumption test, the significance level cannot be trusted. However, the parameter estimates are still unbiased. We infer, based on the parameter estimate, that SBOs are likely impaired in their ability to lever the target company if the target company is already highly levered. This is an unsurprising finding.

Our results on the effects of SBO sponsor size/skills on EBITDA margin expansions and NIBD/EBITDA multiple expansions, H7a-H7b, show insignificant results for EBITDA margin and significant results for NIBD/EBITDA. However, since the residuals of Model D does not pass the normality assumption tests, we cannot trust the significance levels on NIBD/EBITDA. In both cases, we found the expected sign on the parameter estimates. The implication may be that large/skilled SBO sponsors are more motivated by increasing the leveraging of the target than by increasing the operational profitability, but we are reluctant in making this interpretation due to the issues with the normality assumption.

When controlling for the interaction between the low-hanging fruit effect and size and skills, we found no significant result that large and skilled SBO firms are less affected by the low-hanging fruit effect. However, we did find the expected sign for the interaction term.

Our results on the effects of dry powder in EBITDA margin expansion and NIBD/EBITDA multiple expansion, H8a-H8b, show some surprising results. The specification for Model B that controls EBITDA margin expansion in the SBO for the dry powder effect form the basis for H8a. We find a

significant result, but with the wrong sign relative to our expectations. In the analysis, we backtracked the data, and show that an unrepresentatively large number of funds with vintage years 2007-2008 make up the bulk of the observations identified with the proxy variable. We believe this large estimation bias may explain why we find the wrong expected sign at a significant level. NIBD/EBITDA multiple expansions in SBOs are controlled for the dry powder effect in Model D, which is the basis for answering H8b. We find the expected sign, but refrain from drawing inferences due to the weakness of the model.

Our results on the forced exit effect on EBITDA margin expansion and NIBD/EBITDA multiple expansions in SBOs, H9a-H9b, show no significant results and with the wrong sign relative to expectations. In short, we find no evidence of the effect in our sample.

Our results on the effect of pre-PBO ownership on the scope of subsequent abnormal operating performance increases, H10, show no significant results. We believe that our identification strategy may be too crude to capture the hypothesized effect. Finally, we find no evidence of prior private ownership impacting the scope of abnormal operating performance increases of subsequent PE owners.

10. Discussion

In this thesis, we have discussed the implications and potential issues arising from our choice of methodology when they are relevant. Rather than reiterate points already made, we refer to the methodology and analysis for a discussion of the following topics and their implications: definition of fixed assets, definition of NWC, definition of NIBD, recognition of goodwill, outlier treatment, endogeneity issues, and sample size.

In the following section, we first discuss our findings from the event studies and the driver study and how we interpret them. Later, we discuss our choice of methodology and how it may have influenced our findings. We also elaborate on possibilities for increasing the robustness of similar research by discussing the problems we encountered in the making of this thesis. Lastly, we propose subjects for further research.

Discussion of findings from the event studies

In this thesis, we examined the operating performance of Nordic SBOs from 1995-2015. Our findings (Table 13) are largely consistent with the existing body of research on the subject (Table 1), notably that of Bonini (2015), Wang (2012), and Achleitner & Figge (2014). Despite the availability of data on Nordic companies, earlier studies on the subject has largely omitted this region, constituting the research gap which our thesis aims to fill. Additionally, the literature is sparse on SBO operating performance after the financial crisis. Our research suggests that previous findings are still robust. While we find that SBOs underperform PBOs in terms of certain measures of operating performance, we stress that operating performance does not equate to returns. Our findings also do not allow us to draw any conclusions on whether SBOs are objectively inferior investments than PBOs, or whether LPs should be worried about their GPs engaging in SBOs. The topic of value creation should be examined holistically before such a conclusion can be drawn.

As mentioned in the literature review, PE firms have numerous options for value creation in their portfolio companies. While the literature suggests that operating performance increases is a key value creation tool (Achleitner & Figge, 2014a; Guo, Hotchkiss, & Song, 2011; Kaplan & Strömberg, 2009; Heel & Kehoe, 2005), value creation also happens as a function of factors outside the scope of this thesis, such as market timing and negotiation skills (Berg & Gottschalg, 2003). Consequently, the findings of this thesis do not imply that SBOs do not create value. Rather, our findings imply that, on average, SBOs generate lower abnormal operational performance increases than PBOs. This is not mutually exhaustive with value creation for the PE fund. It does, however, imply that the motivations behind PE funds engaging in SBO activities are unlikely to be primarily associated with increases of operating performance.

Discussion of findings from the driver study

In addition to the event studies, this thesis also conducts a study of the drivers of SBO operating performance, based on the motivations behind SBOs found in the literature. We examine the explanatory power of these drivers on operating performance metrics. In particular, we regress NIBD/EBITDA multiple expansion and EBITDA margin expansion on e.g. past performance, fund size, dry powder effects, and forced exit effects.

Our findings are somewhat inconclusive: we find significant explanatory power of the *low-hanging fruit* proxy, somewhat mixed explanatory power of the size/skill proxy (and no explanatory power if we disregard Model D, which violated normality assumption test), wildly unexpected and significant results on the dry powder proxy on EBITDA/Sales, and mostly insignificant results on the rest of the proxies examined.

This leaves us with two questions: I) is our choice of regression model optimal, and II) is our choice of proxies optimal?

Firstly, we have performed the studies to the best of our abilities, but it is unfortunately a likely answer to question I) that a better model exists. We are not educated or trained in advanced econometrics, so it is likely that skilled and experienced academics would have chosen an entirely different approach than a multiple linear regression model. For instance, our data allows us to follow the statistical methodology implicit to panel data instead of our approach of conducting two separate event studies. We chose tools that we are comfortable with, but the delicacies of the data might have benefitted from an entirely different toolbox.

Regarding question II), we have largely relied on proxies used in academic literature (e.g. low-hanging fruit of Guo et al. (2011) or fund size of Phalippou & Gottschalg (2009)). We backtracked the data for all regressions and found some systematic biases. In particular, our proxy to buy pressure for SBOs, which identifies funds aged 4-8 years old at the time of transaction, results in an overweight of fund vintages 2007-2008. We find it likely that better proxies exist, but we cannot exclude that the empirical evidence simply does not exist for these effects.

Due to the above, we believe that the performed study of drivers of SBO operating performance should be considered a complementary analysis to the empirically based event studies, which we consider more robust than the regression-based driver study.

The fairness of comparing SBOs to PBOs

In our thesis, we have calculated abnormal measures of each buyout round and compared the margin expansions of abnormal measures between rounds. This gives a precise indication of SBO operational performance relative to PBO operational performance. Based on hypothetical argumentation, we propose that this comparison is not necessarily fair:

The alternative to an SBO may not always be another PBO. If there are no better alternatives, an SBO may be the only option to invest committed capital. Considering the business model of private equity firms, where mature companies capable of generating cash flows are in demand, an influx of committed capital to the PE industry will undoubtedly increase in the competition for target companies. This is logical, as the supply of mature companies is in no way causally related to the demand for mature companies; there is no supply responsiveness to the demand.

In addition to higher transaction prices (and therefore, probably lower returns), a large influx of capital to the PE industry leads to less target companies available for PBO transactions. Consequently, a large influx of committed capital is likely to result in more SBOs – and possibly some that would not have happened under less capital abundant circumstances. The findings of this thesis suggest that operational performance increases are not, on average, the main motivation to engage in SBOs, but we cannot conclude that a *hot* PE market, coupled with favorable debt-market conditions, is an explanation of the SBO phenomenon. This is merely our speculation.

Validity and handling of data

As described in the methodology, the gross-list of deals which forms the basis of our paper is downloaded from Mergermarket. Additionally, we use Orbis and Datastream as providers of data for peer groups. Even though these databases are considered reliable sources, they may have errors and omissions. To ensure the highest quality data possible, we could have cross-checked the data with other databases, which some of the cited academic articles do. We acknowledge that the data provided from financial databases may be inadequate, but we do not believe that the data provided by either Mergermarket, Orbis, or Datastream has any systematic errors or omissions that introduce biases.

For our financial statements, we used Valu8, Brønnoysundregistrene, and Det Centrale Virksomhedsregister (CVR) for respectively Swedish, Norwegian, and Danish companies. These statements are filed by the companies and follow their respective country accounting laws, and consequently, we see no other source of bias from these sources than our own mistyping when manually handling the data. Any mistyping is guaranteed to be random.

We have not normalized the financial statements, which results in some companies' financial statements including one-offs that ideally should be excluded from operational measures. The superior approach of excluding one-offs is out of the scope for this thesis, as it implies a level of detail in the analysis of financial statements that could not be scaled over our entire sample of SBOs, let alone peers. However, our methodology to omit the year of transaction has implicitly reduced the impact of one-offs, since many transactions costs occur in the transaction year. Such transaction costs include fees to bankers, lawyers, and providers of due diligence.

Besides excluding financial companies from our analysis, we have assumed that there is no difference in accounting standards across neither countries nor industries. This assumption is debatable, but since the reporting standard IFRS[36] is widely adopted in the Nordics, we consider the impact of this assumption negligible (IFRS, 2018).

Academic critique of our methodology

In the academic literature, the methodology of Bonini (2015), which we consider a source of inspiration to our event studies, is subject to some valid critique. Notably, Achleitner & Figge (2014a) comment:

"Bonini's (2010)[37] sampling strategy is definitely innovative. […] However, the analyses focus on the very short performance window of one year prior and one year after the transaction. While this captures the low-hanging fruit effect, it cannot be used to adequately assess the actual realized performance over the total holding period" (Achleitner & Figge, 2014a)

Regardless of this valid criticism, we still find Bonini (2015) to offer the superior approach for our study of SBO operating performance in the Nordics, as we are dealing with a substantially smaller geographical scope and, consequently, reduced pool of observations to create our sample from.

Use of peers

In calculating AOP, we use peers as a tool to control for time and industry. While this approach, which is suggested by Barber & Lyon (1996), is regularly used in the academic literature on the

[36] International Financial Reporting Standard.

[37] Note that the paper cited by Achleitner & Figge (2014a) is an earlier working-paper of Bonini's that follows the same methodology. While Bonini since expanded the horizon to two years, we believe the critique is still valid.

subject, it can be problematic. Firstly, it requires that the quality of the peer data is high. The peer data is as important for the calculation of abnormal measures as the primary data. Secondarily, it requires some simplifications when matching peers to target companies. In our case, we used Fama French 10 industry classification, inspired by Wang (2012). This classification is grossly simplified. For instance, using this classification standard, we end up benchmarking Ambea AB and Frösunda Omsorg AB (two Swedish elderly care companies) with Vitrolife AB (a Swedish company specializing in fertility treatment); the correlation is not immediately obvious. Thirdly, we cannot ensure that peers were classified in the same Fama French 10 industry in the year of our observation. If companies change classification, which is based on self-reported SIC-codes, over time, this may lead to inaccuracies. Fourthly, we have not examined the background of every company in our peer group. Consequently, some may have been previously owned by PE firms, which erodes the basis of comparison. However, we have ensured that none of our sample companies were present in the peer groups, i.e. we removed SBOs that had exited in an IPO and subsequently were present in our peer sample. With these four factors in mind, the introduction of peer groups into the analysis results in some added sources of error in the analysis of SBO operating performance.

Furthermore, even though the methodology of using peer groups to control for external effects is widespread, a relevant remark is that the actual correlation between companies in peer groups is rarely analyzed. Since industry classification codes, which peer groups almost always are based on, usually are self-reported, a bias can arise from using unsuitable peers. We acknowledge that this bias may be represented in our thesis.

Discretionary accounting choices

For the measures on abnormal operating performance calculated in the event studies (Table 8) that include fixed assets in their calculation, there is a probable bias in the form of discretionary accounting choices of the target company owners (Bonini, 2015). We believe, supported by Bonini (2015), that the bias of discretionary accounting choices of owners is somewhat mitigated by the methodology: by comparing the SBO performance to the PBO performance, we allow both sophisticated investors to exercise the discretionary accounting practices that serve them best.

Still, two potential problems are unresolved: I) pre-PBO accounting practices are less likely to follow the same discretionary accounting practices of the subsequent PE sponsors, resulting in a possible

bias, and II) we do not control for changes in available discretionary accounting practices over time. If accounting laws are changed, and subsequent owners are affected by this, our measures may be biased.

We acknowledge that this is a source of error in this thesis. An approach to mitigate the impact of discretionary accounting choices on the findings is to adjust the financial statements based on the notes, as suggested by Guo et al. (2011). Such a granular level of analysis is out of the scope for this thesis.

Impact of the financial crisis on findings

In our identification of research gap, we noticed that the existing body of literature on SBO operating performance largely avoid the years following the financial crisis. Our study includes data from those years and would likely not be possible without including observations from those years, as the sample would be significantly smaller.

One of the measures we have taken to account for the financial crisis is to calculate all operating measures as abnormal. While this approach is likely naïve, we believe that it counteracts the effect of a large exogenous shock like the financial crisis to some extent.

Subjects for further research

This thesis does not examine *how* PE funds achieve operational performance improvements on the operational level. Rather, we look for the measurable effects of the PE fund's value creation by compiling KPIs based on the financial statements in the respective companies.

It can be argued that our approach to researching operational performance leaves out too many critical aspects of the value creation mechanisms available to PE funds, and that isolating the analysis to operational performance is analogous to only examining the proverbial tip of the iceberg. However, as in the case of icebergs, slight inference is possible on value creation in SBOs based on the empirical evidence of the immediately observable.

We believe that a case study format of the *secondary levers* of value creation (Berg & Gottschalg, 2003), such as that of Achleitner et al. (2014b), would be more suitable for such a study. In any case, the topic of *how* PE funds create value requires a level of detail that is out of the scope in this thesis. Consequently, we leave this for future research.

11. Conclusion

One of the primary concerns regarding SBOs is whether the SBO fund can find residual opportunities for operational value creation. Considering that the target company has already received the *shock therapy* (Rappaport, 1990) of the leveraged buyout, the conventional academic prediction is that the scope of operational improvements available to SBOs is smaller than for PBOs – SBOs may simply be "leftovers" of the PBO owner's feast.

Using an up-to-date proprietary data set on SBOs in the Nordics, this thesis presents a qualified answer the research question. We reiterate the research question here:

Do Nordic secondary buyouts create less operational value compared to primary buyouts?

We find that SBOs significantly underperform PBOs on the operating profitability measures EBITDA margin and EBIT margin. The magnitude of the underperformance is 3,27% lower mean abnormal EBITDA margin expansion over the first two years following the SBO compared to the same window on the PBO. For EBIT margin, the mean abnormal margin expansion of the SBO is 3,11% lower. We note that, in absolute terms, EBITDA margin is largely unchanged during the SBO. This implies that acquiring PE firms did not, on average, increase absolute profitability margins during the SBO.

On the operational growth measures, EBITDA growth and Sales growth, we find strongly significant lower operating performance of SBOs relative to PBOs. This implies that the target companies grow more, relative to pre-transaction levels, during the PBO than they do during the SBO. However, we note that the abnormal growth measures for SBOs are still significantly higher than the peers.

To qualify our answer on the difference in operating performance of SBOs, the thesis examines the changes in the leverage levels between buyout rounds, measured by the relative debt measure NIBD/EBITDA. We find that, on average, SBOs increase the debt-multiple levels more than PBOs. This suggests that PE firms engaging in SBOs are motivated by the debt-market conditions. In absolute terms, the abnormal NIBD/EBITDA multiple for SBOs is 4,64x two years after the acquisition compared to 0,96x abnormal NIBD/EBITDA in the year prior to the SBO transaction. These abnormal measures are statistically significant.

To further qualify our answer, we examined some hypothesized drivers of operational performance changes in SBOs. We found significant evidence of the *low-hanging fruit* effect: the abnormal EBITDA margin expansion over the SBO horizon is significantly explained by the level of abnormal EBITDA margin achieved prior to the SBO. We also found weak association between high abnormal NIBD/EBITDA multiple expansions over the SBO horizon and large/skilled SBO sponsors. This could indicate that large/skilled PE sponsors have a comparative advantage in highly levering their portfolio companies.

Finally, we direct the attention of the reader to the open question in the introduction:

Do you wish to get your champagne back?

It seems as hard to answer now as it was before. This study found that the investor of the hypothetical scenario cannot, on average, expect the abnormal operating performance of the SBO to increase more than the PBO. However, other mechanisms of value creation are still available to the PE firm. If the PE firm skillfully utilize those, the LP may look forward to another *home run* champagne on ABC Corporation.

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Appendix

Appendix A: Regression specifications

A (1)

$$AOP\left(\frac{EBITDA}{Sales}\right)ME_{i,PBO} = \beta_0 + \beta_1 AOP(\frac{EBITDA}{Sales})_{PBO_{-1},i} + \beta_2 Large\ PBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ PBO_i + \beta_4 Private_i + \epsilon$$

A (2)

$$AOP\left(\frac{EBITDA}{Sales}\right)ME_{i,PBO} = \beta_0 + \beta_1 AOP(\frac{EBITDA}{Sales})_{PBO_{-1},i} + \beta_2 Large\ PBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ PBO_i + \epsilon$$

A (3)

$$AOP\left(\frac{EBITDA}{Sales}\right)ME_{i,PBO} = \beta_0 + \beta_1 AOP(\frac{EBITDA}{Sales})_{PBO_{-1},i} + \beta_2 Large\ PBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ PBO_i + \beta_4 Private_i + \beta_5(Large_i * Private_i) + \epsilon$$

B (1)

$$AOP\left(\frac{EBITDA}{Sales}\right)ME_{i,SBO} = \beta_0 + \beta_1 AOP\left(\frac{EBITDA}{Sales}\right)_{SBO_{-1},i} + \beta_2 Large\ SBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ SBO_i + \beta_4 Sell\ Pressure_i + \epsilon$$

B (2)

$$AOP\left(\frac{EBITDA}{Sales}\right)ME_{i,SBO} = \beta_0 + \beta_1 AOP\left(\frac{EBITDA}{Sales}\right)_{SBO_{-1},i} + \beta_2 Large\ SBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ SBO_i + \beta_4 Sell\ Pressure_i + \beta_5\left(Large_i * \frac{EBITDA}{Sales}_{SBO_{-1},i}\right) + \epsilon$$

C (1)

$$AOP\left(\frac{NIBD}{EBITDA}\right)ME_{PBO} = \beta_0 + \beta_1 AOP(\frac{NIBD}{EBITDA})_{PBO_{-1},1} + \beta_2 Large\ PBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ PBO_i + \epsilon$$

D (1)

$$AOP\left(\frac{NIBD}{EBITDA}\right)ME_{SBO} = \beta_0 + \beta_1 AOP(\frac{NIBD}{EBITDA})_{SBO_{-1},1} + \beta_2 Large\ SBO\ Fund\ Size_i + \beta_3 Buy\ Pressure\ SBO_i + \beta_4 Sell\ Pressure_i + \beta_5 LBO\ Yield\ Spread_i + \epsilon$$

D (2)

$$AOP\left(\frac{NIBD}{EBITDA}\right)ME_{SBO}$$
$$= \beta_0 + \beta_1 AOP(\frac{NIBD}{EBITDA})_{SBO_{-1,1}} + \beta_2 Large\ SBO\ Fund\ Size_i$$
$$+ \beta_3 Buy\ Pressure\ SBO_i + \beta_4 Sell\ Pressure_i + \epsilon$$

Appendix B: Target list

Company	Country	Fama French	PBO Fund vehicle	PBO Date	SBO Fund vehicle	SBO Date
A/S Cimbria	DK	3	EQT Opportunity	2007/05/31	Axcel IV	2011/06/02
Aalborg Industries A/S	DK	3	Axcel II	2000/05/11	Altor 2003	2005/08/29
Alimak Group AB	SE	3	3i	2001/07/01	Triton II	2007/01/17
Alo AB	SE	3	3i	2002/10/17	Altor III	2011/06/14
Ambea AB	SE	8	3i	2005/04/22	Triton III	2010/02/23
Anticimex AB	SE	10	Nordic Capital IV	2001/09/04	Ratos	2005/12/06
Aspen AB	SE	2	Valedo I	2008/09/23	CapMan IX	2010/07/02
Atos Medical AB	SE	8	Nordic Capital V	2005/03/08	EQT VI	2011/07/18
Aura Light International AB	SE	3	Bridgepoint I	2000/07/02	FSN II	2006/04/26
Avaj International Holding AB	SE	2	Accent 2003	2007/07/03	Priveq IV	2012/11/06
Balco Group AB	SE	10	3i	2003/07/02	Segulah IV	2010/10/25
Basefarm AS	NO	5	Reiten & Co VII	2009/11/27	Abry VII	2012/12/03
Beerenberg Corp. AS	NO	4	Herkules I	2006/04/07	Segulah IV	2013/01/04
Bergteamet AB	SE	10	Accent 2008	2009/11/06	Polaris III	2011/09/30
Biblioteksmedier as	DK	7	LD Equity III	2008/03/03	Evergreen	2013/01/30
Bladt Industries A/S	DK	3	Industri Udvikling	2001/07/01	Nordic Capital VII	2012/03/29
BTX Group A/S	DK	1	EQT IV	2005/05/15	Sun Capital VI	2013/02/08
Com Hem AB	SE	5	EQT III	2003/06/05	n.a.	2005/12/05
Contex Holding A/S	DK	5	EQT Danmark	1999/03/22	Ratos	2007/07/23
Coor Service Management AB	SE	10	3i	2004/10/01	Cinven IV	2007/11/01
CTEK Sweden AB	SE	5	FSN II	2008/05/06	Altor III	2011/06/07
EG A/S	DK	5	Nordic Capital VII	2008/07/01	Axcel IV	2013/06/25
Elixia Nordic AS	NO	7	Norvestor IV	2006/08/30	Altor III	2011/05/12
EPiServer AB	SE	5	Northzone V	2007/08/07	IK 2007	2010/11/10
Espresso House Sweden AB	SE	7	Palamon European Euity II	2006/01/27	Herkules III	2012/09/05
Etraveli AB	SE	5	Norvestor IV	2007/07/01	Segulah IV	2010/07/04
Euro Cater A/S	DK	7	Altor II	2006/12/20	n.a.	2013/04/24
Euroflorist Sverige AB	SE	7	Accent 2003	2004/07/08	Litorina III	2007/08/29
Exotic Snacks AB	SE	1	Segulah III	2007/12/12	Credelity	2011/03/25
Findus Sverige AB	SE	1	EQT II	2000/04/30	CapVest Partners LLP	2006/01/30
Fiskarhedenvillan AB	SE	10	Polaris II	2007/03/16	Litorina IV	2012/02/16
Flextrus AB	SE	3	Accent 2008	2008/04/14	n.a.	2011/06/16
Fristads Kansas	DK	1	Axcel I	1999/04/15	IK 2000	2005/11/11
Frosunda Omsorg AB	SE	8	Polaris II	2007/12/04	Hg VI	2010/05/03
Glud & Marstrand A/S	DK	3	Axcel II	2002/01/02	n.a.	2005/03/07
Haarslev Industries A/S	DK	3	Odin Equity Partners I	2006/03/31	Altor III	2012/01/26
Hansen Protection AS	NO	10	Montagu III	2010/12/17	IK VII	2013/06/06
Hooks Hastsport AB	SE	7	Accent 2008	2011/02/22	Nalka	2014/03/19
Icopal a/s	DK	3	Axcel II	2000/07/01	Evergreen	2007/06/14
Illum AS	DK	7	n.a.	2003/07/01	n.a.	2005/08/03
Inflight Service Europe AB	SE	7	CapMan VII	2005/07/12	Triton II	2009/12/07
Inmeta Crayon ASA	NO	5	CapMan Technology 2007	2008/07/01	Norvestor V	2011/12/08
Inredningsglas Skandinavien AB	SE	2	Accent 2003	2007/02/27	CapMan IX	2010/07/02
Intelecom Group AS	NO	5	Norvestor V	2008/11/04	Herkules III	2010/07/09
KMD A/S	DK	5	EQT V	2009/07/01	Advent Global VII	2012/10/15
KVD Kvarndammen AB	SE	5	Evergreen	2007/06/25	Ratos	2010/11/29
LGT Logistics AB	SE	10	Litorina II	2005/10/01	Axcel III	2009/04/02
LOGSTOR A/S	DK	3	Axcel I	1999/07/01	Montagu III	2006/05/03
Nille AS	NO	7	Herkules II	2006/07/06	BC European Capital IX	2011/03/29

Company	Country	Fama French	PBO Fund vehicle	PBO Date	SBO Fund vehicle	SBO Date
Norican Group	DK	3	Procuritas III	2005/04/14	Emerging Eur. Fund II	2008/03/11
NVS Installation AB	SE	10	Segulah II	2002/01/31	Triton II	2006/05/02
Phadia AB	SE	8	Triton I	2004/01/19	Cinven IV	2007/01/19
Plastal Group AB	SE	3	Gilde Buy-Out II	2001/08/21	Nordic Capital V	2004/12/21
Prenax AB	SE	5	Verdane V	2005/07/01	Evergreen	2012/04/30
QleanAir Scandinavia	SE	10	Credelity	2007/01/01	Priveq IV	2012/02/10
Q-Matic Group AB	SE	5	Litorina II	2004/10/28	Altor II	2007/06/15
RenoNorden ASA	NO	10	Norvestor V	2008/11/06	Accent 2008	2011/09/27
Roxar ASA	NO	4	Lime Rock Partners I	2003/07/01	n.a.	2005/12/05
Saferoad Holding ASA	NO	3	Reiten & Co VI	2006/11/17	Nordic Capital VII	2008/06/13
Schades A/S	DK	3	n.a.	2004/12/15	Capidea I	2009/10/20
Sefina	SE	7	Rutland I	2004/09/07	n.a.	2007/08/02
Semantix AB	SE	10	Accent 2003	2006/02/15	Litorina III	2009/12/21
Skamol A/S	DK	3	Polaris II	2007/07/01	FSN III	2012/12/04
Solhagagruppen AB	SE	8	Valedo I	2007/05/30	Bridgepoint I	2010/03/24
Steni AS	NO	3	n.a.	2006/10/19	Accent Equity 2012	2013/06/08
Synsam Nordic AB	SE	7	Nalka	2007/07/01	CVC Eur. Equity Partners V	2014/03/25
Tampnet AS	NO	4	HitecVision V	2010/07/06	EQT Infrastructure I	2012/10/09
TIA Technology A/S	DK	5	DKA II	2006/07/01	EQT Mid Market	2014/06/17
Troax Group AB	SE	3	Accent 2008	2010/11/11	FSN III	2013/01/07
Unifeeder A/S	DK	10	Montagu III	2007/06/06	Nordic Capital VIII	2013/04/05
Verisure Holding AB	SE	2	EQT V	2008/03/20	Hellman & Friedman VII	2011/06/23
Visma AS	NO	5	Hg V	2006/04/18	Montagu III	2010/09/26
Yrkesakademin AB	SE	10	Evergreen	2010/05/31	CapMan X	2014/06/23

Appendix C: Fund vehicles

Fund vehicle	Vintage year	Size (EURm)	Fund vehicle	Vintage year	Size (EURm)
Abry VII	1999	1.503	Lime Rock Partners I	1999	99
Accent 2003	2003	250	Litorina II	2001	50
Accent 2008	2008	380	Litorina III	2007	149
Accent Equity 2012	2012	437	Litorina IV	2011	280
Advent Global VII	2012	8.411	Montagu III	2005	2.260
Altor 2003	2003	650	Nordic Capital IV	2000	760
Altor II	2006	1.150	Nordic Capital V	2003	1.500
Altor III	2008	2.000	Nordic Capital VII	2008	4.300
Axcel I	1999	148	Nordic Capital VIII	2013	3.500
Axcel II	2000	335	Northzone V	2006	175
Axcel III	2005	403	Norvestor IV	2004	157
Axcel IV	2010	485	Norvestor V	2007	236
BC European Capital IX	2011	6.500	Odin Equity Partners I	2005	134
Bridgepoint I	2000	1.000	Palamon European Euity II	2006	670
Capidea I	2006	101	Polaris II	2005	270
CapMan IX	2009	295	Polaris III	2009	365
CapMan Technology 2007	2007	142	Priveq IV	2011	199
CapMan VII	2002	303	Procuritas III	2003	227
CapMan X	2013	244	Reiten & Co VI	2005	125
CapVest Partners LLP	2000	363	Reiten & Co VII	2004	256
Cinven IV	2006	6.500	Rutland I	2001	338
CVC European Equity Partners V	2008	10.750	Segulah II	2000	101
DKA II	2006	24	Segulah III	2004	258
Emerging Europe Convergence Fund II	2005	665	Segulah IV	2007	541
EQT Danmark	1999	134	Sun Capital VI	2012	1.635
EQT II	1999	704	Triton I	2000	590
EQT III	2001	2.000	Triton II	2006	1.100
EQT Infrastructure I	2008	1.167	Triton III	2009	2.400
EQT IV	2004	2.370	Valedo I	2006	108
EQT Mid Market	2013	1.054	Valedo II	2011	222
EQT Opportunity	2006	372	Verdane V	2005	119
EQT V	2006	4.250	3i	n.a.	n.a.
EQT VI	2011	4.815	Ratos	n.a.	n.a.
FSN II	2005	150	Nalka	n.a.	n.a.
FSN III	2008	375	Credelity	n.a.	n.a.
Gilde Buy-Out II	2000	472			
Hellman & Friedman VII	2009	6.401			
Herkules I	2004	239			
Herkules II	2006	528			
Herkules III	2008	732			
Hg V	2005	1.390			
Hg VI	2010	2.194			
HitecVision V	2008	547			
IK 2000	2000	2.100			
IK 2007	2007	1.700			
IK VII	2013	1.700			
Industri Udvikling	2000	67			
LD Equity I	2006	400			
LD Equity III	2007	100			

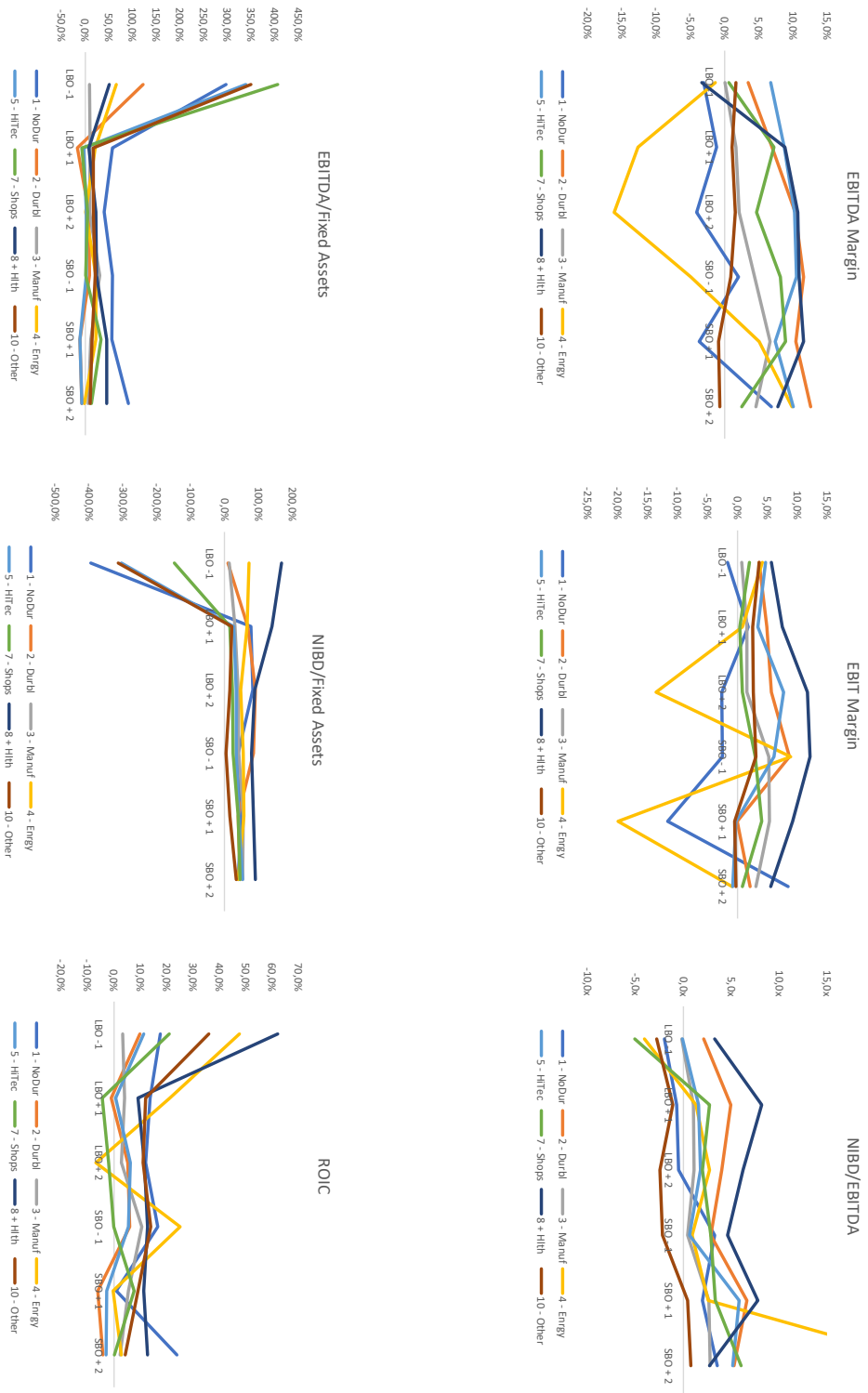
Appendix D: Peer sample

Company	Country	Fama French	Company	Country	Fama French
BAKKAFROST P/F	DK	1	BEIJER ALMA AB	SE	3
CHR HANSEN HOLDING	DK	1	BERGEN GROUP ASA	NO	3
CLOETTA AB	SE	1	BONG LJUNGDAHL AB	SE	3
EGETAEPPER A/S	DK	1	BORREGA	NO	3
ELANDERS AB	SE	1	BRD KLEE A/S	DK	3
ENIRO AB	SE	1	BRODRENE HARTMANN	DK	3
FIRSTFARMS A/S	DK	1	BULTEN AB	SE	3
GABRIEL HOLDING AS	DK	1	CLEMONDO GROUP AB	SE	3
GRIEG SEAFOOD ASA	NO	1	CONCENTRIC AB	SE	3
GYLDENDAL A/S	DK	1	CTT SYSTEMS AB	SE	3
GYLDENDAL ASA	NO	1	F E BORDING A/S	DK	3
HARBOES BRYGGERI A/S	DK	1	FLUGGER A/S	DK	3
IC GROUP A/S	DK	1	GLUNZ & JENSEN HOL	DK	3
KID ASA	NO	1	GOODTECH ASA	NO	3
KOPPARBERGS BRYGGERI	SE	1	GRANGES AB	SE	3
MACKMYRA SVEN	SE	1	GUNNEBO AB	SE	3
MARINE HARVEST ASA	NO	1	H+H INTERNATIONAL	DK	3
MQ HOLDING AB	SE	1	HEXAGON COMPOSITES	NO	3
NHST MEDIA GROUP AS	NO	1	INTERMAIL A/S	DK	3
NORTH MEDIA AS	DK	1	ITAB SHOP CONCEPT	SE	3
ODD MOLLY INTERNA	SE	1	KONGSBERG AUTOMOTIV	NO	3
RNB RETAIL	SE	1	LINDAB INTER	SE	3
ROYAL UNIBREW A/S	DK	1	MULTIQ INTL AB	SE	3
SALMAR ASA	NO	1	NEDERMAN HOLDING AB	SE	3
SANTA FE GROUP A/S	DK	1	NOLATO AB	SE	3
SCANDINAVIAN TOBA	DK	1	NORDIC FLANGES	SE	3
WESC AB (PUBL)	SE	1	OBDUCAT AB	SE	3
ANDERSEN & MARTINI	DK	2	PRECOMP SOLUTIONS	SE	3
BANG & OLUFSEN AS	DK	2	PROFILGRUPPEN AB	SE	3
BUFAB AB (PUBL)	SE	2	RIAS A/S	DK	3
EKORNES ASA	NO	2	ROBLON AS	DK	3
FAGERHULT AB	SE	2	ROCKWOOL INT'L A/S	DK	3
FM MATTSSON MORA	SE	2	ROTTNEROS AB	SE	3
HALDEX AB	SE	2	SANISTAL A/S	DK	3
KABE HUSVAGNAR AB	SE	2	SKAKO A/S	DK	3
LAMMHULTS	SE	2	SP GROUP A/S	DK	3
MEKONOMEN AB	SE	2	SVE MIGATRONIC A/S	DK	3
MIDWAY HOLDING AB	SE	2	SYSTEMAIR AB	SE	3
NKT A/S	DK	2	TOMRA SYSTEMS ASA	NO	3
SCANDINAVIAN BRAKE	DK	2	TTS GROUP ASA	NO	3
SVEDBERGS I DALSTORP	SE	2	VBG GROUP AB	SE	3
ABSOLENT GRO	SE	3	XANO INDUSTRI AB	SE	3
AGES INDUSTRI AB	SE	3	ZINZIN	SE	3
AKVA GROUP ASA	NO	3	AKASTOR ASA	NO	4
ANOTO GROUP AB	SE	3	AKER BP ASA	NO	4
AQ GROUP AB	SE	3	DNO ASA	NO	4
ARCOMA AB	SE	3	DOME ENERGY AB	SE	4
AXIS AB	SE	3	ELECTROMAGNETIC	NO	4
BE GROUP AB (PUBL)	SE	3	FRED. OLSEN ENERGY	NO	4

Company	Country	Fama French	Company	Country	Fama French
GUIDELINE GEO	SE	4	PROACT IT GROUP AB	SE	5
KVAERNER	NO	4	PSI GROUP ASA	NO	5
LUNDIN PETROLEUM AB	SE	4	Q-FREE ASA	NO	5
MAGSEIS ASA	NO	4	QLIRO GROUP AB	SE	5
MISEN ENERGY AB	SE	4	RTX TELECOM A/S	DK	5
NORTH ENERGY ASA	NO	4	SEMCON AB	SE	5
NORWEGIAN ENERGY	NO	4	SIMCORP AS	DK	5
PETROLEUM GEO	NO	4	SOFTRONIC AB	SE	5
SPECTRUM ASA	NO	4	STUDSVIK AB	SE	5
TETHYS	SE	4	TARGETEVERYONE	SE	5
ACANDO AB	SE	5	WEST INTERNATIONAL	SE	5
ADDNODE GROUP AB	SE	5	BERGMAN & BEVING AB	SE	7
ALLGON AB (PUBL)	SE	5	BRDR. A & O JOHANSEN	DK	7
BEIJER REF AB	SE	5	BYGGMAX GROUP AB	SE	7
BIOTAGE AB	SE	5	CLAS OHLSON AB	SE	7
BTS GROUP AB	SE	5	ELECTRA GRUPPEN AB	SE	7
CBRAIN A/S	DK	5	EUROPRIS ASA	NO	7
CELLAVISION AB	SE	5	KAPPAHL AB (PUBL)	SE	7
CHEMOMETEC A/S	DK	5	LAURITZ.COM GROUP	DK	7
COLUMBUS A/S	DK	5	LYKO GROUP AB (PUBL)	SE	7
CONSILIUM AB	SE	5	MALMBERGS ELEKTRISKA	SE	7
DORO AB	SE	5	MATAS A/S	DK	7
ENIRO AB	SE	5	NEW WAVE GROUP AB	SE	7
FORMPIPE SOFTWARE	SE	5	SPORTAMORE AB	SE	7
G5 ENTERTAINMENT	SE	5	SWEDOL AB	SE	7
GENMAB A/S	DK	5	THE LEXINGTON CO	SE	7
GLUNZ & JENSEN HOL	DK	5	VENUE RETAIL GROUP	SE	7
HANZA AB	SE	5	XXL ASA	NO	7
HEXAGON AB	SE	5	ADDLIFE AB	SE	8
HIQ INTERNATIONAL AB	SE	5	ALK-ABELLO A/S	DK	8
HMS NETWORKS AB.	SE	5	AMBU A/S	DK	8
IMAGE SYSTEMS	SE	5	BACTIGUARD H	SE	8
INISSION AB	SE	5	BAVARIAN NORDIC AS	DK	8
KITRON ASA	NO	5	BIOGAIA AB	SE	8
KNOWIT AB	SE	5	BIOINVENT INTL	SE	8
LAGERCRANTZ GROUP AB	SE	5	BIOTEC PHARMACON ASA	NO	8
MYCRONIC AB (PUBL)	SE	5	BOULE DIA	SE	8
NAPATECH	DK	5	C-RAD AB	SE	8
NETENT AB (PUBL)	SE	5	DEDICARE AB (PUBL)	SE	8
NEXT BIOMETRICS	NO	5	ELEKTA AB (PUBL)	SE	8
NNIT A/S	DK	5	GHP SPECIALTY CARE	SE	8
NORDIC SEMICONDUCTOR	NO	5	HOFSETH BIOCARE ASA	NO	8
NOTE AB (PUBL)	SE	5	HUMANA AB	SE	8
NOVOTEK AB	SE	5	KARO PHARMA AB	SE	8
NOVUS GROUP INTER	SE	5	MEDCAP AB (PUBL)	SE	8
OEM INTERNATIONAL AB	SE	5	MEDISTIM ASA	NO	8
ONIVA ONLINE GRO	SE	5	MEDIVIR AB	SE	8
OPUS GROUP AB (PUBL)	SE	5	MIDSONA	SE	8
POLARIS MEDIA	NO	5	MIPS	SE	8

Company	Country	Fama French	Company	Country	Fama French
MOBERG PHARMA	SE	8	REZIDOR HOTEL GROUP	SE	10
NUEVOLUTION AB	SE	8	SENSYS GATSO GR	SE	10
OREXO AB	SE	8	SERNEKE GROUP AB	SE	10
PHOTOCURE ASA	NO	8	SILKEBORG IF INVEST	DK	10
RECIPHARM AB (PUBL)	SE	8	SJR IN SCANDINAVIA	SE	10
SCANDIDOS AB	SE	8	SKISTAR AB	SE	10
SECTRA AB	SE	8	SOLAR A/S	DK	10
SWEDISH ORPHAN	SE	8	SOLSTAD FARSTAD	NO	10
VITROLIFE AB	SE	8	SOLTECH ENERGY	SE	10
XVIVO PERFUSION AB	SE	8	SURG	SE	10
AALBORG BOLDSPILKLUB	DK	10	SVERIGES BOSTAD	SE	10
AF GRUPPEN ASA	NO	10	TIVOLI A/S	DK	10
AIK FOTBOLL AB	SE	10	TK DEVELOPMENT A/S	DK	10
AMERICAN SHIPPING CO	NO	10	TORGHATTEN TRAFIKK	NO	10
ARHUS ELITE A/S	DK	10	VIKING SUPPLY	SE	10
ARKIL HOLDING A/S	DK	10	WILH WILHELMSEN	NO	10
AVENSIA AB	SE	10	WILH. WILHELMSEN	NO	10
AXACTOR AB	SE	10	WILSON ASA	NO	10
BETSSON AB	SE	10	ZALARIS ASA	NO	10
BYGGMA ASA	NO	10	ZETADISPLAY AB	SE	10
CHRISTIAN BERNER	SE	10			
CONCORDIA MARITIME	SE	10			
DALHOFF LARSEN	DK	10			
DAMPSKIBS NORDEN AS	DK	10			
DOF ASA	NO	10			
DOF INSTALLER ASA	NO	10			
ELOS MEDTECH AB	SE	10			
ERRIA A/S	DK	10			
EVOLUTION GAMING	SE	10			
FEELGOOD SVENSKA AB	SE	10			
FJORD LINE	NO	10			
GC RIEBER SHIPPING	NO	10			
HAVILA SHIPPING ASA	NO	10			
HOJGAARD HOLDING A/S	DK	10			
HOUSE OF FRIENDS	SE	10			
I.M. SKAUGEN ASA	NO	10			
JOBINDEX A/S	DK	10			
KOEBENHAVNS	DK	10			
LEOVEGAS AB	SE	10			
LOVISAGRUVAN AB	SE	10			
MAGNOLIA BOSTAD AB	SE	10			
MYTASTE PUBL AB	SE	10			
NTS ASA	NO	10			
OCEAN YIELD ASA	NO	10			
OCEANTEAM ASA	NO	10			
ODFJELL ASA	NO	10			
PARKEN SPORT & ENTER	DK	10			
PER AARSLEFF HOL	DK	10			
POOLIA AB	SE	10			

Appendix E: Yearly Mean AOP(x) categorized by Fama French 10 industry



Appendix F: Regression assumption tests

Appendix F includes the assumption tests conducted on Model A to Model D. Every test output is denoted with a number corresponding to the following tests:

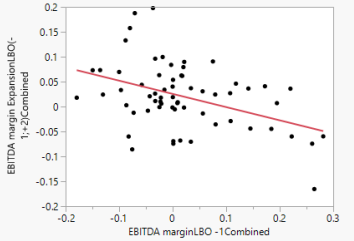
I) Linearity
II) Normally distributed residuals
III) Homoscedasticity in residuals
IV) Multicollinearity between independent variables
V) Outliers removed
VI) Autocorrelation (Durbin Watson test)

(Lomborg, 2000)

Model A (1)

1

Bivariate Fit of EBITDA margin ExpansionLBO(-1;+2)Combined By EBITDA marginLBO -1Combined



Linear Fit

Linear Fit

EBITDA margin ExpansionLBO(-1;+2)Combined = 0.0255555 - 0.2653877*EBITDA marginLBO -1Combined

Summary of Fit

RSquare	0.177727
RSquare Adj	0.164247
Root Mean Square Error	0.059838
Mean of Response	0.02056
Observations (or Sum Wgts)	63

Lack Of Fit

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	0.04720861	0.047209	13.1846
Error	61	0.21841511	0.003581	Prob > F
C. Total	62	0.26562371		0.0006*

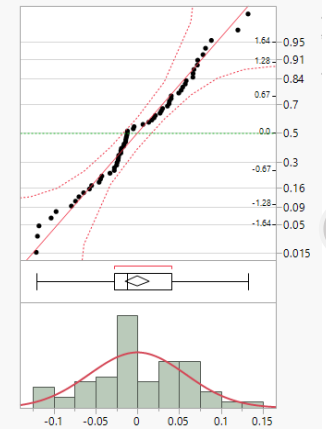
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.0255555	0.007663	3.33	0.0015*
EBITDA marginLBO -1Combined	-0.265388	0.073088	-3.63	0.0006*

2

Distributions

Residual EBITDA margin ExpansionLBO(-1;+2)



Normal(4.4e-19,0.05763)

2

Quantiles

100.0%	maximum	0.1322053296
99.5%		0.1322053296
97.5%		0.1248950042
90.0%		0.0718350407
75.0%	quartile	0.040422638
50.0%	median	-0.012116171
25.0%	quartile	-0.027620906
10.0%		-0.076894521
2.5%		-0.120020804
0.5%		-0.120899162
0.0%	minimum	-0.120899162

Summary Statistics

Mean	4.406e-19
Std Dev	0.0576271
Std Err Mean	0.0072603
Upper 95% Mean	0.0145132
Lower 95% Mean	-0.014513
N	63

Fitted Normal

Parameter Estimates

Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	4.406e-19	-0.014513	0.0145132
Dispersion	σ	0.0576271	0.0490286	0.0699113

-2log(Likelihood) = -181.787881608698

Goodness-of-Fit Test

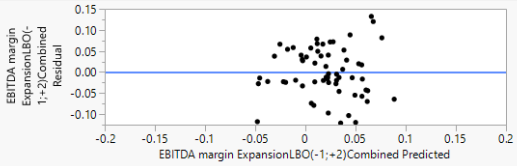
Shapiro-Wilk W Test

W	Prob<W
0.981674	0.4696

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

3

Residual by Predicted Plot



4 & 6

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	0.0230163	0.012261	1.88	0.0655	.
LargePBO Fund Size (Large)	0.033675	0.019402	1.74	0.0879	1.0300818
Buy pressure PBO	-0.007338	0.022626	-0.32	0.7469	1.0071931
Private Dummy	-0.006388	0.015179	-0.42	0.6754	1.0198847
EBITDA marginLBO -1Combined	-0.243996	0.073802	-3.31	0.0016*	1.0284512

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
1.7812354	63	0.0972

5

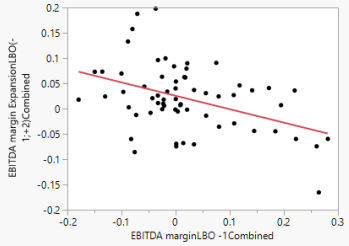
Outliers removed:

1. CTEK Sweden AB
2. Illum AS
3. Phadia AB

Model A (2)

1

Bivariate Fit of EBITDA margin ExpansionLBO(-1;+2)Combined By EBITDA marginLBO -1Combined



Linear Fit

Linear Fit

EBITDA margin ExpansionLBO(-1;+2)Combined = 0.0255555 - 0.2653877*EBITDA marginLBO -1Combined

Summary of Fit

RSquare	0.177727
RSquare Adj	0.164247
Root Mean Square Error	0.059838
Mean of Response	0.02056
Observations (or Sum Wgts)	63

Lack Of Fit

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	0.04720861	0.047209	13.1846
Error	61	0.21841511	0.003581	Prob > F
C. Total	62	0.26562371		0.0006*

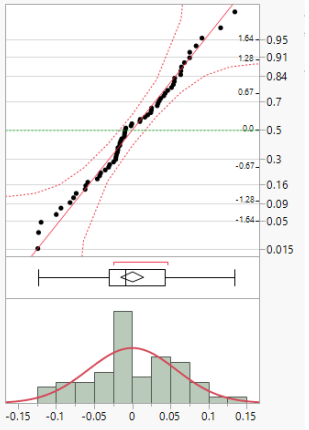
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.0255555	0.007663	3.33	0.0015*
EBITDA marginLBO -1Combined	-0.265388	0.073088	-3.63	0.0006*

2

Distributions

Residual EBITDA margin ExpansionLBO(-1;+2)



Normal(-1e-18,0.05771)

2

Quantiles

100.0%	maximum	0.1348127133
99.5%		0.1348127133
97.5%		0.1236128259
90.0%		0.0726857141
75.0%	quartile	0.0433489638
50.0%	median	-0.009329935
25.0%	quartile	-0.031056721
10.0%		-0.079847106
2.5%		-0.123475334
0.5%		-0.124024936
0.0%	minimum	-0.124024936

Summary Statistics

Mean	-1.1e-18
Std Dev	0.057715
Std Err Mean	0.0072714
Upper 95% Mean	0.0145353
Lower 95% Mean	-0.014535
N	63

Fitted Normal

Parameter Estimates

Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	-1.1e-18	-0.014535	0.0145353
Dispersion	σ	0.057715	0.0491034	0.0700179

-2log(Likelihood) = -181.595815242848

Goodness-of-Fit Test

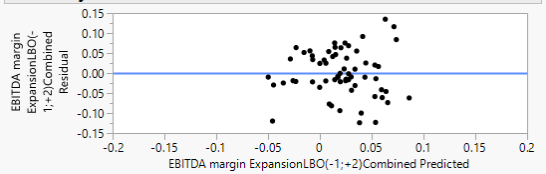
Shapiro-Wilk W Test

W	Prob<W
0.985789	0.6820

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

3

Residual by Predicted Plot



4 & 6

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	0.0195423	0.009002	2.17	0.0340*	.
EBITDA marginLBO -1Combined	-0.246799	0.072987	-3.38	0.0013*	1.0200756
LargePBO Fund Size (Large)	0.0344381	0.019182	1.80	0.0777	1.0210817
Buy pressure PBO	-0.007058	0.022458	-0.31	0.7544	1.0063253

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
1.7586086	63	0.1098

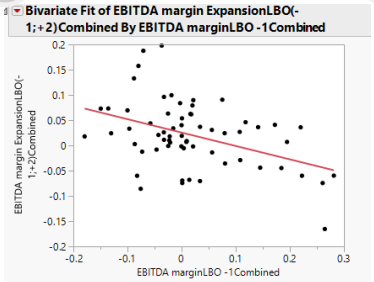
5

Outliers removed:

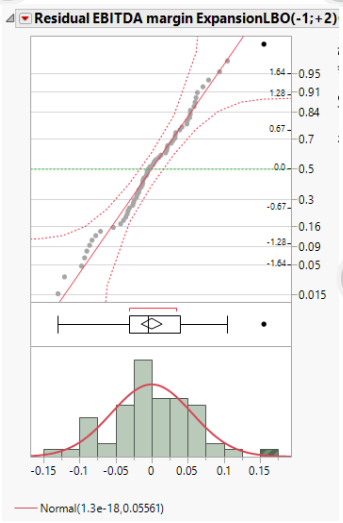
1. CTEK Sweden AB
2. Illum AS
3. Phadia AB

Model A (3)

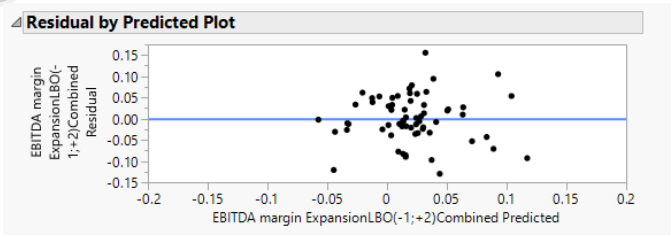
1



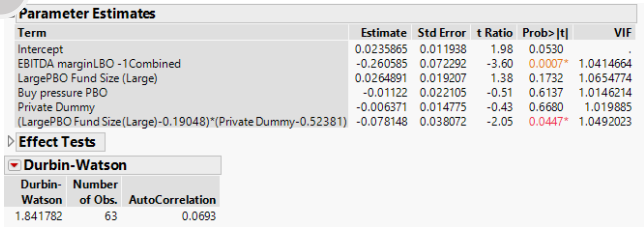
2



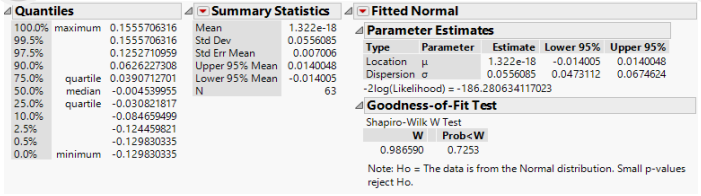
3



4 & 6



2



5

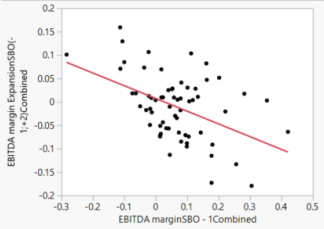
Outliers removed:

1. CTEK Sweden AB
2. Illum AS
3. Phadia AB

Model B (2)

1

Bivariate Fit of EBITDA margin ExpansionSBO(-1;+2)Combined By EBITDA marginSBO - 1Combined



Linear Fit

Linear Fit

EBITDA margin ExpansionSBO(-1;+2)Combined = 0.0072238 - 0.2716961*EBITDA marginSBO - 1Combined

Summary of Fit

RSquare	0.209128
RSquare Adj	0.196372
Root Mean Square Error	0.062141
Mean of Response	-0.01043
Observations (or Sum Wgts)	64

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	0.06330778	0.063308	16.3945
Error	62	0.23941422	0.003862	Prob > F
C. Total	63	0.30272200		0.0001*

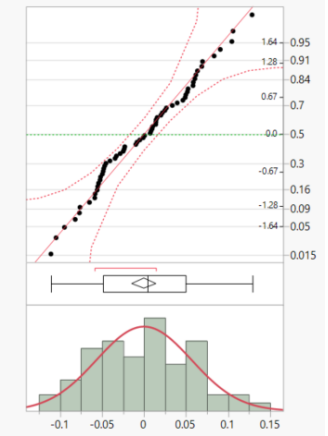
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.0072238	0.008907	0.81	0.4205
EBITDA marginSBO - 1Combined	-0.271696	0.067102	-4.05	0.0001*

2

Distributions

Residual EBITDA margin ExpansionSBO(-1;+2)(



Normal(-3e-18,0.0564)

2

Quantiles

100.0%	maximum	0.1285045252
99.5%		0.1285045252
97.5%		0.1154823871
90.0%		0.0693241271
75.0%	quartile	0.0491780474
50.0%	median	0.0040484759
25.0%	quartile	-0.048778927
10.0%		-0.072708199
2.5%		-0.107146353
0.5%		-0.110674838
0.0%	minimum	-0.110674838

Summary Statistics

Mean	-2.8e-18
Std Dev	0.0564016
Std Err Mean	0.007163
Upper 95% Mean	0.0143233
Lower 95% Mean	-0.014323
N	62

Fitted Normal

Parameter Estimates

Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	-2.8e-18	-0.014323	0.0143233
Dispersion	σ	0.0564016	0.0479279	0.0685433

-2log(Likelihood) = -181.583564793673

Goodness-of-Fit Test

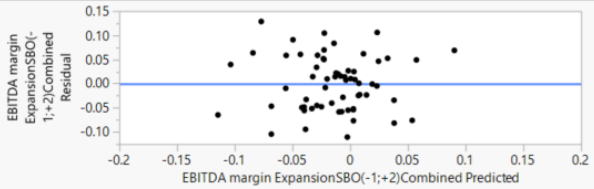
Shapiro-Wilk W Test

W	Prob<W
0.979755	0.3961

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

3

Residual by Predicted Plot



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. arameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	-0.009651	0.011566	-0.83	0.4076	
EBITDA marginSBO - 1Combined	-0.279444	0.069113	-4.04	0.0002*	1.0093935
LargeSBO Fund Size (Large)	0.0224469	0.015752	1.43	0.1597	1.0913617
Buy pressure SBO	0.0529779	0.022631	2.34	0.0228*	1.029831
Sell Pressure SBO	-0.016162	0.023019	-0.70	0.4855	1.0654696
(LargeSBO Fund Size (Large)-0.43548)*(EBITDA marginSBO - 1Combined-0.06982)	0.1913509	0.140504	1.36	0.1787	1.0079855

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
2.2076005	62	-0.1174

5

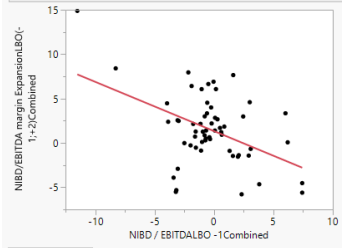
Outliers removed:

1. Alimak Group AB
2. Beerenberg Corp. AS
3. Intelecom Group AS
4. Synsam Nordic AB
5. Illum AS
6. Phadia AB
7. Bergteamet AB

Model C (1)

1

Bivariate Fit of NIBD/EBITDA margin ExpansionLBO(-1;+2)Combined By NIBD / EBITDALBO -1Combined



Linear Fit

Linear Fit

NIBD/EBITDA margin ExpansionLBO(-1;+2)Combined = 1.3341767 - 0.5552606*NIBD / EBITDALBO -1Combined

Summary of Fit

RSquare	0.20466
RSquare Adj	0.190707
Root Mean Square Error	3.490337
Mean of Response	1.491654
Observations (or Sum Wgts)	59

Lack Of Fit

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	178.68551	178.686	14.6675
Error	57	694.39959	12.182	Prob > F
C. Total	58	873.08510		0.0003*

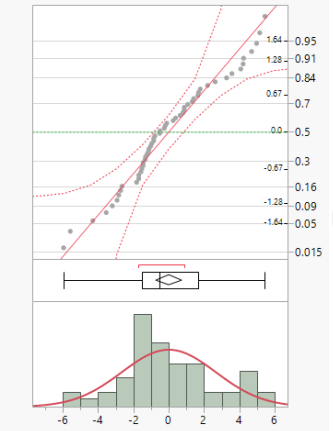
Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	1.3341767	0.45626	2.92	0.0049*
NIBD / EBITDALBO -1Combined	-0.555261	0.144984	-3.83	0.0003*

2

Distributions

Residual NIBD/EBITDA margin ExpansionLBO



Normal(2.4e-16,2.66459)

Quantiles

100.0%	maximum	5.4444920924
99.5%		5.4444920924
97.5%		5.3346305803
90.0%		4.2222502491
75.0%	quartile	1.6548705593
50.0%	median	-0.507877162
25.0%	quartile	-1.540050604
10.0%		-3.065095962
2.5%		-5.815749621
0.5%		-5.958056284
0.0%	minimum	-5.958056284

Summary Statistics

Mean	2.385e-16
Std Dev	2.6645936
Std Err Mean	0.3626053
Upper 95% Mean	0.7272941
Lower 95% Mean	-0.727294
N	54

Fitted Normal

Parameter Estimates

Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	2.385e-16	-0.727294	0.7272941
Dispersion	σ	2.6645936	2.239922	3.2894785

-2log(Likelihood) = 258.090929432881

Goodness-of-Fit Test

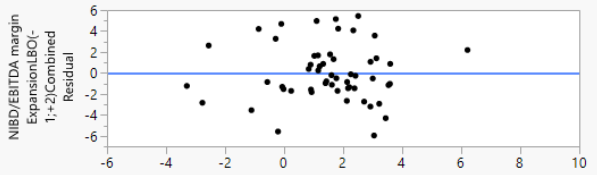
Shapiro-Wilk W Test

W	Prob<W
0.971045	0.2142

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

3

Residual by Predicted Plot



4 & 6

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	1.1965773	0.452292	2.65	0.0109*	.
NIBD / EBITDALBO -1Combined	-0.605688	0.136163	-4.45	<.0001*	1.0273823
LargePBO Fund Size (Large)	0.5270741	1.026488	0.51	0.6099	1.050028
Buy pressure PBO	1.5808496	1.079707	1.46	0.1494	1.0555972

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
1.747011	54	0.1052

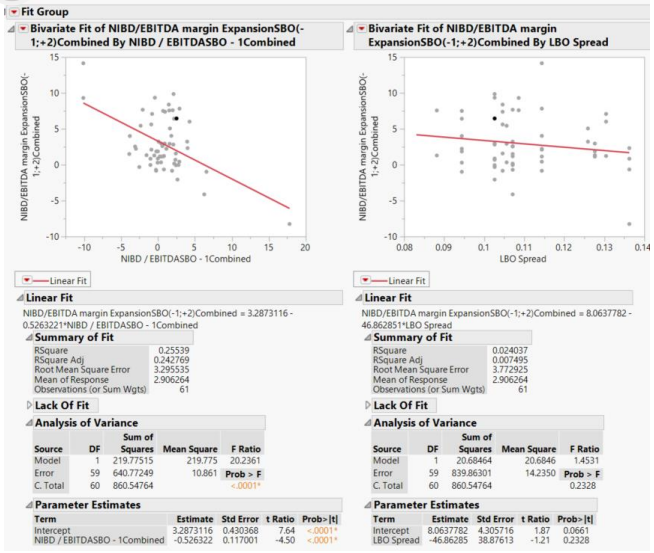
5

Outliers removed:

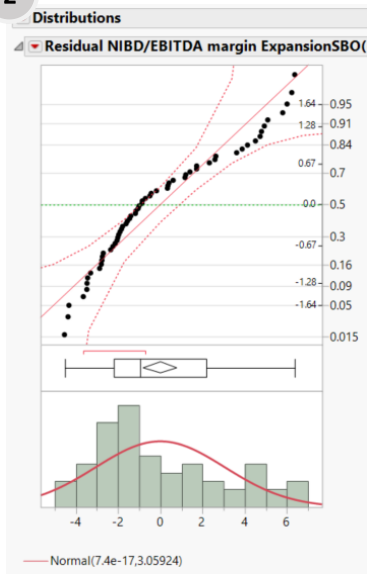
1. Findus Sverige AB
2. Euroflorist Sverige AB
3. Illum AS
4. Fiskarhedenvillan AB

Model D (1) (1 of 2)

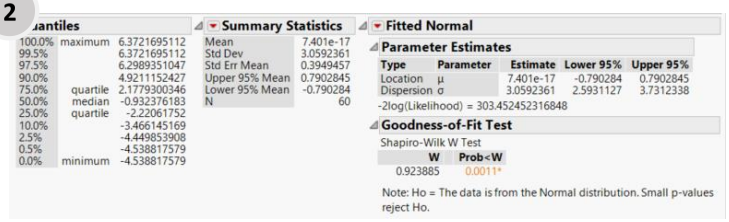
1



2

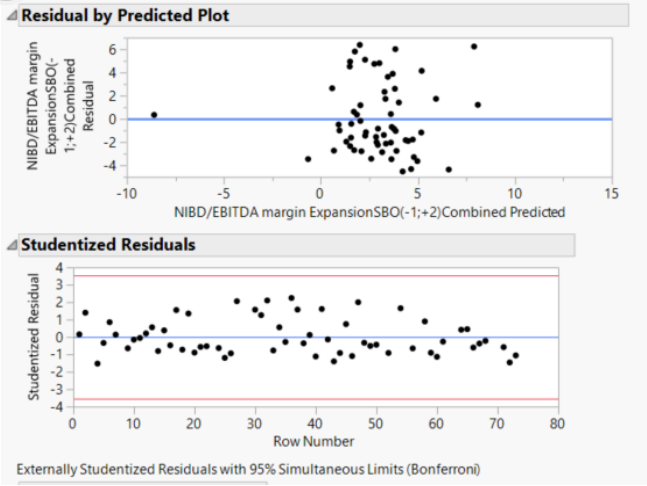


2



Model D (1) (2 of 2)

3



4 & 6

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	6.2704232	3.725871	1.68	0.0982	.
NIBD / EBITDASBO - 1Combined	-0.537876	0.120563	-4.46	<.0001*	1.1234101
LargeSBO Fund Size (Large)	2.1135918	0.894314	2.36	0.0217*	1.1406506
Buy pressure SBO	-0.764358	1.270036	-0.60	0.5498	1.0936791
Sell Pressure SBO	-0.257395	1.260479	-0.20	0.8390	1.0772813
LBO Spread	-33.19174	33.84766	-0.98	0.3312	1.0542928

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
2.0322447	60	-0.0261

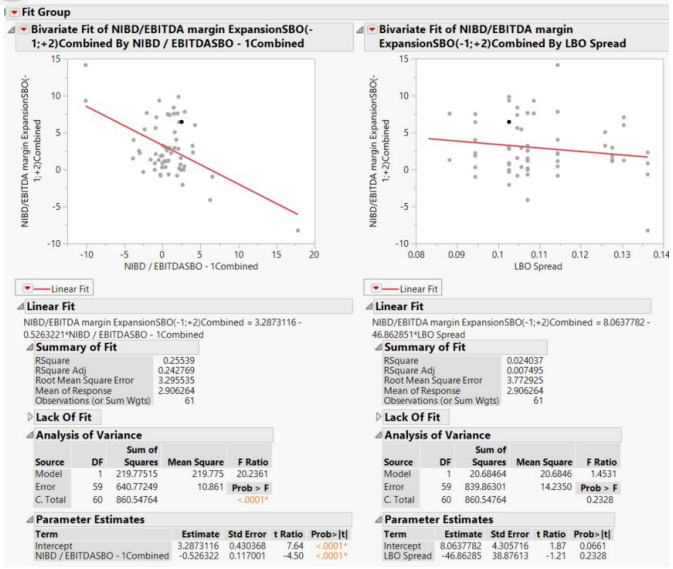
5

Outliers removed:

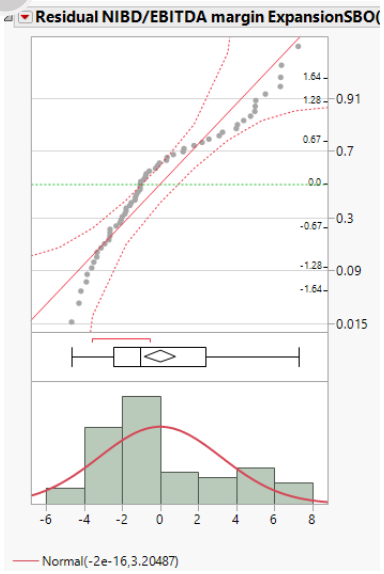
1. Beerenberg Corp. AS
2. Roxar ASA
3. Synsam Nordic AB
4. Illum AS
5. Frosunda Omsorg AB
6. Coor Service Management AB
7. Yrkesakademin AB

Model D (2) (1 of 2)

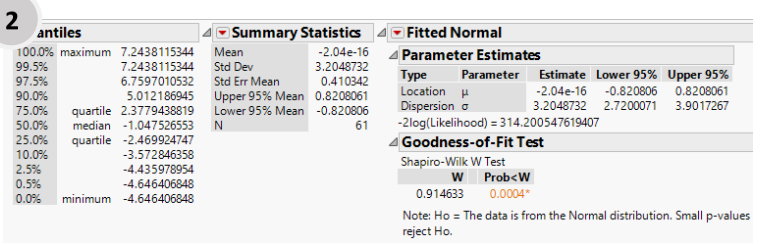
1



2



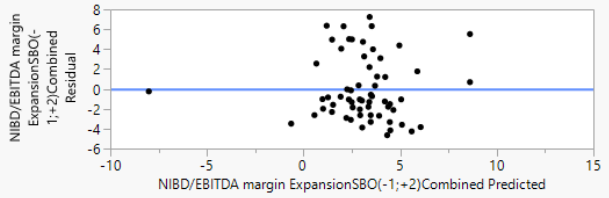
2



Model D (2) (2 of 2)

3

Residual by Predicted Plot



4 & 6

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	2.9020931	0.596068	4.87	<.0001*	.
NIBD / EBITDASBO - 1Combined	-0.56556	0.123211	-4.59	<.0001*	1.0939803
LargeSBO Fund Size (Large)	1.8203335	0.918298	1.98	0.0524	1.1305642
Buy pressure SBO	-0.840452	1.312563	-0.64	0.5246	1.0881574
Sell Pressure SBO	-0.349752	1.30688	-0.27	0.7900	1.0787544

Effect Tests

Durbin-Watson

Durbin-Watson	Number of Obs.	AutoCorrelation
2.0496863	61	-0.0354

5

Outliers removed:

1. Beerenberg Corp. AS
2. Roxar ASA
3. Synsam Nordic AB
4. Illum AS
5. Frosunda Omsorg AB
6. Coor Service Management AB
7. Yrkesakademin AB