Essays on Secondary Buyouts

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Tjark Christopher Viktor Eschenröder

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Hamburg

Referent: Prof. Dr. Thomas Hartmann-Wendels
Korreferent: Prof. Dr. Alexander Kempf
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Chapter 1

Introduction

Private equity (PE) is an asset class, which draws more and more the investors' attention. Since its emergence in the 1980s, the PE business has immensely grown. In the most recent statistics, the total global deal value has reached 582 billion USD in 2018 (Bain (2019)). Although the PE industry has taken a strong hit during the dotcom crisis and the global financial crisis, the deal value has already tripled again since the last crisis. The reasons for this strong growth are manifold: In the past, PE performed exceptionally well. The downside of the asset class' illiquidity was compensated by a consistent level of high returns. This performance driven pull of capital into PE was amplified by a lack of new investment opportunities with comparable returns. Especially the worldwide low interest rates during the last few years and a pessimistic prospect on increasing interest rates in the future strengthen the PE market.

However, the huge capital inflow led to the problem to find attractive investment targets. The dry capital in the PE industry has increased drastically, indicating that general partners (GPs) struggle to find attractive investment targets. It has reached a peak of 2 trillion USD in December 2018 (Bain (2019)).

The huge demand to invest in leveraged buyouts and the scarcity of attractive investment targets brought up demand-driven higher company prices with higher multiples. Consequently, PE investors as limited partners (LPs) worry about the performance of their investment and have a closer look to the investment selection of the GPs.

Especially the dominance of secondary buyouts (SBOs) with a share of more than 50 percent of all financial buyouts (PitchBook (2018a) leaves a lot of questions with the LPs regarding the attractiveness of these investments. An SBO is a financial buyout in which the portfolio company is sold from one PE firm to another one. At a first glance, LPs argue that investing in an SBO is only costly passing-the-parcel without acceptable value creation. From a theoretical point of view, this type of buyout is indeed not intuitive. The portfolio company should have been optimised by the GP during the primary buyout (PBO). Thus, there should be only little value creation potential left for a second investor (Wang (2012), Jenkinson & Sousa (2015), Bonini (2015)). On the other hand, Degeorge et al. (2016) state that value can still be created if other value creation gaps are exploited through complementary skill sets. Achleitner & Figge (2014) argue that value creation is only possible if the portfolio company could not have been optimised during the PBO. Therefore, it looks like a chance that SBOs might perform well under limited circumstances but it does not explain why investments in SBOs are so dominant nowadays. Even if the high share of SBOs is driven by missing investment alternatives, from a rational point of view GPs would not participate in SBOs if they were not worthwhile. Somewhat in contrast to the money-burning incentive proposed by Degeorge et al. (2016), Jenkinson & Sousa (2015) argue that GPs still require a reasonable deal track record for further fund raising. Thus, GPs would not invest in SBOs if they were as bad as the money-burning hypothesis claims.

Hence, this all leave us with the question about the performance of SBOs. If the performance of SBOs would be really as good as the high share of the total buyouts insinuates, it should be

investigated what the drivers of this performance are. Understanding the performance related indicators LPs as well as GPs would have a rational pattern to evaluate the attractiveness of SBOs.

The doctoral thesis consists of the following three essays: Secondary Buyout Performance (Eschenröder (2019)), Performance Dependency of Secondary Buyouts on Primary Buyouts (Eschenröder and Hartmann-Wendels (2019)), and Risk of Financial Distress in Secondary Buyouts (Eschenröder and Hartmann-Wendels (2019)). The first essay has been the product of my own work only. Professor Hartmann-Wendels participated in the conception of the second and third essay. Still, I independently collected and evaluated the data set, carried out all the calculations, and structured and formulated the essays myself.

Based on an empirical analysis this dissertation contributes to find out the constellations, in which SBOs perform well. The first essay focuses on the general performance differences between PBOs and SBOs and examines in which situations SBOs may be worthwhile. The second essay explains how to engage in a successful SBO by displaying the dependency on the preceding PBO and the required action taken by the SBO investor. Lastly, the third essay analyses the risk of financial distress in PBOs and SBOs. It analyses the different risk profiles and answers the question whether SBOs are riskier than PBOs. These three essays offer a principle grid of indicators which determine the performance of SBOs.

The empirical analyses are based on an uniquely assembled dataset consisting of 295 UK based portfolio companies undergoing back-to-back buyouts. Their PBO entry is no earlier than 1996 and their SBO exit no later than 2017. The sample of buyouts is retrieved from several data providers, such as Capital IQ, Thomson Reuters Eikon, Prequin, and Mergermarket, and includes private data from a large German fund-to-fund manager. The dataset includes all information of the balance sheet and the profit and loss accounts at entry and exit of both, PBO and SBO, enabling in-depth analyses on fundamental data. Additionally, deal characteristics and the economic environment, in form of both the macroeconomic environment and a peer group of non-PE-backed companies, are also considered.

The first essay (Eschenröder (2019), Secondary Buyout Performance) digs deep into the performance differences between PBOs and SBOs rather than analysing their interaction and value drivers. With the ongoing search for the best investment opportunities of GPs, Degeorge et al. (2016) argue that investing into SBOs is costly for investors. However, this claim only holds if GPs have a perfect choice between investing in PBOs and SBOs, i.e. that a sufficient amount of potential PBO targets is available in comparison to potential SBO targets. As shown by the increasing levels of dry capital, GPs struggle to find suitable investment targets. Whereas SBOs provide a possible solution to missing investment opportunities, they may be the only sensible opportunity as potentially good PBOs are not available anymore. In this essay, the performance of SBOs is analysed, whilst considering this dilemma.

The in-depth analysis of SBOs and their preceding PBOs reveals new insights about the effective performance of SBOs. Different to the isolated view on SBOs, without considering the previous

PBOs, in this apples-to-apples comparison the performance evaluation is done by evaluating the SBOs' performance compared to its preceding PBOs of the exact same company. The full sample analysis signals that, by tendency, PBOs perform better than SBOs. SBOs, however, prove as very sensible investment opportunities when the investment environment is considered. The underperformance is strongly driven by size and time effects and, interestingly, diminishes in the time period after the financial crisis. The analysis of the data show that in recent times SBO do not perform worse. Assuming that most good PBO targets are already taken off the market, well-selected SBOs perform much better than the remaining worse performing PBOs. Thus, in the current market environment, the performance of SBOs indicates that SBOs can be attractive investment target.

After knowing that SBOs are not necessarily worse-performing, the second essay (Eschenröder and Hartmann-Wendels (2019), Performance Dependency of Secondary Buyouts on Primary Buyouts) analyses how to improve the performance in SBOs. The essay analyses how the value is created in SBOs depending on their preceding PBOs. The performance during the SBO is evaluated by considering the portfolio company's previous development during the PBO. Picking up on the assumption that SBOs only collect the low hanging fruits (e.g. Achleitner et al. (2014)), several indicators of potential PBO targets are identified that contribute to a better performance of an SBO. This essay provides a indicative guideline for the further performance improvement of an SBO which meets one of these selection criteria.

Most of the previous studies on SBOs find that SBOs in general significantly underperform PBOs (e.g. Achleitner et al. (2014)). However, a few studies find that SBOs do not necessarily underperform in certain situations (e.g. Degeorge et al. (2016)). In this empirical analysis, different value drivers of PBOs and SBOs are indentified. PBO investors expand the portfolio company, improve their profitability and improve the degree of innovation. Although, SBO investors further streamline the company, in form of profitability improvements, they do not also expand the company as much to create value and rather focus on efficiency gains. Further on, SBO investor should seek companies that expanded and improved their profitability margins during the PBO more than comparable public firms. On the contrary, companies with lower efficiency gains and worse returns on assets during the PBO compared to their competition are more suited for SBOs. Conditional on these indications, SBO investors indeed need to focus on similar measures to create further value but they need another approach to improve these measures. For example, whereas PBO investors increase profitability through margin improvement, SBO investors focus to enhance the profitability by increasing the return on assets.

From the performance point of view, SBOs are identified as promising targets for GPs. However, it might be different with respect to a risk-adjusted view. The third paper (Eschenröder and Hartmann-Wendels (2019), Risk of Financial Distress in Secondary Buyouts) concentrates on this topic by analysing the risk of financial distress in PE and its difference among PBOs and SBOs. The risk of financial distress in PE is measured by using the Altman Z-Score. Risk drivers are identified for both PBO and SBO. Based on these findings guidance is provided on

how to control risk in PBOs and SBOs.

The risk of PE transactions might be perceived as very high. This perception can, among other factors, be traced back to the high leverage involved in leveraged buyouts. Kaplan & Stein (1993) find that too much debt causes the capital structure to enhance the costs of financial distress. In combination with the finding of Axelson et al. (2013), who find that GPs use too much debt in their buyouts, this assumption can be justified. However, if the risk was as high as generally suggested, SBOs would not be an interesting investment target and, hence, GPs would not invest.

Interestingly, PE investors reduce the risk in the portfolio company more than comparable non-PE-financed companies. Furthermore, SBO investors reduce the risk significantly more than PBO investors in order to prepare an exit to non-financial buyers. However, the risk is driven by different indicators among buyout rounds. For example, the leverage does not affect the risk development during PBOs, whereas a higher leverage increases the risk of financial distress in SBOs. We find that GPs do not focus on the risk level in a specific buyout round, however, SBO investors are able to reduce the risk more in distressed companies compared to PBOs.

The findings of these essays indicate that investments in SBOs are likely to perform well. Performance and risk of these investments are not significantly different to PBOs if GPs understand the different approaches to optimize the portfolio company and use the appropriate drivers to create further value. The negative stigma of the SBOs' underperformance can be disproved. However, it is necessary to point out that GPs need some more understanding of the appropriate skill sets and the knowledge of the working drivers to create additional value in an SBO. At a first glance, the results of the analyses give some guidance to GPs where the potential drivers for value creation can be found. Lastly, the findings also contribute to the big picture that SBOs are indeed a worthwhile investment, which is not in conflict with the high share of SBOs in the total buyout market.

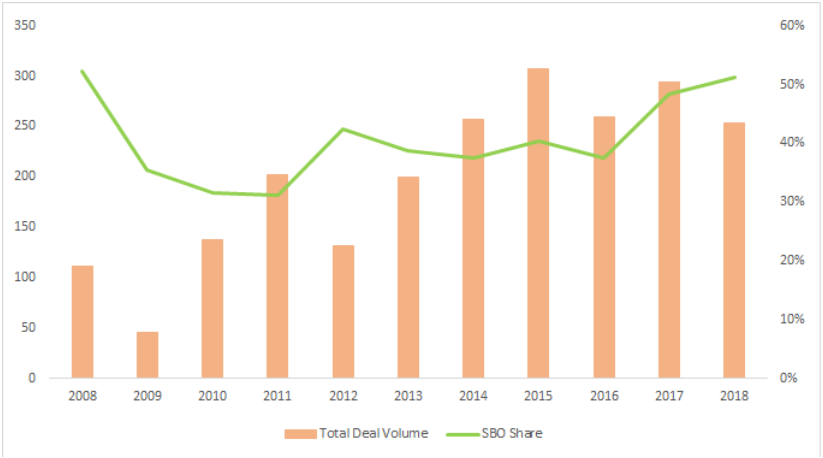
Chapter 2

Performance of Secondary Buyouts

2.1 Introduction

During the financial crisis private equity (PE) faced a tough time with a weak deal flow and low company valuations. Since this dip in activity and performance the PE market grew significantly (Figure 2.1). Besides a small setback around 2012 the volume of leveraged buyouts (LBOs) shows a steadily increasing trend and the growing appetite for PE investment is shown by the increase of raised capital of PE funds (Figure 2.2). The raised capital puts an eminent pressure on the general partners (GPs) to find attractive targets with promising potentials for value creation and, therefore, to achieve the expected and promised excess returns.

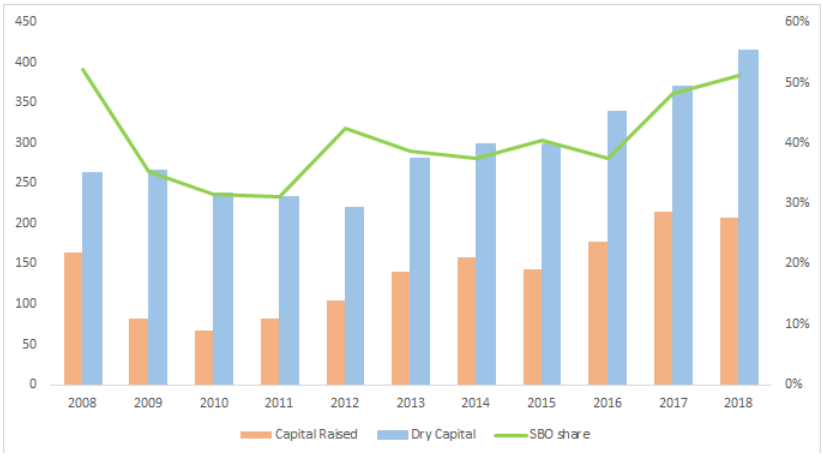
Figure 2.1: European Buyout Deal Volume



Source: Based on PitchBook (2018a).

Note: The graph shows the total deal volume of buyouts in EUR (billions) and the share of SBOs on the total deal volume.

Figure 2.2: European Dry Capital of PE funds



Source: Based on PitchBook (2018a).

Note: The graph shows the amount of PE funds' capital raised and the cumulated dry capital in EUR (billions). The share of SBOs on the total deal volume is plotted on the right Y-axis.

During the life time of the fund GPs aim to improve the acquired portfolio companies financially

and operationally. After having optimsed the value of the company, the portfolio company is exited. This exit can be executed either as an initial public offering (IPO), a trade sale to a strategic buyer or as a sale to another PE investor. IPOs often follow a lengthy and regulated process in which the outcome is difficult to predict and, thus, may not be in line with the typical well-structured PE investment process. Moreover, IPOs only seem to be superior to other exit channels when the equity markets are hot (Wang (2012), Jenkinson & Sousa (2015)). The trade sale of the portfolio company to strategic buyers tends to achieve a lower sales price compared to the sale to financial buyers (Achleitner & Figge (2014)). This exit might also be quite lengthy due to internal and external business procedures of the strategic buyer (e.g. antitrust filings, approval procedures). In contrast, a sale to a PE investor could be a win-win situation for the selling PE firm and the buying PE investor. The mindset and the objective of the investors, the dealing structures, and decision-making processes are similar, which supports a smooth and fast deal execution. In this case, the portfolio company is moving from a primary buyout (PBO) to a secondary buyout (SBO). SBOs have gained a lot of attention from practioners and academics. Meanwhile, SBOs represent more than 50 percent of all buyout deals.

The reasons to engage in an SBO from a buying perspective are not that obvious. The underlying portfolio company should have been optimised, and only limited potential to create additional value is left for another consecutive financial investor (Wang (2012), Jenkinson & Sousa (2015), Bonini (2015)). Degeorge et al. (2016) show that there still are possibilities to create value through additional skillsets of the consecutive financial sponsors. Achleitner & Figge (2014) argue that, if the portfolio company has not been fully optimised throughout the lifetime of the primary buyout (PBO), additional value creation might be possible. Jensen (1989) states that PE simply promotes a superior organisational structure than non PE-backed companies and this also leads to an ongoing better performance. Although these findings may explain the existence of SBOs in principal, they do not necessarily explain why SBOs have become increasingly popular and the share of SBOs is growing for years. This trend is triggered by two main effects. First, the raised capital of PE is drastically increasing. Therefore, more investments need to be made and attractive targets as PBOs simply cannot suffice the demand to invest. Second, SBOs might not perform as adversely as assumed so far when compared over time. Figure 2.2 reveals an aggregated correlation between the dry capital and the share of SBOs on the total buyout volume. It shows that fund raising steadily grows, whilst dry powder also increases. This development indicates that PE firms have problems finding adequate targets and that they may try to expand their pool of potential targets by considering SBOs.

However, it is more than ever necessary to scrutinize how the expected level of excess returns can be maintained by this high portion of SBOs. Therefore, this paper is dedicated to empirically examine the performance of SBOs by answering the following questions:

1. Is the performance of SBOs really worse or at least not better than the performance of PBOs?
2. Are SBOs means of last resort or is it still attractive to invest in SBOs?

Regression analyses on the total sample signal an underperformance of SBOs compared to PBOs in general. However, the underperformance is not consistent in all areas of PE investments. Subsampling shows that the underperformance in certain areas is driven by the progress of the portfolio company's business cycle. The underperformance used to be more pronounced before the financial crisis. In the current environment PBOs and SBOs do not perform significantly different from another. However, GPs do not have a perfect choice between investing in good PBOs and comparable SBOs. Faced with the choice of investing in PBOs or SBOs, GPs should focus to invest in good SBOs rather than in the remaining bad PBO targets as those SBOs develop much better in most aspects.

By answering the above mentioned questions, this paper contributes to the literature in several ways. First, the dataset for general performance analyses is superior in several ways compared to previous studies. This paper is able to use a dataset of consecutive buyout rounds rather than a random selection of buyouts for the performance evaluation of SBOs. The dataset used in this paper does not only have the most observations in this setup but is also more recent, which allows to consider the latest developments of SBOs. The analyses use considerably more performance variables and perform a variety of additional robustness checks. Second, this paper analyses how the performance differences are driven and finds that the performance depends on the size of the portfolio company and the time of investment. Third, to my knowledge, it is the first paper that applies percentile regressions to get a more representative view on the performance distribution of PBOs and SBOs. These analyses provide arguments as to why the share of SBOs is that high and put the share in context of the current development of the PE market.

The next chapter discusses the literature in the research areas of PE and in particular SBOs. In Chapter 2.3 the data sample and the calculation of the variables are presented. The summary statistics provide further insights into the dataset and are the base for further empirical analyses in the following chapter. Several robustness checks are performed in a separate chapter of this paper. The conclusion finishes the paper.

2.2 Theoretical Background

2.2.1 PE Performance

After the acquisition of portfolio companies, PE firms aim to improve acquired companies both operationally and financially in order to create higher value throughout the holding period. When the PE business first started, GPs relied solely on the concept of LBOs in which the return on the invested capital is increased drastically by loading up the company with great debt levels. At this early time of the PE business, Jensen (1989) states that LBOs make use of high proportions of debt of approximately 60-90 percent of the total capital. Korteweg (2010) confirms this result by stating that GPs set a high leverage as optimal capital structure. Achleitner

et al. (2010) further show that, especially for large companies, GPs implement high leverage as the optimal capital structure. It is assumed that agency costs are reduced as managers are incentivised to perform well (Jensen & Meckling (1976), Jensen (1986)). After loading up the portfolio company with debt, the manager needs to generate sufficient cash flows to cope with the increased interest payments and, eventually, the repayment of the loans. Wright et al. (1994) further recognize that high levels of debt require more rigorous monitoring to ensure less risky operations. Despite greater default and liquidation risks of portfolio companies, interest rates can be deducted from the tax exposure and thus create tax shields. These tax shields affect the performance positively (Lerner (2011) Wright et al. (2009), Kaplan & Strömberg (2009)).

This strategy works well when the financial markets allow the easy improvement of capital costs by increasing leverage. However, when debt markets overheated, PE firms needed other means to realize their outperformance (Matthews et al. (2009)). Consequently, PE firms focussed on the improvement of their operations by increasing the efficiency and profitability of their investments (De Fontenay (2014)). Operational engineering is provided in several forms, such as sales expansion, cost cutting, production development, add-on acquisitions or restructuring (Acharya et al. (2012), Lee et al. (2001), Wright et al. (2001)). These measures often come along with the hiring of experts for skill transfer into the company (Wright et al. (2009)). PE firms are able to strongly improve the operations of their portfolio companies compared to their non PE-backed peers, such as increasing the operating sales margin and the cash conversion (Kaplan (1989), Smith (1990)). Lichtenberg & Siegel (1990) find that the total factor production of PE-backed companies improves more than of non PE-backed ones. Further, they find that less labour and capital is needed to achieve a certain level of output. The management of inventory and working capital can be improved more in PE-backed companies as well (Wright et al. (1992)). These improvements of portfolio companies often come at the expense of higher capital expenditures and research and development costs (Bruining et al. (2005)). Whereas the mentioned findings all describe the development during the holding period, other research finds that PE investors tend to invest into less structured companies with inferior monitoring practices and a generally worse management (Cuny & Talmor (2007), Wright et al. (2001)), showing that GPs aim to find potentially large value creation gaps to exploit them.

Improvements in the areas of financial and operational engineering describe the intrinsic value creation of the company. According to Perembetov et al. (2014), value creation is achieved by 51 percent operational engineering, 31 percent financial engineering, and 18 percent multiple effects through negotiation and market timing. Kaplan (1989) shows that portfolio companies outperform their non PE-backed peer group, which is confirmed by other studies as well (Lehn & Poulsen (1989), Weir et al. (2005), Groh & Gottschalg (2008), Guo et al. (2011)). However, Guo et al. (2011) show that PE-backed companies do not necessarily perform better than non PE-backed companies, already indicating that the performance difference may have changed over time. Phalippou & Gottschalg (2009) even find an underperformance of PE when considering risk-adjusted returns.

2.2.2 Performance SBOs

As PE aims to find and exploit value creation gaps, those gaps should be closed during the holding period of the PBO. This assumption puts the performance of SBOs in question. In the following, the literature on SBO performance is presented, and it is further discussed whether SBOs are worthwhile investments.

The evidence about the financial leverage of SBOs is rather mixed. Achleitner & Figge (2014) postulate that GPs generally use, by and large, the same skill set throughout both buyout rounds and thus the only way to create additional value during the second buyout round is by increasing the leverage. In contrast, Wang (2012) points out that PBOs should have applied an efficient financial engineering and thus have found an optimal capital structure, which should not be changed during the SBO. Empirical analyses strongly differ according to the construction of the dataset and the underlying working market conditions. Whereas some papers observe a greater leverage in SBOs than in PBOs (Achleitner & Figge (2014), De Maeseneire & Brinkhuis (2012)), others do not find a significant difference (Arcot et al. (2015), Bonini (2015)). However, the tendency of these studies' findings is to increase the leverage rather than decreasing it. The results may be traced back to the fact that the probability to engage in an SBO is significantly higher when the underlying company possesses a great debt bearing capacity (Achleitner & Figge (2014)). Apparently, GPs select their companies according to the ability to absorb the forthcoming gearing.

Picking up on the theory about exploiting the value creation gap of a company, there are several reasons why the full value creation could not have been completed during the PBO (Achleitner & Figge (2014)). Firstly, the fund that incorporates the portfolio company has a limited lifespan. When the end of the fund lifetime is about to be reached, GPs are forced to sell the portfolio company early (Jenkinson & Sousa (2011)). Secondly, some GPs may not be able to fully exploit the whole value due to missing knowledge and skills. Another GP with complementary skill sets may be able to add further value by focusing on other parts of the value creation (Wang (2012)). Degeorge et al. (2016) even find that complementary skill sets can lead to an outperformance of SBOs compared to PBOs. These skill sets include specialisations in industries, technologies and geographies (Rigamonti et al. (2016)) or advancements in the different stages of the business cycle of the company (Jenkinson & Sousa (2011)). Lastly, when GPs need to raise capital for new funds, they may wish to sell some portfolio companies to realise the return on those investments (Jenkinson & Sousa (2011), Wang (2012)). The realised performance can be used for marketing purposes in upcoming fund raisings. It may also happen that there is less improvement potential left within this buyout round towards the end of the holding period. Despite the above mentioned explanations of further value creation potentials, Achleitner & Figge (2014) argue that most value drivers have already been implemented during the PBO and, thus, only little additional value can be created during the SBO. Other research finds that portfolio companies, in general, have better organisational structure compared to non PE-backed companies (Jensen (1989)). This observation could imply that SBOs may perform

just as well as PBOs as the company structure and the general PE-mindset are the base for further value creation. Rappaport (1990), however, argues that the structural benefit is a one-off effect and that the structure of the portfolio company should eventually turn back to its former, non PE-backed form.

The findings, so far, show that the performance of SBOs tends to be worse compared to PBOs. Most authors, such as Achleitner & Figge (2014), find an underperformance of SBOs relative to the PBO performance. Degeorge et al. (2016) state that, generally, SBOs have low average returns when potential targets are acquired with buying pressure. However, they also show that without buying pressure SBOs are able to perform just as well as PBOs. Still, as buying pressure is omnipresent, Axelson et al. (2013) show that GPs may be incentivised to invest into lower performing portfolio companies to receive fees on the invested capital.

2.3 Data

2.3.1 Explanation of the Sample

Many studies about SBOs face three essential problems regarding their datasets. First, the number of observations is often very small. This feature is also in the nature of PE studies as the number of deals is relatively low compared to other investment types. Also, the data availability for those deals is quite limited as the companies are taken private and in many countries it is not mandatory to publish the portfolio companies' financial accounts. Furthermore, due to the definition of SBOs, quite a long time period is necessary to analyse those deals. This restriction significantly limits the availability of closed deals' data within a specific period of time. As a large number of SBOs have been executed recently, only few observations are analysed over the last decades. Second, in order to solve the aforementioned problem of limited sample size, many studies aim to include as many SBOs as possible and thereby creating a mismatch in the data outline. These studies often compare and analyse very heterogeneous companies across the two buyout rounds, making isolated regressions very difficult. Lastly, PE studies suffer a lot from survivor bias when only public data providers are considered, since only successful deals may be published. Companies, which have been liquidated or had a poor development over the investment horizon, might not be listed in these data bases. As a result, PE-backed companies often outperform non-PE backed companies according to these studies.

The underlying dataset of this paper focusses on the PE market in the UK. First of all, it is assumed that the UK market is a good proxy for the overall PE industry of developed countries. The PE market in the UK has the highest activity in Europe in terms of quantity of transactions and deal volume, which in turn is the second most active continent after the North American market (PricewaterhouseCoopers (2019)). More importantly, in the UK also private companies need to publish their financial accounts regularly. This fact ensures a good level of detail for the analyses of the financial and operative performance.

In order to compile the initial list of companies that underwent at least one financial buyout, I searched several data providers such as Capital IQ, Thomson Reuters Eikon, Prequin, and Mergermarket for all PE transactions that were labelled financial buyout and secondary buyout. To avoid the charge of an underlying selection bias in this sample, I further used non-public data from a large fund to fund manager, which also include underperforming investments. The analysed companies have their SBO entry earliest in 1996 because most data providers started their search engine for PE transactions in 1996. The latest year for the transaction date is 2017. Analysing the fundamental data of the underlying portfolio company, a sufficient amount of time is required between the exit date and the time of the analysis for the company to publish its accounts. Even after a very quick turnaround of the company, a company requires at least one year to publish its results after the exit. Thus, the total initial list displays all available transaction dates of financial buyouts in the UK from 1996 to 2017. Afterwards, all financial buyouts other than SBOs were eliminated by individually looking at the timeline of the transaction for these companies. This procedure is important as the analyses are based on the direct difference between PBOs and the consecutive SBO rather than between two different SBOs. I end up with the company names that underwent an SBO and the accompanying date of the SBO entry, and, thereby, due to the construction of the dataset, the exit date of the PBO. In the next steps, I collected the entry date of the PBO and the exit date of the SBO. Therefore, I retrieved the list of PBO and SBO exits from the same data providers and matched those lists with the initial existing list. However, for most observations at least one of the dates was still missing. In case of missing dates, I hand-collected the dates from news reports, the deal publication of the PE firms, and the portfolio companies' website. Those companies for which no clear PBO entry date or SBO exit date could be identified, have been eliminated from the dataset.

After knowing the three transaction dates of the companies, I retrieved the fundamental data for these companies at the time of the respective transaction. There are three sensible and consistent ways on which financial statements can be chosen for the purposes of the analysis. The first possibility is to capture the whole investment period, i.e. using fundamental data from before the entry date and after the exit date. This method has the advantage of capturing the whole treatment effect of the underlying buyout. However, if the time span between the transaction date and the financial statement is too long, there might be some other, unwanted non-treatment effects in the observations. Second, it is possible to capture less independent effects of the treatment, i.e. using the financial statements after the entry date and before the exit date. The problem with this method is that some quick adjustments may have already happened and, thus, the development throughout the treatment cannot be observed. As an example, the implementation of leverage happens at the beginning of the investment period, and it is assumed that the leverage is reduced over the time of the investment period (Phalippou & Gottschalg (2009)). Lastly, it is possible to choose the financial statements that are the closest to the actual transaction date. This method allows to minimize the disadvantages of the first two possibilities because the time difference between the financial statement and the

Table 2.1: Variable Overview

Name	Description
Company Specific	
Valuation Growth	The portfolio company's compound annual growth rate in valuation.
Sales Growth	The portfolio company's compound annual growth rate in sales.
Total Assets	The portfolio company's total assets including all fixed assets and current assets at the time of the respective transaction.
Equity Growth	The portfolio company's valuation compound annual growth rate.
Employees	The portfolio company's compound annual growth rate in number of employees.
EBITDA Margin Growth	The development of the EBITDA margin between the investment exit and investment entry divided by the years of the holding period.
EBIT Margin Growth	The development of the EBIT margin between the investment exit and investment entry divided by the years of the holding period.
Profit Margin Growth	The development of the profit margin between the investment exit and investment entry divided by the years of the holding period.
Return on Equity Growth	The development of the return on equity between the investment exit and investment entry divided by the years of the holding period. Return on equity is defined as profit over equity.
Return on Assets Growth	The development of the return on assets between the investment exit and investment entry divided by the years of the holding period. Return on assets is defined as EBITDA over total assets.
EBITDA Employees Ratio Growth	The development of the EBITDA employees ratio between the investment exit and investment entry divided by the years of the holding period. This variable is defined as the EBITDA over number of full-time employees.
Current Ratio Growth	The development of the current ratio between the investment exit and investment entry divided by the years of the holding period. The current ratio is defined as receivables over current liabilities.
Cash Ratio Growth	The development of the cash ratio between the investment exit and investment entry divided by the years of the holding period. The cash ratio is defined as cash over current liabilities.

Table 2.1 Variable Overview – continued from previous page

Name	Description
Inventory Sales Ratio Growth	The development of the inventory sales ratio between the investment exit and investment entry divided by the years of the holding period. This variable is defined as stocks over sales.
Receivables Turnover Ratio Growth	The development of the receivables turnover ratio between the investment exit and investment entry divided by the years of the holding period. The receivables turnover ratio is defined as sales over debtors.
Working Capital Growth	The development of the working capital ratio between the investment exit and investment entry divided by the years of the holding period. The working capital is defined as the difference between current assets and current liabilities.
Leverage Ratio Growth	The development of the leverage ratio between the investment exit and investment entry divided by the years of the holding period. The leverage ratio is defined as liabilities over equity.
Operative Leverage	The development of the operative leverage ratio between the investment exit and investment entry divided by the years of the holding period. The operative leverage ratio is defined as liabilities over EBITDA.
Deal-Specific	
SBO Dummy	Dummy variable that indicates whether the deal is a secondary buyout. Variable is equal to one when the underlying deal is a secondary buyout.
Holding Period	The time (in years) the investors holds the portfolio company during the first and second buyout, i.e. the time difference between the first and second transaction date and the time difference between the second and third transaction date.
GICS Dummy	Dummy variables that indicates the industry classification of the portfolio company. The classification is based on the 8-digit sub-industry GICS code.
Holding Period	The amount of time (in years) that the portfolio company is held in the fund's portfolio.
Company Age	The age (in years) of the portfolio company at time of the investment entry.
PE Firm Age	The age (in years) of the financial sponsor at time of the investment entry.
Macroeconomic	
Inflation Rate	The annual inflation rate in the UK at time of the buyout entry.
Credit spreads	The difference between the Moody's BAA bond index and the UK government bond
Employment Rate	The proportion of employed working people on the total number of working people at time of the buyout entry.
GDP Index	The GDP index with 1996 indexed at 100.

Note: The table above presents all measures that are used in this study. All of those ratios are calculated for the portfolio companies during both PBO and SBO. The excess developments are computed as the development difference to the close peer group. The table shows both company-specific data and deal-specific data.

transaction date on average is smaller compared to the other methods. Hence, the average treatment effect should be isolated in the best possible way and thus serves well for this study. For that purpose, I checked the availability of financial statements for the years closest to the three transaction dates. For many cases the balance sheet and profit and loss statement were published, however, only in rare cases also the cash flow statement was available. Therefore, I retrieved the full financial statements available and additional information on the number of employees. Table 2.1 explains the variables that have been used and calculated in this study. The final dataset consists of 295 portfolio companies, equalling 590 PE deals and 885 transactions with the financial and operative development during the buyouts.

2.3.2 Calculation of the Relevant Variables

This study compares and analyses the difference in performance measures between PBOs and SBOs. For that purpose, performance needs to be defined. The term performance indicates some form of development over a period of time of a specific operational or financial variable. For that purpose, I calculate the change of the underlying performance measures considering the time spent on achieving that change. The variables, for which both nominator and denominator stay positive throughout the time of the observation, are calculated with the compound annual growth rate (CAGR) measure,

$$CAGR_{i,t}(X) = (\frac{x_{i,t}}{x_{i,t-k}})^{1/k} - 1 \tag{2.1}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the holding period of the investment.

In this study, I calculate the variables company value, sales, total assets, and number of employees with the CAGR. The measure company value was not retrieved but internally valued with a valuation approach using trading multiples (for reference see Eschenröder & Hartmann-Wendels (2019)).

The other category includes those variables that may be negative or positive during the buyout. For those variables CAGR is not a sensible measurement as one cannot differentiate between a negative and positive development. Thus, I calculate the annual average development as

$$Growth_{i,t}(X) = (\frac{x_{i,t} - x_{i,t-k}}{t-k}) \tag{2.2}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the holding period of the investment.

This paper does not only investigate which buyout round generally performs better, but also which buyout round performs better compared to its close peer group. In this way, the economic environment can be included and interpreted as well. In order to capture the development of the competition, the excess development of the underlying variables is calculated. Bonini (2015) uses this approach as his base measurement of performance. In this paper, it rather acts as

additional information and robustness check. The excess development is calculated as follows:

$$d_{i,p} = (x_i - m_p) \tag{2.3}$$

where x_i is the performance indicator x for company i and m being the median of the performance indicator of peer group p.

The identification of the close peer group is, therefore, crucial to gain reasonable insights for this measure. This means that every company is matched with non PE-backed companies that share similar characteristics with the underlying portfolio company. The pool of potential peers is retrieved from Compusstat database and includes only listed companies, as the performance of these companies can be tracked well throughout time. All public companies are either from the UK or the US for several reasons. The perfect peer for our UK sample should be from the UK as well. However, when the number of close peers within the country of interest is limited, a country with similar characteristics can improve the comparison by providing more potential peers (Schreiner (2009)). Especially for large companies, it is hard to find a perfect fit and thus the range of companies should be enlarged. For all those potential peers, the same fundamental data are retrieved as it has been done for the sample companies. Like Guo et al. (2011), this study applies a pre-performance matching, i.e. finding a peer group before the activity begins. Due to the setup of this consecutive data set the matching is done twice, once before the PBO and once before the SBO. I adjusted the peer group between the two buyout rounds, as in many cases the investment period may take a long time and the peer group that was a good match at the beginning of the PBO may not be a good comparison at the time of the SBO.

Out of the pool of potential peers, the five closest companies are identified. Unlike Barber & Lyon (1996) who apply an industry-size-year matching, I include the company's profitability as well for two reasons: First, ceteris paribus a company should develop differently when it operates at a very high profitability compared to a company that generates losses from year to year. Second, as this study also analyses the development of profitability, the peer group should have a similar starting point to enable good comparison. This approach is also suggested by Bhojraj & Lee (2002). Thus, the peer group is listed in the same year as the entry year of the buyout. As the performance is tracked throughout the holding period, the peer company needs to be still listed in the year of the buyout's exit. As proposed by Alford (1992), the companies should have a similar size and, therefore, the total assets should not deviate by more than 50 percent from the portfolio company. Profitability, measured as EBITDA over total sales, should not deviate by more than 25 percent and should have the same sign. The industry match is done based on GICS codes as they perform very well among the common industry classifications (Bhojraj et al. (2003)). I follow the procedure of Alford (1992) to start with the most detailed classification. If there are not enough matches, then the next level of classification code is considered. If more than five matches have been identified, I select the five peers with the smallest difference in size. Five peers seem to be a reasonable choice for a good peer group size because it is seen as neither too small nor too large (Bhojraj & Lee (2002),

Pereiro (2002), Schreiner (2009)).

After the identification of the closest five peers, the performance indicators are calculated like it was done for the sample companies. For all performance measures the median of the peer group is calculated to set the benchmark for comparative performance. The median provides a smoothed performance development and is, therefore, a common choice for benchmarks.

Winsorisation is often used before the analyses to cope with potential outliers. After plotting several developments, it was quite clear that several outliers exist in the dataset. Robust regressions with MM-estimations showed deviations from the original regression, indicating that there might be outliers that distort the results of the regression. For that purpose, I followed Jenkinson & Sousa (2015) and applied a five percent winsorization level.

2.4 Performance Difference between PBOs and SBOs

2.4.1 Variable Selection

The empirical analysis uses various variables that measure operational and financial performance. In this study, these variables are grouped into clusters that analyse a similar category of performance. Using several clusters containing similar measures has mainly three reasons. First, as the observed companies operate in different industries, it may be sensible to look at several performance measures that are more suitable for certain industries. Second, the general idea is to cluster several variables in order to explore trends rather than specific measures. Third, these clusters provide further robustness to the underlying study.

The first cluster covers all these variables that pertain to company growth, i.e. they are proxies for company expansion. The first variable is the growth of the company's valuation. The overall value development of a company is commonly referred to as a company's performance. Further, the development of all underlying variables ultimately determines the company value and thus provides a good indication about overall performance of a company. For some purposes, however, it might be interesting to go into more detail and thus analyse the drivers of a certain development. The development of total sales, for example, is crucial to every company for several reasons. Increasing sales represents a growing market and/or market share, both of which might be beneficial to the company. I further analyse the development of equity because it provides a less volatile view on the past performance than the profit and loss statement. Total assets and the number of employees describe the resources of a company. Some companies require a high degree of total assets, e.g. heavy machinery, whereas other companies are very focussed on the labour activity, e.g. marketing agencies. For that purpose, I analyse these two means of resources as they build the fundament of company growth.

The second cluster describes those variables that measure the profitability of a company. Generally, there are two categories. The first category belongs to those variables that explain the operative earnings in relation to the achieved revenues, namely EBITDA margin, EBIT mar-

gin, and profit margin. The other category describes those measures that show the operative earnings in relation to the sales of the company. All three variables of the first cluster are independent of the resources to reach the operative earnings. It foremost analyses how the company manages its overall costs. The EBITDA margin is ideal for analysing the clear operating profitability without considering the effects of high depreciation and amortization. The EBITDA per employee is meant to capture the profitability in relation to the required workforce for companies that have a greater exposure to labour markets. The EBIT margin further includes a deduction of depreciation and amortization to assess the amount of assets that were necessary to reach that certain earnings. Especially when looking at different industries, e.g. asset based industry and service providers, it may be interesting to look at both measures to provide a better comparability according to the importance of depreciation and amortization to the operations of a business. Lastly, it is necessary to look at the profit margin, as this measure also incorporates the interests and taxes. Whereas it is assumed that there are only limited possibilities to change the effective tax rate, PE investments often go along with high leverage and, thus, the interest payments should be considered for a comprehensive study of its overall performance. In contrast, the measures for return on assets and return on equity are also necessary to analyse because they put the achieved earnings in relation to the company's size. These variables provide a different perspective as balance sheet items generally are less volatile than positions in the profit and loss accounts. Thereby, it is crucial to differentiate between equity returns and assets returns because financial engineering may drastically inflate the total assets.

In the third cluster, I analyse other variables that are operatively relevant but have a rather indirect effect. The current ratio and the working capital both describe the relation of current assets to current liabilities. Whereas the current ratio describes the proportion of current assets to current liabilities, the working capital ratio describes the difference between current assets and current liabilities in relation to its total assets. These liquidity ratios demonstrate the short term ability to meet obligations and thus are relevant for the risk perception of a company. The cash ratio may also be relevant for high risk investments as it conservatively calculates the ability to directly repay short term obligations with cash and cash equivalents. The inventory sales ratio describes the efficiency of a company to sell off its inventory. Reducing the necessary average inventory for achieving a certain sales number should usually lead to a cost reduction and consequently to an improved profitability. The receivables turnover ratio is analysed to further understand how effectively the company is able to collect the receivables outstanding and turning it into sales. This is ultimately important when considering cash flow generation for portfolio companies.

The last cluster covers the measures for leverage. Applying financial engineering is one of the key components of PE value creation and thus needs to be analysed. Firstly, profitability may be increased due to tax shields. Secondly, the return on equity to investors may be improved. For these reasons, I analyse both the financial and the operative leverage, i.e. both the proportion of liabilities to equity and the proportion of liabilities to operative earnings, respectively. To

Table 2.2: Cross Correlation Table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Valuation CAGR	1.000																
(2) Sales CAGR	0.205	1.000															
(3) Total Assets CAGR	0.080	0.220	1.000														
(4) Equity Growth	0.024	-0.145	-0.240	1.000													
(5) EBITDA Growth	0.103	0.511	-0.071	0.115	1.000												
(6) Profit Growth	0.092	0.287	-0.136	0.186	0.895	1.000											
(7) Current Ratio Growth	0.014	-0.003	-0.001	0.004	-0.002	-0.002	1.000										
(8) Cash Ratio Growth	-0.001	-0.062	-0.092	0.012	0.041	0.048	0.008	1.000									
(9) Inventory Sales Growth	-0.304	-0.402	0.034	-0.002	-0.205	-0.211	0.001	-0.008	1.000								
(10) Receivables Turnover Growth	0.015	0.626	-0.086	-0.001	0.812	0.664	-0.002	0.051	-0.042	1.000							
(11) Working Capital Growth	-0.014	0.060	0.023	0.009	0.045	0.037	0.044	0.353	-0.019	0.006	1.000						
(12) Leverage Growth	0.003	-0.003	-0.009	0.001	0.007	-0.003	-0.004	0.009	0.002	-0.004	0.002	1.000					
(13) Operative Leverage Growth	-0.047	-0.259	0.055	-0.406	0.038	0.107	-0.001	0.048	0.006	-0.041	-0.044	-0.025	1.000				
(14) log(Total Assets)	-0.022	-0.084	-0.288	0.101	-0.067	0.003	-0.013	0.080	-0.027	-0.049	-0.002	0.070	-0.056	1.000			
(15) log(Holding Period)	-0.115	-0.134	-0.212	0.074	0.000	0.012	-0.019	0.173	0.030	-0.022	0.176	0.000	0.011	-0.050	1.000		
(16) log (Company Age)	0.030	-0.064	-0.107	0.017	0.014	0.039	0.021	-0.013	0.002	0.049	-0.079	-0.013	-0.005	0.138	-0.088	1.000	
(17) log(PE Firm Age)	-0.085	-0.039	-0.058	0.030	0.039	0.036	-0.069	-0.027	0.050	0.024	-0.038	-0.017	-0.007	0.112	0.006	0.018	1.000

Note: The table above shows the correlations of all relevant variables used in this study. Most of the correlations are not relevant to this study as most of the variables are not in the same regression at the same time. The relevant correlations do not raise concern about multicollinearity.

further check the robustness, I analyse the net of cash measures for both financial and operative leverage. Multicollinearity for all observed data should not be an issue as can be inferred from the correlation matrix in Table 2.2. Also, the variance inflation factors do not signal any concern.

2.4.2 Summary Statistics

Table 2.3 shows the results of the summary statistics for the final dataset of 590 buyouts and provides first insights into the underlying data sample. The statistics are split into three categories. Firstly, the full sample is displayed. Afterwards, I present the data of PBOs and SBOs individually. In order to recognize initial performance differences between the PBO and SBO, Wilcoxon ranksum test and nonparametric equality-of-medians tests are performed. The first part of the table shows the investment characteristics about the buyouts themselves. The second part of the table illustrates the development of the chosen variables over the holding period of the buyout.

The portfolio companies are held approximately 54 months on average, which is in line with Achleitner & Figge (2014). Interestingly, neither the mean nor the median holding period are significantly different among PBO and SBO, indicating that the structure and process of the two buyout rounds is quite similar after all. Per definition of the dataset, the investment year and the company age at the time of the investment are significantly different from each other, as the consecutive SBO will occur later than the PBO. More importantly, the mean and median of the investment year are both around 2007 and 2008, which means that quite a lot of deals may have taken place around the financial crisis, arguably the roughest time within this sample for PE activity. The average company age is with about 28 year quite mature, however, the high standard deviation clearly shows that the buyouts in this sample do not necessarily target a specific company age. The financial sponsor's age does not differ significantly across buyout rounds, however, with a slightly higher mean and median for PBOs.

In terms of performance, a lot of variables are significantly different among PBOs and SBOs. For those variables that explain the expansion of a company, the growth of valuation, sales, and total assets are significantly higher in PBOs than in SBOs. The other variables in this cluster are not significantly different across buyout rounds. In terms of the development of profitability, the first insights indicate that PBOs are able to improve the profitability better than the consecutive SBOs because four out of six possible measures are significantly greater for PBOs. Lastly, the financial leverage is not significantly different between the buyout rounds, only operative leverage seems to be different. Generally spoken, it seems that, if there is a significant difference in performance, PBOs perform better than SBOs.

2.4.3 Methodology

This study is based on the performance analysis of consecutive deals of the same portfolio company. Due to that setup, the underlying dataset is arranged as panel data and, thus,

Table 2.3: Summary Statistics

	Total				PBO				SBO			
	Mean	SD	Median	Obs	Mean	SD	Median	Obs	Mean	SD	Median	Obs
Panel A: Information at Buyout Entry												
Years Held	4.10	2.55	4	590	4.06	2.44	4	295	4.15	2.65	4	295
Start Year	2005.30	4.34	2005.50	590	2003.05	3.71	2003	295	2007.55***	3.73	2007***	295
PE Firm Age	25.74	32.11	19	590	28.41	36.52	20	295	23.06	26.80	18	295
Company Age	27.69	34.24	17	590	25.48	34.28	15	295	29.90***	34.10	20***	295
Total Assets	94496	346381	26967	590	65561	145865	19987	295	123432	466274	36442	295
Panel B: Information about Growth during Buyout												
Valuation	1.23	0.46	1.17	590	1.24	0.48	1.17	295	1.23	0.45	1.15	295
Sales	1.18	0.24	1.11	590	1.23	0.26	1.16	295	1.14***	1.14	1.09***	295
Total Assets	1.18	0.23	1.13	589	1.22	0.25	1.18	295	1.13***	0.20	1.09***	294
Equity Asset Ratio	0.11	0.18	0.06	590	0.12	0.18	0.07	295	0.95	0.17	0.06	295
Employees	1.10	0.18	1.06	539	1.12	0.19	1.07	265	1.09	0.16	1.05	274
EBITDA Margin	0.05	0.12	0.02	589	0.08	0.13	0.03	295	0.03***	0.10	0.01***	294
EBIT Margin	0.04	0.10	0.01	590	0.06	0.11	0.02	295	0.02***	0.09	0.01***	295
Profit Margin	0.05	0.11	0.01	590	0.06	0.12	0.02	295	0.03***	0.11	0.01***	295
Return on Equity	- 0.19	0.30	- 0.01	588	- 0.00	0.29	0.00	294	- 0.03	0.31	- 0.01	294
Return on Assets	- 0.00	0.06	- 0.00	589	0.00	0.05	0.00	295	- 0.01	0.06	- 0.00	294
EBITDA/ Employees	1.59	9.16	0.40	538	2.81	9.05	1.27	265	0.41***	9.12	- 0.02***	273
Current Ratio	0.08	0.39	0.03	589	0.08	0.37	0.35	295	0.08	0.41	0.02	294
Cash Ratio	- 0.05	0.14	- 0.01	589	- 0.05	0.14	- 0.01	294	- 0.05	0.14	- 0.01	295
Inventory Sales Ratio	- 0.00	0.01	- 0.00	590	- 0.00	0.01	0.00	295	- 0.00	0.01	0.00	295
Receivables Turnover	- 0.29	1.32	- 0.05	584	- 0.38	1.38	- 0.13	294	- 0.20	1.25	- 0.06*	290
Working Capital	- 0.05	0.10	- 0.03	589	- 0.04	0.10	- 0.02	295	-0.07***	0.11	- 0.04***	294
Leverage Ratio	2.62	32.33	- 0.059	590	3.49	37.08	- 0.07	295	1.76	26.79	- 0.05	295
Net Leverage Ratio	2.36	28.56	- 0.024	590	3.26	33.48	- 0.04	295	1.46	22.62	- 0.02	295
Operative Leverage	- 5.04	77.75	- 0.09	589	4.08	68.58	- 0.11	295	- 14.20	85.12	- 0.08	294
Net Operative Leverage	- 5.13	75.84	- 0.06	589	3.72	66.47	- 0.06	295	- 14.02	83.38	- 0.06	294

Note: The table above presents the summary statistics of 295 companies with their development during the PBO and the consecutive SBO. The summary statistics shows the data distribution of the whole dataset, and the PBO and SBO, seperately. It also presents the difference for all analysed variables between the PBO and SBO, measured by Wilcoxon ranksum and non-parametric median tests. The significance levels for the mean difference and median difference test between PBO and SBO are ***0.1%, **1% and *5%.

a panel regression model is used. This may be advantageous as unobserved effects may be explained to a greater degree. The model is defined as follows.

$$y_{it} = \alpha + \beta * X_{it} + \epsilon \tag{2.4}$$

where α is the y-intercept, β is the coefficient of the firm-specific variable X for firm i at transaction date t. ϵ is the error term of the regression.

I use a random-effects model as the Hausman-test yields statistically indifferent estimates on the 10 percent level (Hausman (1978)). The modified Wald test suggests heteroskedasticity in the regression models. Thus, in order to counteract potential heteroscedasticity, I use robust Huber-White-sandwich estimates of variance.

For all clusters of target variables, the same independent variables are used. The only variable of interest is the SBO dummy variable. This variable identifies the difference in the performance measure between PBO and SBO. Total assets are used to control for the company size. Similarly, the company age is included in the regression to control for the advancement of the business cycle. Further, I include the holding period as all measures in this study are expressed as developments over time. The PE firm age is used to express the degree of experience that the involved financial sponsor brings with the investment. Controlling for leverage ratio is rather important in leveraged buyouts as the leverage at entry of the investment indicates the debt bearing capacity and, thus, the opportunities of the underlying investment. The GDP index, the inflation rate, the unemployment rate, and credit spreads account for the macroeconomic environment. Lastly, I control for time and industry effects.

2.4.4 Results

Table 2.4 reports the results of the random-effects regression analysis for all those variables that represent company expansion. The specifications (1) to (5) use the dependent variables company value CAGR, sales CAGR, total assets CAGR, equity growth, and employees CAGR. The specifications (6) to (10) use the same variables but computed as an excess measurement compared to its peer group of public companies. Out of the mentioned six dependent variables, two are significant, namely sales CAGR and total asset CAGR. Both specifications have a negative coefficient for the SBO dummy, showing that SBOs have a significantly lower sales growth and total assets growth over the investment horizon. The same is true for the equivalent excess measures. PE firms may not wish to increase total assets any further during the SBO as they may try to use the high level of assets more efficiently. Further, the expansive sales strategy cannot be continued for the second buyout round as the momentum may be gone or the short-term potential has been used up (Acharya et al. (2012)).

Table 2.5 reports the results of the random-effects regression analyses for those variables that represent the change in profitability and efficiency of the portfolio companies. The specifications (1) to (6) use the change in EBITDA margin, EBIT margin, profit margin, return on equity,

Table 2.4: Development of Growth Variables

	Normal					Excess				
	Valuation	Sales	Total Assets	Equity	Employees	Valuation	Sales	Total Assets	Equity	Employees
SBO	-0.035	-0.053*	-0.062**	-0.019	-0.014	-0.042	-0.069**	-0.078***	-0.012	-0.015
	(0.45)	(0.02)	(0.00)	(0.27)	(0.42)	(0.40)	(0.00)	(0.00)	(0.49)	(0.46)
log(Total Assets)	-0.031*	-0.035***	-0.060***	-0.033***	-0.022***	-0.028*	-0.030***	-0.053***	-0.031***	-0.020***
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)
log(Holding Period)	-0.095**	-0.101***	-0.068***	0.014	-0.041***	-0.056	-0.085***	-0.054***	0.018	-0.024
	(0.00)	(0.00)	(0.00)	(0.24)	(0.00)	(0.09)	(0.00)	(0.00)	(0.14)	(0.07)
log(Company Age)	-0.034	-0.042***	-0.024*	-0.003	-0.031***	-0.020	-0.042***	-0.029**	-0.007	-0.031***
	(0.05)	(0.00)	(0.01)	(0.64)	(0.00)	(0.30)	(0.00)	(0.00)	(0.37)	(0.00)
log(PE Firm Age)	-0.020	-0.009	0.007	0.006	-0.005	-0.024	-0.010	0.009	0.007	-0.007
	(0.23)	(0.28)	(0.37)	(0.30)	(0.46)	(0.19)	(0.22)	(0.25)	(0.26)	(0.36)
Leverage Ratio	-0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.000	0.000	-0.000	0.000
	(0.18)	(0.62)	(0.67)	(0.97)	(0.69)	(0.68)	(0.96)	(0.31)	(0.94)	(0.82)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	1.744***	1.904***	1.897***	0.384***	1.563***	0.611**	0.800***	0.789***	0.279**	0.483***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Overall R2	0.107	0.230	0.239	0.146	0.158	0.098	0.213	0.206	0.143	0.125
N	590	590	590	590	539	590	590	590	590	539

Note: The table above shows the estimates of the panel regressions. The various specifications show the different measures representing the development of the portfolio company's growth variables. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 2.5: Development of Profitability Measurements

	Normal						Excess					
	EBITDA Margin	EBIT Margin	Profit Margin	RoE	RoA	EBITDA/ Employee	EBITDA Margin	EBIT Margin	Profit Margin	RoE	RoA	EBITDA/ Employee
SBO	-0.047***	-0.030**	-0.027*	-0.047	-0.006	-2.791**	-0.047***	-0.029**	-0.026*	-0.059	-0.008	-2.709*
	(0.00)	(0.00)	(0.02)	(0.13)	(0.32)	(0.00)	(0.00)	(0.00)	(0.03)	(0.06)	(0.18)	(0.03)
log(Total Assets)	-0.008*	-0.008**	-0.003	0.002	-0.000	-0.060	-0.005	-0.004	0.000	0.005	0.000	0.035
	(0.01)	(0.00)	(0.29)	(0.82)	(0.94)	(0.83)	(0.19)	(0.12)	(0.95)	(0.60)	(0.88)	(0.92)
log(Holding Period)	-0.015	-0.014*	-0.010	0.015	0.002	-0.635	-0.005	-0.007	-0.002	0.022	0.003	0.824
	(0.06)	(0.03)	(0.19)	(0.47)	(0.60)	(0.32)	(0.56)	(0.32)	(0.81)	(0.30)	(0.38)	(0.33)
log(Company Age)	-0.017***	-0.012**	-0.012*	-0.004	0.000	-0.401	-0.016***	-0.010**	-0.009	-0.002	0.001	-0.180
	(0.00)	(0.00)	(0.01)	(0.76)	(0.92)	(0.28)	(0.00)	(0.01)	(0.07)	(0.86)	(0.73)	(0.71)
log(PE Firm Age)	-0.004	-0.002	-0.003	0.016	-0.001	-0.281	-0.004	-0.002	-0.001	0.016	-0.002	-0.025
	(0.29)	(0.54)	(0.52)	(0.15)	(0.50)	(0.42)	(0.39)	(0.62)	(0.75)	(0.15)	(0.41)	(0.96)
Leverage Ratio	-0.000	-0.000*	-0.000	0.000*	-0.000	-0.001	-0.000	-0.000*	-0.000	0.000*	-0.000	-0.001
	(0.08)	(0.02)	(0.06)	(0.02)	(0.35)	(0.05)	(0.10)	(0.02)	(0.09)	(0.01)	(0.30)	(0.12)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.267***	0.260***	0.174**	-0.191	0.008	6.471	0.160**	0.173***	0.097	-0.194	0.008	-5.193
	(0.00)	(0.00)	(0.00)	(0.17)	(0.78)	(0.16)	(0.00)	(0.00)	(0.08)	(0.18)	(0.76)	(0.39)
Overall R2	0.178	0.164	0.118	0.055	0.064	0.088	0.159	0.146	0.102	0.058	0.071	0.073
N	590	590	590	588	589	538	590	590	590	588	589	538

Note: The table above shows the estimates of the panel regressions. The various specifications show the different measures representing the profitability development of the portfolio company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

return on assets, and EBITDA per employee as dependent variables. The specifications (7) to (12) inherit the same dependent variables as in the previous specifications, again measured as the excess development compared to its peer group. Out of the aforementioned six variables four have significant coefficients, namely the development of the EBITDA margin, the EBIT margin, the profit margin, and the EBITDA per employee. The significance is given for both the normal and the excess measures. The first three variables are all earnings figures in comparison to the realised sales. All of these variables are significant and negative. The SBO dummy's coefficient becomes smaller from the EBITDA margin development over the EBIT margin development to the profit margin development. Firstly, these results show that the companies' profitability clearly develops better during the PBO than during the SBO. Secondly, the effect decreases the less emphasis is put on operational costs. This insight shows that PBO investors seem to concentrate on the reduction of operational costs more than SBO investors. As expected, depreciation and amortization will increase more strongly during the PBO as the total assets CAGR is also significantly higher during the PBO, thus reducing the difference in EBIT margin between PBO and SBO. The development in profit margin during SBOs is not as strong as during PBOs, indicating that PBO investors may experience higher interests due to possibly greater leverage or SBOs may not necessarily be better at reducing their effective tax rate. Lastly, the development of EBITDA per employee is worse during the SBO than during the PBO. This result should be driven mainly from the greater EBITDA development rather than through reduction of employees as the coefficient of employee CAGR among buyouts is not significant.

Table 2.6 represents other operational measurements that may have an indirect effect on the profitability and efficiency measures of a firm. The specifications (1) to (5) use the change in current ratio, cash ratio, inventory sales ratio, receivables turnover ratio, and working capital as dependent variables. The specifications (6) to (10) use the same dependent variables as in the previous specifications, measured as excess ratios compared to its peer group. In these specfications, none of the SBO coefficients are significant.

Table 2.7 shows the results for all regressions that are related to leverage. The specifications (1) to (4) show the regressions with leverage ratio, net leverage ratio, operative leverage ratio, and net operative leverage ratio as dependent variables, respectively. The specifications (5) to (8) use the same variables as the previous specifications as dependent variables, this time excess measures compared to the close peer group are used. Out of the four coefficients, the net operative leverage ratio is significant and negative. SBOs experience a slighter growth in net debt in relation to its operative earnings. Although the EBITDA development in SBOs is weaker than in PBOs, as can be inferred from the previous analysis, SBOs seem to need less debt for achieving certain operative earnings. They perform better at cash conversion, as can be inferred by the significant difference between the operative leverage ratio and the net operative leverage ratio.

Overall, SBOs underperform in several measures with respect to expansion, profitability, and operative leverage compared to PBOs. Although there are also other measures with insignificant

Table 2.6: Development of Operational Measurements

	Normal					Excess				
	Current Ratio	Cash Ratio	Inventory Sales Ratio	Receivables Turnover	Working Capital	Current Ratio	Cash Ratio	Inventory Sales Ratio	Receivables Turnover	Working Capital
SBO	0.021	-0.004	-0.000	0.156	-0.016	0.048	-0.002	-0.001	0.072	-0.018*
	(0.61)	(0.77)	(0.71)	(0.25)	(0.07)	(0.30)	(0.93)	(0.41)	(0.68)	(0.07)
Log(Total Assets)	-0.006	0.011**	0.000	0.075	0.007*	0.008	0.015**	-0.000	0.143**	0.013***
	(0.57)	(0.01)	(0.65)	(0.05)	(0.03)	(0.56)	(0.00)	(0.43)	(0.00)	(0.00)
log(Holding Period)	0.017	0.054***	0.000	0.046	0.045***	0.027	0.061***	0.000	0.076	0.049***
	(0.54)	(0.00)	(0.64)	(0.61)	(0.00)	(0.39)	(0.00)	(0.71)	(0.51)	(0.00)
log(Company Age)	0.016	0.003	0.000	-0.026	-0.006	0.000	-0.002	0.000	0.055	-0.006
	(0.32)	(0.64)	(0.81)	(0.62)	(0.18)	(1.00)	(0.76)	(0.77)	(0.42)	(0.17)
log(PE Firm Age)	0.013	-0.002	0.001	-0.059	-0.000	-0.000	-0.005	0.000	-0.076	-0.001
	(0.36)	(0.65)	(0.09)	(0.23)	(0.88)	(0.20)	(0.43)	(0.37)	(0.23)	(0.72)
Leverage Ratio	-0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.91)	(0.86)	(0.82)	(0.98)	(0.80)	(0.67)	(0.84)	(0.87)	(0.92)	(0.80)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-0.101	-0.262***	-0.012*	-0.392	-0.198***	-0.224	-0.319***	-0.016*	-0.806	-0.286***
	(0.59)	(0.00)	(0.01)	(0.53)	(0.00)	(0.30)	(0.00)	(0.02)	(0.31)	(0.00)
Overall R2	0.046	0.131	0.063	0.060	0.162	0.054	0.117	0.065	0.074	0.153
N	589	589	590	584	589	589	589	590	584	589

Note: The table above shows the estimates of the panel regressions. The various specifications show the different measures representing the developments of the operational measurements of the portfolio company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 2.7: Development of Leverage Variables

	Normal				Excess			
	Leverage Ratio	Net Leverage Ratio	Operative Leverage	Net Leverage Ratio	Leverage Ratio	Net Leverage Ratio	Operative Leverage	Net Leverage Ratio
SBO	-0.571	-0.624	-1.463	-1.562*	-0.608	-0.662	-1.450	-1.537
	(0.23)	(0.18)	(0.06)	(0.03)	(0.22)	(0.17)	(0.13)	(0.10)
log(Total Assets)	0.088	0.065	0.092	0.059	0.134	0.108	0.127	0.048
	(0.51)	(0.61)	(0.68)	(0.77)	(0.33)	(0.42)	(0.63)	(0.85)
log(Holding Period)	-0.270	-0.318	-0.863	-0.487	-0.244	-0.283	-1.344*	-0.434
	(0.40)	(0.31)	(0.10)	(0.31)	(0.46)	(0.38)	(0.03)	(0.48)
log(Company Age)	0.173	0.180	-0.189	-0.154	0.193	0.202	-0.056	0.016
	(0.34)	(0.31)	(0.53)	(0.58)	(0.31)	(0.27)	(0.88)	(0.96)
log(PE Firm Age)	-0.113	-0.107	0.046	0.040	-0.169	-0.152	0.151	0.187
	(0.51)	(0.52)	(0.87)	(0.88)	(0.34)	(0.38)	(0.66)	(0.57)
Leverage Ratio	-0.001***	-0.001***	0.001*	0.001*	-0.001***	-0.001***	0.001*	0.001**
	(0.00)	(0.00)	(0.03)	(0.02)	(0.00)	(0.00)	(0.03)	(0.01)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-1.114	-0.686	-0.560	-0.410	-1.415	-1.053	-0.893	-1.273
	(0.61)	(0.75)	(0.88)	(0.90)	(0.53)	(0.63)	(0.84)	(0.76)
Overall R2	0.079	0.080	0.062	0.065	0.079	0.080	0.062	0.072
N	590	590	589	589	590	590	589	589

Note: The table above shows the estimates of the panel regressions. The various specifications show the different measures representing the leverage development of the underlying portfolio company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

coefficients, SBOs generally have the tendency to underperform rather than to outperform compared to PBOs.

2.4.5 Size Effect

In order to test for potential size effects, I perform subsampling according to the total assets of the portfolio company, i.e. differentiating among small, medium-sized, and large corporates. The small subsample consists of the smallest 25 percent, the medium-sized companies are between the 25th and 75th percentile, and the subsample of large companies consists of the remaining top 25th percentile of total assets. I choose these cut-off points as there is a clearer distinction between small and big companies compared to subsamples with an equal distribution. In absolute terms, the first subsample consists of all companies that have total assets below 9.899 million GBP. The second subsample inherits all those companies that have total assets between 9.899 million GBP and 63.027 million GBP. Large companies are those observations whose total assets are above 63.027 million GBP. Per construction of the dataset, most likely the analysed PBOs are smaller than the subsequent SBOs, as the total assets should increase on average along the time during the observation period.

Table 2.8 shows the results of the regression using size subsampling. First, the difference in expansion performance between PBO and SBO is mostly observed for small and medium-sized companies. These results are very similar for both the normal and the excess measurement. As the business life cycle suggests, smaller and developing companies firstly need to expand and generate revenues, thus reaching a certain market share. Not surprisingly, PBOs then perform better for small companies as, most likely, they have more experience on how to handle early company growth. Assuming a general company growth during a buyout, as can be inferred from the summary statistics, a portfolio company will grow during the PBO so much that it will not belong anymore to the small company group by the time of the SBO. If the company is still considered small, it probably is relatively hard to expand the business, which is resembled by the missing expansion during the PBO. Therefore, PE firms that invest in small companies via an SBO may run the risk of picking a bad company if total asset growth is considered as a good performance indicator. Interestingly, also after the expansion PBO investors perform better at turning the portfolio company into profitable and efficient operations. This insight may be inferred from the profitability analysis as the significant underperformance of SBOs for medium-sized companies conforms to the results of the full sample regression. First, the subsample size is the largest and is, thus, the most representative part of the full sample. Second, and more importantly, the companies may move into the next stage of the business life cycle and, thus, companies need to be turned into profitable operations and generate greater cash flows. For the same reason, as for small companies, PBO investors may have a superior experience and thus perform better. Interestingly, SBO investors are able to develop the number of employees more strongly in large companies than PBO investors. In accordance with this finding the development of EBITDA per employee is significantly worse during the SBO than during the PBO.

Table 2.8: SBO Coefficients of Size Subsampling

	Normal				Excess			
	Full Sample	1	2	3	Full Sample	1	2	3
Valuation	-0.035	-0.156	-0.077	0.083	-0.042	-0.175	-0.104	0.130
	(0.45)	(0.11)	(0.27)	(0.42)	(0.40)	(0.10)	(0.16)	(0.24)
Sales	-0.053*	-0.103*	-0.087**	0.097	-0.069**	-0.116*	-0.101**	0.088
	(0.02)	(0.04)	(0.00)	(0.07)	(0.00)	(0.02)	(0.00)	(0.10)
Total Assets	-0.062**	-0.116*	-0.058*	0.049	-0.078***	-0.142**	-0.070*	0.023
	(0.00)	(0.01)	(0.05)	(0.29)	(0.00)	(0.01)	(0.03)	(0.67)
Equity	-0.019	-0.096*	0.009	0.022	-0.012	-0.112*	0.019	0.034
	(0.27)	(0.02)	(0.73)	(0.48)	(0.49)	(0.01)	(0.47)	(0.32)
Employees	-0.014	0.005	-0.035	0.103*	-0.015	-0.016	-0.029	0.094
	(0.42)	(0.90)	(0.14)	(0.01)	(0.46)	(0.72)	(0.28)	(0.05)
EBITDA margin	-0.047***	-0.045	-0.059***	-0.031	-0.047***	-0.041	-0.061***	-0.023
	(0.00)	(0.10)	(0.00)	(0.26)	(0.00)	(0.16)	(0.00)	(0.43)
EBIT margin	-0.030**	-0.037	-0.040**	0.011	-0.029**	-0.032	-0.039**	0.019
	(0.00)	(0.11)	(0.00)	(0.64)	(0.00)	(0.15)	(0.00)	(0.39)
Profit margin	-0.027*	-0.038	-0.041**	0.002	-0.026*	-0.040	-0.037*	0.010
	(0.02)	(0.15)	(0.00)	(0.94)	(0.03)	(0.17)	(0.01)	(0.74)
Return on Equity	-0.047	0.069	-0.043	-0.140	-0.059	0.076	-0.065	-0.142
	(0.13)	(0.29)	(0.27)	(0.11)	(0.06)	(0.26)	(0.11)	(0.10)
Return on Assets	-0.006	0.017	-0.012	-0.014	-0.008	0.017	-0.017*	-0.015
	(0.32)	(0.25)	(0.15)	(0.16)	(0.18)	(0.25)	(0.04)	(0.16)
EBITDA/ Employee	-2.791**	-1.746	-1.760	-6.737**	-2.709*	0.038	-2.555	-7.794*
	(0.00)	(0.35)	(0.22)	(0.01)	(0.03)	(0.99)	(0.17)	(0.01)
Current Ratio	0.021	-0.100	0.097	-0.075	0.048	-0.048	0.084	0.003
	(0.61)	(0.21)	(0.11)	(0.43)	(0.30)	(0.60)	(0.23)	(0.98)
Cash Ratio	-0.004	0.048	-0.022	-0.020	-0.002	0.054	-0.033	-0.007
	(0.77)	(0.11)	(0.24)	(0.47)	(0.93)	(0.17)	(0.19)	(0.85)
Inventory Sales Ratio	-0.000	0.001	0.002	-0.002	-0.001	0.003	0.001	-0.003
	(0.71)	(0.76)	(0.15)	(0.53)	(0.41)	(0.31)	(0.59)	(0.39)
Receivables Turnover Ratio	0.156	0.636*	-0.171	0.179	0.072	0.179	-0.060	0.094
	(0.25)	(0.04)	(0.40)	(0.55)	(0.68)	(0.63)	(0.82)	(0.80)
Working Capital	-0.016	-0.004	-0.021	-0.033	-0.018	-0.013	-0.022	-0.037
	(0.07)	(0.81)	(0.16)	(0.07)	(0.07)	(0.58)	(0.14)	(0.06)
Leverage	-0.571	-0.896	-0.676	0.447	-0.608	-0.507	-0.769	0.226
	(0.23)	(0.17)	(0.24)	(0.76)	(0.22)	(0.46)	(0.20)	(0.88)
Net Leverage	-0.624	-1.011	-0.710	0.335	-0.662	-0.681	-0.790	0.112
	(0.18)	(0.13)	(0.20)	(0.82)	(0.17)	(0.34)	(0.16)	(0.94)
Operative Leverage	-1.463	1.581	-1.567	-3.973	-1.450	1.196	-1.413	-3.576
	(0.06)	(0.22)	(0.17)	(0.07)	(0.13)	(0.42)	(0.30)	(0.19)
Net Operative Leverage	-1.562*	0.944	-1.326	-3.853	-1.537	0.960	-1.013	-3.981
	(0.03)	(0.42)	(0.20)	(0.06)	(0.10)	(0.52)	(0.44)	(0.13)

Note: The table above shows the estimates of the SBO coefficient of the panel regressions. The various specifications show the different measures representing all analysed variables with respect to the full sample and its subsamples. Specification 1 considers the smallest 25 percent in terms of total assets. Specifcation 2 considers the 25th to 75th size percentile. The third specification considers the largest 25 percent of this sample. Subsampling is done for the normal measure and the excess development. The estimates shown in this table are the coefficients of the SBO dummy. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

2.4.6 SBO Improvement over Time

The results of the base regressions and the intial robustness checks still do not fully explain the popularity of SBOs. Either the performance is not statistically different or PBOs perform significantly better than SBOs. Although, all the analyses account for time effects, there might be a change in the performance of SBO investors over time. By construction of the consecutive deal structure, SBOs are more likely to occur after the financial crisis than PBOs. For that reason, it is possible that the SBO coefficients may be biased by a better PE market environment before the financial crisis. Therefore, I perform time subsampling leading to regressions with subsamples both before the financial crisis and after the financial crisis. Whereas the first subsample considers all buyouts with an entry before 2008, the second subsample considers all buyouts with an entry in or after 2008. The first subsample consist of about two thirds of the total sample.

Table 2.9 shows the results for the time subsampling regressions. The post crisis subsample does not experience any significant coefficients, whereas the coefficients of the pre-financial crisis regression perfectly coincide with the coefficients of the full sample regression. These results show that the significance of the full sample results is strongly driven by the observations that happened before the financial crisis. This is partly due to the fact that a higher proportion of buyout entries is done before the financial crisis. However, as can be seen by the slightly stronger coefficients for the pre-crisis subsample compared to the full sample, it is reasonable to say that the performance difference between PBO and SBO has diminished over time. To back up this finding, it is even possible to recognise a slight outperformance of SBOs compared to PBOs, though not being statistically significant. Assuming different value drivers across PBOs and SBOs (Eschenröder & Hartmann-Wendels (2019)), PE firms first need to understand the new value drivers to exploit the full value creation. Thus, PE firms surely developed a better know-how to handle SBOs over time and could, therefore, reduce the difference in performance between PBO and SBO. Once GPs are more familiar with the process of SBOs and the possibilities on how to handle the investments with a foregoing buyout round, they may on average perform as well with SBOs as they do with PBOs if not better. At least from a performance perspective, this finding may partially explain why SBOs became increasingly popular over time. Especially, when considering lower screening and transaction costs, the return on SBOs may be significantly higher compared to PBOs.

2.4.7 Robustness Checks

The initial regressions used Huber-White-sandwich estimates of variance in order to prevent the regression to suffer from heteroscedasticity. To further prove the robustness of the results, I rerun the same initial regressions with conventional variance estimators. The results of these regressions confirm the previous findings.

Winsorizing is not only used to treat the initial data set but also as a method to further test the robustness of the results. For that purpose, I repeat the regressions with winsorization

Table 2.9: SBO Coefficients of Time Subsampling

	Normal			Excess		
	Full Sample	1	2	Full Sample	1	2
Valuation	-0.035	-0.052	0.082	-0.042	-0.056	0.069
	(0.45)	(0.28)	(0.59)	(0.40)	(0.28)	(0.68)
Sales	-0.053*	-0.055*	-0.058	-0.069**	-0.072**	-0.054
	(0.02)	(0.02)	(0.43)	(0.00)	(0.00)	(0.49)
Total Assets	-0.062**	-0.074***	0.072	-0.078***	-0.090***	0.048
	(0.00)	(0.00)	(0.29)	(0.00)	(0.00)	(0.50)
Equity	-0.019	-0.027	0.058	-0.012	-0.020	0.032
	(0.27)	(0.11)	(0.34)	(0.49)	(0.28)	(0.62)
Employees	-0.014	-0.010	-0.018	-0.015	-0.015	0.011
	(0.42)	(0.59)	(0.77)	(0.46)	(0.48)	(0.87)
EBITDA margin	-0.047***	-0.049***	-0.021	-0.047***	-0.049***	-0.041
	(0.00)	(0.00)	(0.59)	(0.00)	(0.00)	(0.31)
EBIT margin	-0.030**	-0.036***	0.004	-0.029**	-0.034**	-0.004
	(0.00)	(0.00)	(0.89)	(0.00)	(0.00)	(0.90)
Profit margin	-0.027*	-0.033**	0.003	-0.026*	-0.033**	-0.012
	(0.02)	(0.00)	(0.93)	(0.03)	(0.01)	(0.76)
Return on Equity	-0.047	-0.058	-0.018	-0.059	-0.075*	0.004
	(0.13)	(0.07)	(0.86)	(0.06)	(0.02)	(0.97)
Return on Assets	-0.006	-0.009	0.017	-0.008	-0.011	0.019
	(0.32)	(0.15)	(0.40)	(0.18)	(0.06)	(0.34)
EBITDA EMPLOY	-2.791**	-3.178**	-0.050	-2.709*	-3.189*	-3.436
	(0.00)	(0.00)	(0.98)	(0.03)	(0.02)	(0.38)
Current Ratio	0.021	0.017	0.030	0.048	0.049	0.036
	(0.61)	(0.67)	(0.85)	(0.30)	(0.31)	(0.83)
Cash Ratio	-0.004	-0.000	-0.029	-0.002	0.005	-0.038
	(0.77)	(0.99)	(0.55)	(0.93)	(0.79)	(0.53)
Inventory Sales Ratio	-0.000	-0.000	0.003	-0.001	-0.002	0.006
	(0.71)	(0.76)	(0.38)	(0.41)	(0.29)	(0.18)
Receivables Turnover Ratio	0.156	0.185	-0.103	0.072	0.132	-0.551
	(0.25)	(0.20)	(0.82)	(0.68)	(0.47)	(0.35)
Working Capital	-0.016	-0.015	-0.017	-0.018	-0.016	-0.028
	(0.07)	(0.10)	(0.57)	(0.07)	(0.14)	(0.42)
Leverage	-0.571	-0.344	-2.102	-0.608	-0.369	-2.119
	(0.23)	(0.50)	(0.12)	(0.22)	(0.49)	(0.14)
Net leverage	-0.624	-0.416	-2.001	-0.662	-0.450	-1.960
	(0.18)	(0.41)	(0.12)	(0.17)	(0.39)	(0.15)
Operative Leverage	-1.463	-1.643	-1.290	-1.450	-1.787	-0.313
	(0.06)	(0.05)	(0.60)	(0.13)	(0.07)	(0.92)
Net Operative Leverage	-1.562*	-1.675*	-1.567	-1.537	-2.002*	0.981
	(0.03)	(0.03)	(0.49)	(0.10)	(0.04)	(0.76)

Note: The table above shows the estimates of the SBO coefficient of the panel regressions. The various specifications show the different measures representing all analysed variables with respect to the full sample and its subsamples. Specification 1 considers all buyouts that occured before the financial crisis. Specifcation 2 considers all buyouts that happened after the financial crisis. Subsampling is done for the normal measure and the excess development. The estimates shown in this table are the coefficients of the SBO dummy. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

levels at the 10th and 90th percentile and the 20th and the 80th percentile, respectively. The significance of the coefficients stays more or less the same and thus the dataset seems to provide a robust basis for analysis. When using these strong winsorization levels, I get similar results.

When analysing datasets, and especially smaller datasets, it is questionable how to treat outliers. Throughout the analyses, different levels of winsorization are used to move away from arbitrary data adjustment. However, most of the used methods do not incorporate rational thresholds on how to determine sensible cut-off points for outlier treatment. In terms of recognizing outliers and giving them less weight, robust regressions are superior to traditional regressions. Thus, as another robustness check for the winsorization level, I rerun the regressions with a MM-estimation, as this method is superior to other robust regressions when it comes to detecting outliers (Susanti et al. (2014)). The results are very similar in general and, therefore, serve very well to provide further robustness to this study.

2.5 PBOs versus SBOs - a Nuanced Picture

The findings mentioned in Chapter 2.2.2 argue that the SBO performance is not better than the PBO performance. However, this paper shows that the underperformance has vanished after the financial crisis and, therefore, SBOs are not as bad-performing as previously assumed. Generally, if there still was an underperformance, or at least a not significantly differing performance between PBOs and SBOs, the reason to invest in SBOs up to such a high degree remains in question. Degeorge et al. (2013) argue that "'secondary buyouts' are costly for institutional investors". This claim only holds if there is a perfect choice between investing into PBOs or SBOs. In the past, before the deal volume and the number of PE deals has reached such a high level, this might have been true. Recently, higher fund raising, larger funds, and significant amounts of dry powder arose. The greater availability of capital forces GPs to find investments. However, the dry capital indicates that GPs struggle to find good targets. Thus, it seems that the supply of potentially attractive targets does not increase as much as the available capital enlarges. Axelson et al. (2013) show that GPs are incentivised to spend the raised capital in order to collect fees on invested capital. Even when considering this incentive, GPs do not fully invest their raised capital, pointing out how severe the investment problem actually is. The shortage of targets is especially reflected in the availability of potential PBOs. The number of new companies that have not yet been discovered as buyout targets, does not grow as fast as the demand for those companies, especially considering the high levels of multiples. According to PricewaterhouseCoopers (2019), 72 percent of GPs claim the scarcity of investment opportunities, i.e. the supply of portfolio companies, to be a top three key issue of the PE industry.

Per definition, it is possible that the quantity of SBOs is equal to the number of PBOs, assuming that PBOs do not default. Therefore, the introduction and growth of SBOs may provide a solution to further increase the supply of potential targets. Given that GPs quickly take good companies off the market, only potentially worse-performing targets stay in the market. This

assumption may also be true for SBOs, but to a much lower degree. First, the supply during recent times is bigger, which is also indicated by the high share of SBOs. Second, GPs may still be reluctant to invest through SBOs as previous studies generally found an underperformance. As the first analyses of this paper show that this finding is not necessarily true in recent times, the GP's caution to invest in SBOs is arbitrary. Considering the current market environment, I analyse whether good performing SBOs are better than the remaining, potentially worse, PBOs.

I analyse whether choosing a good SBO is superior to choosing a bad PBO in terms of various performance measures. Therefore, I run regressions that consider the subsample of the top 50 percent performing SBOs and the subsample of the bottom 50 percent performing PBOs for the respective measures. This subsampling approach clearly indicates the difference in performance given the current market environment. The variables to measure performance are the same as the ones used in previous regressions.

Table 2.10 shows the estimates of the regressions considering the company growth. Many of the expansion variables now turn positive and significant compared to the previous regressions. Not only did those variables that have been insignificant before now have a positive coefficient, also significantly negative coefficients of the previous analysis are now significantly positive. The growth of the valuation, the sales, and the total assets are much better for top-performing SBOs compared to worse performing PBOs. Especially the difference in the growth of the valuation and the growth of sales is economically large. The difference in the development of equity and number of employees is not statistically different, neither for in the normal nor the excess specifications. The missing significance indicates that the development of equity and the number of employees does not behave differently across buyouts. This finding may be traced back to a slower pace to strongly influence those performance measures within the short holding period.

The estimates of the regressions concerning the profitability are shown in Table 2.11. Also in these regressions, at least in the normal specifications, many SBO coefficients are positive and statistically significant. The difference between PBO and SBO is significant and positive for the development of the EBITDA margin, the EBIT margin, the return on assets, the return on equity, and the EBITDA employee ratio. Interestingly, the difference in the development of the profit margin between PBO and SBO is neither significant in the normal nor the excess specification. Following classical valuation techniques, GPs may be more interested in creating free cashflows rather than profits. Further, due to financial leverage the profit margin may be strongly reduced for both PBO and SBO as well.

Table 2.12 shows the results for all regressions that consider other operational measurements. In this cluster, two variables are significant for both specifications, namely the cash ratio and the working capital. Whilst these coefficients are also positive now, the other three variables are not significant in neither of the specifications. The cash ratio's coefficient indicates that the deviation in the difference of liquidity is mainly driven by cash and cash equivalents rather

Table 2.10: Development of Growth Variables Bottom PBOs vs Top SBOs

	Normal					Excess				
	Valuation	Sales	Total Assets	Equity	Employees	Valuation	Sales	Total Assets	Equity	Employees
SBO	1.600*	0.781*	0.318***	2.375	0.773	1.656*	0.744*	0.289***	2.376	0.877
	(0.03)	(0.01)	(0.00)	(0.20)	(0.07)	(0.02)	(0.02)	(0.00)	(0.20)	(0.08)
log(Total Assets)	-0.104	-0.050	-0.029**	1.143	0.027	-0.090	-0.049	-0.025*	1.150	0.025
	(0.49)	(0.80)	(0.01)	(0.12)	(0.77)	(0.55)	(0.80)	(0.04)	(0.12)	(0.78)
log(Holding Period)	-0.909	-0.419	-0.050	1.633	-0.550	-0.823	-0.415	-0.041	1.635	-0.535
	(0.07)	(0.07)	(0.20)	(0.28)	(0.17)	(0.10)	(0.07)	(0.31)	(0.28)	(0.18)
log(Company Age)	0.351	-0.004	-0.018	-0.046	0.055	0.368	-0.010	-0.017	-0.050	0.051
	(0.31)	(0.98)	(0.07)	(0.90)	(0.69)	(0.30)	(0.95)	(0.13)	(0.89)	(0.72)
log(PE Firm Age)	-0.359	0.003	0.014	0.132	-0.060	-0.348	0.003	0.012	0.137	-0.071
	(0.07)	(0.98)	(0.28)	(0.81)	(0.36)	(0.08)	(0.98)	(0.42)	(0.80)	(0.28)
Leverage Ratio	-0.000	-0.000	-0.000	0.000	0.001	-0.000	-0.000	-0.000	0.000	0.001
	(0.52)	(0.30)	(0.39)	(0.34)	(0.34)	(0.47)	(0.32)	(0.90)	(0.32)	(0.30)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	4.379	1.818	1.429***	-15.876	1.840*	3.106	0.841	0.376*	-16.093	0.798
	(0.08)	(0.31)	(0.00)	(0.18)	(0.01)	(0.22)	(0.64)	(0.04)	(0.18)	(0.29)
Adjusted R2	0.084	0.047	0.297	-0.010	0.051	0.079	0.043	0.191	-0.010	0.051
N	295	295	295	295	269	295	295	295	295	269

Note: The table above shows the estimates of the regression, comparing the best 50 percent performing SBOs to the worst 50 percent performing PBOs within all individual variables. The various specifications show the different measures representing the expansion of the underlying company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 2.11: Development of Profitability Variables Bottom PBOs vs Top SBOs

	Normal						Excess					
	EBITDA Margin	EBIT Margin	Profit Margin	RoE	RoA	EBITDA/ Employee	EBITDA Margin	EBIT Margin	Profit Margin	RoE	RoA	EBITDA/ Employee
SBO	0.464*	0.727*	0.391	2.640*	0.152*	16.360*	0.455*	0.704	0.388	2.592*	0.146	11.974
	(0.05)	(0.04)	(0.15)	(0.02)	(0.05)	(0.01)	(0.05)	(0.05)	(0.16)	(0.03)	(0.05)	(0.11)
log(Total Assets)	-0.121	0.172	0.192	-0.531	-0.073	2.731	-0.119	0.177	0.197	-0.529	-0.074	2.286
	(0.79)	(0.78)	(0.72)	(0.43)	(0.46)	(0.31)	(0.79)	(0.78)	(0.71)	(0.43)	(0.46)	(0.39)
log(Holding Period)	0.176	0.492	0.447	0.233	0.004	-1.188	0.192	0.514	0.496	0.257	0.006	0.341
	(0.58)	(0.39)	(0.29)	(0.56)	(0.93)	(0.78)	(0.55)	(0.37)	(0.24)	(0.52)	(0.90)	(0.94)
log(Company Age)	0.329	0.334	0.432	0.652	0.118	-2.045	0.331	0.333	0.435	0.663	0.117	-0.979
	(0.25)	(0.24)	(0.17)	(0.13)	(0.19)	(0.54)	(0.25)	(0.24)	(0.16)	(0.12)	(0.19)	(0.79)
log(PE Firm Age)	0.098	0.189	0.036	0.042	0.031	-2.198	0.093	0.186	0.042	0.217	0.030	-1.292
	(0.41)	(0.27)	(0.84)	(0.82)	(0.23)	(0.43)	(0.44)	(0.28)	(0.82)	(0.28)	(0.25)	(0.65)
Leverage Ratio	-0.001	-0.000	-0.001*	-0.001*	0.000	-1.310*	-0.001	-0.000	-0.001*	0.016***	0.000	-1.325*
	(0.09)	(0.42)	(0.02)	(0.00)	(0.03)	(0.01)	(0.11)	(0.45)	(0.03)	(0.00)	(0.45)	(0.01)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-1.352	-3.846	-3.792	-3.951	-1.083	-10.080	-1.440	-3.954	-3.951	-2.127	-1.072	-37.006
	(0.72)	(0.51)	(0.46)	(0.44)	(0.51)	(0.71)	(0.70)	(0.50)	(0.44)	(0.67)	(0.52)	(0.23)
Adjusted R2	0.036	0.031	0.030	0.031	0.051	0.398	0.036	0.031	0.031	0.051	0.051	0.372
N	295	295	295	294	294	269	295	295	295	294	294	269

Note: The table above shows the estimates of the regression, comparing the best 50 percent performing SBOs to the worst 50 percent performing PBOs within all individual variables. The various specifications show the different measures representing the profitability development of the underlying company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 2.12: Development of Operational Measurements Bottom PBOs vs Top SBOs

	Normal					Excess				
	Current Ratio	Cash Ratio	Inventory Sales Ratio	Receivables Turnover	Working Capital	Current Ratio	Cash Ratio	Inventory Sales Ratio	Receivables Turnover	Working Capital
SBO	9.822	0.286***	0.007	14.508	0.196***	9.822	0.284***	0.005	14.423	1.040***
	(0.17)	(0.00)	(0.59)	(0.19)	(0.00)	(0.17)	(0.00)	(0.72)	(0.19)	(0.00)
log(Total Assets)	-1.085	0.029	0.012	-8.806	-0.008	-1.052	0.030	0.016	-8.820	-0.138
	(0.27)	(0.14)	(0.32)	(0.36)	(0.18)	(0.28)	(0.24)	(0.22)	(0.36)	(0.07)
log(Holding Period)	-4.232	0.021	0.007	4.155	0.000	-4.181	0.124	0.011	3.947	3.503***
	(0.43)	(0.44)	(0.39)	(0.38)	(0.98)	(0.43)	(0.26)	(0.18)	(0.40)	(0.00)
log(Company Age)	0.729	-0.023	0.002	9.347	-0.001	0.714	-0.026	0.000	9.313	0.056
	(0.53)	(0.30)	(0.75)	(0.22)	(0.83)	(0.54)	(0.40)	(0.99)	(0.23)	(0.50)
log(PE Firm Age)	-3.987	0.007	0.006	1.813	0.005	-4.002	0.003	0.005	1.854	0.028
	(0.42)	(0.62)	(0.29)	(0.44)	(0.47)	(0.42)	(0.92)	(0.44)	(0.43)	(0.75)
Leverage Ratio	0.005	-0.000	0.000	0.001	-0.000*	0.005	-0.000	0.000	0.001	0.000*
	(0.34)	(0.67)	(0.46)	(0.94)	(0.02)	(0.35)	(0.39)	(0.63)	(0.94)	(0.05)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	26.835	-0.373	-0.495	51.434	0.000	26.550	-0.601*	-0.519	51.908	-0.573
	(0.43)	(0.06)	(0.23)	(0.49)	(1.00)	(0.44)	(0.02)	(0.21)	(0.49)	(0.56)
Adjusted R2	-0.025	0.122	0.019	0.066	0.247	-0.025	0.020	0.027	0.067	0.232
N	294	294	295	292	294	294	294	295	292	294

Note: The table above shows the estimates of the regression, comparing the best 50 percent performing SBOs to the worst 50 percent performing PBOs within all individual variables. The various specifications show the different measures representing other developments for efficiency of the underlying company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 2.13: Development of Leverage Variables Bottom PBOs vs Top SBOs

	Normal				Excess			
	Leverage Ratio	Net Leverage Ratio	Operative Leverage	Net Operative Leverage Ratio	Leverage Ratio	Net Leverage Ratio	Operative Leverage	Net Operative Leverage Ratio
SBO	32.993	26.883	15.351*	13.853*	32.790	26.641	14.345*	12.878*
	(0.10)	(0.11)	(0.03)	(0.02)	(0.10)	(0.11)	(0.04)	(0.03)
log(Total Assets)	-3.409	-3.201	4.728	5.008	-3.336	-3.086	5.676	5.899
	(0.72)	(0.74)	(0.43)	(0.43)	(0.73)	(0.75)	(0.34)	(0.35)
log(Holding Period)	6.552	6.644	2.565	2.820	6.563	6.658	0.688	1.066
	(0.17)	(0.21)	(0.72)	(0.63)	(0.17)	(0.21)	(0.92)	(0.86)
log(Company Age)	-0.798	-1.007	4.311	3.987	-0.739	-0.951	4.170	3.946
	(0.81)	(0.72)	(0.38)	(0.41)	(0.82)	(0.74)	(0.39)	(0.41)
log(PE Firm Age)	-1.875	-1.067	1.480	0.813	-1.899	-1.086	1.630	0.865
	(0.40)	(0.61)	(0.55)	(0.72)	(0.39)	(0.61)	(0.52)	(0.70)
Leverage Ratio	-0.303*	-0.304*	0.003***	0.003***	-0.303*	-0.304*	0.004***	0.004***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.03)	(0.03)	(0.00)	(0.00)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Macroecomic Control	YES	YES	YES	YES	YES	YES	YES	YES
Constant	101.955	99.226	-61.893	-67.575	101.385	98.089	-69.061	-73.994
	(0.27)	(0.26)	(0.41)	(0.37)	(0.27)	(0.27)	(0.35)	(0.33)
Adjusted R2	0.308	0.310	0.015	0.001	0.308	0.310	0.020	0.008
N	295	295	294	294	295	295	294	294

Note: The table above shows the estimates of the regression, comparing the best 50 percent performing SBOs to the worst 50 percent performing PBOs within all individual variables. The various specifications show the different measures representing the leverager development of the underlying company. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

than other current assets. This finding is further backed by the fact that the inventory sales ratio does not develop differently among PBO and SBO. Similar to the previous reasoning, the difference in the development of working capital is especially important to GPs aiming to sell their portfolio company, as the free cash flows can be strongly increased by improving the working capital ratio.

Lastly, Table 2.13 shows the results for all regressions that consider the various measurements of leverage. Interestingly, the financial leverage is still not statistically different between PBOs and SBOs. This finding further shows that the leverage may be increased in PE but both PBO and SBO use a similar degree of financial engineering to create value throughout their holding period. The operative leverage and the net operative leverage are significant, both net in cash and for the normal specification. This finding aligns with the significance of the EBITDA margin, and hints that the significance is mainly driven by the operative earnings rather than the amount of debt.

At least for the majority of the analysed variables, SBOs now perform much better than PBOs. These results question the initial claim and show that GPs should look for reasonably performing SBO rather than desperately investing in the remaining, comparatively bad performing PBO targets. In the analysed market environment SBOs may not be costly as there may simply be less good PBOs available. Thus, carefully chosen SBOs are sensible solutions for generating sufficient returns.

2.6 Conclusion

The literature more or less agrees on the outperformance of PE-backed companies compared to non PE-backed companies. However, the ongoing growth of SBO transactions is still puzzling as the reasons to invest are not quite clear. Generally, there could be two alternative explanations for that growth. First, the performance is becoming increasingly better over time. Second, the PE industry is missing alternatives to invest in and, thus, choose SBOs as a fall back, consequently with a lower level of returns. With a dataset consisting of 295 UK companies that went through consecutive PBOs and SBOs, this paper analyses the operational and financial performance of both PBOs and SBOs and examines whether SBOs actually perform as poorly as commonly assumed. I analyse a more up to date data set compared to other papers on SBOs, which is becoming increasingly important due to the recent strong growth of SBO share. Furthermore, the relevant sample size is much bigger and inherits a lot more detail, which also enables a more robust analysis. The subsampling approach generates new insights, which have not been covered yet. Up to date, this is the first paper that aims to put the performance in relation to its economic environment.

The summary statistics of this study indicates a slight underperformance of SBOs compared to PBOs in many relevant fields. These measures, however, only consider the absolute development rather than considering the economic environment and the performance of its peer group. Many

SBOs occur before and around the financial crisis and, thus, they might have a disadvantage to begin with. During the financial crisis investments were locked in because GPs paid much more for portfolio companies before the crisis than during the crisis. Therefore, they might have been forced to hold investment slightly longer compared to buyouts that did not have their investment period throughout the crisis.

Using multivariate regressions, I find that SBOs are generally worse at expanding the portfolio company, in terms of sales and total assets, but do not perform statistically different in terms of company valuation. As expected, PBOs perform better at improving the profitability of the portfolio companies. However, it seems that PBOs require comparatively more assets and equity to achieve the profitability improvement. Interestingly, there is no evidence for any difference in the usage of financial leverage, however, PBOs in absolute terms have a lower growth of operative leverage compared to SBOs.

The performance difference in expansion is strongly driven by the development in small and medium-sized companies, i.e. PBOs perform better at expanding small and medium-sized companies, but do not perform differently for large companies. The performance difference in profitability measures is mainly driven by medium-sized companies. This indicates that there may be a sequence of operational improvements done by PBO investors very similar to the concept of the business lifecycle. Further and more importantly, subsampling for time shows that the performance of SBOs has improved strongly over time, resulting in no significant difference in any performance measure during the time after the financial crisis compared to PBOs. This development has a huge impact on the investor perspective on the SBOs' quality and explains why there is such a strong demand for SBOs. In combination with lower transaction costs, SBOs present a worthwhile investment nowadays.

Due to the increasing level of dry powder and the resulting investment distress, PE firms need to find suitable targets. Obviously, the supply of good PBOs is not sufficient anymore, leading to the question whether to invest into a rather good SBO or a worse than average PBO. There is a clear evidence that for almost all expansion and profitability performances, well performing SBOs are much better than bad performing PBOs. Considering the lack of PBO targets, SBOs are even more attractive than before. Therefore, SBOs are not at all means of last resort but prove as rational investment decision. This finding explains the increasing share of SBO on total buyouts.

Future research should focus on two follow ups to this study. First, as SBOs are a genuinely good alternative to PBOs from a performance point of view, further research needs to analyse whether the performance is still satisfying when considering the underlying risk of the investment. Second, it may be interesting to see whether this study applies only to SBOs, or also to further buyout rounds after the SBO. It is questionable whether the use of skillsets is cyclical, i.e. that further financial buyouts reverse to the skillsets of the PBO.

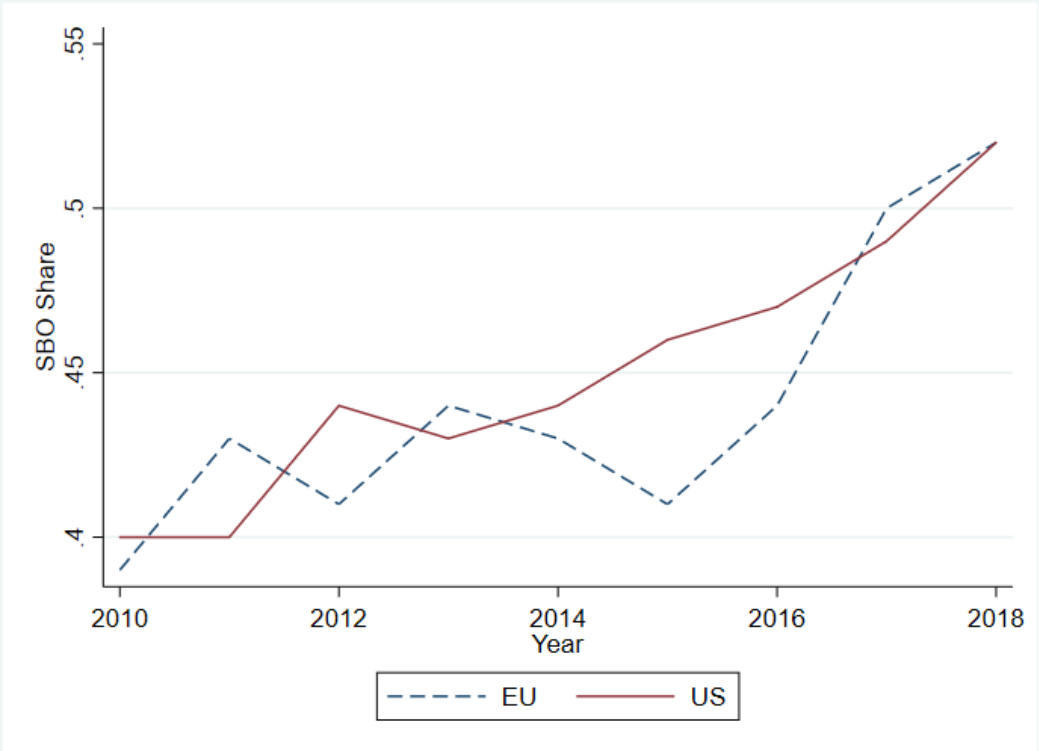
Chapter 3

Performance Dependency of Secondary Buyouts on Primary Buyouts

3.1 Introduction

After the downturn of the private equity (PE) market during the global financial crisis, PE is growing significantly ever since. PE funds are getting bigger and large amounts of committed money is available. This success, however, puts general partners (GPs) in a conflict. On the one hand, GPs are facing a shortage of attractive investment targets. On the other hand, GPs are forced to exit their portfolio companies within the lifespan of the tendered fund. Due to this market design, secondary buyouts (SBOs) seem to represent a solution to the scarcity of investment opportunities as their share of total buyouts is steadily growing. SBOs are leveraged buyouts (LBOs) in which one PE investor sells his portfolio company to another PE investor. As shown in Figure 3.1, the share of the SBO transaction volume on the total PE transaction volume grew since 2010 and reaches 52 percent in 2018, both in the EU and the US market.

Figure 3.1: Buyout Exits



Source: Based on PitchBook (2018a) and PitchBook (2018b).

During an LBO the PE investor creates value by using financial and operational engineering. After closing the deal, the agenda of GPs is to optimise the portfolio company with respect to short-term and mid-term time horizons. Thus at first glance, a second investor should not be able to achieve abnormal investment returns as the value creation potential is already captured by the first PE investor (e.g. Jenkinson & Sousa (2015), Wang (2012), Bonini (2015)). However, PE investors may decide to acquire companies directly from other financial investors. There are several attempts on explaining the investment rational of SBOs. For example, Jenkinson & Sousa (2015) mention complementary skill sets of the GPs, time pressure to sell the portfolio

company early, marketing the successful sale of portfolio companies for future fund raising, and usage of favourable debt market conditions as possible explanations. Another used argument is that both the primary buyout (PBO) and the SBO are successful as the organisational structure of PE is superior to non-PE organisational structures (Jensen (1989)) and, thus, SBOs may still provide sufficient returns to investors. Nevertheless, the dependency between the two buyout rounds may further prove the advantages of SBOs. These analyses may provide criteria on how to achieve successful SBOs.

Following these findings, we provide empirical guidance for investing into successful SBO investments. First, we analyse the value drivers in PBOs and SBOs to understand how the total value creation is composed and whether value is driven differently amongst the individual buyout rounds. Second, after the identification of value drivers, we are able to study dependencies of value drivers across the buyout rounds. Do any value drivers during the PBO have an impact on the value creation during the SBO? Answering this question leads to certain characteristics that are favourable for the engagement in an SBO, thus identifying selection criteria for potentially successful SBOs. Third, once selection criteria are identified, a GP needs to understand what to focus on during the SBO based on the development during the PBO. Thus, we analyse the value drivers dependent on the identified selection criteria.

We find that the value drivers partially differ among buyout rounds. PBO investors primarily focus on company growth, profitability improvement, and boosting innovation to create value. In contrast, SBO investor focus more on increasing profitability and efficiency gains. We are able to identify five selection criteria for target selection that drive value creation during the SBO. Companies with a lower value creation during the PBO compared to its close peers are generally preferred for SBOs. Portfolio companies with a great company growth and profitability development, in terms of EBITDA margin, are favoured. On the other hand, good SBO targets demonstrate weak efficiency during the PBO and, consequently, also an inferior development of return on assets compared to its close peers. The value drivers dependent on these selection criteria differ quite substantially. We confirm the findings of Jenkinson & Sousa (2015) that complementary skill sets exist, i.e. that GPs focus on something completely different across buyout rounds. Exemplary, the SBO investor improves profitability after the PBO investor has focussed on company growth. However, we also find that this is not the only way to create value in SBOs. SBO investors also do something similar as the previous PBO investor but with a different approach than the PBO investor. For example, the PBO investor works on profitability by improving the EBITDA margin, whereas the SBO investor also focusses on profitability but rather works on the improvement of return on assets. However, an SBO investor does not simply apply the same mechanics as it was done during the PBO.

This paper contributes to the literature in the following ways. Most studies about PE performance and SBO performance consider PBO and SBO autonomously (e.g. Achleitner & Figge (2014), Degeorge et al. (2016)). In our opinion, for a rigorous analysis it is crucial to consider two consecutive deals rather than any two independent deals because the dependencies are measured between two back-to-back buyouts rather than individual, independent buyouts.

Otherwise, the underlying data may suffer from a random selection of individual PBOs and SBOs. To our knowledge, only Bonini (2015) analyses the operating performance of two sequential deals and aims to find reasons for investing into consecutive private equity transactions. This paper does not suffer as much from selection bias as others. By using both public data providers and private data from a large fund of fund manager, we make sure that unsuccessful PE deals are also included. Furthermore, the full length of the holding period of back-to-back buyouts is considered. Most importantly, based on fundamental data it is the first paper that identifies selection criteria and company profiles that are suitable for successful SBOs. We are able to give advice on what to do during SBOs dependent on the individual selection criteria to make the buyout successful.

This paper is structured as follows. The following chapter describes the dataset and its preparation in detail. Chapter 3.3 presents the summary statistics of the dataset. The following three chapters explain the hypotheses of the three consecutive research questions, the underlying methodology for the analyses, and present the empirical findings of this study. Finally, the conclusion can be found in the last chapter.

3.2 Data Sample

3.2.1 Explanation of the Data Sample, the Peer Group and the Underlying Variables

Many studies about PE, and especially about SBOs, face tremendous problems gathering sufficient observations for reasonable analyses. Firstly, compared to other transactions, PE deals cover relatively fewer deals. Secondly, many PE transactions are taken privately, which does not require the financial investor to disclose financial information in many countries. Thirdly, due to the construction of PE and the underlying holding periods of portfolio companies, many transactions during the last few years cannot be considered as the financial investor has not yet exited the investment. This is especially critical for our study as we use two consecutive PE deals and thus we can only consider PBOs with an early exit. Lastly, data providers are strongly dependent on financial investors publishing the news of acquiring and exiting their investment, which is also not always the case.

Our original dataset consists of PE portfolio companies, which are located in the United Kingdom (UK). The UK is a very active PE market and, therefore, provides a significant amount of observations. In contrast to the USA, most of the companies in the UK need to publish their full financial accounts, which enables operative analyses on a more detailed level.

We used several data providers to retrieve an initial list of all buyouts that are labelled as “secondary buyout” and “financial buyout”. These data were collected from Capital IQ, Thomson Reuters Eikon, Prequin, Mergermarket and private information from a large fund of fund manager. The list of SBOs includes the names of the portfolio companies that the PE companies

invested in and the date of the investment entry and most of the time the investment exit. We eliminated all buyouts that are in fact tertiary buyouts or any other financial buyouts that occurred after the SBO. Most data providers start the portfolio company search in 1996 and companies need at least one year to publish their financial accounts in a timely manner. Therefore, the portfolio companies had their PBO no earlier than 1996 and their SBO exit no later than 2017. We chose those dates as the time horizon needs to be as large as possible to guarantee a sufficient number of observations. Per definition of the consecutive deal analysis, the PBO investment exit date is equal to the SBO investment entry date. After matching for company keys and company name, only few companies had the full information for the first transaction date (at PBO entry), for the second transaction date (at PBO exit/at SBO entry), and for the third transaction date (at SBO exit). However, for most companies at least one out of the three dates was still missing. Thus, we hand-collected the missing dates, if available, from the financial investor's websites or other official transaction publications.

We, then, retrieved accounting information for the underlying portfolio companies for the fiscal years which are the closest to the first, second, and third transaction date, respectively. On the one hand, collecting data only for the fiscal year before the entry date and for the fiscal year after the exit date covers the full time span of the deal but, if the entry date and the respective fiscal year are too far apart, mayor early improvements of the GP may not be recognized in the analysis. On the other hand, collecting data for the fiscal year after the entry date and for the fiscal year before the exit date may not cover the full value creation of the specific buyout. We assume that using the closest fiscal year to the transaction date provides the lowest bias possible. For most private companies in the UK, only the balance sheet and the P&L are published and for some rarer cases the cash flow statement is also published. The reason to track both of those financial statement's items is to combine the static view of the balance sheet with operative, dynamic measures of the P&L statement. Furthermore, we retrieved the number of fulltime employees, if available. Table 3.1 provides an overview of all the retrieved financial information. Ideally 23 variables and ratios have been retrieved, however, that strongly depends on the availability and depth of the financial information. Even if not the full information were available, the observation was kept in the sample. Multicollinearity for the observed variables should not be a problem as can be inferred from the low correlations in Table 3.2.

The final sample consists of 295 companies. We were able to collect accounting data at the three transaction dates within the setting of consecutive PE deals. This means that we collected information about 590 investments, thus having access to a maximum of 885 transactions per variable. Obviously due to the depth of the available information, the number of observations for individual variables may differ significantly.

As explained in the following section a peer group is needed for both calculating the relevant performance measures and the valuation of our sample companies. The peer group consists of public companies from the UK and the USA. Obviously for our UK sample, it is reasonable to use a UK peer group. Due to the fact that we apply an accurate matching procedure over a large time horizon, our potential peer group needs to be very large. The peer group's quality can be

Table 3.1: Variable Overview

Name	Description
Company Specific	
Valuation Growth	The portfolio company's compound annual growth rate in valuation. The calculation of this variable is described in Chapter 3.2.2. This variables is winsorised at 1% and 99%.
Growth	
Sales Growth	The portfolio company's compound annual growth rate in total sales. This variables is winsorised at 1% and 99%.
Equity Growth	The portfolio company's compound annual growth rate of equity. This variables is winsorised at 1% and 99%.
Profitability	
EBITDA Margin Growth	The development of the EBITDA margin between the investment exit and investment entry divided by the years of the holding period. This variables is winsorised at 1% and 99%.
Profit Margin Growth	The development of the profit margin between the investment exit and investment entry divided by the years of the holding period. This variable is winsorised at 1% and 99%.
Return on Equity Growth	The development of the return on equity between the investment exit and investment entry divided by the years of the holding period. Return on equity is defined as profit over equity. This variable is winsorised at 1% and 99%.
Return on Assets Growth	The development of the return on assets between the investment exit and investment entry divided by the years of the holding period. Return on assets is defined as EBITDA over total assets. This variable is winsorised at 1% and 99%.
Leverage Ratio Growth	The development of the leverage ratio between the investment exit and investment entry divided by the years of the holding period. The leverage ratio is defined as liabilities over equity. This variable is winsorised at 1% and 99%.
Liquidity	
Cash Ratio Growth	The development of the cash ratio between the investment exit and investment entry divided by the years of the holding period. The cash ratio is defined as cash over current liabilities. This variable is winsorised at 1% and 99%.
Current Ratio Growth	The development of the current ratio between the investment exit and investment entry divided by the years of the holding period. The current ratio is defined as receivables over current liabilities. This variable is winsorised at 1% and 99%.

Table 3.1 Variable Overview – continued from previous page

Name	Description
Efficiency	
Inventory-Sales Ratio Growth	The development of the inventory sales ratio between the investment exit and investment entry divided by the years of the holding period. This variable is defined as stocks over sales. This variable is winsorised at 1% and 99%.
Receivables-Turnover Ratio Growth	The development of the receivables turnover ratio between the investment exit and investment entry divided by the years of the holding period. The receivables turnover ratio is defined as sales over debtors. This variable is winsorised at 1% and 99%.
Intangible Asset Growth	The development of the intangible asset ratio between the investment exit and investment entry divided by the years of the holding period. The intangible asset ratio is defined as the proportion of intangible assets of total assets. This variable is winsorised at 1% and 99%.
Altman Z-Score Development	The development of the Altman Z-score between the investment exit and investment entry divided by the years of the holding period. It is defined as: $\text{Altman Z-Score}_{i,t} = 0.717 * \frac{Working\ Capital_{i,t}}{Total\ Assets_{i,t}} + 0.847 * \frac{Profit_{i,t}}{Total\ Assets_{i,t}} + 3.107 * \frac{EBIT_{i,t}}{Total\ Assets_{i,t}} + 0.420 * \frac{Equity_{i,t}}{Liabilities_{i,t}} + 0.998 * \frac{Sales_{i,t}}{Total\ Assets_{i,t}}$
Control Variables	
SBO Dummy	Dummy variable that indicates whether the deal is a secondary buyout. Variable is equal to one when the underlying deal is a secondary buyout.
Total Assets	The portfolio company's total assets including all fixed assets and current assets at the time of the respective transaction. This variables is winsorised at 1% and 99%.
Start Year Dummy	Dummy variables that indicate the entry year of the underlying deal.
Holding Period	The time (in years) the investors holds the portfolio company during the first and second buyout, i.e. the time difference between the first and second transaction date and the time difference between the second and third transaction date.
GICS Dummy	Dummy variables that indicates the industry classification of the portfolio company. The classification is based on the 8-digit sub-industry GICS code.
Market-Based	
Inflation Rate	The annual inflation rate at time of entry and exit of the underlying deal.
Credit spreads	Difference between Moody's BAA bond index (corporate bond index) and the risk-free UK government bond (risk-free rate)
Employment Rate	The yearly employment rate in the UK; Employed Working People/Working People
GDP Index	GDP Index Development with 1996=100

Note: The table above presents all variables and ratios that are used in the analysis of this paper. All development measures are calculated for both the PBO and the SBO. When applicable, the absolute excess development compared to the close peer group is considered (see section 3.2.2.). The table includes company specific information, deal-specific, and economic data.

Table 3.2: Cross Correlation Table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Valuation	1.000																	
Sales	0.422	1.000																
EBITDA	0.421	0.466	1.000															
Profit	0.223	0.229	0.588	1.000														
Equity	0.086	-0.221	0.041	0.059	1.000													
Total Assets	-0.088	-0.217	-0.113	-0.049	0.102	1.000												
Holding Period	-0.194	-0.214	-0.022	0.036	0.076	-0.049	1.000											
Intangible Asset	0.105	0.131	0.099	0.029	-0.221	-0.130	-0.018	1.000										
Leverage Ratio	-0.047	0.009	0.049	0.028	-0.003	0.100	-0.064	-0.033	1.000									
Current Cash	0.027	-0.057	0.015	0.043	0.012	-0.005	0.087	-0.025	-0.002	1.000								
Return on Equity	0.071	-0.012	0.010	0.150	-0.005	-0.055	0.000	0.006	0.045	0.015	1.000							
Return on Assets	0.238	0.127	0.327	0.412	0.023	-0.073	0.067	0.001	0.021	0.078	0.279	1.000						
Receivables Sales	0.040	0.185	0.224	0.338	0.000	-0.053	-0.028	-0.011	-0.032	-0.040	0.240	0.196	1.000					
Inventory Sales	-0.280	-0.201	-0.193	-0.295	-0.003	-0.030	0.029	0.001	-0.001	-0.046	0.047	-0.044	-0.044	1.000				
Credit Spreads	0.078	0.008	0.005	-0.006	0.033	0.049	-0.190	0.016	0.003	-0.025	0.002	-0.074	0.008	-0.004	1.000			
Employment Rate	-0.069	-0.025	-0.041	-0.041	-0.042	-0.029	0.023	0.008	-0.001	0.018	0.022	-0.002	0.014	0.067	-0.353	1.000		
Inflation Rate	-0.006	-0.043	-0.003	-0.028	0.034	0.047	-0.018	0.023	0.040	0.026	-0.038	-0.042	-0.078	0.004	0.286	-0.528	1.000	
GDP Index	0.059	-0.053	0.049	0.023	0.015	0.048	-0.179	0.063	0.000	-0.034	0.014	-0.046	0.056	0.001	0.170	0.164	0.460	1.000

Note: The table above shows the correlation matrix of the variable developments used in this paper. The highest positive correlation is 0.588 between EBITDA development and profit development. On the opposite the highest negative correlation is -0.528 between inflation rate and employment rate. None of these variables should cause concern about multicollinearity.

improved by enlarging the dataset with data of other countries that share similar investment characteristics. Especially for bigger companies, such as buyout companies, other countries that share a similar investment market should suffice for an improved comparison (Schreiner (2009)). The American market should therefore serve well as an enlargement of the UK peer group as the PE markets are quite similar. We used Compustat database to retrieve data for all companies that were listed from 1996 to 2017 on the UK and US equity markets. Additionally, we were able to retrieve the same accounting information as for the sample firms.

3.2.2 Preparation of the Dataset

Valuation of Sample Companies

The analysis aims to identify the value drivers of the intrinsic value creation. Thus, the equity valuation needs to be considered. For several reasons, we chose to value the equity of our sample companies ourselves by using multiple valuation techniques. For most PE transactions the deal values are not published or at least the value at either entry or exit is missing. Only using those deals, for which deal values are available, would decrease the total number of observations drastically. From our point of view the pricing of transaction values is determined by many factors that do not directly inherit the private equity core activity. Such factors include price influencers, e.g. negotiation skills of the PE firms (Achleitner et al. (2011)) or random shifts in the demand and supply of potential target companies. In fact, we have been trying to isolate the operational value creation and, thus, created a fair market value of the sample's companies using public market data. We assumed that the success of a buyout is a combination of several drivers and, thus, analysed the combined effect of those drivers, expressed as multiple valuations on certain key accounting information. The multiple valuation has the advantage that the observed companies' valuation seems to be more homogenous throughout time, which enables good comparability as small unobservable, firm specific drivers may be included over the time period of the two consecutive deals. Lastly, multiple valuation shares the same fundament as comprehensive valuations and thus provide a good groundwork for deal values (Liu et al. (2002)). Although these market values may differ slightly from actual deal values, they serve well as tendencies of the actual price and are assumed to be quite accurate.

Accordingly, we used trading multiples rather than transaction multiples for the valuation of our sample companies. Most importantly, using transaction multiples would again provide us with price distortion, e.g. in form of transaction fees, possible synergy effects between the target and the acquiring firm and liquidity premia. Thus, for determining purely the operational success, transaction multiples do not seem to provide a reasonable valuation basis. Choosing transaction multiples, we would need to use PE transaction to truly capture all the PE mechanics. A lack of suitable observations may be a problem in that case, too. We, therefore, favoured trading multiples in our study. Within the category of trading multiples several studies analyse the differences between forecasting multiples, trailing multiples, and the combination of both of them. Forecasting multiples are those multiples that are based on forecasted accounting

information, such as the consensus of broker reports' forecasts. Those forecasting multiples lead to the lowest valuation error (Liu et al. (2002)). Unfortunately, broker reports are not available in the necessary quantity for private companies. We decided to not forecast the financial information ourselves, as we feel that such a forecast would lead to a too subjective outcome. As a result, trailing multiples seem to be the right choice for valuing the sample's companies. Trailing multiples are those multiples that are based on past fundamental data. Several studies aim to identify both the stand-alone accuracy of the multiple valuations and of the combination of several multiple valuations. Amongst others sales, EBITDA, earnings, and equity book value multiples perform the best. Liu et al. (2002) find that those multiples perform very well and are not much weaker than forecasting multiples. They analyse the effects of cash flow multiples and find that they perform significantly worse than the above mentioned multiples. For some observations it may be reasonable to implement industry-specific multiples. However, due to the various and detailed industry specifications of our sample, it would not be feasible as most companies do not publish the necessary information. Therefore, sales, EBITDA, earnings and book equity multiples seemed to be the best choice for a sufficient multiple valuation.

The identification of the best possible peer group is a crucial process for optimising the valuation accuracy. Therefore, our identification process and the underlying matching process underwent a complex and detailed structure. The matching procedure followed the LBO matching procedures of Guo et al. (2011) to apply a pre-performance matching, i.e. finding suitable matches before the activity of the PE investor begins. Generally, we matched our sample portfolio companies with the listed companies by the peer group. The pre-performance matching was done twice, before the PBO as well as before the SBO. With this process we reset the benchmark of the underlying observations. Many other studies apply an industry-size-year matching as this process is supposed to identify the most similar companies available (Barber & Lyon (1996)). However, we assumed that sometimes matching for industry, size, and year as proposed is not enough. Ceteris paribus, a company that is very profitable should perform differently compared to a company that is specified as a loss company, and thus develop differently. Therefore, we followed the idea of Bhojraj & Lee (2002) and included a measure of profitability, namely the EBITDA margin, in our matching process. For every sample company, the matching process results in the five closest peer companies. First of all, the sample company's year of transaction has to be the same as the trading year of the peer company in order to eliminate time effects. Secondly, as we track the development of both the sample and peer group companies, the peer firm still needed to be listed at the end of the PE firm's buyout. Thirdly, the companies needed to have a similar size at the beginning of the buyout as a proxy for a similar development within the business lifecycle (Alford (1992)). Thus, a peer group company may not deviate more than 50 percent in total assets from the sample firm. Fourthly, the companies should have a similar profitability. The peers do not deviate more than 25 percentage points in EBITDA margin and should have the same sign of the EBITDA margin. Both of these cut-off points were chosen to represent a reasonable comparison. The profitability interval is slightly lower compared to the size interval because the margin is usually centered around an industry average anyways,

whilst the size is not necssarily bound to an industry benchmark. Lastly, the companies needed to be in the same industry for all the other premises to be comparable. Out of the standard industry classification codes, GICS codes perform the best for a reasonable valuation (Bhojraj et al. (2003)). We followed Alford (1992) as we matched by the most detailed industry code at the beginning. If there were less than five matches per sample firm, we reduced the depth of the industry codes until every PE portfolio company has at least five matches. If there were more than five matches per portfolio company, the five peers which had the most similar size were selected. A good peer group should have enough observations to smoothen the results, but too many observations may distort the results. Pereiro (2002) and Schreiner (2009) show that a peer group should consist of 2 to 10 peers. We followed Bhojraj & Lee (2002) and find the five most similar peers, as this is in accordance with the leading literature. Due to the nature of the dataset and the corresponding possible peer group, the geographic matching occured between the UK and the US. A single country-matching would be superior but usually the number of similar companies in each year and industry is very limited, thus there is no harm to increase the potential comparable companies by comparing to similar economies as well (Schreiner (2009)).

After the identification of the correct peers for each sample company, the peer group multiples needed to be estimated. First of all, we extracted the accounting data of the peer group which are matched with the three transaction dates of the sample companies. The accounting data for the peer group have the same fiscal year as in the sample data collection, i.e. the closest fiscal year to the transaction date. For every match we calculated the multiples of sales, EBITDA, earnings, and equity book value based on the market capitalisation of the respective companies. After the calculation of the individual value for all peer group companies, these values needed to be aggregated. Herrmann & Richter (2003) find that using the arithmetic mean would lead to an overestimation of the valuation and thus distort the valuation. They as well as Baker & Ruback (1999) instead propose that the median is a very good way to aggregate these valuations. Thus, we chose to use the median values. Ultimately, we got the median values for sales, EBITDA, earnings and book equity multiples of the portfolio companies that we wanted to value.

The actual valuation was simply done by multiplying the peer group's multiple values with the sample company's respective accounting data. This process provided four company values as each multiple valuation was done independently of each other. As the companies are quite similar by the nature of the matching process, we applied an arithmetic mean to find the average company equity value among all the multiple valuations.

After the valuation of our sample companies' equity we retrieved as many actual deal values as possible for those sample companies in order to validate the valuation. We were able to retrieve 136 actual transaction values of our underlying sample companies. A mean test between the actual observation and the valuations was performed. The valuation of the sample companies and the actual deal values were not significantly different from each other, already indicating that our valuation is not too far off, and is a very good approxmiation of the actual value.

Further, we regress the value of the self-valued companies on the actual transaction prices in order to see whether our estimates performed well at predicting the actual transaction price. With a coefficient of 0.9333 and a R-squared of 0.85 the company valuations seem to be a very good fit and thus may be used for further analysis. The results do not change drastically when only considering PBOs and SBOs individually, indicating that the companies are valued equally well.

Variable Calculation

Our study focusses on the development of both the overall company growth, but also the growth of all the observed financial information. Generally, when calculating growth two categories of measures arise. Those variables that always stay positive can be calculated with the compound annual growth rate (CAGR),

$$CAGR_{i,t}(X) = (\frac{x_{i,t}}{x_{i,t-k}})^{1/k} - 1 \tag{3.1}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the holding period of the investment.

As the nominator and denominator will always be positive, it is possible to distinguish a positive growth from a negative growth. In the underlying analysis the growth of the company value, total assets, equity, number of full-time employees, and sales are calculated with the CAGR.

Other variables may become negative over the investment period. For these values the CAGR is mathematically not feasible. For that reason, we chose to calculate the yearly growth ratios by dividing the total change in the underlying ratio by the length of the holding period in years.

$$Growth_{i,t}(X) = (\frac{x_{i,t} - x_{i,t-k}}{t-k}) \tag{3.2}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the holding period of the investment.

Winsorising is a commonly used method in the related literature to adjust the underlying data for thorough and generally applicable studies. All the relevant fundamental data were winsorised at the 1 percent and 99 percent level as only a few observations strongly distorted the results. This approach is in accordance with other studies in the research field of PE (e.g. Achleitner & Figge (2014)).

We further chose to use the absolute excess development rather than simply analysing the companies' performance isolated. Especially, for investment purposes it is more important how a company performs in comparison to its peers and the industry it operates in. Although a certain performance indicator may be high in absolute terms, it does not mean that the company is well managed as it may underperform its close peer group. Therefore, similar to Bonini (2015), we calculated the difference between all variables of the underlying portfolio

company and the corresponding variables of its peer group as follows.

$$d_{i,p} = (x_i - m_p) \tag{3.3}$$

where x_i is the performance indicator x for company i, and m being the median of the performance indicator of peer group p.

3.2.3 Variable Selection

This chapter presents the variables that were used in this paper. In the following, the measurement of growth, profitability, financial engineering, liquidity, efficiency, and innovation are explained.

The growth of a portfolio company is measured in two ways, namely total sales and equity growth. The analysis of total sales growth is necessary for two reasons. Increasing sales either represents a sufficient market share on the total market or it may indicate a growing industry. Further, the growth of equity is analysed as it is a balance sheet position and, thus, provides a more stable view on the development throughout the holding period compared to positions of profit and loss statement.

The profitability is defined by four variables, namely the EBITDA margin, profit margin, return on equity, and return on assets. The first two variables measure the operating earnings in comparison to the total sales. The EBITDA margin clearly identifies the operating earnings without considering any financing and accounting effects. Complementary to this measure, we use the profit margin because it also inherits the depreciation, amortization, interest payments, and taxes. Usually, GPs are not able to strongly reduce the tax liabilities of the portfolio company, but due to high leverage, interest payments may be very high. The other two profitability variables rather measure the earnings in contrast to the input of capital. They are also crucial to analyse because they are more stable compared to pure profit and loss profitability measures. Within this category of variables, we need to measure both asset and equity returns because the amount of total assets and equity usually differ strongly in buyouts due to the financial leverage.

The capital structure and financial engineering is measured by the development of the financial leverage. The financial leverage is measured as the ratio of liabilities to equity. It serves both well as explanatory variable and control variable of the capital structure.

Liquidity is measured by two variables, namely the cash ratio and the current ratio. The cash ratio is measured as cash and cash equivalents over current liabilities. Especially for high risk investments, such as buyouts, the availability of cash to pay off current liabilities directly, seems to be a valid proxy for liquidity. The current ratio is defined as the current receivables over current liabilities. This ratio measures a similar degree of liquidity but also considers other assets, which shows how solvent a company is in the short-term.

This paper uses two proxies as part of the portfolio company's efficiency. The inventory sales ratio, which is defined as sales over inventory, measures the efficiency on how the inventory is used to achieve certain sales. Generally, companies may aim to reduce the necessary inventory whilst always having just enough inventory to keep the business running smoothly. The receivables turnover ratio represents the efficiency of a company to ultimately collect its money owed by its business partners. It is defined as sales over receivables outstanding.

Innovation and asset structure are represented by the intangible asset ratio, which is the proportion of intangible assets to total assets. It shows the degree of innovation and brand value, as mostly patents and goodwill are incorporated in intangible assets. Also, it can serve well as a control variable for asset structure, which may be important especially when considering the recent development of digitalisation.

The control variables are manifold. First, we use credit spreads, the employment rate, inflation rate, and GDP index as macroeconomic control variables. Second, as we consider the growth of variables, we need to control for the length of the holding period to differentiate between short-term and long-term value drivers. Third, total assets are used to control for the size of the company. Fourth, we control for the risk of financial distress of the portfolio company. As portfolio companies are not listed, a market price and its underlying volatility cannot be observed. For that purpose, we choose to measure the risk of a company by analysing its fundamental data as well. The Altman Z-score is a well-established measure to predict financial distress and thus serves well as control variable of risk for private companies (Altman (1968)). Lastly, we apply time and industry dummies.

3.3 Summary Statistics

Table 3.3 displays the summary statistics for the final dataset of 590 investments. For informational purposes, all the statistics are split into three categories: the total sample, primary buyouts and secondary buyouts. Mean T-tests and nonparametric equality-of-medians tests are performed to recognise the differences in characteristics between PBOs and SBOs. The statistics are divided into two panels: the company information at entry and the development of company information during the buyouts. The observations are relatively well balanced, i.e. for most information the full number of potential observations are available so that only few observations go missing in further analysis.

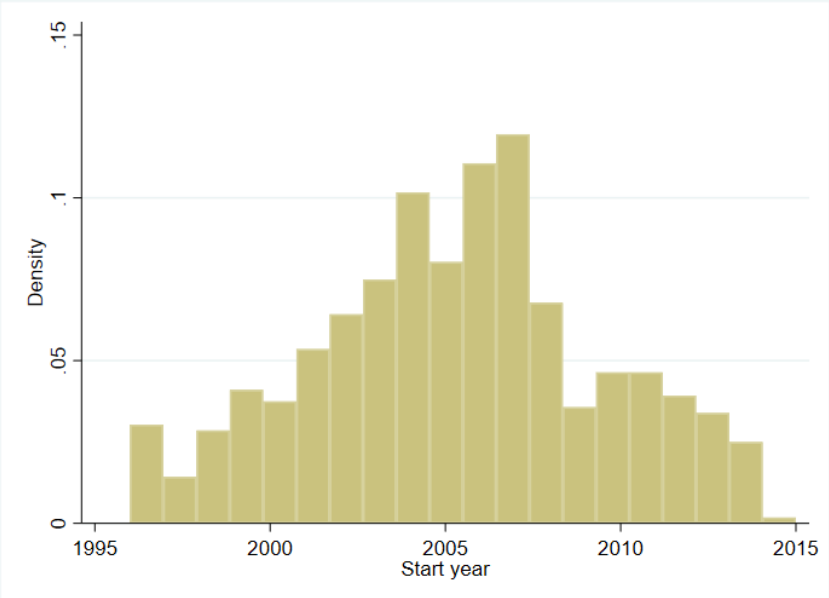
Table 3.3: Summary Statistics

Panel A: Company Information at Entry												
	Total				PBO				SBO			
	Mean	**SD**	**Median**	**Obs**	**Mean**	**SD**	**Median**	**Obs**	**Mean**	**SD**	**Median**	**Obs**
Valuation at Entry	60,801	98,030	26,432	590	52,784	98,481	19,979	295	68,818*	97,083	36,143***	295
Sales at Entry	58,253	87,979	27,684	590	47,813	83,215	19,800	295	68,693**	91,452	36,056***	295
EBITDA at Entry	7,926	16,954	3,412	590	6,588	17,988	2,288	295	9,263	15,771	4,958***	295
Profit at Entry	3,079	7,922	1,492	590	1,740	7,082	745	295	4,418***	8,483	2,423***	295
RoA at Entry	0.156	0.198	0.139	590	0.153	0.226	0.138	295	0.16	0.166	0.141	295
Total Assets at Entry	82,872	176,586	26,966	590	65,562	145,864	19,987	295	100,182***	201,478	36,442***	295
Equity at Entry	2,4116	61,813	5,442	590	19,029	54,307	3,491	295	29,204*	68,217	9,271***	295
Leverage at Entry	2.35	52.3	1.601	587	1.441	58.6	1.816	293	3.36	45.3	1.389	294
Panel B: Company Information Development												
	Total				PBO				SBO			
	Mean	**SD**	**Median**	**Obs**	**Mean**	**SD**	**Median**	**Obs**	**Mean**	**SD**	**Median**	**Obs**
Valuation CAGR	1.320	0.917	1.161	589	1.293	0.769	1.170	294	1.346	1.045	1.148	295
Sales CAGR	1.245	0.617	1.112	589	1.289	0.613	1.162	294	1.2	0.62	1.088***	295
EBITDA Margin Growth	0.111	0.556	0.018	588	0.125	0.507	0.031	294	0.098	0.601	0.008***	294
Profit Margin Growth	0.086	0.412	0.014	589	0.09	0.387	0.022	294	0.082	0.436	0.005***	295
Return on Assets Growth	-0.005	0.115	-0.001	587	-0.002	0.117	0.001	294	-0.009	0.113	-0.003	293
Total Assets CAGR	1.202	0.388	1.133	588	1.268	0.455	1.179	294	1.136***	0.0291	1.094***	294
Equity Growth	0.125	0.29	0.06	589	0.152	0.323	0.074	294	0.099*	0.251	0.055	295
Leverage Ratio Growth	2.766	32.41	-0.055	585	3.734	37.166	-0.06	292	1.801	26.877	-0.047	293
Holding Period	4.102	2.550	4	590	4.054	2.445	4	295	4.149	2.654	4	295

Note: The table above presents the dataset of 295 companies from the UK that have been tracked throughout the two consecutive buyouts, i.e. the PBO and the SBO. For most of those companies we were able to collect the balance sheet and P&L fundamental data at time of the transactions, speaking before the PBO, after the PBO, and after the SBO. The variables used in this study are defined in Table 3.1 . Absolute data are presented in thousands GBP. Panel A displays the valuation and the operative and financial characteristics of the buyouts at time of the investment entry. These fundamental data and ratios represent the basic data of the underlying portfolio company. Panel B illustrates the development of the valuation and the key characteristics throughout the holding period. The calculation of the respective development is also presented in Table 3.1 . The significance levels for the mean difference and median difference test between PBO and SBO are ***0.1%, **1% and *5%.

The first panel covers the valuation, some fundamental data, and selected ratios to display the operative and financial characteristics of the portfolio companies at the beginning of the investment. Figure 3.2 provides an overview on the investment entry year. The valuation at entry for the total sample has a mean of 60.8 million GBP. This is slightly lower than the deal values in other studies (e.g. Achleitner & Figge (2014)). The size difference may arise from the specific country focus. Large deals are also less likely to be bought twice by financial investors as those deals are quite rare anyway. Thus, in this setting it is less likely to include those large companies twice. The valuation at entry of SBOs is significantly greater in its mean with a weak significance compared to entry valuation of PBOs, indicating that value is created throughout the primary buyout. The medians of the two buyout types are significantly different from each other which clearly shows that value is created in PBOs. As shown by the valuation CAGR, the total sample develops positively over time the mean of the fundamental data should be higher at the entry of the SBO. However, the mean differences of the three ratios at entry of PBOs and SBOs, namely return on equity, return on assets and the leverage, are not significantly different from each other. Both return measures are very similar both in mean and median. Although the operative earnings increase, the equity and assets invested to achieve this return grow proportionally the same. Surprisingly, the mean leverage ratios at entry are not significantly different from each other. The standard deviations of both means are extremely high which clearly indicates that there are different approaches on how to use leverage as a tool for value creation. The median tests show roughly the same results and thus do not require further interpretation.

Figure 3.2: Start Year Density

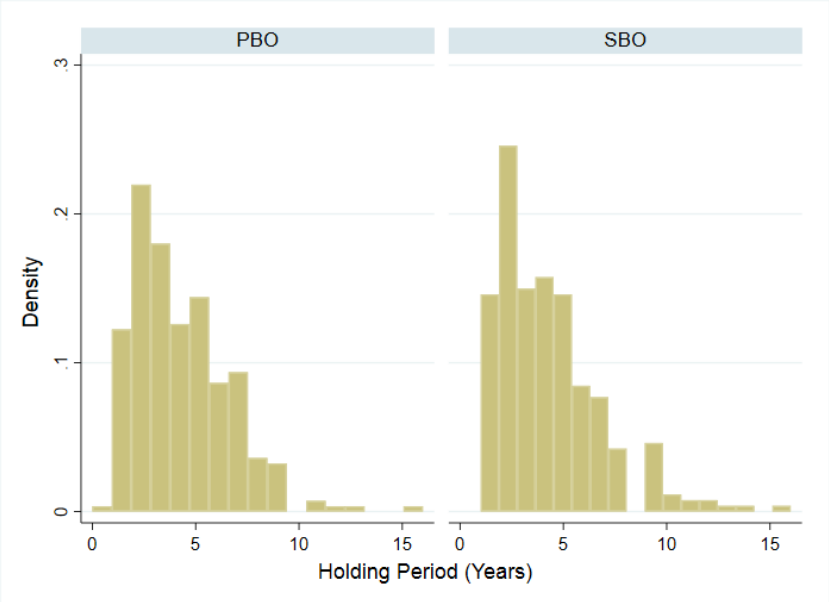


Note: This figure shows the density of the sample's investment entry year.

The second panel shows the excess development of the valuation, the aforementioned fundamental data, and their ratios. Most variables' means are not significantly different from another.

This suggests that neither investment type generally performs better or worse than the other. This brings up the question which deal, PBO or SBO, outperforms in the respective fields. The valuation CAGR is positive for both buyout types indicating that both buyouts create excess value compared to its peer group. However, neither the mean nor the median are different from another, showing that in this sample PBOs do not necessarily perform better than SBOs. The mean growth of total assets and equity are significantly different from another which shows that GPs may bloat the balance sheet more during the PBO. Interestingly, the medians of developments of sales, the EBITDA margin, the EBIT margin, the profit margin, and total assets are significantly different from each other and higher in PBOs, showing that for many deals the development of the selected performance indicators are better during the first investment round. The holding period for the total sample on average is 4.1 years. The mean holding periods are not significantly different from another which might indicate that SBOs on average do not follow the idea of having buying and selling pressure more than PBOs. Figure 3.3 represents the deviation of holding periods according to PBOs and SBOs.

Figure 3.3: Holding Period by Buyout



Note: This figure shows the densitiy of the holding periods in years during the PBO and SBO, respectively.

3.4 Differing Value Drivers Across Buyout Rounds

Throughout the history of PE, portfolio companies generally faced two phases of buyout activity. The first phase focussed on value creation through financial engineering. The second phase made use of operational engineering. Nowadays, both financial and operational engineering are applied to maximise the value creation within a buyout.

Jensen (1989) states that a buyout structure with high leverage allows the PE investors to align management incentives, and to create efficient and lean organisational structures. Other studies further show that a high leverage reduces agency costs due to a high powered incentive system (e.g. Jensen & Meckling (1976), Jensen (1986)). Korteweg (2010) finds that during the early investment stages, PE investors often prefer high leverage as their optimal capital structure. The evidence about leverage as value driver in SBOs is rather mixed. Achleitner & Figge (2014) propose that all GPs may use similar skill sets for operational improvements and, therefore, the only way to create additional return is by increasing the leverage. On the other hand, Wang (2012) states that a successful PBO usually relies on an almost optimal capital structure and, therefore, the second PE buyer should not change the leverage. For these partially mixed reasons, we expect leverage to have at least a small positive effect on value creation in both buyout rounds of our sample.

After a downturn in the debt markets, financial investors had to reinvent their business model and focused on operational performance enhancement rather than simply implementing financial engineering (Matthews et al. (2009)). GPs are more focussed on strategic and operative decision-making and, thus, trying to improve the efficiency and profitability of the underlying investment companies (De Fontenay (2014)). Operational engineering may come in form of improvements in production, cost structures, marketing, human resource management, inorganic growth, repositioning in the market, or restructuring (Acharya et al. (2012), Lee et al. (2001), Wright et al. (2001)). According to Perembetov et al. (2014), operational engineering and its underlying improvements comprise about 51 percent of the total value creation in PE, whereas financial engineering and multiple effects explain 31 percent and 18 percent, respectively. Generally, SBOs inherit some theoretical problems with respect to operational engineering. The idea of PE is that either GPs are good at identifying and selecting strong performing companies or they are able to optimise portfolio companies throughout the investment period. After the completion of the holding period, there should not be any or only little value creation potential left. Thus, after the PBO, the SBO should not be able to achieve a significantly more additional value compared to the first buyout round. Achleitner & Figge (2014), however, find that financial buyouts still offer potential for operational performance, such as sales growth and margin expansion, which have not been developed during the PBOs. Therefore, SBOs do not develop differently compared to PBOs.

Growth and expansion as value drivers should be relevant in buyout rounds, but probably more during the PBO because a lot of capital is invested into the portfolio company to gain high market shares and expand quickly. Although SBO investors may also try to grow the portfolio company, further market growth may be more difficult to achieve as marginal costs to achieve the growth are higher, resulting in a lower expected effect of growth on value creation.

GPs do not only make use of expansive growth but also ultimately turn the previous growth into profitable cashflows. Thus, we expect that an improvement in profitability has a positive influence on value creation during both buyout rounds. However, this effect could be more relevant during the SBO because the portfolio company is older and thus potentially further

developed in the business life cycle. After the growth period during the PBO, the SBO may aim on streamlining the business as a following step.

PE investments belong to the illiquid investment class and, therefore, do not suffer from any short-term goals from shareholders. The portfolio companies do not need to provide a huge degree of liquidity, just enough to run the business smoothly. Shortages in liquidity may also be covered by further capital injections by the financial sponsor. Thus, we expect that financial sponsors focus less on the portfolio companies' liquidity and, therefore, that there is a negative effect of liquidity on value creation during the buyout rounds.

The growth and expansion of companies during buyout rounds leads to inflated balance sheet positions (e.g. assets and equity). Consequently, efficiency ratios suffer as the input variables may increase more than the output variables. The portfolio company is possibly streamlined with respect to those measures during the SBO as part of the "fine-tuning" after the implementation of main value drivers during the PBO. We, therefore, expect a positive correlation with value growth during the SBO but an insignificant effect during the PBO.

During a PBO the PE firm may aim to invest heavily to foster growth, which may also come in form of growth in intangible assets, representing mainly innovation and brand value. The SBO investor can either make use of the increased level of innovation or even further invest in research and development. Due to superior negotiation skills of PE firms and the accompanying high exit price of the portfolio company (Achleitner et al. (2011)), it is reasonable to assume an above average development of goodwill in PBOs. Assuming similar negotiation skills between PBO and SBO investors, the amount of goodwill should not change a lot during the SBO. Thus, we expect a stronger increase of innovation and brand value during the PBO and, thus, a greater effect on value creation.

3.4.1 Methodology

We analyse which determinants are related to value growth of the portfolio companies. As the SBOs directly follow the PBOs, we are able to construct a determinant analysis in form of a panel analysis. The model is defined as:

$$y_{it} = \alpha + \beta * X_{it} + \gamma * Y_t + \epsilon \tag{3.4}$$

where X describes the firm-specific variables and Y describes the macroeconomic variables for firm i at transaction date t.

The potential main value drivers are commonly used by other papers and serve well as a start of a determinant analysis (e.g. Achleitner & Figge (2014), Bonini (2015), Achleitner et al. (2011)). For that purpose, we include growth, profitability, leverage, liquidity, eifficiency, and innovation in this model. However, as we were able to retrieve the whole profit and loss account and balance sheet we improve the analysis by including more detailed performance measures. We analyse

the excess growth of the individual characteristics compared to its predefined peer group of public companies. We use a random-effects model, as the Hausman-test estimates between random and fixed effects are not significantly different from another (Hausman (1978)). We assume that we control for most of the relevant characteristics and the unobservable effects are rather small. Therefore, a random-effect model is also sensible from an economic point of view.

Afterwards, we apply an OLS regression for both PBOs and SBO separately. This helps to identify if value drivers are different between both buyout rounds. The variables and specification are the same as in the panel regression.

3.4.2 Results

The determinant analyses consist each of three specifications which are displayed in Tables 3.4-3.6. The base case specifications only consider the four multiples that were used to perform the valuation of the observed company. Afterwards, in the second specifications, we further include controls for the size, the holding period, the macroeconomic environment, the time, and the main industry the company operates in. In the third specifications, we complete the regressions by adding more detailed firm characteristics that should serve as value drivers.

The determinant analysis for all buyouts is a combination of the following two determinant analyses about PBOs and SBOs. Table 3.4 shows the results of all buyouts for comparison. The results are not further discussed as we rank the importance of the value drivers in PBO and SBO separately higher than for all buyouts in general. We can confirm that the results for all buyouts align with the PE literature.

Table 3.5 displays the determinant analysis of PBOs. The growth of a portfolio company is a significant value driver for primary buyouts, as both sales CAGR and equity growth have positive and significant coefficients. Companies that expand their total sales and improve the operative earnings margin are likely to increase their operative cash flows and, thus, create higher value. Higher equity is equal to a greater intrinsic book value of the company. Further, those companies that are able to increase their equity over time indicate a positive past performance and higher stability, thus increasing the company value.

Profitability seems to play various roles for value drivers in PBOs. The EBITDA margin is significant for all specifications and the profit margin for the last, most relevant, specifications as well. The coefficient of the EBITDA margin is in line with the previous finding that ultimately, and in combination with sales increase, operative earnings, and operative cash flows may be increased. Interestingly, the profit margin coefficient is not significant for the first two specifications but becomes weakly significant and negatively correlated to the company's valuation for the third specification. This observation indicates that portfolio companies aiming to have a great profit margin, without considering the other value drivers, may have a bad overall value development. Portfolio companies that intend to increase their profit margin seem to perform worse at other value drivers, e.g. sacrificing the growth in sales for a higher profitability margin. Furthermore, due to a strong leverage, portfolio companies tend to pay high interest and, thus,

Table 3.4: Determinant Analysis: Total Buyouts

	(1)	(2)	(3)
Growth			
Sales_{G}	0.885***	0.881***	0.786***
	(0.00)	(0.00)	(0.00)
Equity_{G}	0.018***	0.022***	0.023***
	(0.00)	(0.00)	(0.00)
Profitability			
$\text{EBITDA margin}_{\text{G}}$	0.788***	0.744***	0.754***
	(0.00)	(0.00)	(0.00)
$\text{Profit margin}_{\text{G}}$	-0.040	0.008	-0.192*
	(0.61)	(0.93)	(0.04)
$\text{Return on equity}_{\text{G}}$			0.058
			(0.08)
$\text{Return on assets}_{\text{G}}$			2.007***
			(0.00)
$\text{Leverage ratio}_{\text{G}}$			-0.002
			(0.06)
Liquidity			
$\text{Cash ratio}_{\text{G}}$			-0.056
			(0.59)
$\text{Current ratio}_{\text{G}}$			0.044
			(0.29)
Efficiency			
$\text{Receivables Turnover Ratio}_{\text{G}}$			-0.002
			(0.27)
$\text{Inventory Sales Ratio}_{\text{G}}$			-0.195***
			(0.00)
$\text{Altman Z-score}_{\text{G}}$			0.008
			(0.57)
$\text{Intangible asset ratio}_{\text{G}}$			0.403*
			(0.02)
log (total assets)		0.006	0.016
		(0.80)	(0.54)
log (holding period)		-0.120	-0.147*
		(0.06)	(0.02)
Macro controls	NO	YES	YES
Time Dummy	NO	YES	YES
Industry Dummy	NO	YES	YES
Constant	0.095**	708.192	979.980*
	(0.01)	(0.14)	(0.04)
Overall R2	0.264	0.396	0.467
Number of Observations	590	590	572

Note: The table above shows the estimates of the panel random-effects regression. For all three specifications, the dependent variable is the excess company value growth. The first specification represents the base case which includes the variables used in the valuation of the company. The second specification adds time controls, industry controls and selected macroeconomic variables. The third specification adds more company-specific variables that influence the company value. The t-statistics are reported in parenthesis below the respective coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%. The lower case G indicates whether the variable is a measure of excess growth.

Table 3.5: Determinant Analysis: Primary Buyouts

	(1)	(2)	(3)
Growth			
Sales_{G}	0.877***	0.800**	0.730*
	(0.00)	(0.00)	(0.02)
Equity_{G}	0.019***	0.018***	0.021***
	(0.00)	(0.00)	(0.00)
Profitability			
EBITDA margin_{G}	0.851**	0.982**	0.922*
	(0.01)	(0.01)	(0.01)
Profit margin_{G}	-0.185	-0.288	-0.325*
	(0.15)	(0.09)	(0.04)
Return on equity_{G}			0.072
			(0.25)
Return on assets_{G}			0.543
			(0.60)
Leverage ratio_{G}			-0.001
			(0.58)
Liquidity			
Cash ratio_{G}			-0.036
			(0.73)
Current ratio_{G}			0.029
			(0.55)
Efficiency			
Receivables turnover ratio_{G}			-0.003
			(0.05)
Inventory sales ratio_{G}			-0.035
			(0.41)
Alman Z-score			0.116
			(0.32)
Intangible asset ratio_{G}			0.511*
			(0.02)
log (total assets)		0.039	0.037
		(0.27)	(0.31)
log (holding period)		-0.002	-0.017
		(0.99)	(0.89)
Macro controls	NO	YES	YES
Time Dummy	NO	YES	YES
Industry Dummy	NO	YES	YES
Constant	0.005	83.267	80.230
	(0.90)	(0.05)	(0.06)
Adjusted R-Squared	0.361	0.356	0.380
Number of observations	294	294	290

Note: The table above shows the estimates of the OLS regression for all PBOs. For all three specifications, the dependent variable is the excess company value growth. The first specification represents the base case which includes the variables used in the valuation of the company. The second specification adds time controls, industry controls and selected macroeconomic variables. The third specification adds more company-specific variables that influence the company value. The t-statistics are reported in parenthesis below the respective coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%. The lower case G indicates whether the variable is a measure of excess growth.

portfolio companies may have negative net earnings. The return on assets and equity are not significant, indicating that the necessary capital may work against the increase in earnings.

In this sample, financial engineering does not seem to be relevant as the coefficient is not statistically significant. However, this development of the financial leverage may be explained because GPs aim to reduce the leverage towards the end of the holding period as can be inferred as well from the summary statistics. Therefore, this explanation may be a reason why there is not an effect on the value creation of a PBO portfolio company.

As expected, the excess developments of liquidity and efficiency do not influence the value creation during the PBO. These findings, however, need to be treated with caution because due to the construction of this dataset, SBOs are the follow-up investors. Assuming that PE investors care less about the underlying liquidity of companies compared to strategic buyers, PBO investors do not focus as much on this measure because SBO investors simply may not regard these developments as valid selection criteria.

PBOs seem to benefit from early innovation and improvement of goodwill. Portfolio companies that increase the share of intangible assets in total assets have a stronger value growth. This might be explained by the fact that those younger companies tend to focus more on intellectual property generation or goodwill growth than companies with older and traditional mind-sets. This finding needs to be treated with caution as well. The result can be heavily driven by the increase from goodwill after the exit of the PBO when there was a comparably lower goodwill before the PBO.

The results of the SBO value driver analysis are presented in Table 3.6. Growth seems to be less important in SBOs than in PBOs. The sales CAGR is only significant for the first specifications with a positive coefficient. The coefficient is slightly higher than in specifications of the PBO, which may indicate that during the PBO the expansion of the business probably comes at lower costs as low hanging fruits can easily be collected.

The focus of profitability changes during SBOs compared to PBOs. The development of excess EBITDA margin is weakly significant and positive for the first and the third specification with a slightly lower coefficient than in the PBO analysis. This finding meets the expectation, as companies with a positive development of a profitability experience superior operative earnings, which contributes to a higher company value. However, the weaker effect of the excess EBITDA margin development on value creation for SBOs compared to PBOs indicates that the improvement comes along with higher opportunity costs during the SBO than during the PBO. The return on assets is positively correlated and significant with a very high coefficient, showing that the return on assets is extremely important in SBOs. It seems that portfolio companies may become cost efficient, in terms of EBITDA margin, during the PBO but lack the asset efficiency in order to achieve that certain profitability. As shown in the t-test, total assets increase strongly during the PBO. This increase in assets seems to be higher in comparison to the improvement in operative earnings. During an SBO the GP increases total assets significantly less than during a PBO, indicating that total assets are not build up unnecessarily

Table 3.6: Determinant Analysis: Secondary Buyouts

	(1)	(2)	(3)
Growth			
Sales_{G}	0.932**	0.786	0.636
	(0.00)	(0.10)	(0.22)
Equity_{G}	-0.002	-0.007	-0.000
	(0.82)	(0.64)	(1.00)
Profitability			
$\text{EBITDA margin}_{\text{G}}$	0.788*	0.733	0.863*
	(0.03)	(0.06)	(0.03)
$\text{Profit margin}_{\text{G}}$	0.069	0.155	-0.126
	(0.75)	(0.53)	(0.28)
$\text{Return on equity}_{\text{G}}$			0.085
			(0.41)
$\text{Return on assets}_{\text{G}}$			3.829**
			(0.01)
$\text{Leverage ratio}_{\text{G}}$			-0.003
			(0.29)
Liquiditiy			
$\text{Cash ratio}_{\text{G}}$			-0.051
			(0.82)
$\text{Current ratio}_{\text{G}}$			0.138*
			(0.03)
Efficiency			
$\text{Receivables turnover ratio}_{\text{G}}$			0.026
			(0.11)
$\text{Inventory Sales Ratio}_{\text{G}}$			-0.265***
			(0.00)
Altman Z-score			-0.208
			(0.09)
$\text{Intangible asset ratio}_{\text{G}}$			-0.307
			(0.67)
log (total assets)		-0.035	-0.044
		(0.43)	(0.32)
log (holding period)		-0.202	-0.267*
		(0.10)	(0.05)
Macro controls	NO	YES	YES
Time Dummy	NO	YES	YES
Industry Dummy	NO	YES	YES
Constant	0.186***	1251.213	1917.697
	(0.00)	(0.37)	(0.14)
Adjusted R-Sqaured	0.216	0.183	0.287
Number of observations	294	294	282

Note: The table above shows the estimates of the OLS regression for all PBOs. For all three specifications, the dependent variable is the excess company value growth. The first specification represents the base case which includes the variables used in the valuation of the company. The second specification adds time controls, industry controls and selected macroeconomic variables. The third specification adds more company-specific variables that influence the company value. The t-statistics are reported in parenthesis below the respective coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%. The lower case G indicates whether the variable is a measure of excess growth.

during an SBO, which goes along with a better return on assets.

Similar to the finding for PBOs, financial engineering does not have a statistically significant effect on value creation during the SBO. This absence of significance is probably driven for the same reason as for PBOs that the leverage is reduced towards the end of the holding period anyways and therefore the full effect cannot be observed.

In contrast to PBOs, in SBOs it is rather important to focus more on liquidity. One of the two possible measures for liquidity, namely the current ratio, is significant with a positive coefficient. This result indicates that financial sponsors should hold sufficient current assets to cover all outstanding short-term payables. This is increasingly important when the SBO exits via a strategic sale or through an IPO as liquidity is reasonably more important to non-PE buyers. This reason also explains the difference between PBOs and SBOs for liquidity as value driver during the holding period.

Efficiency gains throughout the SBO holding period also become increasingly important. The inventory sales ratio is highly significant and negatively correlated, as expected. GPs pursue inventory management and indicate that they can sell off their inventory quickly or find ways of using the inventory more efficiently. This measure is also amplified through the former analysis of the return on assets metric, as good inventory management reduces the amount of necessary current assets to achieve a certain level of sales and ultimately operative earnings.

The excess development of innovation is not significant for value creation during SBOs. As expected, innovation does not play a role in value creation for SBOs. As the overall value creation is not superior for SBOs compared to PBOs an above-average development of goodwill will not be achieved at time of the exit. Further, total assets increase significantly less during the SBO compared to the PBO. This indicates that probably less growth in intangible assets can be recognized.

3.5 Selection Criteria for SBOs

The previous analysis shows that the value drivers differ across buyout rounds, but still do have some similarities. The differences may be explained by two factors. First, the typical GP of an SBO may prefer to implement other measures than the GP of a PBO. Second, and more importantly, different action needs to be taken considering the state of the company at the time of the investment entry. Whereas PBOs stem from a less specialised and less streamlined field of business, i.e. the non-PE backed background, SBO investors acquire companies that have been in the hand of a GP before. Having the same PE driven mindset can serve beneficial for SBOs because the business structures are very similar and many of the favourable traits (such as governance engineering) are already implemented in the business. On the contrary, the potential for value creation might be closed and only little or no potential to create value exists.

Achleitner & Figge (2014) argue that SBOs are able to exploit gaps of value creation if the optimisation process during the PBO could not been completed. The remaining potential for SBOs may occur for several reasons. For example, there may not be enough time in the lifespan of the funds and the portfolio company must be sold early before the GP could cover the whole potential of value creation (Jenkinson & Sousa (2011)). For marketing purposes during the fund raising, some investments will be exited early to illustrate good performance to potential investors (Wang (2012) Jenkinson & Sousa (2011)).

As this paper aims to identify the dependency of value creation, we take a closer look at the value chain. As a first step, a good potential target needs to be identified. Identifying good investment targets based on past performance indicators is also done in non-PE areas of corporate finance (e.g. Capron & Shen (2007)). The selection of targets should not differ between PE and non-PE in the way how the analysis is conducted. Therefore, we analyse the effect of the portfolio company's development during the PBO on the excess value creation during the SBO. This approach helps to identify individual good traits of an SBO. The academic findings on target selection from a PE perspective are unusually silent. Whereas Jenkinson & Sousa (2015) describe in which situations SBOs are the best choice of exit, there is only little evidence on the characteristics of the process from a buying perspective.

Growth during the PBO may be a very important selection criteria. Usually during the PBO, GPs aim to scale the portfolio company. The odds to sufficiently expand the company during the SBO are reasonably low if the PBO investor was not able to do so, assuming a similar ability to implement growth strategies. Thus, it might be worth looking at strongly growing companies which represent a good acceptance of the market and an increasing market share. Therefore, we expect that the portfolio company's expansion during the PBO has a positive effect on the value creation during the SBO.

Consistent with the argument that targets of SBOs are further progressed in the business life cycle, improving the portfolio company's profitability during the SBO might be the consequent step forward. As seen in the previous analyses, the EBITDA development is positively and the development of the profit negatively correlated to the value creation within the buyout. Thus, the portfolio company may already be quite profitable and further improvement of the profitability is rather difficult. Due to the mixed explanations, on average we do not expect that the profitability development during the PBO has a significant effect on the value creation during the SBO.

The probability that the portfolio company is exited via SBO is higher when the underlying company has a great debt bearing capacity (Achleitner et al. (2014)), indicating that leverage seems to be important to potential financial acquirers. Although leverage is not a significant value driver in our sample, it may be possible that the optimal capital structure has already been found during the PBO. When the leverage is relatively low after the PBO or the portfolio company is able to absorb additional debt, leverage may very well be a value driver for SBOs. Therefore, we expect leverage development during the PBO to have a negative effect on value

creation during the SBO.

Liquidity does not seem to be important to GPs, as they can cover shortages in liquidity by providing more capital to the portfolio company. On the other hand, GPs do not intend to inject unnecessary capital into the company and, thus, a low level of liquidity is not desired. Therefore, on average, whether the investment becomes more liquid during the PBO should not matter for the decision of investing in an SBO as long as the liquidity is acceptable from a buyer's point of view.

As can be inferred from the previous analysis, efficiency gains are made in SBOs to create value. SBO investors may focus on this area in a second step because the implementation of efficiency gains may not belong to the category of low-hanging fruits. The less efficient companies are during the PBO in contrast to their peers, the more attractive they become as potential targets for SBOs because there is simply more space for improvement. Thus, we expect that the efficiency improvement during the PBO is negatively correlated to the value creation during the SBO.

Innovation during the PBO may indicate strongly growing companies and thus align with the growth hypothesis. At the same time, SBO investors may wish to invest in companies that are not as innovative yet. Investments may foster the value growth more in less innovative companies compared to high-end developed companies. Due to these mixed explanations, we do not expect a significant effect of the degree of innovation during the PBO on the development of the company value during the SBO.

3.5.1 Methodology

After understanding which value drivers are generally important to control, we analyse if and how the success in the second investment round is dependent on the development of the performance drivers during the PBO. We calculate the possibility of an SBO being successful depending on the success of the PBO. A deal is defined as successful when it produces a superior company value development compared to its predefined peer group. Those companies that have an above average development are assigned a "1" in a binary variable setting. Due to the assignment in the binary variable setting, we are able to estimate probabilities whether an investment is going to be successful conditional on the outcome of the prior investment. This overview provides a first idea whether there might be dependencies between the two buyout stages. The conditional probabilities for each case are estimated as follows:

$$P(SBO|PBO) = \frac{P(SBO \cap PBO)}{P(PBO)} \tag{3.5}$$

In addition, we use an OLS regression to determine whether the development during the PBO has any influence on the value creation during the SBO. This analysis determines which companies are suitable for an SBO. We regress the excess valuation development during the secondary buyout conditional on the excess developments of the value drivers during the PBO. We use

the same value drivers as in the determinant analysis following this model specification:

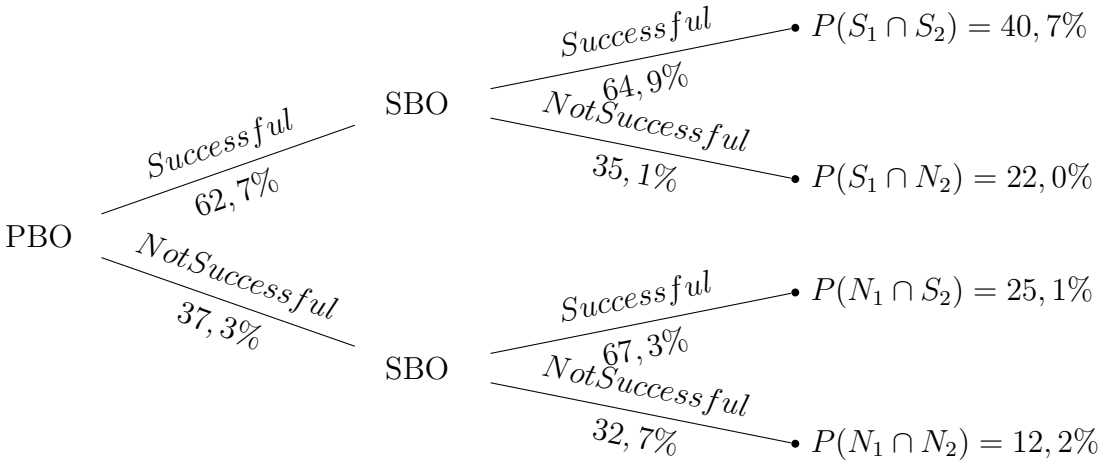
$$y_{it}(SBO) = \alpha + \beta * X_{it}(PBO) + \gamma * Y_t + \epsilon \tag{3.6}$$

where y describes the company value growth of company i at time t during the SBO, X describes devlopment of the firm-specific variables during the PBO and Y describes the economic variables.

3.5.2 Results

The probability tree in Figure 3.4 shows the success probabilities for all buyout rounds and the conditional probabilities for all four cases after the SBO. In our sample there are more deals that outperformed their peer group than deals that underperformed compared to their peer group.

Figure 3.4: Conditional Probability



Note: This figure shows the (conditional) success probabilities during the PBO and SBO.

The conditional probabilities of the SBO being successful are rather similar with 64.9 percent and 67.3 percent for a successful and unsuccessful PBOs, respectively. Thus, it seems that PE investors themselves may perform superior compared to other shareholders and, thus, on average foster the companies' growth more than their peer group. However, after any development of the PBO there are evidentially some small differences between outperforming the market and underperforming the market. The conditional probabilities show that there are slight differences for the success of the SBO conditional on how the PBO performed. However, the differences are not very big and, thus, we may need a more detailed analysis on how to engage in a successful SBO. Possibly, SBO investors need to adjust their stategy according to the company development during the PBO. Therefore, in the following we analyse which companies are especially suitable for good SBOs.

Table 3.7 summarises the results of the OLS regression. The evidence about dependency of growth and expansion during the PBO is rather mixed. In all specifications the value growth during the PBO has a negative influence on the value growth during the SBO with a high significance. Those companies, which develop a higher company value during the PBO than their competitors, perform worse during the SBO. This result follows the idea that most of value creation potential is already used up during the PBO. This result corroborates the finding from the conditional probabilities, but its extent is weaker as the conditional probabilities for success are only in a binary variable setting and, thus, inherit less variation. This theory aligns with the partially significant and negative coefficients in equity development during the PBO as a measure of intrinsic value growth. The sales CAGR is at least for the last specification weakly significant with a positive coefficient. Companies that grow rapidly represent great market acceptance and, therefore, may promise potential further growth in the future. These results indicate that it is beneficial when the intrinsic value of the company developed rather weakly during the PBO, whilst the market participation, measured in sales, grows.

The results for SBO value creation based on the excess profitability development during the PBO is also mixed. The development of the excess EBITDA margin during the PBO is statistically significant and positively correlated to the value growth during the SBO. GPs should invest into companies having a good operative margin. Companies that could not be improved into more efficient companies during the PBO may not improve the EBITDA margin during the SBO either as some businesses are not possible to streamline further. In contrast to the EBITDA-margin, the return on assets ratio is negatively and significantly correlated. We observe that it is important to find companies that have a suboptimal usage of their assets. This finding aligns with the previous regression that return on assets is a very strong value driver for SBOs. Therefore, it seems that portfolio companies should have great operating earnings but require further fine-tuning according to asset usage. This finding is further backed by the inventory sales ratio. According to this variable, PE firms should acquire companies that are bad at selling off and managing their inventory, i.e. using parts of their assets inefficiently. Potentially, during an SBO the GP can sell off the excessive inventory, thereby reducing its working capital and, thus, improving its profitability with respect to the invested assets.

The coefficient of the financial leverage is not significant as expected. Leverage does not seem to be a value driver neither in the PBO nor in the SBO. Thus, it would be highly abnormal if the development of the leverage during the PBO had an impact on value creation during the SBO. Interestingly, the current ratio is not significant in this regression, following the significance as SBO value driver. This can be due to the fact that this metric works a little different compared to other measures. It is assumed that low-hanging fruits can be collected for measures such as the EBITDA margin, i.e. with increasing marginal costs to improve. The liquidity measure may have a more linear function of marginal improvement and, therefore, does not need a bad development during the PBO anyway.

Interestingly, the intangible asset's coefficient is statistically not significant. As the overall value creation during the PBO is negatively correlated, we would have expected a similar result, solely

Table 3.7: Target Selection

	(1)	(2)	(3)
Growth			
$\text{Valuation}_{\text{PBO,G}}$	-0.345***	-0.354***	-0.318***
	(0.00)	(0.00)	(0.00)
$\text{Sales}_{\text{PBO,G}}$	0.222	0.276	0.394*
	(0.06)	(0.14)	(0.04)
$\text{Equity}_{\text{PBO,G}}$	-0.474*	-0.422*	-0.330
	(0.03)	(0.03)	(0.09)
Profitability			
$\text{EBITDA margin}_{\text{PBO,G}}$	0.164*	0.145*	0.189*
	(0.03)	(0.01)	(0.04)
$\text{Profit margin}_{\text{PBO,G}}$	-0.088	-0.025	-0.052
	(0.35)	(0.68)	(0.60)
$\text{Return on assets}_{\text{PBO,G}}$			-0.295***
			(0.00)
$\text{Return on equity}_{\text{PBO,G}}$			-0.001
			(0.85)
$\text{Leverage ratio}_{\text{PBO,G}}$			-0.000
			(0.51)
Liquidity			
$\text{Cash ratio}_{\text{PBO,G}}$			0.069
			(0.09)
$\text{Current ratio}_{\text{PBO,G}}$			-0.041
			(0.07)
Efficiency			
$\text{Receivables turnover ratio}_{\text{PBO,G}}$			0.001
			(0.60)
$\text{Inventory Sales Ratio}_{\text{PBO,G}}$			0.543***
			(0.00)
$\text{Altman Z-score}_{\text{PBO,G}}$			0.010
			(0.73)
$\text{Intangible asset ratio}_{\text{PBO,G}}$			-0.062
			(0.66)
$\text{log (holding period)}_{\text{PBO}}$		-0.132	-0.123
		(0.07)	(0.12)
$\text{log (total assets)}_{\text{SBO}}$		-0.020	-0.040
		(0.46)	(0.10)
Macro controls	NO	YES	YES
Time Dummy	NO	YES	YES
Industry Dummy	NO	YES	YES
Constant	0.266***	2.773	4.570
	(0.00)	(0.59)	(0.37)
Adjusted R-Squared	0.062	0.136	0.292
Number of observations	295	294	290

The table above shows the estimates of the OLS model regressing the excess valuation growth during the SBO on the excess variable developments during the PBO. The first specification represents the base case which includes the variables used in the valuation of the company. The second specification adds time controls, industry controls and selected macroeconomic variables. The third specification adds more company-specific variables that influence the company value. The t-statistics are reported in parenthesis below the respective coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%. The lower case G indicates whether the variable is a measure of excess growth.

from the perspective of a goodwill creation. It seems that SBO investors do not seek companies that develop the degree of innovation during the holding period of the PBO. Thus, the growth in sales during the SBO does not necessarily depend on the products and services' degree of innovation.

3.6 SBO Value Drivers are Conditional on PBO Development

Knowing the fundamental selection criteria for value creation in superior SBOs, raises the questions how to exploit the further potential of value creation in the acquired portfolio company. Considering the previous development of the portfolio company, the value drivers should differ slightly from the first analyses in which the average effect of value drivers in SBOs is measured. Certain developments during the PBO may force the GP of the SBO to act in a way that the GP would not do otherwise. Generally, there should be three potential ways on how to generate further value. First, the second GP takes exactly the same action as the first GP because there is still value creation potential left. Second, the SBO investor works on a similar measure but is better performing or takes a different approach. Third, as Degeorge et al. (2016) finds, the GP takes different actions and works on other areas of interest, i.e. complementary skill sets. Their study argues from another perspective than we do. They try to categorize the GPs considering their skillset and analyse the effect on value creation during the SBO. Our paper claims that the skillsets of GPs belongs either to the category of expansion or to the category of a margin grower, thus, possibly oversimplifying the skillsets of GPs. In our view, it is very likely that the GPs have multiple skillsets to act accordingly to very different companies. Thus, we do not categorize the GPs but rather observe what has been done during both buyout rounds. Observing the development in value drivers clearly shows what the particular GP is capable of doing. Authors like Achleitner & Figge (2014) also argue that the main value drivers have already been implemented during the investment period of the PBO and, therefore, the remaining potential value gap supposedly is relatively small. This explanation indicates that new measures need to be taken to exploit other gaps of value creation. Possibly, a mixture of all three aforementioned explanations might work in SBOs. Therefore, we expect differing value drivers depending on the various selection criteria.

3.6.1 Methodology

After identifying the characteristics for suitable targets it is crucial to know what to do with the investment once it is acquired. During the analysis of the target selection we identified five company specific characteristics that make the acquisition of the portfolio company reasonable. These characteristics are lower company growth, strong sales growth, superior EBITDA margin development, weaker development in return on assets, and improved inventory sales ratio. We perform subsampling for all identified value drivers during the regressions for target selection,

e.g. if we identified a negative value driver in the previous question, we construct a subsample consisting of all observations that underperform in that specific value driver compared to its peer group. We are able to analyse what to do with a portfolio company if one of the previous selection criteria is met. We may be able to recognise similarities in the required actions of the different subsamples to finally identify which performance drivers increase the portfolio companies' valuation as much as possible. In this analysis, we look at those individual selection criteria separately. Thus, we apply an OLS regression for all SBOs with different subsamples:

$$y_{it}(SBO) = \alpha + \beta * X_{it}(SBO) + \gamma * Y_t + \epsilon \tag{3.7}$$

where y describes the company value growth of company i at time t during the SBO, X describes the firm-specific variables development during the SBO and Y describes the economic variables.

3.6.2 Results

The results are summarised in Table 3.8. The five specifications represent the subsamples according to the significant variables from the previous question, namely valuation growth, sales growth, EBITDA margin development, return on asset development and inventory sales ratio development. The first specification considers the subsample of all companies that underperformed in terms of valuation growth during the PBO. It is hard to analyse this subsample of 106 companies are characterised, as there are several value drivers during the PBO. The coefficient of the profit margin is significant with an economically relevant effect. The other specifications provide a better insight how the acquired companies are characterised and are more interesting to this study.

The second specification analyses the subsample for those companies that had a superior sales development compared to its peers. Interestingly, the coefficient for sales is not significant, although, we found some significance in the SBO determinant analysis. This observation may indicate that GPs neglect the further excessive expansion of sales when a company grew strongly in the past. On the other hand, the equity growth has a positive and significant coefficient, indicating that successful SBOs are able to channel their earnings into equity. The return on assets is both significant and also highly positive, indicating that it is highly important to improve the effective usage of the portfolio company's assets in order to realise strong value growth. Thus, GPs should focus to redirect the previous strong sales growth into a profitable operation in relation to its invested assets. The leverage ratio development is significant with a negative coefficient indicating that the proportion of liabilities to equity should decrease. It confirms that financial engineering is less relevant when the underlying company has strongly expanded before and probably does not need further capital to generate additional value. Furthermore, it has the effect to reduce the amount of total assets which aligns well with the reasoning about the improvement in return on assets.

The third specification focuses on those companies whose excess EBITDA margin development

Table 3.8: SBO Value Drivers

	(1) Valuation	(2) Sales	(3) EBITDA	(4) RoA	(5) Inventory
Growth					
$\text{Sales}_{\text{SBO,G}}$	0.004	0.413	0.980***	0.481**	0.531***
	(0.99)	(0.10)	(0.00)	(0.00)	(0.00)
$\text{Equity}_{\text{SBO,G}}$	0.780	0.474*	0.335	0.362	0.170
	(0.10)	(0.02)	(0.30)	(0.05)	(0.61)
Profitability					
EBITDA $\text{margin}_{\text{SBO,G}}$	0.047	0.075	-0.128	0.564**	0.208
	(0.84)	(0.81)	(0.26)	(0.01)	(0.18)
Profit $\text{margin}_{\text{SBO,G}}$	0.202**	0.496	0.251	0.020	0.024
	(0.01)	(0.19)	(0.42)	(0.48)	(0.49)
Return on $\text{assets}_{\text{SBO,G}}$	-0.713	1.918*	2.243**	0.057	0.005
	(0.70)	(0.02)	(0.01)	(0.96)	(1.00)
Return on $\text{equity}_{\text{SBO,G}}$	-0.010	0.026	0.003	0.023	0.011
	(0.66)	(0.25)	(0.79)	(0.25)	(0.50)
Leverage $\text{ratio}_{\text{SBO,G}}$	0.001	-0.004*	-0.003	0.000	-0.001
	(0.84)	(0.03)	(0.18)	(0.91)	(0.62)
Liquidity					
Cash $\text{ratio}_{\text{SBO,G}}$	0.028	0.085	0.034***	-0.042	0.188
	(0.06)	(0.32)	(0.00)	(0.64)	(0.34)
Current $\text{ratio}_{\text{SBO,G}}$	-0.001	-0.013	0.000	-0.029	-0.038
	(0.66)	(0.52)	(0.86)	(0.47)	(0.41)
Efficiency					
Inventory sales $\text{ratio}_{\text{SBO,G}}$	-1.621	-0.211	-0.118	-2.886	-3.147
	(0.55)	(0.74)	(0.83)	(0.07)	(0.06)
Receivables turnover $\text{ratio}_{\text{SBO,G}}$	0.010	-0.058	-0.055	0.011	-0.039
	(0.30)	(0.06)	(0.09)	(0.22)	(0.07)
Altman Z-score	0.088	-0.054	0.118	0.099	-0.281
	(0.23)	(0.60)	(0.06)	(0.14)	(0.08)
Intangible asset $\text{ratio}_{\text{SBO,G}}$	-0.083	0.084	0.002	-0.769**	-0.124
	(0.54)	(0.31)	(0.99)	(0.00)	(0.63)
log $(\text{holding period})_{\text{SBO,G}}$	-0.296	-0.071	-0.025	-0.084	-0.051
	(0.11)	(0.28)	(0.72)	(0.31)	(0.58)
log $(\text{total assets})_{\text{SBO}}$	-0.000	-0.000	0.000*	0.000	-0.000
	(0.94)	(0.56)	(0.02)	(0.56)	(0.49)
Macro Controls	YES	YES	YES	YES	YES
Time Dummy	YES	YES	YES	YES	YES
Industry Dummy	YES	YES	YES	YES	YES
Constant	-0.581	7.520	3.729	2.002	-5.672
	(0.95)	(0.11)	(0.50)	(0.80)	(0.30)
Adjusted R-Squared	0.358	0.405	0.456	0.490	0.503
Number of observations	106	205	171	135	141

Note: The table above shows the estimates of the OLS model regressing the excess valuation growth during the SBO on the excess variable developments during the SBO. All specifications include the base variables, time controls, industry controls, macroeconomic variables and additional company-specific variables. The specifications are subsamples that represent the target selection criteria identified in the second research question. The t-statistics are reported in parenthesis below the respective coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%. The lower case G indicates whether the variable is a measure of excess growth.

was positive, i.e. the company developed its operative earnings margin better than its peer group during the PBO. The coefficient for sales growth is significant and positive, meaning that GPs should rather concentrate on expanding the portfolio company's sales when the operating structures already became leaner. The portfolio companies may benefit strongly as for every additional unit in sales the operative earnings are relatively high. The company should aim to improve the effective utilisation of assets as the significant coefficient for return on assets is very high positive. The size of the company at entry of the SBO, measured in total assets, is significantly and positively correlated to value growth, but the coefficient is too small to be economically relevant. Furthermore, the cash ratio is highly significant and positive, showing that the GPs need to use their profitable situation to build up cash, which may be used either to repay the high amount of debt or to invest.

The fourth specification includes those companies whose return on assets has not developed as well as their peers. These companies need to consider the growth of the company and turn the company into a more profitable organisation with an increased operating cash flows. It seems that the inferior return on assets is driven by lower operative earnings. Interestingly, the intangible asset ratio is significant and negatively correlated to value creation. It seems that counteracting the inferior return on assets is achieved by the reduction of intangible assets. They seem to be less effective in generating earnings, at least in the short-run and, therefore, SBO investors reduce the level of intangible assets on total assets.

The last specification concerns those companies that developed the inventory sales ratio stronger than their close competitors during the PBO, i.e. being worse at inventory management than the peer group. In this specification, only the sales growth coefficient is significant and positive. This indicates that rather than reducing the inventory for a certain level of sales, higher sales should be targeted.

Very interestingly, companies are not only successful when they have additional skillsets as previously assumed. First, they do apply additional skillsets, e.g. improving return on assets during the SBO after sales growth during the PBO. Thereby they do something different to create further value in a consecutive buyout. Second, SBO investors work on a similar area of value drivers, e.g. increasing profitability by improving return on assets, although profitability was already focussed on during the PBO as the EBITDA margin has been improved strongly. However, it seems that SBO investors do not simply continue with the previous strategy by doing the same over again in the second buyout round.

Generally, there are different types of characteristics that make PBO portfolio companies interesting for an SBO. Our analysis shows that there is not just a single value driver for SBOs but rather a combination of reactions to the operational development during the PBO. Often the reasons for acquiring a company in an SBO are manifold. However, the different indicators give a good first insight on how to handle portfolio companies in different economic and operational situations. The investors may decide to which category the investment belongs, test whether the significant value drivers can be implemented, and then decide accordingly.

3.7 Conclusion

With a dataset of 295 companies undergoing consecutive PBOs and SBOs this paper answers three research questions. First, we analyse whether PBOs and SBOs have differing value drivers. Second, we answer the question how a company should have developed during the PBO to be suitable for an SBO. Third, we investigate the separate value drivers dependent on the previous development of the portfolio company. Our paper contributes to the existing literature in many ways. The dataset is different from most papers, as it considers consecutive deals rather than PBO and SBO separately. Up to our knowledge this dataset is the largest and most detailed one with this specific construction of back-to-back buyouts. The dataset thus enables a more sensible way to analyse different sets of value drivers. Furthermore, as we hand-collect many data items, we are able to analyse other characteristics that have not been properly examined yet. It is also the first paper which does not only investigate the differences between the two buyouts but rather looks at the dependency between the two buyout rounds based on a fundamental analysis.

The descriptive summary indicates different value creation profiles of PBO and SBO. Like many other studies, we see that the portfolio companies develop operationally well compared to its non PE-backed peers. Interestingly, the mean differences between PBO and SBO are not significant for most of the applied measures. However, the median differences of the same measures are often significantly different from another, mostly with better medians for the PBO. The mean for the valuation CAGR is greater for SBOs than for PBOs, whilst the median value is greater in PBOs than in SBOs. This is the first indication that it is possible to create more value during an SBO than during PBOs but there is simply much more volatility in the operational success of an SBO. Thus, we look closer into the value creation of buyouts and especially of SBOs. The dependency analyses help to identify mechanisms that promote successful SBOs.

We find that dependencies between the operational performance of PBOs and the operational performance of SBOs exist. We identify five developments during the PBO that influence the value creation during the SBO and thus serve well as selection criteria. The more value was created during the PBO, the less attractive it becomes as potential target for an SBO. However, SBO investors should seek to invest into strongly expanding companies as these companies represent promising markets and, by this, stronger pertinence. When a portfolio company's profitability developed well during the PBO it becomes favourable for SBO acquisitions. An inferior return on assets on the other hand is favourable as it allows further fine-tuning during the SBO. Lastly, the less a portfolio companies improves its efficiency during the PBO, the higher the value creation during the SBO.

The required action taken by the SBO investors differs among the identified selection criteria. Generally, two types of value drivers exist which are conditional on certain selection criteria. First, we find supporting evidence that complementary skillsets exist, e.g. when sales are developed strongly during the PBO, SBO investors tend to improve the profitability of the portfolio companies. Second, the SBO investors also work on similar measures as the PBO

investors but do it differently, e.g. although profitability is focussed on PBO, in terms of EBITDA margin, the SBO investor still aims to work on the profitability, but rather focuses on the improvement of the return on assets. SBO investors either need to set different objectives for their performnce management compared to PBO investors or they concentrate on the same objectives with a different approach. However, a simple continuation of the PBO strategy does not create value during the SBO.

Future research may expand this study by further analysing the combination of these effects. Whilst our study provides an initial overview on which companies to acquire and what to do once they are acquired, these findings solely focus on individual effects. Usually, companies are acquired for several reasons rather than just one. This directly effects the combination of what to do with the portfolio company and may differ from what we found. Further, up to this point, it is not clear which of the proposed dependencies provides the greatest success.

Chapter 4

Risk of Financial Distress in Secondary Buyouts

4.1 Introduction

Especially in recent times of extremely low interest rates, financial investors are facing a difficult time. There is plenty of money available to be invested in different asset classes but in most asset classes the possible return is quite small. The asset class Private Equity (PE) has presented an outperformance compared to other asset classes (e.g. Kaplan (1989), Guo et al. (2011)). The attractiveness to invest in PE is demonstrated by the continuously growing flow of capital into this asset class. In 2018 more than 450 billion euro were raised in Europe alone (PitchBook (2018a)). However, PE faces challenges to find attractive targets as the investment of the dry capital to achieve excess market returns is very competitive. This problem reveals the question whether PE firms are willing to take on more risk considering the pressure to invest.

By 2018, more than 50 percent of all financial buyouts are done by Secondary Buyouts (SBOs), which means that General Partners (GPs) sell portfolio companies of the Primary Buyouts (PBOs) to other financial investors (PitchBook (2018a)). Investors as Limited Partners (LPs) criticise this development as these deals are seen as too costly and potentially underperforming because the value creation might already be done in the PBOs. On the other hand, Degeorge et al. (2016) argue that under certain situations SBOs do not perform worse than PBOs and, thus, may also outperform their non-PE backed peers. However, both the huge demand to find attractive buyout targets and the increasing share of SBOs on the total deal volume, possibly driven by the incentives of the GPs, scrutinize the attractiveness of these financial buyouts. If the SBO performance is not necessarily as good as the PBO performance, the high share of SBOs is highly questionable. This dilemma leads to the question whether SBOs are less risky than their preceding PBOs.

GPs acquire a portfolio company and create value by financial and operative improvements. They use a substantial amount of debt to improve the portfolio company's governance structure, to create tax shields on debt and, thereby, increasing the return on the invested equity. Several studies find that an increased leverage improves the performance of the portfolio company (e.g. Achleitner et al. (2010), Kaplan & Strömberg (2009), Wright et al. (2009)). However, these beneficial features of debt might come at a high cost of a greater risk of financial distress (henceforth, risk of financial distress and risk are used interchangeably). If the capital structure is composed of too much debt, additional costs of financial distress may be created (Kaplan & Stein (1993)). Not only financial engineering, but also the operational development during the holding period may lead to a higher risk, e.g. liquidity risk or default risk, as GPs may use different strategies compared to the management of non PE-financed companies.

The issues about risk creation and value transfer from other stakeholders to GPs is widely discussed, yet only sparsely analysed in empirical studies (e.g. Guo et al. (2011), Robinson & Sensoy (2013)). For example, GPs are able to initiate the payout of exceptional dividends to themselves. Sometimes the amount of these dividend recapitalisation may even exceed the initial equity investment of the GP, thus, eliminating the investment risk by transfering the risk of the GP to other stakeholders. Furthermore, the usage of high leverage, used for example

to pay out dividend recapitalisation or make add-on acquisitions, among others can lead to a liquidity drain of the company and the incapacity to settle outstanding payables. On the contrary, GPs do have an incentive to avoid financial distress in their portfolio companies, as financial distress reduces their return and, ultimately, the return to the limited partners (LPs). Furthermore, GPs usually need a decent deal track record for future fund raising. If it comes to a situation of significant distress, on the fund level, GPs often have unspent capital that can be injected to help turn around a distressed portfolio company. Keeping companies out of financial distress builds a reliable reputation both with banks and LPs. A good reputation is substantial to receive favorable credit conditions in upcoming investment rounds.

Whilst we know that the return to the PE sponsors is high compared to non-PE investments, we know only little about the risk of PE investments. Although some of the investments do not actually default due to the PE-backing, the risk of financial distress may still be high in these portfolio companies.

Since literature merely agrees that SBOs do not outperform PBOs, a lower risk of SBOs compared to PBOs, could make the follow-up investment worthwhile. The steady increase of SBOs makes it necessary to understand whether the risk level of SBOs changes compared to the PBO. Based on a dataset of 590 back-to-back buyouts, we, therefore, analyse the risk of financial distress in PE transactions, and specifically in SBO transactions. The aim of this paper is to provide an in-depth analysis, whether risk of financial distress is higher in SBOs and what factors drive the risk in PE transactions. We, thereby, aim to contribute to find explanations of the spectacular growth of the SBO share on the total buyout volume and demonstrate which financial ratios to focus on in the buyout rounds to control risk and avoid the associated higher costs of financial distress.

The results of this study indicate that the buyouts' risk of financial distress is not different at investment entry, showing that neither PBO nor SBO investors necessarily specialise on investing in distressed companies. However, SBO investors tend to improve the risk profile of their portfolio companies significantly more than PBO investors. In contrast to Kaplan & Stein (1993), we find that leverage does not have an impact on the risk of financial distress in the full sample regression. If the company is considered as financially distressed, the leverage at entry increases the risk of financial distress during the buyout. The development of leverage during the buyout predominately increases risk during SBOs rather than during PBOs. Furtheron, the higher the risk level is at the beginning of the investment the more pressure is put on the GPs to improve the risk during the holding period. However, this effect is primarily observed for companies that are considered as non-risky.

Most of the literature focuses on the outperformance compared to their non-PE peers (e.g. Guo et al. (2011), Kaplan (1989)). Only a few papers consider the probability of bankruptcy in PE (e.g. Wilson & Wright (2013), Hotchkiss et al. (2014), Hammer et al. (2015)), whereas Tykvová & Borell (2012) consider the general risk of PE transactions. Degeorge et al. (2016) measure the risk in SBOs that have been executed late in the fund life time. This paper puts

the performance of SBOs and its increasing attractiveness in the PE market into context of its underlying risk.

The approach of our paper is to consider SBOs in general and to show the difference in risk of financial distress among the buyout rounds. It identifies how the risk is driven and recognises how risk has developed according to firm-specific and economic situations. The focus of the analysis is not to look at actual defaults but rather display the intrinsic risk of the investments with respect to financial distress. Thus, it is the first paper that analyses the difference in risk across PBOs and their consecutive SBOs and identifies the specific drivers of this risk.

The structure of the paper is as follows. The Chapter 4.2 presents the literature on risk in private equity and the theoretical reasoning about risk in PE. Afterwards, in Chapter 4.3, the dataset is explained. Chapter 4.4 displays alternative measures of risk and presents the analyses and its resuluts of this paper, which will be followed by robustness checks in Chapter 4.5. Chapter 4.6 summarises the paper and provides an outlook for further research.

4.2 Literature Review

4.2.1 Risk in Private Equity

Empiricial Evidence

There are only few empirical studies that analyse the risk in PE investments, although it is widely discussed in the media. The limited number of studies can be traced back to the low data availability. However, there are still several attempts that either try to capture actual defaults and bankruptcies of investments or to measure the general business risk.

Strömberg (2008) lays the groundwork of risk in PE. He questions the claim that PE ownership leads to short-termism and financial failure. However, he does not find support to this claim.

Tykvová & Borell (2012) continued to properly analyse the company risk in the area of PE financing. They analyse the effect that PE financing has on the rate of bankruptcy and the financial distress. Whereas they find that GPs invest in companies with lower risk profiles compared to non PE-backed companies, they observe that risk of financial distress increases during the investment period of the GP. Although the risk of the portfolio company increases, the default rate is not significantly higher compared to non-PE backed companies. Even more, GPs with greater investment experience are able to reduce bankruptcy rates compared to the rates of comparable non PE-backed peers.

Wilson & Wright (2013) use an insolvency hazard model to observe the risk profiles of PE-backed companies. They find that PE-financed buyouts are more likely to default compared to non-buyouts. However, the default risk is lower than expected given the company's characteristics before the buyout. Interestingly, the leverage does not necessarily drive the risk within PE investment defaults. This finding is in contrast to the initial finding of Axelson et al. (2013) who find that too much leverage is used in PE financed companies. Their evidence indicates

that a suboptimal capital structure is the major driver of financial distress.

Hotchkiss et al. (2014) study the default probabilities using a hazard model with time-varying covariates and follow-up with analyses on how GPs resolve financial distress. First, they find that PE-financed companies do not default more often than comparable non PE-backed companies with a similar capital structure. If a company is financially distressed, PE backed companies are better at restructuring and require less time to resolve the distress. They justify the superior handling of financial distress partly with the possibility of GPs to inject unspent capital of the fund into the portfolio company when more capital is needed.

Hammer et al. (2015) also use a hazard model to analyse the effect of PE financing on the probability of default of the portfolio company. The authors aim to analyse the heterogeneity of the PE strategies. They find that generalist experience a lower probability of default compared to specialised GPs. However, if specialists invest in their specialised field, the probability of default is lower compared to generalists. Whereas, SBOs have higher default probabilities than PBOs, deal syndication of several GPs reduces the default risk. They also find that portfolio companies using inorganic growth strategies have a lower bankruptcy risk.

Lastly, Degeorge et al. (2016) aim to answer the question whether underperforming SBOs (compared to PBOs) are less risky, which would explain the popularity of these buyouts. They measure risk by looking at the companies' probability of bankruptcy and capital loss, its leverage, and its beta. They do not find significant results with respect to the risk in SBOs. This paper, however, does not use regression models and, thus, does not fully close the research gap for risk in SBOs.

Theoretical reasoning

This paper analyses both how risk of financial distress differs among buyout rounds and how the risk of financial distress is composed. There are several arguments why the risk of PE-backed companies, and especially SBOs, should behave differently compared to their public peers. Ultimately, the risk of financial distress depends on several other risk factors such as liquidity risk, operational risk, and leverage.

The main argument brought forward for higher risk of financial distress is financial engineering, and the accompanying high leverage. A greater leverage should theoretically increase the risk in buyouts since capital costs are enhanced. Kaplan & Stein (1993) postulate that too much leverage causes higher financial distress. Axelson et al. (2013) state that leverage depends on credit markets conditions, and that leverage is especially high when credit markets boom. Thus, leverage is more dependent on the economic conditions rather than on firm-intrinsic effects. However, leverage contributes to lower risk by establishing superior governance structures (Jensen (1989)). Managers are incentivised to perform well, since they would not be able to repay the company's debt obligations and the interest payments. Further, Guo et al. (2011) describe the value transfer from taxpayers to GPs by tax shields, which can improve the operational earnings of the portfolio company.

On the one hand, Wang (2012) argue that during SBOs the leverage stays the same as during the PBO and value is created solely through operational improvements. On the other hand, Achleitner & Figge (2014) ascertain that value can only be created by increasing leverage as the operational value creation potential is already used up during the PBO. Consistent with these two findings, we expect that leverage drives risk in both buyout rounds. As the additional debt in SBOs may drive the leverage too high, we further expect that leverage increases the risk more strongly in SBOs than in PBOs.

PE compensation schemes may incentivise GPs to increase the share of debt in their investments. GPs may tend to invest in more risky companies and to overinvest as risk is shifted in the principal-agent dynamism. The carried interest, which GPs earn on excess investment returns, rewards successful buyouts, whereas underperforming buyouts do not penalise the GP as much. The downward risk is primarily shifted from the GP to the LP, whereas the upward risk is shared amongst both parties (Robinson & Sensoy (2013)). On top of the carried interest, dividend recapitalisations represent another possibility of value transfer from LPs to GPs. Dividend recapitalisations are additional dividends paid out directly to the GP. The volume of the dividend can even exceed the initial equity investment of the GP. Consequently, the dividend puts the company in a financially more risky situation, due to reduced equity and worse level of liquidity. Harford & Kolasinski (2013), however, find that dividend recapitalisations do not increase default probabilities. This finding may indicate that GPs only pay out dividends if the portfolio company has sufficient funds. GPs do not only take out capital from the portfolio company, but they can also inject additional capital of the funds into the company. During financial distress, such an injection can help to avoid the break of covenants or even bankruptcy.

Especially, when GPs are specialised in restructuring, they can handle higher risk better compared to non-specialised GPs (Hotchkiss et al. (2014)). Injecting capital and taking money out of the company leads to changes in the liquidity of the company. We assume that the degree of liquidity lowers the risk of financial distress in buyouts. Similar to Hotchkiss et al. (2014), we expect that more investment experience of GPs decreases risk in PE transactions, especially when those companies are distressed.

As Tykvová & Borell (2012) suggest, risk in buyouts is increased. Hence, we assume that SBOs are more likely to start their investment with a higher intrinsic risk. As higher risk of financial distress at entry needs to be handled more cautiously, we expect that risk of financial distress at investment entry has a stronger influence on the risk development in SBOs than in PBOs.

Bonini (2015) finds that GPs optimise their inventories and improve their liquidity management, by aligning outstanding payables and receivables. According to his study, the effect is less severe in SBOs as they aim to squeeze out liquidity from portfolio companies to increase the effective return. He finds that PBOs generate more cash compared to SBOs. Therefore, cash generation seems to be more important in PBOs than in SBOs. Amongst others, cash generation improves the liquidity of the portfolio company. Liquidity helps to keep the company's operations running and, thus, we expect that the risk of financial distress is reduced by higher liquidity. Thus, we

further expect that liquidity measures reduce risk more in PBOs than in SBOs.

The limited lifespan of a fund of up to 12 years can lead to a value transfer. The time-wise limitation can incentivise GPs to sacrifice long-term value creation for short-term gains. However, the claim of suboptimal short-term orientation has not been confirmed (Cao & Lerner (2009)). In addition to this, GPs may not only be interested in short term gains. As GPs usually aim to raise consecutive funds, extraordinary risk profiles in previous investments are not supportive to convince investors to further invest in their funds. Also, the business relationships to other stakeholders, such as banks, benefit from lower risk profiles. Demiroglu & James (2010) show that GPs with a good reputation pay lower interest rates and are able to build a higher leverage compared to companies with worse reputation. Therefore, GPs have an incentive to reduce risk.

Several studies find that SBOs, generally, do not perform better in terms of company growth, profitability, and efficiency compared to PBOs (e.g. Achleitner & Figge (2014), Bonini (2015)). However, the stronger the performance of the company, the lower the risk of financial distress should be. Although some actions can come at a cost (e.g. cost-cutting to improve profitability may involve a costly reduction of the workforce), we have no reason to expect that good performance increases risk of financial distress. Thus, we expect that superior operational performance reduces risk of financial distress.

As most papers do not find a better overall performance of SBOs compared to PBOs (e.g. Achleitner & Figge (2014)), we expect risk of financial distress develops more strongly during SBOs than during PBOs.

On the other hand, If the average performance of SBOs is not better than the PBO's performance, it is questionable why SBOs have become increasingly popular throughout the last years. Whereas, it may partly be driven by missing investment opportunities and high levels of dry capital, the underlying risk may make it attractive to invest in SBOs. Therefore, it might also be that SBOs have a lower risk of financial distress compared to PBOs to compensate for the outperformance of PBOs. Thus, we analyse whether the risk of portfolio companies develops differently between buyout rounds.

4.3 Dataset

4.3.1 Explanation of the Dataset

The empiricial research in PE faces the problem of data availability. First, the size of the data sample in PE studies is often small. Compared to other studies, for example on capital markets, the actual total number of deals is relatively low. Furthermore, the data availability of these deals is comparably weak. This problem is omnipresent for all studies considering fundamental data since private companies do not necessarily have to publish their financial accounts in most countries. Hence, many studies rather analyse non-fundamental data, such as cashflows to the

fund, transaction values or filed bankruptcies. Second, when analysing SBOs in comparison to PBOs in a panel setting, fundamental data both for the PBO and SBO are necessary, which further reduces the number of total observations. Third, PE studies tend to suffer from a survivor bias because GPs do not want to publish unsuccessful buyouts. This bias may alter the results especially in regard of risk of financial distress.

To counteract to the aforementioned problems we build a comprehensive dataset. We retrieved data from Capital IQ, Thomson Reuters Eikon, Prequin, Mergermarket, and a large fund of fund manager. These databases do not only provide information about a high quantity of transactions but also include the full spectrum of higher to lower performing buyouts as well.

The analysed sample consists of UK-based buyouts. We chose the UK as the sample market for two reasons. First, the geographic spread of buyouts across many countries can be problematic. Many other studies claim to have a worldwide sample, whereas most deals stem from the UK or the USA (e.g. Strömberg (2008)). To avoid any accounting related distortions in our a sample, we looked for a representative PE market. We believe that the PE market in the UK serves well as a representative market for the overall PE industry in developed countries. The UK market is the second biggest PE market in terms of volume and number of deals (PricewaterhouseCoopers (2019) and does not have heterogenous business cultures compared to other western countries. Second, and most importantly, in the UK it is mandatory to publish the financial accounts, which leads to a much greater data availability compared to other countries.

With the transactions' entry date earliest in 1996 and the exit latest in 2017, we use a large and current dataset. Most of the databases start their data base for PE deals in 1996. The year 2017 is the last year of observation because a company usually requires at least a year to publish their financial accounts, and we conduct analyses that also consider the financial statements at the time of the exit. We searched the databases for all UK transactions that were labelled "secondary buyout" or "financial buyout". Afterwards, all those financial buyouts, which are not an SBO, i.e. later buyout rounds, such as tertiary buyouts, are eliminated from the sample. The initial list of buyouts only contained the entry dates of the SBOs, and as we analyse the consecutive buyout round, per definition, the exit date of the PBO. We further searched for the entry date of the PBOs and the exit date of the SBOs in the same databases. In most cases, the timeline of buyouts was still incomplete, as at least one date was missing. In these cases, we hand-collected the missing transaction dates from the website of the portfolio company, the GP's website, newspaper articles or other official transaction publications. Those companies, for which at least one transaction date could not be found, were deleted from the sample.

We, then, retrieved the fundamental data at the time of the entry and the exit of the PBO and the associated SBO. Generally, there are three options on how to retrieve the fundamental data. The first one is to use the fundamental data before the entry date and after the exit date to fully capture the treatment effect of PE financing. However, the disadvantage is that also unwanted, non-treatment effects, such as the time before the PE-financing, are included. These effects must not be neglected when the time difference between the transaction and

the financial statement is too long. The second option is to retrieve the fundamental data after the entry and before the exit in order to isolate the treatment effect. The downside of this approach is that some PE mechanics, such as the usage of leverage, experience stronger changes at the beginning or at the end of the investment. For instance, Phalippou & Gottschalg (2009) find that leverage is increased at the beginning of the investment to directly operate at the optimal capital structure and that it is reduced towards the end of the investment. Using this second measurement approach may not be able to capture these changes. Thus, in PE studies this approach is not sensible. The third possibility is a combination of both approaches. The financial statement is retrieved, which is the closest to the transaction date. As we do not differentiate between any of the two aforementioned measurement errors, we aim to minimise the time between the transaction and the financial statement. On average, this procedure should measure the treatment effect across the sample in the most efficient way possible. Consequently, we collected the balance sheet and the profit and loss statement of the portfolio companies at entry and exit of the respective buyout rounds. We eliminated those companies, for which both statements were not available. By this data selection we were able to build a comprehensive dataset of 295 companies, which underwent consecutive buyout rounds. Thus, 590 buyouts and 885 transactions were used in the analyses of this paper.

4.3.2 Variable Calculation

In this paper, the risk and its explaining variables are measured both statically, i.e. at entry and exit of the investment, and dynamically, i.e. the development throughout the holding period. Whereas the static view is easily observed, the development needs to be calculated based on the observations at entry and exit of the investment, considering the length of the holding period. To capture the development of the relevant variables, either the compound annual growth rate (CAGR) or the average annual change of the variable is calculated. Those variables, which have both a positive nominator and a positive denominator throughout the holding period, are calculated with the CAGR, which is defined as follows.

$$CAGR_{i,t}(X) = (\frac{x_{i,t}}{x_{i,t-k}})^{1/k} - 1 \tag{4.1}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the length of the holding period of the investment.

The development of the other variables is calculated with the average annual change of the respective variable. This calculation has the advantage that a change from a positive value to a negative value, and vice versa, can clearly be recognized as positive and negative movements compared to the CAGR approach. The average annual change is calculated as follows.

$$Annual\ Change_{i,t}(X) = (\frac{x_{i,t} - x_{i,t-k}}{k}) \tag{4.2}$$

with $x_{i,t}$ being the variable of interest at time t of company i, and k being the holding period

of the investment.

4.4 Differences in Risk of Financial Distress between PBO and SBO

4.4.1 Variable Selection

Target Variable

The prediction of bankruptcy has become an increasingly important topic, especially after economically challenging times such as the financial crisis. Within the category of overall risk, this paper focusses on the risk of financial distress and indirectly on some of the associated risks, e.g. liquidity risk. The risk of financial distress in this paper is defined as the risk that a company cannot operate anymore due to the incapacity of paying its financial obligations. The literature widely discusses on what the best measurement for risk of financial distress is (e.g. Balcaen & Ooghe (2006)). Thereby, all the measurements ultimately predict the upcoming event of bankruptcy within a certain time horizon.

Generally, the literature distinguishes between two strings of measurements for financial distress. The first type of measurement is a market-based approach that considers publicly available data, such as stock prices (e.g. Bharath & Shumway (2008)). Due to the nature of PE, almost all investments are taken private, and, therefore, such measurements are not suitable for private equity studies. The second string is an accounting-based approach, which considers financial ratios measuring the solvency, liquidity, collateral and profitability of the analysed company.

Beaver et al. (2011) find that accounting-based approaches are well-suited to measure risk of privately-held companies. Their results are robust over a time horizon of over 40 years.

Beaver (1966) pioneered the research on corporate failure prediction. His approach is a simple univariate discriminant model that uses several financial ratios, which have been selected using a dichotomous identification process. Whereas the calculation of this method is very easy, it assumes a linear relationship between the corporate failure and an individual ratio, which probably may not be realistic. Afterwards, risk index models evolved, which are the combination of several measurements, leading to an easy point system. Tamari (1966) first allocated points, ranging from 0 to 100, to certain financial ratios. Moses & Liao (1987) identified optimal cut-off points for individual ratios, using an univariate regression model. If the threshold is exceeded, the financial ratio receives a 1 in a binary variable setting.

Altman (1968) introduced a more sophisticated model by using a multiple discriminant analysis (MDA) to estimate his nowadays popular Z-score model. An MDA is a linear combination of various variables, which ideally have explanatory power to distinguish between failing and non-failing companies. However, it is necessary to note that the individual ratios do not necessarily

need to provide explanatory power in an univariate setting, but rather provide significance in the context of a multivariate setting of the MDA model (Altman (1968)). This multivariate regression approach then provides beta coefficients for the identified variables to give individual weighting to the respective financial ratio. Those companies, whose discriminant score is below the pre-defined threshold, are likely to default in the short-run. Therefore, the score determines whether the analysed company is similar to a company that has defaulted in upcoming years (Blum (1974)). The calculation of the Altman Z-Score is as follows.

$$\begin{aligned} Altman\ Z-Score_{i,t} = 0.717 * \frac{Working\ Capital_{i,t}}{Total\ Assets_{i,t}} + 0.847 * \frac{Profit_{i,t}}{Total\ Assets_{i,t}} \\ + 3.107 * \frac{EBIT_{i,t}}{Total\ Assets_{i,t}} + 0.420 * \frac{Equity_{i,t}}{Liabilities_{i,t}} + 0.998 * \frac{Sales_{i,t}}{Total\ Assets_{i,t}} \end{aligned} \quad (4.3)$$

where the variables are observed for company i at time t.

A company is considered as risky or distressed when the value of the Altman Z-Score is below 1.23. Several authors further show that the coefficients of the MDA model do not represent the relative importance of the input variables (e.g. Altman (1968), Blum (1974)).

After being the benchmark of bankruptcy prediction for several years, conditional probability models were introduced, first, by Ohlson (1980) in form of a logit analysis and, second, by Zmijewski (1984) as a probit analysis. These methods allow the consideration of non-linear relationships of the variables. As all of these models have a static view and only consider the actual event of bankruptcy, Shumway (2001) proposes the usage of a hazard model, in which also the years of non-default are considered. Other models use option pricing theory (e.g. Vassalou & Xing (2004)) or neural networks (e.g. Kumar & Ravi (2007)) to predict bankcruptcy .

In this paper the Altman Z-score is used to evaluate the risk of the portfolio companies. This choice has two reasons. First, as PE transactions are often "blackboxes" throughout the holding periods, we observe the variables at the beginning and at the end of the investment. Further, we are not directly interested in the actual default of the buyout but rather in the portfolio company's risk of financial distress, i.e. the threshold when a company is endangered of going bankrupt. Also GPs can avoid the actual default event by injecting additional capital into the portfolio company and, thus, a hazard model would be biased. Therefore, hazard models are not a sensible measurement of our research questions. The second reason is the strong acceptance of the Altman Z-Score in academia to measure the risk of privately-held companies. Jackson & Wood (2013) study how often certain prediction models are used. They find that multiple discriminant analyses were used most often. In a review of the Altman Z-Score, Altman et al. (2017) find that the prediction power for UK companies is sufficiently high.

Explanatory Variables

The portfolio companies' risk of financial distress can be driven by several factors ranging from operational performance over capital structure to special characteristics of the GP. As potential risk drivers we selected measures for the firm-level characteristics company size, profitability, efficiency, liquidity, capital structure, risk at investment entry, GP's characteristics, and several control variables.

The size of a company is measured by total sales and equity. Whilst sales can be inflated by strong capital expenditures and market penetration, the total sales are a common proxy of the market acceptance. Additionally, measuring equity provides a more stable view on the true company size. Sales can be extraordinarily high or low in one particular year of observations, whilst equity is not as sensitive to the performance in that respective year of observation.

The profitability of the portfolio company is measured by the EBITDA margin, the profit margin, return on assets, and return on equity. The EBITDA margin identifies the operative earnings before interests, taxes, and depreciation and amortization in relation to the reported sales. Additionally, we measure the profit margin, measured as profit over sales, to account for accounting, financing, and industry effects. Due to financial engineering, both variables are necessary to analyse. The variables return on assets and return on equity, are based on total assets and equity rather than sales. These ratios represent a more stable view on profitability compared to ratios based on sales figures. Due to the possible influence of leverage, returns on assets and equity have to be analysed separately.

Efficiency of the portfolio company is measured with two proxies. The receivables turnover ratio is measured as sales over outstanding receivables. This variable measures how efficiently a company can collect its outstanding receivables. The second variable is the inventory sales ratio, which measures the ability of a company to manage its inventory in relation to its sales. It is defined as sales over inventory. The intention usually is to keep inventory as low as possible in order to reduce operational costs, whilst not creating a bottleneck for the running business.

The degree of liquidity is measured with three variables: the cash ratio, the current ratio, and the working capital. Whereas the cash ratio considers the cash and cash equivalents compared to current liabilities, the current ratio is measured by all current receivables over current liabilities. Both measures signal the ability to repay short term liability obligations. The working capital is defined as the difference between the portfolio company's current assets and its current liabilities. Ultimately, all variables measure the liquidity but with a rather different focus on the assets available to settle current obligations.

The capital structure, and thereby the degree of financial engineering of the GP, is used as control variable and explanatory variable. Both of these variables are measured with the leverage ratio, defined as total liabilities over equity. First, the capital structure is measured at entry of the investment to account for the exploitation of the debt capacity. Second, the development of the leverage ratio measures the financial engineering as part of the PE value creation.

This study considers several control variables, including deal characteristics such as the company age at entry, signalling the maturity of the portfolio company. The age of the PE firm is used as a rough proxy for experience of the GP. Further, we control for size, measured as total assets, and capital structure at beginning of the investment. As the risk of the company is analysed, we differentiate between risky and less risky companies, and thus control for risk at entry, by introducing the Altman Z-Score at buyout entry to the regressions. Lastly, we use time and industry fixed-effects.

4.4.2 Descriptive Statistics

Table 4.1 and 4.2 show the summary statistics of the dataset. The statistics focus on the distribution of entry years and the distribution of the financial ratios used in the analyses. The statistics are displayed for the whole sample, as well as for PBOs and the SBOs, separately.

Table 4.1 presents the distribution of investment entries of the sample. The table illustrates the share of annual entries to the total number of entries in this sample. Furtheron, the total sample is split into financially distressed and non-distressed companies, i.e. they have an Altman Z-Score of 1.23 or below at investment entry or have an Altman Z-Score above 1.23, respectively. Most of the buyouts start before and around the financial crisis with 11.4 percent of the total sample's entries in 2007. The share of SBOs is especially high at that point in time. The majority of PBO deals in this sample is centred around the year 2003. Interestingly, companies with an entry in 2003 are distressed in 57.7 percent of the time. The share of distressed portfolio companies around 2003 is more strongly pronounced for PBOs than for SBOs. Around 2008, the number of buyouts is much lower, which confirms with the slump in the PE activity right after the financial crisis. Contrary to the common expectation, the share of distressed companies is very low during and right after the financial crisis with a share of distressed companies of only 28.9 percent in 2008. Thus, it seems that GPs were careful to invest and might have overcompensated the high market risk by investing in overly financially stable companies.

Table 4.2 shows the selected information of the buyout at entry and the growth of several variables. In order to recognize the initial differences of performance indicators between the two buyout rounds, the total sample statistics are split into PBOs and SBOs. The statistical difference of the analysed variables between PBOs and SBOs is measured with the Wilcoxon ranksum test and nonparametric equality-of-medians test.

In the total sample, the portfolio companies are held 4.1 years on average. The holding period of PBOs and SBOs do not show a significant difference. The analysed PE firms are on average 25 years old, which indicates that the GPs are rather experienced. The deals in this sample are quite large with average total assets of just above 94 million GBP. Since portfolio companies on average grow throughout the buyout, the average of total assets at entry is higher in SBOs compared to PBOs. The average of the total sample is not considered as risky. The average Altman Z-Score is with 2.29 much higher than the risky threshold of 1.23. However, the

Table 4.1: Distribution of Entry Years

	Total Sample						PBO						SBO					
	Total		Distressed		Non-Distressed		Total		Distressed		Non-Distressed		Total		Distressed		Non-Distressed	
Start Year	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1996	17	2.9%	7	41.2%	10	58.8%	17	5.8%	7	41.2%	10	58.8%	0	0.0%	0	n.a.	0	n.a.
1997	8	1.4%	3	37.5%	5	62.5%	8	2.7%	3	37.5%	5	62.5%	0	0.0%	0	n.a.	0	n.a.
1998	16	2.7%	4	25.0%	12	75.0%	15	5.1%	4	26.7%	11	73.3%	1	0.3%	0	0.0%	1	100.0%
1999	23	3.9%	9	39.1%	14	60.9%	17	5.8%	8	47.1%	9	52.9%	6	2.0%	1	16.7%	5	83.3%
2000	21	3.6%	6	28.6%	15	71.4%	20	6.8%	6	30.0%	14	70.0%	1	0.3%	0	0.0%	1	100.0%
2001	30	5.1%	10	33.3%	20	66.7%	22	7.5%	7	31.8%	15	68.2%	8	2.7%	3	37.5%	5	62.5%
2002	36	6.1%	8	22.2%	28	77.8%	27	9.2%	4	14.8%	23	85.2%	9	3.1%	4	44.4%	5	55.6%
2003	42	7.1%	22	52.4%	20	47.6%	26	8.8%	15	57.7%	11	42.3%	16	5.4%	7	43.8%	9	56.3%
2004	57	9.7%	21	36.8%	36	63.2%	35	11.9%	16	45.7%	19	54.3%	22	7.5%	5	22.7%	17	77.3%
2005	45	7.6%	11	24.4%	34	75.6%	25	8.5%	6	24.0%	19	76.0%	20	6.8%	5	25.0%	15	75.0%
2006	62	10.5%	17	27.4%	45	72.6%	27	9.2%	9	33.3%	18	66.7%	35	11.9%	8	22.9%	27	77.1%
2007	67	11.4%	16	23.9%	51	76.1%	25	8.5%	6	24.0%	19	76.0%	42	14.2%	10	23.8%	32	76.2%
2008	38	6.4%	11	28.9%	27	71.1%	13	4.4%	4	30.8%	9	69.2%	25	8.5%	7	28.0%	18	72.0%
2009	20	3.4%	5	25.0%	15	75.0%	4	1.4%	0	0.0%	4	100.0%	16	5.4%	5	31.3%	11	68.8%
2010	26	4.4%	7	26.9%	19	73.1%	11	3.7%	3	27.3%	8	72.7%	15	5.1%	4	26.7%	11	73.3%
2011	26	4.4%	4	15.4%	22	84.6%	3	1.0%	1	33.3%	2	66.7%	23	7.8%	3	13.0%	20	87.0%
2012	22	3.7%	4	18.2%	18	81.8%	0	0.0%	0	n.a.	0	n.a.	22	7.5%	4	18.2%	18	81.8%
2013	19	3.2%	9	47.4%	10	52.6%	0	0.0%	0	n.a.	0	n.a.	19	6.4%	9	47.4%	10	52.6%
2014	14	2.4%	2	14.3%	12	85.7%	0	0.0%	0	n.a.	0	n.a.	14	4.7%	2	14.3%	12	85.7%
2015	1	0.2%	1	100.0%	0	0.0%	0	0.0%	0	n.a.	0	n.a.	1	0.3%	1	100.0%	0	0.0%
Total	590		177		413		295		99		196		295		78		217	

Note: The table above presents the distribution of entries on the total sample. The entries are divided into PBOs and SBOs and whether the portfolio company is distressed. A company is classified as distressed if the Altman Z-Score at entry is below 1.23.

Table 4.2: Summary Statistics

	Total				PBO				SBO			
	Mean	SD	Median	Obs	Mean	SD	Median	Obs	Mean	SD	Median	Obs
Panel A: Information at buyout entry												
Years Held	4.10	2.55	4	590	4.06	2.44	4	295	4.15	2.65	4	295
Start Year	2005.30	4.34	2005.50	590	2003.05	3.71	2003	295	2007.55***	3.73	2007***	295
PE Firm Age	25.74	32.11	19	590	28.41	36.52	20	295	23.06	26.80	18	295
Company Age	27.69	34.24	17	590	25.48	34.28	15	295	29.90***	34.10	20***	295
Total Assets	94496	346381	26967	590	65561	145865	19987	295	123432	466274	36442	295
Altman Z-Score	2.29	1.53	2.05	588	2.24	1.55	1.89	294	2.34	1.50	2.17	294
Excess Altman Z-Score	0.02	0.04	0.49	584	0.02	0.04	0.48	294	0.03	0.03	0.50	290
Panel B: Variable growth during buyout												
Altman Z-Score	0.01	0.47	0.02	584	0.01	0.47	0.01	294	0.02	0.47	0.02	290
Sales	1.18	0.24	1.11	590	1.23	0.26	1.16	295	1.14***	1.14	1.09***	295
Total Assets	1.18	0.23	1.13	589	1.22	0.25	1.18	295	1.13***	0.20	1.09***	294
Equity Asset Ratio	0.11	0.18	0.06	590	0.12	0.18	0.07	295	0.95	0.17	0.06	295
EBITDA Margin	0.05	0.12	0.02	589	0.08	0.13	0.03	295	0.03***	0.10	0.01***	294
Profit Margin	0.05	0.11	0.01	590	0.06	0.12	0.02	295	0.03***	0.11	0.01***	295
Return on Equity	- 0.19	0.30	- 0.01	588	- 0.00	0.29	0.00	294	- 0.03	0.31	- 0.01	294
Return on Assets	- 0.00	0.06	- 0.00	589	0.00	0.05	0.00	295	- 0.01	0.06	- 0.00	294
Current Ratio	0.08	0.39	0.03	589	0.08	0.37	0.35	295	0.08	0.41	0.02	294
Cash Ratio	- 0.05	0.14	- 0.01	589	- 0.05	0.14	- 0.01	294	- 0.05	0.14	- 0.01	295
Inventory Sales Ratio	- 0.00	0.01	- 0.00	590	- 0.00	0.01	0.00	295	- 0.00	0.01	0.00	295
Receivables Turnover	- 0.29	1.32	- 0.05	584	- 0.38	1.38	- 0.13	294	- 0.20	1.25	- 0.06*	290
Working Capital	- 0.05	0.10	- 0.03	589	- 0.04	0.10	- 0.02	295	-0.07***	0.11	- 0.04***	294
Leverage Ratio	2.62	32.33	- 0.059	590	3.49	37.08	- 0.07	295	1.76	26.79	- 0.05	295

Note: The table above presents the summary statistics of 295 companies with their development during the PBO and the consecutive SBO. The summary statistics shows the data distribution of the whole dataset, and of the PBO and SBO, seperately. It also presents the difference for all analysed variables between the PBO and SBO, measured by Wilcoxon ranksum and non-parametric median tests. The significance levels for the mean difference and median difference test between PBO and SBO are ***0.1%, **1% and *5%.

Table 4.3: Cross Correlation Table

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Altman Z-Score	1.000														
2	SBO	0.009	1.000													
3	Total assets	0.007	0.207	1.000												
4	Company age	-0.058	0.192	0.138	1.000											
5	PE firm age	-0.036	-0.083	0.060	0.040	1.000										
6	Leverage ratio	-0.025	0.035	-0.072	0.023	0.022	1.000									
7	Sales	0.180	0.019	-0.084	-0.064	-0.051	0.002	1.000								
8	EBITDA margin	0.107	-0.007	-0.195	-0.042	-0.006	0.004	0.233	1.000							
9	Profit margin	0.228	-0.053	-0.240	-0.053	-0.014	0.005	0.335	0.568	1.000						
10	Return on assets	0.089	0.052	-0.058	0.044	0.009	-0.000	0.565	0.655	0.559	1.000					
11	Cash ratio	0.102	0.014	0.080	-0.013	0.006	-0.008	-0.062	-0.039	-0.033	0.046	1.000				
12	Current ratio	0.092	0.054	-0.013	0.021	-0.008	0.003	-0.003	0.003	0.001	0.004	0.008	1.000			
13	Working capital	0.158	-0.085	-0.002	-0.079	0.026	0.014	0.060	0.021	0.002	0.043	0.353	0.044	1.000		
14	Inventory sales ratio	-0.136	-0.054	-0.027	0.002	0.056	-0.001	-0.402	0.051	-0.040	0.013	-0.008	0.001	-0.019	1.000	
15	Receivables sales ratio	0.058	0.051	-0.049	0.049	0.007	0.003	0.626	0.314	0.569	0.848	0.051	-0.002	0.006	-0.042	1.000

Note: The table above shows the correlations of all relevant variables used in this study. The relevant correlations do not raise concern about multicollinearity.

the Altman Z-Score's standard deviation of 1.53 already indicates that several companies are distressed, especially as the median of 2.05 is also slightly lower than the arithmetic average.

The development of performance indicators draws a nuanced picture. Whereas the Altman Z-score on average is higher during the SBO than during the PBO, the development is not statistically different from another. On average, PE-financed companies slightly reduce their risk during the holding period. The risk development in comparison to the close peer group is very similar as shown by the excess Altman Z-Score. Although SBOs and PBOs do not develop risk differently during the holding period, both buyouts, on average, reduce risk more than comparable non PE-financed companies. This excess development of the risk is measured as the difference between the development of the Altman Z-Score in buyouts compared to their public peers. The peers include the five most similar companies in terms of size, profitability, industry and time of the investment. The development of key performance indicators such as sales, total assets, EBITDA margin and profit margin are significantly better during PBOs than during SBOs. These first insights consequently lead to the question, why the risk profile does not develop differently in an univariate statistical test. If the risk of financial distress was the same and the performance better in PBOs, the investment rational for SBOs would be invalid.

4.4.3 Methodology

To analyse the difference in risk across the back-to-back buyout rounds, we regress company risk on several determinants. As we analyse consecutive buyout rounds, we can perform a panel regression model, which is defined as follows.

$$Risk_{it} = \alpha + \delta * SBO + \beta * X_{it} + \epsilon \tag{4.4}$$

where α is the y-intercept, δ is the coefficient of the SBO dummy, β is the coefficients of the firm-specific variables X for firm i at transaction date t. ϵ is the error term of the regression.

The explanatory variables of this regression model are described in Section 4.4.1. We reject the claim of strong multicollinearity for the used variables. Table 4.3 shows the correlation matrix for all regressions of each regression specification. None of the correlations is alarmingly high. Also, the variance inflation factors do not raise any concern. The Hausman-test suggest to use a random-effects model for our panel data as the estimates between fixed and random effect models are not statistically different (Hausman (1978)). To get a more detailed view on the risk composition, we run the regression at entry, at exit, and for the development during the holding period.

4.4.4 Results

The three analyses at entry, at exit, and for the development are shown in Tables 4.4-4.6. These determinant analyses of the risk identify a potential difference in risk between PBOs and SBOs. In the following, we apply three specifications. We regress the univariate effect of the

SBO dummy on the Altman Z-Score. In the second specification, we add time and industry fixed-effects. Lastly, in the third specification, we add further determinants of company's risk profile. Table 4.4 identifies the determinants of risks in portfolio companies at the point of entry. The risk of financial distress is not statistically different between PBOs and SBOs. This result holds for all three specifications. Adding industry and time effects to the regression model strongly increases the overall fit of the regression. The third specification provides the strongest explanatory power as several financial ratios explain the risk profile according to the Altman Z-Score. Most of the variables' coefficients are intuitive, such as the increased total sales and the decreasing risk. Interestingly, risk does not seem to be driven by other profitability measures such as EBITDA or profit margin. The operative earnings in relation to total assets are rather important, indicating that the efficiency of asset usage is more important compared to solely generating sufficient cashflows. In line with this rather unexpected finding, the coefficient of total assets is statistically and negatively correlated to the Altman Z-Score. Rather than believing that total assets serve well as collateral for liquidation, it seems that larger companies, at least in PE transactions, are more risky than smaller companies. On the other hand, as expected, the portfolio companies manage to preserve a minimum of liquidity and efficiency, as the coefficient of the current ratio and the inventory ratio indicate. Table 4.5 shows the results of the same regression specifications, but at the exit of the investment. The results are very similar compared to the regressions at the entry of the investment. This time, the experience of the GP has a positive, yet small effect on the Altman Z-Score. Interestingly, the leverage ratio is statistically and positively correlated to the Altman Z-Score. Thus, in contrast to the initial claim that leverage is one of the main drivers for the risk of financial distress, leverage actually reduces the risk of financial distress at the end of the investment. The results indicate that the leverage in PE transactions may be increased towards the end of the investment as the improvement of the governance structure outweighs the costs of financial distress (Jensen (1989)). In contrast to the previous set of regressions, the current ratio and the working capital ratio are not significant at the time of the exit. The absent significance indicates that the portfolio company's exit of a PBO does not require good liquidity measures, as the SBO investor can bridge the liquidity needs by capital injections.

Table 4.6 shows the results of the main analysis of this paper. The development of the risk profile is regressed on the development of the aforementioned performance indicators. Additionally, this specification also controls for the company's capital structure and its size. We control for the level of risk at investment entry since we assume that distressed companies at entry are handled differently during the holding period than less risky companies. The reason being that endangered companies may need to focus more on the generation of solid cash flows to repay its debt.

Apart from the univariate regression, the risk is reduced significantly more during SBOs compared to PBOs. From previous regressions, we find that the Altman Z-Score is not statistically different at the entry of the investment across the buyout rounds, thus the GPs have a similar risk profile to work with from the beginning of the holding period. Therefore, the statistical

Table 4.4: Risk at Entry

	(1) Altman Z-Score	(2) Altman Z-Score	(3) Altman Z-Score
SBO	0.101	-0.082	-0.037
	(0.22)	(0.51)	(0.68)
Size			
log(sales)			0.751***
			(0.00)
log(equity)			0.239***
			(0.00)
Profitability			
EBTIDA margin			-0.129
			(0.10)
Profit margin			0.000
			(0.97)
Return on assets			0.383***
			(0.00)
Return on equity			0.005
			(0.46)
Leverage ratio			-0.000
			(0.87)
Liquidity			
Cash ratio			-0.027
			(0.56)
Current Ratio			0.111***
			(0.00)
Working capital			0.888***
			(0.00)
Efficiency			
Inventory sales ratio			-0.929***
			(0.00)
Receivables turnover ratio			0.022**
			(0.03)
log(total assets)			-0.963***
			(0.00)
log(company age)			0.052
			(0.29)
PE firm age			-0.000
			(0.96)
Time Effects	NO	YES	YES
Industry Effects	NO	YES	YES
Constant	2.238***	2.391***	1.505***
	(0.00)	(0.00)	(0.00)
Overall R-squared	0.001	0.348	0.779
N	588	588	526

Note: The table above shows the estimates of the panel regressions. The various specifications show the influence on the Altman Z-Score at entry. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 4.5: Risk at Exit

	(1) Altman Z-Score	(2) Altman Z-Score	(3) Altman Z-Score
SBO	0.025	0.091	0.046
	(0.75)	(0.44)	(0.65)
Size			
log(sales)			0.737***
			(0.00)
log(equity)			0.505***
			(0.00)
Profitability			
EBTIDA margin			-0.106
			(0.16)
Profit margin			0.003
			(0.72)
Return on assets			0.698***
			(0.00)
Return on equity			-0.007
			(0.42)
Leverage ratio			0.002*
			(0.09)
Liquidity			
Cash ratio			0.018
			(0.92)
Current ratio			0.001
			(0.48)
Working capital			-5.492
			(0.77)
Efficiency			
Inventory sales ratio			0.857*
			(0.08)
Receivables turnover ratio			-0.007***
			(0.00)
log(total assets)			-1.272***
			(0.00)
log(company age)			-0.075
			(0.18)
PE firm age			0.002*
			(0.10)
Time Effects	NO	YES	YES
Industry Effects	NO	YES	YES
Constant	2.344***	2.251***	2.996***
	(0.00)	(0.00)	(0.00)
Overall R-squared	0.000	0.332	0.695
N	584	584	520

Note: The table above shows the estimates of the panel regressions. The various specifications show the influence on the Altman Z-Score at exit. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Table 4.6: Risk Development

	(1) Altman Z-Score	(2) Altman Z-Score	(3) Altman Z-Score
SBO	0.008	0.088*	0.129***
	(0.83)	(0.08)	(0.01)
Size			
Sales			0.522***
			(0.00)
Equity			0.008***
			(0.00)
Profitability			
EBTIDA margin			-0.026
			(0.19)
Profit margin			-0.005
			(0.70)
Return on assets			0.133***
			(0.01)
Return on equity			0.254***
			(0.00)
Leverage ratio			-0.000
			(0.47)
Liquidity			
Cash ratio			0.139**
			(0.02)
Current ratio			0.001*
			(0.07)
Working capital			0.268**
			(0.04)
Efficiency			
Inventory sales ratio			-0.073***
			(0.00)
Receivables turnover ratio			-0.000
			(0.82)
Altman Z-Score			-0.035***
			(0.00)
log(total assets)			0.012
			(0.41)
log(company age)			-0.010
			(0.64)
PE firm age			0.000
			(0.65)
Leverage ratio entry			-0.000
			(0.26)
Time Effects	NO	YES	YES
Industry Effects	NO	YES	YES
Constant	0.006	0.053	-0.416
	(0.83)	(0.78)	(0.11)
Overall R-squared	0.000	0.123	0.348
N	584	584	575

Note: The table above shows the estimates of the panel regressions. The various specifications show the influence on the development of the Altman Z-Score. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

significant difference in the development of the risk profile indicates that SBO investors are superior at reducing the risk of financial distress during their holding period. In this sample, there are no PBOs that are exited via other means than SBOs. The improvement of the risk profile may be less important for PBO investors compared to those transactions that are exited via trade sales or initial public offerings. As the SBOs in our sample may possibily be exited via other means than another financial buyout, the risk profile needs to be improved in order to find potential buyers of the portfolio company. In line with this assumption, the coefficient of the Altman Z-Score at entry of the buyout and its development are negatively correlated with a statistical significance. When the risk of financial distress is higher at the beginning of the investment period, the GPs are able to increase the Altman Z-Score more than in comparable less risky buyouts. The higher the risk of financial distress, the higher is the need to reduce it in order to preserve a healthy financial business structure.

The development in the performance measures explain the change in the portfolio companies' risk profiles well. The sales and equity growth are statistically significant and positive. Especially sales has an economically large coefficient, indicating the importance of sales expansion for GPs to reduce the risk of financial distress. The return on assets and return on equity are almost equally important to reduce the risk of financial distress. Interestingly, also in these specifications the profitability measures based on the total revenue do not have an impact on the development of the Altman Z-Score. As expected, the better the efficiency and liquidity management of the portfolio company, the lower is the risk of financial distress. The financial leverage does not have an impact on the risk of the portfolio company, neither at investment entry nor during the development during the holding period. Generally, this result indicates that the additional costs of debt balance with the benefits of the leverage.

4.5 Robustness

4.5.1 Difference between PBO and SBO

As we identify a difference in the risk development among buyout rounds, we further analyse whether there are differences on how the risk is driven in PBOs and SBOs. The identification of separate risk drivers allows investors to prioritise certain operational decisions to control the risk in the portfolio. We run regressions with the same specifications, subsampled to PBOs and SBOs with an OLS regression model. As the dataset is not handled as a panel data model anymore, the coefficients of the results may behave slightly different to the initial random-effects model.

Table 4.7 shows the results of the subsample regressions according to the individual buyout rounds. In SBOs, the leverage ratio at entry is negatively correlated to the development of the Altman Z-Score. In contrast to the full sample regression, this shows that the portfolio company's capital structure influences the risk profile of SBOs. When analysing the development of the leverage during the holding period, the coefficient is also significant in SBOs and

Table 4.7: Subsample Buyout

	(1) Altman Z-Score Total	(2) Altman Z-Score PBO	(3) Altman Z-Score SBO
SBO	0.129***		
	(0.01)		
Size			
Sales	0.522***	0.256	0.599***
	(0.00)	(0.20)	(0.00)
Equity	0.008***	0.008***	-0.018**
	(0.00)	(0.00)	(0.01)
Profitability			
EBTIDA margin	-0.026	0.037	-0.173
	(0.19)	(0.26)	(0.13)
Profit margin	-0.005	0.039*	-0.018
	(0.70)	(0.06)	(0.32)
Return on assets	0.133***	0.053	0.393
	(0.01)	(0.46)	(0.17)
Return on equity	0.254***	0.064	0.328**
	(0.00)	(0.68)	(0.02)
Leverage ratio dev	-0.000	0.000	-0.002*
	(0.47)	(0.69)	(0.07)
Liquidity			
Cash ratio	0.139**	0.130**	0.205*
	(0.02)	(0.04)	(0.07)
Current ratio	0.001*	0.041	0.001***
	(0.07)	(0.34)	(0.00)
Working capital	0.268**	0.142	0.072
	(0.04)	(0.72)	(0.77)
Efficiency			
Inventory sales ratio	-0.073***	-0.129***	-0.181*
	(0.00)	(0.00)	(0.10)
Receivables turnover ratio	-0.000	0.002**	0.003
	(0.82)	(0.03)	(0.53)
Altman Z-Score	-0.035***	-0.027**	-0.098***
	(0.00)	(0.03)	(0.00)
Leverage ratio entry	-0.000	0.000	-0.001*
	(0.26)	(0.95)	(0.06)
log(total assets)	0.012	0.010	-0.013
	(0.41)	(0.72)	(0.57)
log(company age)	-0.010	-0.037	0.004
	(0.64)	(0.22)	(0.92)
PE firm age	0.000	-0.000	0.000
	(0.65)	(0.83)	(0.69)
Time Effects	YES	YES	YES
Industry Effects	YES	YES	YES
Constant	-0.416	-0.310	0.569
	(0.11)	(0.44)	(0.12)
Overall/ Adjusted R-squared	0.348	0.137	0.310
N	575	292	283

Note: The table above shows the estimates of the panel regression and the OLS regressions of the subsamples according to the number of the buyout round. The various specifications show the influence on the development of the Altman Z-Score. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

not significant in PBOs. Both, existing leverage and the development of the leverage, bring burden to the SBO investor, yet being a small effect. Whereas leverage is used as a disciplinary structure in PE, a high leverage does not bring any advantage in an SBO as the management is already PE-minded. Further, in case of a non-financial exit, leverage at exit should not be too high, as the capital structure of PE portfolio companies is usually not compatible with capital structures of non PE-financed companies. Therefore, SBO investors aim to reduce the leverage to control the overall risk in their portfolio company.

The risk profile at entry is relevant in both buyout rounds. As expected from former analysis, the effect is more predominant in SBOs as the risk level may be more important when the portfolio company is exited to a non-PE owner and, therefore, the risk of financial distress needs to be lower at time of the exit in SBOs compared to PBOs.

Breaking down the performance measures, PBOs and SBOs differ in how risk of financial distress is composed. In terms of expansion, the risk in PBOs reacts to equity growth, without a significant influence of sales growth, whereas SBOs' risk is more driven by both sales and equity. The equity growth in SBOs is even negatively correlated to the development of the Altman Z-Score. SBOs improve the return on the existing equity rather than building up equity to reduce the risk of financial distress. It seems that during SBOs, the investors build up equity without equally improving their operational earnings. In order to reduce risk, the PBO investors prefer the route of margin improvement, as the development of the profit margin positively correlates with the development of the Altman Z-Score only in PBOs, but not in SBOs. Whereas efficiency gains are important in both buyout rounds to reduce risk, liquidity management is more important during SBOs compared to PBOs. These results can be inferred from the economically larger effect of the cash ratio on the risk development and the significance of the current ratio. In case of an exit to a non-financial investor, liquidity problems may be more severe compared to a sale to another PE investor, as PE investors can cover liquidity needs in the short run. Other than that, the performance measures behave very similar in PBOs and SBOs compared to the full sample regression.

4.5.2 Distressed Companies

The base regression indicates that lower risk of financial distress at investment entry leads to an increase of the Altman Z-Score during the holding period. As the level of risk seems to be rather important in the development of risk, we analyse the value drivers depending on the initial level of risk. Specifically, we analyse whether the risk of financial distress is driven differently among companies considered as risky and non-risky. To do so, we rerun the initial regression with subsamples that either consider all risky companies, i.e. those companies that have an Altman Z-Score below 1.23, or non-risky companies, which are those companies with an Altman Z-Score of above or equal 1.23 at investment entry. The results of the Altman Z-Score subsample regression are shown in Table 4.8. The difference in the development of the Altman Z-Score between PBOs and SBOs has partly vanished. Using subsamples, the difference in

Table 4.8: Subsample Altman

	(1) Altman Z-Score Total	(2) Altman Z-Score High Risk	(3) Altman Z-Score Low Risk
SBO	0.129***	0.101	0.139**
	(0.01)	(0.13)	(0.03)
Size			
Sales	0.522***	0.090	0.559***
	(0.00)	(0.55)	(0.00)
Equity	0.008***	-0.011***	0.009***
	(0.00)	(0.00)	(0.00)
Profitability			
EBTIDA margin	-0.026	-0.010	0.457***
	(0.19)	(0.33)	(0.00)
Profit margin	-0.005	-0.011*	0.566***
	(0.70)	(0.05)	(0.00)
Return on assets	0.133***	2.325***	0.445***
	(0.01)	(0.00)	(0.00)
Return on equity	0.254***	-0.163	0.422***
	(0.00)	(0.10)	(0.00)
Leverage ratio	-0.000	-0.000*	-0.005***
	(0.47)	(0.10)	(0.00)
Liquidity			
Cash ratio	0.139**	-0.259**	0.211***
	(0.02)	(0.02)	(0.00)
Current ratio	0.001*	0.000	0.001***
	(0.07)	(0.22)	(0.00)
Working capital	0.268**	0.397***	0.274
	(0.04)	(0.00)	(0.37)
Efficiency			
Inventory sales ratio	-0.073***	-0.044**	-0.145***
	(0.00)	(0.01)	(0.00)
Receivables turnover ratio	-0.000	-0.024***	0.001
	(0.82)	(0.00)	(0.40)
Altman Z-Score	-0.035***	-0.024	-0.019*
	(0.00)	(0.39)	(0.09)
log(total assets)	0.012	0.007	0.033
	(0.41)	(0.72)	(0.17)
log(company age)	-0.010	-0.058	0.020
	(0.64)	(0.13)	(0.45)
PE firm age	0.000	0.000	0.001*
	(0.65)	(0.92)	(0.08)
Leverage ratio at entry	-0.000	-0.000*	-0.002
	(0.26)	(0.06)	(0.28)
Time Effects	YES	YES	YES
Industry Effects	YES	YES	YES
Constant	-0.416	0.226	-0.906**
	(0.11)	(0.51)	(0.02)
Overall R-squared	0.348	0.641	0.267
N	575	172	403

Note: The table above shows the estimates of the panel regressions of the subsamples according the level at risk at entry. The various specifications show the influence on the development of the Altman Z-Score. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

risk development is only prevalent in portfolio companies with a high Altman Z-Score. The investment round does not affect companies that are endangered of entering financial distress. Companies that are considered as not risky at investment entry are much better managed in terms of risk development by SBO investors. The risk in risky companies requires great management attention in both buyout rounds. The SBO investor, in this sample, may focus on the risk improvement of low-risk companies more than the PBO investor, as the potential exit to non-PE owners needs to be prepared. Thus, this subsample seems to drive the coefficient in the base regression. Interestingly, the experience of the GP only has an influence on the risk development for companies with a high Altman Z-Score. Whereas additional experience would have been expected for distressed companies, the coefficient is not significant in the risky subsample.

The base regression does not show an overall effect of leverage on the risk of financial distress of the portfolio company, thus rejecting the commonly assumed main risk driver in PE. Subsampling with respect to the initial risk level, reveals that leverage at entry is only relevant in companies that are already risky at the beginning of the investment period. The coefficient for the leverage ratio at entry in the subsample with a high Altman Z-Score is negatively and significantly correlated to the risk development of the portfolio company. Whilst being a small effect, high leverage may lead to unnecessarily high interest payments, which ultimately increases the risk of financial distress. In contrast, companies that are not considered as risky may have less problems absorbing the higher interest payments and, thus, do not experience greater risk of financial distress. The negative and significant coefficients of the development of leverage confirm this reasoning.

Whereas the Altman Z-Score is significant in the full sample regression, it is driven by the subsample with a high Altman Z-Score, i.e. the risk of financial distress at entry is more relevant for those companies that are considered as non-risky. This means that when a company is considered as risky according to the Altman Z-Score it does not matter how low the Altman Z-Score is. Thus, a company with an extremely low Altman Z-Score does not experience a higher risk of financial distress compared to a company that is just on the verge of being risky according to the threshold of the Altman Z-Score. For non-risky companies, it may be more important to have a reasonable risk profile because the lower the Altman Z-Score is the more they move towards the cluster of risky companies.

Both growth variables are predominately positive and significant for the non-risky subsample. Risky companies behave differently, such that sales growth does not have an effect and equity growth even has a negative effect on the development of the Altman Z-Score. Companies should not aim to grow equity directly but rather focus on running the business smoothly. Especially in the case of PE, the generation of equity is not necessarily important as capital needs can be covered through additional capital injections by the fund. In terms of profitability, all variables behave as expected for non-risky companies, such that a higher profitability reduces the risk of financial distress. The development of the Altman Z-Score in risky companies reacts strongly and positively to the improvement of return on assets, being the only positive influence in terms

of profitability. In contrast, the other profitability variables are not significant and the profit margin is even negatively correlated to the development of the Altman Z-Score. The result of the profit margin aligns with the finding about equity growth, as profits directly influence the level of upcoming year's equity as well. Rather than aiming to directly streamline the profit margin, risky companies should aim to establish a solid company structure. This finding can be backed up by the negative relationship of cash ratio and the positive relationship to the development of the Altman Z-Score. Whilst the generation of the necessary cash can be covered by the PE fund, it is more relevant for the GP to improve the working capital structure of the company in order to run the business smoothly. In contrast, non-risky companies do not need to build the fundament of the business by working on the working capital to influence the risk level but rather generate sufficient cash through operations, as shown by the positive and significant coefficient of the cash ratio.

4.5.3 Time Effects

As the initial analysis about risk development in all buyouts improved significantly with the introduction of time-fixed effects, we perform subsampling regarding the time periods of the investment. Especially, when considering the risk of an investment, the financial crisis may play a crucial role to explain the development of risk of financial distress in portfolio companies. For that purpose, we perform two subsamples to illustrate the structural break of the financial crisis. Whereas the first subsample consists of all companies that had their investment entry before the year 2008, the other subsample considers all companies that had their investment entry after 2008. Table 4.9 shows the results of the subsample regressions considering the time effect before and after the financial crisis. The difference in the risk of financial distress between PBOs and SBOs is not driven particularly from the period before or after the financial crisis. Although the SBO coefficient is positive in both subsample regressions, it is not statistically significant.

Interestingly, the leverage ratio at entry is only significant for those buyouts that had their entry after the financial crisis. The leverage ratio at entry is negatively correlated to the development of the Altman Z-Score. As portfolio companies have taken a hit through the financial crisis in terms of risk of financial distress, as can be inferred from Figure 4.1, especially close to the financial crisis, companies needed action taken for strong and quick recovery. This finding hints that companies with a high leverage at times of the financial crisis had problems to compensate the interest payments given the difficult economic environment. The higher the leverage ratio at entry is, the harder it is for GPs to take on additional debt to restructure the company and manoeuvre it through the economic downturn. Therefore, the development of the leverage is also negatively and significantly correlated to the development of the Altman Z-Score. In contrast to the full sample regression, unnecessarily high leverage makes the company more risky, as debt markets and the market environment are difficult. In line with this reasoning, the Altman Z-Score at entry is negatively correlated to the development of the Altman Z-Score, both before and after the financial crisis. This effect is more predominant for the time after

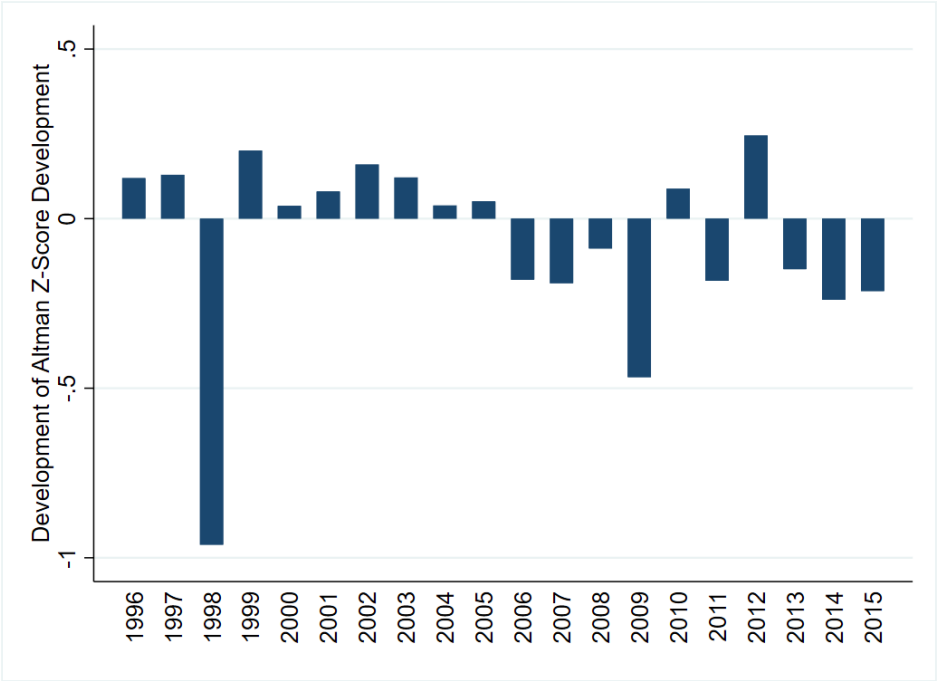
Table 4.9: Subsample Time

	(1) Altman Z-Score Total	(2) Altman Z-Score Before crisis	(3) Altman Z-Score After crisis
SBO	0.129***	0.065	0.075
	(0.01)	(0.19)	(0.53)
Size			
Sales	0.522***	0.284***	0.646***
	(0.00)	(0.01)	(0.00)
Equity	0.008***	0.008***	-0.023
	(0.00)	(0.00)	(0.10)
Profitability			
EBTIDA margin	-0.026	0.044	-0.099
	(0.19)	(0.16)	(0.15)
Profit margin	-0.005	-0.047**	-0.012
	(0.70)	(0.02)	(0.59)
Return on assets	0.133***	0.754***	0.007
	(0.01)	(0.00)	(0.97)
Return on equity	0.254***	0.205***	0.480***
	(0.00)	(0.01)	(0.00)
Leverage ratio development	-0.000	-0.000	-0.007**
	(0.47)	(0.78)	(0.05)
Liquidity			
Cash ratio	0.139**	0.110	0.157
	(0.02)	(0.10)	(0.21)
Current ratio	0.001*	0.001**	-0.000
	(0.07)	(0.05)	(0.84)
Working capital	0.268**	0.425***	0.367
	(0.04)	(0.00)	(0.26)
Efficiency			
Inventory sales ratio	-0.073***	-2.598***	-0.103**
	(0.00)	(0.00)	(0.04)
Receivables turnover ratio	-0.000	0.000	0.004*
	(0.82)	(0.85)	(0.10)
Altman Z-Score	-0.035***	-0.031***	-0.182***
	(0.00)	(0.00)	(0.00)
log(total assets)	0.012	0.015	-0.041
	(0.41)	(0.35)	(0.41)
log(company age)	-0.010	-0.028	0.124
	(0.64)	(0.19)	(0.13)
PE firm age	0.000	0.001	0.001
	(0.65)	(0.17)	(0.71)
Leverage ratio at entry	-0.000	-0.000	-0.003**
	(0.26)	(0.51)	(0.03)
Time Effects	YES	YES	YES
Industry Effects	YES	YES	YES
Constant	-0.416	-0.405	0.000
	(0.11)	(0.14)	(.)
Overall R-squared	0.348	0.468	0.606
N	575	415	160

Note: The table above shows the estimates of the panel regressions of the subsamples before and after the financial crisis. The various specifications show the influence on the development of the Altman Z-Score. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

the financial crisis.

Figure 4.1: Risk Development over Time



Note: The graph shows the yearly average change of the Altman Z-Score (in percent) for the observed companies with an investment entry in a specific financial year.

Considering performance measures in these subsample regressions, two patterns arise. First, before the financial crisis, the risk of financial distress is strongly driven by weak returns on assets and equity, poor liquidity management, and efficiency loss. The only unexpected relationship is the negative influence of the profit margin development on the development of the Altman Z-Score. As the majority of the subsample's entries was close to the financial crisis, this finding is plausible. Portfolio companies that streamlined their business to achieve high profits, may have taken a strong hit when the financial crisis began and, hence, the risk of the portfolio company increased during the holding period. Second, after the financial crisis, the return on equity is the only profitability measure that has an influence on the risk development during the holding period. Whilst this variable is highly significant, the large effect may partly be driven through the nearly significant and negative effect of equity development on the development of the Altman Z-Score.

4.5.4 Size Effects

Lastly, the regression for the risk composition at entry and exit of the portfolio companies shows that the size of the portfolio companies influences the risk level of financial distress. Thus, we perform subsampling according to the size of the portfolio companies and rerun the regressions. The first subsample considers the smallest 25 percent of the total sample, i.e. companies that have 9.899 million GBP in total assets or less. The second group comprises all medium-sized

companies with total assets between 9.899 million GBP and 63.027 million GBP. The third subsample inherits all companies with total assets above 63.027 million GBP. Table 4.10 shows the results of subsampling regressions considering the various sizes of the portfolio companies.

The influence of the buyout round on risk development varies among the different sizes of the portfolio companies. Whereas the development of risk in small and medium-sized companies benefits from SBO ownership compared to the first buyout round, there is no significant effect on large companies. The impact on the risk development of SBOs is most prevalent for small companies. Thus, the bigger the company, the more the effect on risk development diminishes. Especially for small companies, the risk reduction has a higher priority, as small and young companies are often perceived as more risky. Thus, in order to find buyers for the portfolio company, GPs need to provide an acceptable risk profile of the target. Again, as this sample considers back-to-back buyouts, the PBO investor does not necessarily pay too much attention to the risk development because the follow-up investor can handle a higher risk better compared to non PE-financing.

The leverage ratio at entry is significantly negative only for large companies. This result can be explained by higher costs alongside the leverage, such as interest payment and cashflow reductions, outweigh the benefits that the leverage enables for mature and less dynamic companies. Also, the development of the leverage ratio differs among sizes. Whereas, the leverage ratio has a positive effect on the Altman Z-Score development of small companies, a higher degree of liabilities increases the risk of financial distress for large companies. Consistent with the prior finding, a high degree of leverage is disadvantageous for large companies, because the debt capacity is already fully exploited in mature companies. In contrast, small and often young companies that have a higher leverage ratio indicate strong trust from debtholders and, thus, a strong market acceptance.

Whereas, small and medium-sized companies' risk of financial distress is driven by liquidity management, it does not seem to matter for large companies in terms of risk development. In contrast to small and medium-sized companies, large companies usually have sufficient collateral in order that liquidity needs are less important, especially when the company is PE-backed and liquidity provision is possible at all times. Large companies need to focus on efficiency, expressed in the receivables turnover ratio and profitability measures to control their risk of financial distress. As such, the receivables turnover ratio is significant only for large companies. This pattern may be reasoned with the advancement in the business cycle, such that small companies first need to expand, then proftability follows, and, lastly, profitabilty and efficiency is further promoted in mature companies.

4.6 Conclusion

Based on a dataset of 295 PBOs and their consecutive SBOs in the UK during 1996 und 2017 we analyse the risk of financial risk of these buyouts. The risk profile was determined by using the

Table 4.10: Subsample Size

	(1) Altman Z-Score Total	(2) Altman Z-Score Small	(3) Altman Z-Score Medium	(4) Altman Z-Score Large
SBO	0.129***	0.273**	0.142**	-0.033
	(0.01)	(0.04)	(0.02)	(0.65)
Size				
Sales	0.522***	0.502**	0.405***	0.090
	(0.00)	(0.04)	(0.00)	(0.57)
Equity	0.008***	0.007*	-0.008	0.543***
	(0.00)	(0.07)	(0.37)	(0.00)
Profitability				
EBTIDA margin	-0.026	-0.017	0.039	0.262***
	(0.19)	(0.73)	(0.65)	(0.00)
Profit margin	-0.005	-0.003	0.012	-0.212***
	(0.70)	(0.92)	(0.53)	(0.00)
Return on assets	0.133***	0.022	0.910***	0.494**
	(0.01)	(0.88)	(0.00)	(0.02)
Return on equity	0.254***	0.321	0.250**	0.069
	(0.00)	(0.12)	(0.01)	(0.39)
Leverage ratio Dev	-0.000	0.016**	-0.001	-0.000*
	(0.47)	(0.02)	(0.21)	(0.08)
Liquidity				
Cash ratio	0.139**	0.208	0.305*	-0.116
	(0.02)	(0.11)	(0.07)	(0.22)
Current ratio	0.001*	0.491***	0.001**	0.005
	(0.07)	(0.00)	(0.03)	(0.79)
Working capital	0.268**	0.699**	0.200	0.224
	(0.04)	(0.05)	(0.32)	(0.53)
Efficiency				
Inventory sales ratio	-0.073***	-0.204	-1.984**	-0.026
	(0.00)	(0.67)	(0.04)	(0.37)
Receivables turnover ratio	-0.000	0.001	0.007	0.066***
	(0.82)	(0.47)	(0.31)	(0.00)
Altman Z-Score	-0.035***	-0.026***	-0.060***	-0.045**
	(0.00)	(0.01)	(0.00)	(0.03)
log(total assets)	0.012	-0.087	-0.015	0.026
	(0.41)	(0.19)	(0.79)	(0.54)
log(company age)	-0.010	-0.110	0.018	-0.033
	(0.64)	(0.12)	(0.57)	(0.27)
PE firm age	0.000	0.001	0.001	-0.001
	(0.65)	(0.54)	(0.23)	(0.19)
Leverage ratio at entry	-0.000	-0.002	-0.001	-0.000**
	(0.26)	(0.80)	(0.12)	(0.05)
Time Effects	YES	YES	YES	YES
Industry Effects	YES	YES	YES	YES
Constant	-0.416	0.430	-0.121	-0.164
	(0.11)	(0.56)	(0.86)	(0.81)
Overall R-squared	0.348	0.684	0.600	0.892
N	575	145	291	139

Note: The table above shows the estimates of the panel regressions of the subsamples according the size at entry. The various specifications show the influence on the development of the Altman Z-Score. The p-values are reported in parenthesis below the individual coefficients. The significance levels for all specifications are ***0.1%, **1% and *5%.

Altman Z-Score, as a widely accepted accounting-based default prediction model, to determine the risk of financial distress and bankruptcy of a company. We calculated the Altman Z-Score at the entry into the PBOs and at the exit to the SBOs as well as during the holding period. In the course of the study, we investigate risk drivers in portfolio companies and the difference of PBOs and SBOs in handling the risk. To our knowledge this study is the only paper in PE research that analyses the risk profile of SBOs compared to their preceding PBOs and examines the different underlying drivers of the risk.

Risk perception is a contentious issue for investors, and especially SBOs are seen riskier than their preceding PBOs at first glance. In general, the analysis reveals that during the holding period GPs slightly reduce the risk of the managed portfolio companies. This finding is in contrast to Tykvová & Borell (2012) who argue that the risk in PE investments increases. Our analyses show that the buyouts are not particularly financially distressed at the entry of the investment. The initial comparison unveils that there is no significant difference in the risk development between PBOs and SBOs, although SBOs show a slightly higher decrease in the risk level than PBOs. Even during the financial crisis, the risk of PBOs and SBOs was not critical. PBOs as well as SBOs reduce the risk of financial distress during the holding period, especially when the risk level at the investment entry is high. Furthermore, SBO investors improve the risk profile of the portfolio companies more than PBOs. Assuming that SBOs are sold to non-PE investors, it might be easier to sell the company with a lower risk of financial distress. However, SBOs, in general, cannot be seen as riskier investments. SBO investors are especially better than PBO investors at the risk reduction for companies, which are not distressed at investment entry. The risk reduction in small and medium-sized companies benefits more from a SBO sponsorship compared to the holding period of the PBO.

In contrast to the common belief that leverage increases the risk of financial distress in buyouts (e.g. Kaplan & Stein (1993)), we find that leverage does not impact the risk profile of PBOs. However, a higher leverage in SBOs leads to a higher risk level. Self-evidently, improvements in efficiency are risk reducing in both buyout rounds. In PBOs the drivers to reduce risk are improvements of profitability, such as a better profit margin, whereas the risk in SBOs is controlled by better liquidity management and a reduction of leverage. These results indicate that GPs of SBOs use different sets of drivers to reduce the risk compared to their counterpart in PBOs. This insight guides us to the argument that the focus of risk management in PBOs already leads to risk reduction by using the specific drivers, and SBOs, therefore, concentrate on different drivers.

The findings of this study contribute to the discussion about the investment quality of SBOs. While SBOs do not necessarily outperform PBOs, SBOs indicate a significantly lower risk of financial distress compared to their preceding PBOs. This risk-adjusted view on the investment in SBOs proposes an argument to invest in SBOs and explains their increasing share in the total financial buyout market.

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Eidesstattliche Erklärung
nach § 8 Abs. 3 der Promotionsordnung vom 17.02.2015

Hiermit versichere ich an Eides Statt, dass ich die vorgelegte Dissertation selbstständig und ohne die Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Die aus anderen Quellen direkt oder indirekt übernommenen Aussagen, Daten und Konzepte sind unter Angabe der Quelle gekennzeichnet. Bei der Auswahl und Auswertung folgenden Materials haben mir die nachstehend aufgeführten Personen in der jeweils beschriebenen Weise unentgeltlich geholfen:

Prof. Dr. Thomas Hartmann-Wendels.

Weitere Personen neben den in der Einleitung der Dissertation aufgeführten Koautorinnen und Koautoren waren an der inhaltlich-materiellen Erstellung der vorliegenden Dissertation nicht beteiligt. Insbesondere habe ich hierfür nicht die entgeltliche Hilfe von Vermittlungs- bzw. Beratungsdiensten in Anspruch genommen. Niemand hat von mir unmittelbar oder mittelbar geldwerte Leistungen für Arbeiten erhalten, die im Zusammenhang mit dem Inhalt der vorgelegten Dissertation stehen. Die Dissertation wurde bisher weder im In- noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde vorgelegt. Ich versichere, dass ich nach bestem Wissen die reine Wahrheit gesagt und nichts verschwiegen habe.

Tjark Christopher Viktor Eschenröder — Cologne, January 14, 2020