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Can Secondary Buyouts with Complementary Skillsets Explain Operational Performance Improvements in Target Companies?

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ABSTRACT

This thesis aims to explain secondary buyout operational value creation through complementary skillsets between acquiring and selling PE firms by using a sample of 118 buyouts with target companies located in the UK. The sample consists of 78 secondary buyouts and 40 primary buyouts between 2012 and 2017. This paper is the first to use difference-in-differences regressions combined with a propensity score matching method to estimate the causal effect of secondary buyouts on operating performance to ensure buyouts and control companies are comparable and eliminate treatment selection bias. Next, this thesis contributes to previous literature by adding new proxies for complementary skillsets and operating performance measurements. The findings of this thesis contradict previous literature on SBO value creation through complementary skillsets as both an overperformance and underperformance is found relative to non-buyout companies and first-time buyouts. These results show no conclusive evidence for the correlation between operational performance improvements for target companies and secondary buyouts with complementary skillsets.

Keywords: Private Equity; Secondary buyout; Operational performance; Complementary skillset

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1. Introduction

Private equity (PE) has become a valuable financial asset, especially for institutional investors like sovereign wealth funds and pension funds around the globe. The market has developed since the boom in leveraged buyouts (LBOs) in the 1980s in the United States and later on during the 1990s in Europe to an all-time high of $6.5 trillion assets under management (AUM) today[1]. Although deal volume plateaued in 2019 at $1.47 trillion, PE deal value had still grown 13 per cent annually from 2013 to 2018. PE exit value continued six years of solid distributions for investors of $405 billion in 2019. The exit is referred to the divestment of the portfolio companies by PE firms which plays an essential role in general PE activities as they need to realise returns for their Limited Partners (LPs). PE funds also have a limited lifetime which puts pressure on their General Partners (GPs) to sell their assets (prematurely) to return capital to their investors (Sousa, 2010).

Traditionally, PE firms exited their companies through an IPO or a strategic sale, however exiting through a secondary buyout (SBO) is now an often-used strategy. In a SBO, one PE firm sells one or more portfolio companies to another PE firm (Degeorge, Martin and Phalippou, 2013). Kaplan and Strömberg (2009) show a large increase in SBO deal value as 2% of total deal value was related to SBOs in the first buyout wave (1985-1989) and 26% during the PE boom from 2005 to mid-2007. Today, SBOs account for 30% of all PE exits[2]. Although SBOs have increasingly become more prominent, their performance compared to primary buyouts (PBOs) is debated across previous research. Due to a lack of literature on SBO performance, this makes it a promising field of research. Generally, SBO value creation tends toward an underperformance compared to IPO firms (Jenkinson and Sousa, 2013) or PBOs (Sousa, 2012; Wang, 2012; Achleitner and Figge, 2014; Bonini, 2015). Some suggest, however, that there is still room to create value in SBOs under certain conditions making SBOs a worthwhile investment (Sousa 2010; Jenkinson and Sousa, 2012; Wang 2012; Achleitner and Figge 2014; Degeorge, Martin and Phalippou, 2016).

One potential explanation is found in the literature as a reason for potential value creation in SBOs which are differences in skillsets between PE firms (Sousa, 2010; Wang, 2012;

[1] McKinsey Global Private Markets Review 2020
[2] Bain Global Private Equity Report 2020

Achleitner and Figge, 2014; Degeorge et al., 2016). When the acquiring PE firm possesses different skills compared to the previous PE firm owner, then there might be still operating performance improvement potential left which the previous owner could not exploit. Therefore, new skills would allow multiple PE firms to create value during different stages in the life cycle of the portfolio firm. This thesis refers to these new skills as complementary skillsets when the acquiring PE firm has different skillsets than the selling PE firm that allows the new owner to further improve the target firm's operating performance in a way the previous owner could not. An example of value creation by using complementary skillsets is when a global-oriented PE firm acquires a business from a regional-oriented PE firm as it would allow the acquirer of the target firm to create additional operational performance improvements because of its expertise and broad international network the previous owner did not have (Degeorge et al., 2016). Achleitner and Figge (2014) also suggest other skills as functional[3], industry experience, size and a PE firm's network as potential factors explaining SBO performance. Extensive research, however, lacks on whether PE complementary skillsets influence SBO performance.

This thesis analyses the performance of SBOs compared to non-buyout companies and PBOs and tests whether complementary skillsets might explain SBO operating performance improvements. These tests were performed to explain the substantial growth in SBOs of the last two decades. Based on these tests, the main research question is formulated:

"*Can complementary skillsets between the buying and selling PE firm in a secondary buyout explain operational performance improvements in the target company?*"

Seven different PE firm skill proxies are used to test whether complementary skillsets between the acquiring and selling PE firm in a secondary buyout significantly increase operating performance improvements for the target company. These skillsets are related to differences in international expansion, experience and performance and (investment) strategy, educational background and professional experience. Experience and performance are both combined as these two factors are strongly related to each other. International expansion is estimated by

[3] Achleitner and Figge (2014) state functional skills as expertise in specific strategic areas such as buy-and-build.

either stating a PE firm as a global-oriented or regional-oriented investor. PE fund size proxy for experience and recent fundraising rank proxies for performance. Industry specialisation, business stage specialisation and operational involvement are proxies for a PE firm's (investment) strategy.

This thesis used a sample consisting of 118 buyout deals split between 78 SBOs and 40 PBOs completed between 2012 and 2017. Buyout deals until 2017 are used as an event window of two years after the buyout was used. The target companies of these buyouts are originated in the UK when the buyout took place. To analyse improvements in performance, several measurements for accounting operating performance were used: (1) growth in total assets, (2) growth in fixed assets, (3) growth in turnover, (4) growth in EBITDA, (5) growth in EBIT, (6) growth in EBIT margin, (7) growth in EBITDA margin and (8) growth in return on total assets (ROA). Growth for these operating performance variables is estimated as one year prior to the buyout and the second year after the buyout similar to Bonini (2015).

To analyse the dataset a unique method was used compared to previous literature on SBO value creation. This thesis used difference-in-differences (DiD) regressions to estimate the effect of SBOs on operational performance improvements compared to non-buyout target companies and PBOs. This effect is also called the average treatment effect on the treated (ATET). To avoid treatment selection bias and ensure that samples are comparable this paper used a propensity score matching method based on multiple confounding factors. These confounding factors include total assets, revenue, EBIT margin, EBITDA margin, debt to assets ratio, ROA and total asset turnover. All variables are used from one year prior to the buyout. Next to this, companies are matched according to industry and year to control for different industry performance movements and year effects (Cohn, Mills and Towery, 2014), Ayash, 2016).

This paper finds mixed results for SBO value creation through complementary skillsets relative to non-buyout companies and PBOs. Although SBOs with complementary skillsets based on fund size, industry specialisation, business stage specialisation, operating performance and educational background find significant overperformance in some operating performance variables compared to non-buyout companies, several other performance indicators are significantly negative while most variables have insignificant coefficients. Significant positive results are also found for SBOs with complementary skillsets based on fund size, industry

specialisation and business stage specialisation relative to PBOs, however significant negative and mostly insignicant results are found for other complementary skillsets and operating performance indicators. These results show no conclusive evidence on whether SBOs with complementary skillsets create operational value. Therefore, further research should be conducted on this topic.

This thesis contributes to the existing literature in financial economics and PE in multiple aspects. At first, although SBOs are increasing research is limited on value creation in SBOs where especially literature on the impact on operating performance is scarce. Second, the sample used in this study consists of buyouts between 2012 and 2017, therefore, more recent buyouts are investigated compared to previous literature. New proxies for complementary skillsets are also added to previous literature. These skillsets are based on a PE firm's fund size, fundraising rank, industry specialization, business stage specialisation and operational involvement. Following the paper by Degoerge et al. (2016), international expansion, educational background and professional experience are other proxies used in this thesis. Furthermore, this thesis used a more extensive list of operating performance indicators where multiple proxies for the effect on size and profitability are tested. This thesis is also the first to use an improved method for estimating the effect of SBOs on operational value creation as DiD regressions were used combined with a propensity score matching method to ensure buyout and control companies are comparable and eliminate treatment selection bias.

The remainder of this paper is structured as follows. Section 2 will provide a discussion on the theoretical background regarding PE, SBOs and potential factors explaining value creation. Based on relevant literature, section 3 elaborates on the formulated hypotheses to answer the research question. Section 4 will discuss the methodology and dataset used in this thesis. The empirical results are discussed in section 5. Finally, section 6 will discuss the limitations and suggestions for further research and section 7 provides the conclusion of this paper.

2. Theoretical Background

2.1 Private Equity

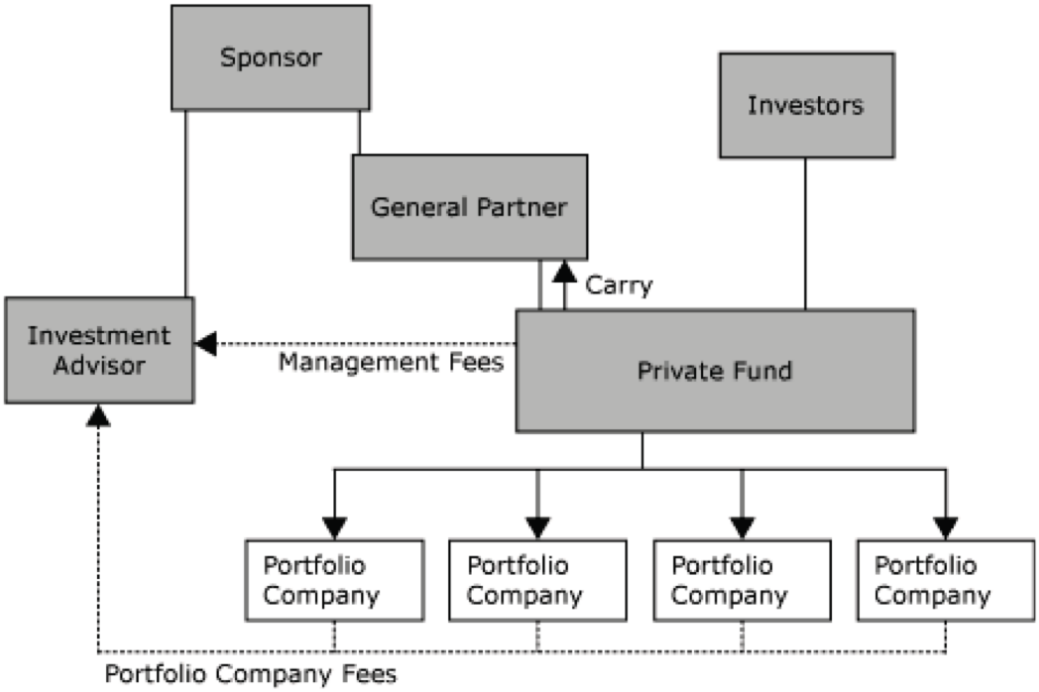
The main goal of PE firms is to gain high rates of return by selling its stake in the initially acquired company. In general, PE firms acquire preferably underpriced businesses with high growth potential, enhance the value of the asset by actively managing the company and finally sell it to capture the value created during the holding period. The holding period is the duration of an investment that is held by an investor, or the period between the acquisition and sale of a security[4]. This section presents a brief overview of the structure of PE funds before discussing PE value creation mechanisms.

PE investing is usually constructed through a limited partnership structure in which the PE firm serves as the general partner (GP). The GP invests through funds in public and private firms, manages the portfolio companies and sells investments to realise high rate of returns. The limited partners (LPs) are split between institutional investors such as pension funds and insurance companies and wealthy individuals or families who provide capital to the PE firms (see figure 1 on the next page for further details). The GP will then distribute and return the capital within an agreed time period. The capital is not directly invested but is called by the fund manager throughout an investment period of generally up to five years (Jenkinson, Sousa and Wetzer, 2018). The period to return capital to the LPs typically lasts ten or more years, making the capital commitments illiquid until funds are realised (Barber and Yasuda, 2017). However, the current volatile and unpredictable economic environment also reinforces longer-term investment vehicles. These types of funds have longer holding periods with investment periods normally of at least 15 years[5]. An example of this new development is Blackstone's announcement about the final close of its long-hold PE fund at its hard cap of $8 billion (Blackstone, 2020). Despite the duration of the holding period, each limited partnership or fund is basically a closed-end fund with a limited duration. When the GP invests a large portion of a fund, the GP also attempts to raise capital for a consecutive and separate fund.

[4] GLOBAL PRIVATE EQUITY REPORT 2020 BAIN & COMPANY

[5] Bain: Spotlight on Long-Hold Funds

Figure 1: Private Equity Fund Structure



GPs typically charge both a performance fee and a management fee. Although this differs between PE firms and their funds, management fees are normally around 2% of assets under management and performance fees of 20% based on the rate of return on their investments. Performance fees are typically referred to as "carried interest" or "carry". A hurdle rate is normally agreed between LPs and GPs which allows GPs to receive performance fees only after the rate of return on investments exceeds the hurdle rate. The hurdle rate is typically between 8% and 10%. Performance fees motivate PE firms to increase returns. These fees are intended to align the interests between GPs and LPs.

Previous literature within PE often distinguishes between the most common type of PE investments: buyouts or LBOs and venture capital (VC). An LBO is a transaction where a majority share in a business is acquired using debt as the main source of capital. The PE firm will add value through the LBO by restructuring the company's debt, installing a new management team, and/or making other operational improvements. Generally speaking, most suitable candidates for LBOs are mature, stable, non-cyclical and predictable companies due to the significant amount of debt used to finance this type of deals (Kaplan and Strömberg, 2009). On the other hand, venture capital (VC) firms generally acquire small, early-stage companies

with high growth expectations using less debt to finance the acquisition[6]. Although these types of companies are considered risky, they can create substantial returns. However, the remainder of this paper will focus on LBOs within PE.

2.1.1 Operational Value Creation in PE

Given the economic impact of PE investments and negative public image regarding their effect on a firm's operating performance, analysing performance following a buyout is valuable for the overall economy. Accordingly, an extensive list of research in the finance literature have studied this topic and found different results across different time horizons and circumstances.

Studies during the first buyout wave of the 1980s show a large positive impact of LBOs on operating performance and Kaplan (1989) was one of the first researchers to explore post-LBO performance in public-to-private deals. He finds significant post-LBO performance improvements within three years after the LBO took place. The main operational performance proxies in this study were EBITDA and EBITDA to assets or sales ratio, net cash flow as EBITDA minus capital expenditures and net cash flow to assets or sales ratio. Other research also finds an increase in operating performance in LBOs during the first buyout wave with similar proxies for operating performance. These proxies are Smith (1990) operating cash flow to operating assets[7] (Smith, 1990), EBIT (Singh, 1990), EBITDA, EBITDA to sales and EBITDA to employees ratio, operating cash flow, operating cash flow to sales and operating cash flow to employees ratio (Opler, 1992), and EBIT to sales (Smart and Waldfogel, 1994).

Although strong empirical evidence is provided for post-LBO improvements in operating performance during the first buyout wave, the second buyout wave (1990-2006) show mixed results. the second buyout wave of 1990 to 2006 shows mixed results. Various publications measure a significant LBO impact on operating performance[8]. Other studies find contradicting

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[6] Wendt, T. (2019, June 9). *Five Things Companies Get Wrong about Corporate Venture Capital*. Bain & Company. https://www.bain.com/insights/five-things-companies-get-wrong-about-corporate-venture-capital/

[7] Smith (1990) defines operating assets as the average book value of current assets added by net PPE, adjusted for write-ups on inventory, accounts receivable, and PPE after the buyout

[8] Bergström, Grubb and Jonsson (2007); Cressy, Munari, Malipiero (2007); Guo, Hotchkiss and Song (2011); Boucly, Sraer and Thesmar, (2011); Acharya, Gottschalg and Kehoe (2013); Sannajust and Chevalier (2018)

results as either insignificant or negative effects of LBOs on operating performance are concluded[9]. Overall, the evidence suggests that the impact of LBOs on operating performance measures is positive.

The two primary sources of the origination of operational value creation in buyouts are governance mechanisms and a PE fund's skillsets to improve the corporate structure, deal structure, and a firm's strategy. The next sections will discuss the previous literature on these two sources.

2.1.2 Governance Mechanisms

Jensen (1986, 1989) was the first to argue that LBOs create wealth with an organizational structure that reduces agency costs. According to Jensen, LBOs reduce agency costs by increasing leverage in a company as an increase in leverage results in higher interest expenses which decreases free cash flow. Less excessive free cash flow limits the risk of managers making worthless investments which aligns the interests of managers and shareholders. Berg and Gottschalg (2005) also argue two other levers for PE firms in a governance context to create value: (1) improving incentive alignment and (2) improving monitoring and controlling.

Another way a PE firm utilises governance mechanisms to reduce agency costs and increase value creation is to allow management to invest equity alongside the PE firm (Berg and Gottschalg, 2005). PE firms will strongly encourage the management of the portfolio company to acquire a significant equity stake Following a buyout. By making the personal wealth of the management dependent on the performance of the portfolio company, the management is incentivised to reduce financial slack and implement only value-creating strategies (Smith, 1990). This incentive mostly results in higher operating performance, more aligned investment decisions between management and the target firm (Palepu, 1990; Muscarella and Vetsuypens, 1990; Smith, 1990; Easterwood and Seth, 1993).

[9] Desbrieres and Schatt (2002); Vinten (2007); Leslie and Oyer (2008); Cohn et al ., (2014); Bharath, Dittmar and Sivadasan (2014); Goergen, O'Sullivan and Wood (2014); Weir, Jones and Wright (2015); Ayash and Schütt (2016)

Finally, a buyout will often bring about a change in the governance structure so that monitoring and controlling becomes more pronounced mechanisms. Because there is a correlation between concentration of ownership and the degree of active ownership, Acharya, Kehoe and Reyner (2008) argue that the marginal cost of monitoring will be substantially lower in LBOs. PE funds use a variety of mechanisms to exercise its active ownership, such as setting aggressive (strategic) targets (Anders, 1992), taking board positions and sophisticating the financial reporting in the portfolio company (Berg and Gottschalg, 2005). These mechanisms will typically be implemented immediately after the LBO. However, the PE firm remains frequently engaged with the company in the long run to evaluate and monitor management to increase value creation (Berg and Gottschalg, 2005).

2.1.3 PE Firm Experience and Expertise

Besides the mechanisms of value creation described in section 2.1.2, PE firms can use their experience and expertise to create value for their fund and portfolio companies by improving operating performance or deal pricing. The application of their knowledge and expertise to create value can play a vital role in certain types of PE firm strategies (i.e., buy-and-build) and the negotiation and acquisition process. Haspeslagh and Jemison (1991), for example, point out that a PE firm's ability to create value in buyouts is caused by the knowledge and skills of a small number of financial and legal experts and operating managers with extensive experience and expertise in deal-making and analysis. Because of a fund's expertise, they can capture value by taking advantage of information asymmetries, their superior negotiation skills at entry or exit and market inefficiencies.

The theory of superior private information in the context of value creation in buyouts reflects these information asymmetries between insiders and outsiders, which was a cornerstone topic during the first buyout wave (Jensen, 1989; Lee, 1992). During this period, the so-called Management Buyouts (MBOs), in which the current management of a firm acquires the company alongside a PE fund, was highly popular (Berg and Gottschalg, 2005). By definition, the management acquired relatively more significant stakes in such acquisitions, thereby enhancing the magnitude of potential value creation. However, in the current third buyout wave, MBOs are less pronounced that diminishes the value extraction potential of insider information (Berg and Gottschalg, 2005).

During the first buyout wave, PE firms typically paid lower prices as a result of GP superior negotiation skills compared to strategic buyers (Butler, 2001). GPs are fierce negotiators and can reduce the purchasing price when performing due diligence (Butler, 2001). Their capabilities to obtain relatively cheaper acquisitions helps PE firms to create value in the buyout process by using multiple arbitrage before any operational improvements occurred. The superior negotiation skills of GPs might be explained by their extensive network across financial institutions and the "acquisition learning curve" as PE companies tend to acquire significantly more businesses than strategic buyers (Anders, 1992).

PE firms also use their expertise to search for market inefficiencies to capture value by identifying and exploiting the so-called "conglomerate discount effect". This effect suggests that a diversified company is less valuable than the sum of its parts in isolation (Berg and Gottschalg, 2005). While diversification is generally a desirable attribute, Saunders and Walter (2012) discuss that the market does not compensate for this in private companies, as diversified firms are more complex and bureaucratic. PE funds can, therefore, exploit this market inefficiency by acquiring the total firm at a lower price and divest ("asset strip") individual divisions at a higher price. This strategy occurred mostly during the first buyout wave (Singh, 1993), but has been on the decline in more recent years as fewer firms act as conglomerates (Davis et al., 2011).

Using relatively cheaper debt in target firms is another value-creating source for PE firms based on their experience and expertise. PE firms contain strong negotiating skills to obtain cheaper credit for their portfolio companies as they can use their extensive expertise in capital markets during the acquisition process. PE firms gained this knowledge from their excellent network across financial institutions and a high reputation among debt providers (Demiroglu and James, 2010). Another benefit PE firms possess for their portfolio firms is creating value after the acquisition by using their negotiation skills for raising extra capital with terms that would otherwise not have been accomplished by the portfolio company itself (Anders, 1992; Cotter and Peck, 2001).

After the acquisition, the PE firm's experience and expertise might also have a direct impact on creating value for the target firm by increasing revenue and reducing costs. PE funds often play an important role in advising their firms on their strategy. This advisory role often leads to improved business strategies resulting in operational performance improvements by reducing

costs and increasing product/service value and innovation (Gilbert and Strebel, 1987). Add-on acquisitions are another strategic enhancement originating from the knowledge of PE firms which often also increase revenue growth. Research shows that PE firms use their industry-specific knowledge to conduct buy-and-build strategies which leads to a consolidated market segment (Baker and Montgomery, 1994; Wright et al., 2001). PE firms, then, try to create synergies to increase revenue growth which the portfolio company could not generate on a standalone basis (Loos, 2006).

2.3 Secondary Buyouts

2.3.1 Value Creation in SBOs

As PE firms aim to find and exploit value creation opportunities in targets, those targets should be maximally improved during the holding period of the primary buyout (PBO). This assumption questions the ability for SBOs to create value . Historically, only distressed transactions were using SBOs as an exit route as successful buyouts were usually sold to a strategic player or through an IPO. Therefore, a question remains among studies on why PE firms acquire target companies in SBOs and how SBOs create value. Three explanations are given in previous literature for the emergence of SBOs and value creation scepticity.

Firstly, it is assumed that PBOs have effectively restructured the target firm and lowered agency costs by active monitoring, making it unclear how a second GP could use similar techniques to improve operating performance. So, if PBOs fully capture operational value, then SBOs can only underperform PBOs as there are no value creation opportunities left. Following this assumption, PE investors are expected to only participate in SBOs when the former PE firm did not capture all value-creating opportunities within the target company (Bonini, 2015).

Wang (2012) shows a second potential driver for SBOs as capital market conditions significantly affect SBO activity. PE funds tend to be more likely to sell their companies through a SBO at a 'cold' equity market and when the credit market conditions are advantageous. More exits through SBOs during ‘cold’ equity markets implies SBOs as another exit opportunity as these equity market conditions are not favourable for an IPO. The impact of the debt market conditions might also explain SBO activity as increasing debt to the target company after the buyout creates the possibility to create value for the PE firm (Wang, 2012) An increase

in leverage is associated with a higher risk of default risk, which might be reflected in lower operating performance for companies engaged in SBOs (Freelink and Volosovych, 2012).

Thirdly, Wang (2012) observes a higher premium paid for SBOs compared to PBOs. On average, secondary deals contain a 16% higher enterprise multiple compared to first-time deals. Target firm characteristics as size or the buyer's abilities to borrow do not explain this multiple suggesting that SBOs are overpriced transactions (Wang, 2012). Reasons for a higher premium might be that the buying PE firm acquires the target company form a selling PE firm with similar negotiation skills and market timing (Achleitner and Figge, 2014).

When looking at operational performance improvements Volosovych and Freelink (2012) were one of the first researchers examining whether SBOs improve operating performance. They examined UK SBO deals between 1999 and 2008 and looked at the change between one year prior to the buyout and one year after the buyout for four proxies of operating performance. The profitability indicators in this study were sales growth and return on assets growth. They found no significant improvements in operational improvements in SBOs, showing that improvements in operating performance do not primarily drive value creation in SBOs. Wang (2012) presents similar results, as she shows mixed results on improvements in operational performance in SBOs. She looked at an increase in operating performance from one year prior to three years after the buyout for UK SBOs between 1997 and 2008. Achleitner and Figge (2014) apply a narrower window from one year before the buyout to one year after the buyout. They consider 2,456 European LBOs from 1990 to 2010 and find no evidence of superior operational value creation potential in SBOs compared to PBOs measured by sales and EBITDA margin. Bonini (2015) examines panel data on 326 European LBO transactions between 1998 to 2008. Comparing SBOs to PBOs, this paper finds that SBOs offer significantly lower, although still positive value on performance indicators such as EBITDA, Sales, and ROI. Bonini (2015) suggests that this effect is caused by the previous PE firm that captures the potential value creation during the first buyout. These findings show a tendency of underperformance of SBOs compared to PBOs. This results in the following hypothesis:

Hypothesis 1: "Secondary buyouts show less operational performance improvements compared to first time buyouts."

However, some studies suggest that not all SBOs should be treated equal as there are factors that might explain value creation in SBOs. I will discuss these factors in the following section.

2.3.2 Potential Determinants Explaining Value Creation in SBOs

As described in the previous section, the literature is sceptical about the possibility of value creation in SBOs and how the acquiring PE firms could create this value. Despite the significant growth in SBOs, SBO value creation is a limited topic in previous research, and just a small number of researchers have looked into the potential drivers of SBO performance.

Two factors are suggested by research to impact SBO performance explaining why PE firms would participate in this type of buyouts. The first factor explains that the first investor in the portfolio company could not to capture all the value as LPs force GPs to sell their investments because of opportunistic and structural reasons. This pressure on selling investments is due to the fact that LPs and GPs agree on a 10 to 12 years lifespan of the PE fund (Kaplan and Schoar, 2005). This agreement forces the PE firm to sell their current portfolio companies to liquidate an LP's investment in the fund and present a track record for the following funds. However, there still might be operational performance potential (Strömberg, 2007; Sousa, 2010). This pressure on selling PE firms creates an opportunity for acquiring PE firms as operational performance potential is not fully captured by the first investor. Therefore, this would suggest that the first investor was not entirely successful and explains why a second investor could still offer value-creating opportunities for the portfolio company.

The second explanation for potential operating performance improvements in SBOs argues that PE firms with different skillsets could apply different operating performance strategies on target companies (Sousa, 2010; Wang, 2012). Previous research suggests strategies as international expansion, industry consolidation, changes in strategy or the introduction of a new management team as explanations for SBO value creation. Different PE strategies might give the possibility to add value further to the portfolio company as the new holder can add value through new mechanisms. For example, when a business was acquired by a regional-focused PE firm and later sold to a PE firm with a global-oriented focus, the second PE firm could create value by expanding the company to other international markets the first owner could not. This assumptions states that different PE firms with complementary skillsets can create value during multiple stages in the lifecycle of the portfolio company. One of the first researchers to examine the impact complementary skillsets were Degeorge et al. (2016). They focused on

complementary skillsets of PE firm managers related to their educational (MBA or non-MBA) and career (ex-banker or ex-consultant) backgrounds. Besides GPs, complementary skills between PE firms were also tested and distinctions were made between 'margin growers' and 'sales growers' and between regional or global-focused PE firms. Their paper finds evidence for value creation in SBOs for PE investors with complementary skills. Degeorge et al. (2016) measure value creation by examining returns for both the buyer and the seller in a secondary buyout. According to these findings, the following hypothesis can be formulated:

Hypothesis 2: "Operational performance improvements in a secondary buyout are realised when a buying PE firm has complementary skillsets to the selling PE firm"

However, evidence and research on the impact of PE firms complementary skillsets and strategies on SBO value creation is still missing in previous research. This thesis will contribute to the current literature by examining the impact of complementary skillsets between acquiring and selling PE firms on operational performance improvements for SBOs using six proxies related to international expansion, experience and performance, and a PE firm's strategy. This study is somewhat similar to the paper by Degeorge et al. (2016), however operational performance in target companies is examined instead of returns and new proxies for complementary skillsets are added.

3. The Effect of PE Firm Skillsets on SBO performance

3.1 PE Firm Skillsets

This paper analyses the impact of PE firm complementary skillsets between the acquiring and selling PE firm in a SBO on operational performance improvements in the target firm. The main focus is on operational performance as this is a primary source of value creation in buyouts. This section will discuss several PE skillsets that might influence SBO performance according to the current literature. The main focus is on five different factors: (1) International expansion, (2) PE experience and performance, (3) (investment) strategy, (4) educational background and (5) professional experience. Previous literature suggests several of these factors as most important in influencing value creation in buyouts, and they are relatively accurate and easily measurable. The next sections will discuss the expected effects of the different factors on operational performance in more detail and the corresponding hypotheses.

3.2 International Expansion

The acquisition by a global-oriented PE firm from a regional-oriented PE firm would allow the acquirer of the target firm to create operational performance improvements by having a larger international expansion. The SBO case study by Strömberg (2013) perfectly illustrates the role of such complementary skills in SBO value creation. This case study discusses the SBO of Com Hem by two global-oriented PE firms Carlyle and Providence Equity Partners from a regional-oriented PE firm EQT from Sweden. EQT grew the company from SEK 53m to SEK 700m after implementing an efficiency program, adding new products and services and strengthening and incentivising the board of directors. EQT was, however, not able to expand Com Hem internationally as this was not their main expertise. Then Carlyle and Providence took over the company, as these PE firms were both international orientated and had previous experience with multinational television companies. Their expertise gave them the possibility to further add value to the company. This case is an excellent example of a buyout where the regional-focused PE firm cannot hold the business to implement the next strategy phase, but where the second internationally-focused holders tend to be the right owners for the firm at that stage. Achleitner and Figge (2014) also suggest that international expansion might have a positive impact on operational performance in a secondary buyout. As mentioned before, Degeorge et al. (2016) was the first researchers to test this empirically. They found that a change in international expansion indeed is related to investment returns for both the buyer and the seller in a SBO. Wright et al. (2005) show other supporting evidence by examining cross-border buyouts in the VC market, which is similar to the PE market (Wright and Robbie, 1998). They explain that the VC market often uses cross-border investments to enter foreign markets. In line with the previous research, changing from a regional-focused PE firm to a global-focused PE firm could allow the target company to improve operational performance. This results in the following hypothesis:

Hypothesis 3: "Operational performance improvements in a secondary buyout are realised when a global-oriented PE firm acquires a portfolio company from a regional-oriented PE firm."

3.3 Experience and Performance

Fund experience and performance are other PE firm skillsets that might influence operational performance improvements for SBOs, according to the literature. When an experienced PE firm

acquires a company from a less experienced PE firm it is expected that the new owner has a higher potential for creating new additional value by using skillsets gained from experience (Achleitner and Figge, 2014). More experience translates into superior strategic and negotiating skills because of the "acquisition learning curve". These PE firms with more experience could also use their experience to obtain relatively cheaper debt and more favourable terms, because of more extensive insights into the mechanisms of the capital market and a high reputation as trustworthy clients in the debt market (Anders, 1992; Cotter and Peck, 2001). The literature mainly uses three different proxies for experience and performance. These proxies are: (1) a PE firm's recent fundraising (Schmidt, Nowak and Knigge, 2004; Achleitner et al., 2011), (2) size of PE fund (Kaplan and Schoar, 2005; Achleitner et al., 2011). According to research, these three factors relate to a PE firm's experience and performance. Kaplan and Schoar (2005) show that size relates to a PE firm's experience as more experienced and better-performing firms raise higher amounts of capital for their funds.

As explained in the previous section, differences in experience and performance between the selling PE firm and the acquiring PE firm could affect operational improvements in SBOs. Hence, these are the following hypotheses:

Hypothesis 4a: "Operational performance improvements in a secondary buyout are realised when the acquiring PE firm of a portfolio company has a larger fund size than the selling PE firm."

Hypothesis 4b: "Operational performance improvements in a secondary buyout are realised when the acquiring PE firm of a portfolio company has recently raised more funds than the selling PE firm."

3.4 PE Firm Strategies

As shown in section in 3.2, PE firms with a different skillset could create additional value to the portfolio company. This section will discuss the potential effect of the three PE firm strategies which are industry specialisation, business stage specialisation and operational involvement. Previous literature shows that industry specialised PE firms perform better than PE firms with a more diversified strategy (Cressy et al. (2007); Gottschalg and Wright 2008). Cressy et al. (2007) argue that specialised PE firms relative to their competitors have a better understanding of a target firm's competitive landscape its weaknesses and strengths. They

further state that specialised PE firms are able to select potentially superior target companies and also provide more effective monitoring and advice after the buyout. Based on this, the following hypothesis can be formulated:

Hypothesis 5a: "Operational performance improvements in a secondary buyout are realised when an industry-specialised PE firm acquires a portfolio company from a more diversified PE firm."

The second factor related to PE firm strategies that could influence operational improvements in SBOs is business stage specialisation. A PE firm investing in a generally larger target company could add new operational improvements that could not be made by the previous owner. Martin and Stefanus (2019) illustrate an example of such a transaction. They discuss the SBO of a healthcare company by Cinven (mid-buyout PE firm) from Trition (small-buyout PE firm). The subsequent buyer of the next larger category, in this case Cinven, expanded the company to new emerging markets and introduced new products to improve operational performance. The investment finally generated an IRR of 31% for Cinven. This example shows that the buyer with a larger target size has a skillset that the seller does not have to create additional value. In line with this example, the following hypothesis can be composed:

Hypothesis 5b: "Operational performance improvements in a secondary buyout are realised when the acquiring PE firm of a portfolio company invests in larger target companies than the selling PE firm."

Finally, operational involvement is used as a proxy for a PE firm's strategy to test the impact of complementary PE firm strategies on SBO operational performance. In operational engineering, a PE firm focuses on developing industry and operational knowledge to actively support the target firm to create value (Gompers et al., 2015). Operational engineering is considered as a complementary skillset to financial and governance engineering as it uses other value-creating mechanisms. Previous literature argues that financial engineering creates operational value by reducing agency costs by setting aggressive debt levels to put pressure on management to invest capital wisely (Jensen, 1986 & 1989; Berg and Gottschalg, 2015). On the other hand, research suggests that governance engineering creates operational value by improving the governance structure of the target firm (Palepu, 1990; Muscarella and Vetsuypens, 1990; Smith, 1990; Anders, 1992; Easterwood and Seth, 1993; Berg and

Gottschalg, 2005;). Finally, Acharya et al. (2013) show higher margin improvements for PE firms being more operationally engaged and involved in target firms. These findings show that operational engineering provides new value-creating mechanisms which results in the following hypothesis:

Hypothesis 5c: "Operational performance improvements in a secondary buyout are realised when a PE firm specialised in operational engineering acquires a portfolio company from a PE firm not specialised in operational engineering."

3.6 Educational Background & Professional Experience

Research also suggests that educational background and professional experience influence operational value creation. Degeorge et al. (2016) were the first to research the impact of complementary skillsets related to educational background and professional experience on SBO operational value creation. They found an increase in sales growth for SBOs when the GPs of the acquiring and selling PE firm have a different educational background or professional experience. A distinction was made between a financial and a non-financial education and financial and operational professional experience. Acharya et al. (2013) also show a significant role in a GP's professional experience for the type of deal it generates a higher return. Their results show higher returns for GPs with financial professional experience performing buy-and-build transactions while GPs with operational professional experience generate superior returns in value-creating initiatives within the target firm. From this finding it can be concluded that an acquiring PE firm's GPs with a different professional experience can add new value to the portfolio company. Following this assumption, the next two hypotheses are formulated:

Hypothesis 6a: "Operational performance improvements in a secondary buyout are realised when a PE firm with a financial education acquires a portfolio company from a PE firm with a non-financial education."

Hypothesis 6b: "Operational performance improvements in a secondary buyout are realised when a PE firm with a non-financial education acquires a portfolio company from a PE firm with a financial education."

Financial (i.e. economics or accounting) and non-financial education (i.e. engineering or medicine) teach students different topics and skills required to excel in PE. GPs with a financial education are more likely to have skills related to increasing operational value through financial engineering while GPs with a non-financial educational background as engineering or medicine might have more skills and knowledge related to operations of the business to increase operational value through operational engineering. As Degeorge et al. (2016) show SBO value creation when professional experience between acquiring and selling PE firms is different, the following two hypotheses are formed:

Hypothesis 7a: "Operational performance improvements in a secondary buyout are realised when a PE firm with financial professional experience acquires a portfolio company from a PE firm with operational professional experience."

Hypothesis 7b: "Operational performance improvements in a secondary buyout are realised when a PE firm with operational professional experience acquires a portfolio company from a PE firm with financial professional experience."

4. Methodology

As discussed in the previous section, this thesis strives to empirically test the magnitude of operational value creation in SBOs, and, whether this is influenced by PE firm-specific characteristics. The following sections provide an overview of the methodology. These are divided into sample selection, variables and empirical models.

4.1 Sample Selection

To investigate the impact of PE characteristics this study considers panel data on two samples of private UK companies in the period 2012-2017. The first sample consists of companies acquired by PE firms in a first-time buyout and companies acquired by PE firms in a second-time buyout and the second sample includes a control group that is constructed of the most relevant peers. Theoretically the buyout samples would consist of all transactions in the period, however, as the following sub-sections show data availability, extreme observations and the chosen event window somewhat limit the depth of the study.

4.1.1 Construction Buyout Samples

To generate a sample of buyouts, the Zephyr database from Bureau van Dijk was used. Zephyr is the most comprehensive database containing information and statistics related to M&A transactions (Bollaert and Delanghe, 2015). Initially, an extensive list including information on all completed PE acquisitions in the UK from 2012-2017 was extracted. To transform the raw list of transactions into the buyout sample, various criteria were applied to ensure that each deal was representative and comparable. First, only transactions where the PE firm acquired a majority stake were included. To implement the value-creating initiatives discussed in the literature review, a majority stake is required in most cases (Baker and Wruck, 1989). So, to evaluate the impact of PE ownership on operational performance it is most appropriate to only include majority stake transactions. Next, deals were individually cross-checked on whether PE firms were involved to determine if a deal is a first-time buyout, second-time buyout or not. First-time buyouts following a secondary buyout within two years were also removed from the sample as the event window is at least two years post-LBO to test operational improvements. This thesis follows Bonini (2015) using a two-year event window centred on the year of SBO completion. As value creation in PE funds tends to follow the J-curve, with modest performance in the first years followed by improved performance in the latter years, an event window with ownership of PE firms in multiple years is preferred (Grabenwater, 2005). Based on these arguments, and the data availability, this thesis uses an event window of -1/+2. One caveat of this event window is the restriction on the sample size, as only transactions from 2017 and before would have sufficient data.

Finally, the Orbis database (Bureau van Dijk) was used to collect financial information of individual target companies within the event window. Missing financial information was looked up in financial statements.

4.1.2 Construction Control Sample

To investigate whether PE owned firms exhibit superior operational performance, a control sample is constructed. Two methods were used in previous literature, where either a 'direct matching strategy' using multiple regression is carried out (Kaplan 1989; Smith 1990), or a 'propensity matching strategy', where an industry benchmark is used (Rosenbaum and Rubin, 1983). This thesis used propensity score matching (PSM) comparable to Cohn et al. (2014) and Ayash (2016) to determine control companies. The goal of PSM is to balance treatment and

control groups on any confounding factors, eliminating treatment selection bias and ensuring that the groups are comparable. (Caliendo and Kopeinig, 2008). Section 4.2.3 provides descriptive statistics for the differences between PBOs and SBOs. This thesis used nearest neighbour matching on propensity score, because this matching method matches the most reliable control companies as it selects a matching control company whose propensity score is closest to that of the buyout company. Next to this method, a one-to-one implementation of the propensity score matching was used which matches one buyout company to one control company. Companies are matched according to the matching with replacement method where control firms can be matched to multiple buyout firms. This is contrary to matching without replacement where each control firm can be used as a match once. Matching with replacement has the benefit of always matching each buyout company to the closest control company and therefore results in lower bias. Following the methods described above, this thesis matches by industry and year to control for different industry performance movements and year effects (Cohn et al. 2014, Ayash, 2016). Then, we use multiple observable covariates to control for selection bias and other confounding effects. These variables consist of total assets and total revenue to control for size; EBITDA margin and EBIT margin to capture profitability; the total debt to total assets ratio to assess the capital structure; ROA (EBIT to total assets), and total asset turnover to control for efficiency. These metrics cover the most important factors to determine whether a company is comparable or not. All variables are taken one year prior to the buyout. A logistic regression is used to estimate the following propensity score:

$$p(x_i) = prob(D|x_i) = E(D|x_i)$$

Where D equals 1 if a company is following a buyout (treatment) and 0 for a company without a buyout (no treatment) and x_i corresponds to the described covariates and acts as an independent variable for each company i.

4.2 Variables

4.2.1 Operating Performance Measurements

Several operating performance measurements are identified and analysed to test whether SBOs impact operational value creation. These operating accounting measurements are in line with Wang (2012), Achleitner and Figge (2014) and Bonini (2015). Two accounting measures are

suggested in the literature to determine the operating performance of a company, which are size and profitability (Kaplan and Strömberg, 2009; Wright et al., 2009; Kaplan (1989), Lichtenberg and Siegel (1990); Acharya et al. (2010); Guo et al. (2011); Achleitner, Braun and Engel, 2011). An increase in the growth of these measurements of operating performance indicates additional value creation by the PE firm. Table 1 below presents an overview of the accounting measurements for operating performance.

To measure operating performance improvements, this thesis measures the annualised percentage increase for all variables for each buyout. Following the paper of Bonini (2015), the annualised percentage increase is calculated between one year before the buyout to two years after the buyout.

Table 1: Operating performance variables used to analyse differences between PBOs and SBOs

Measurement	Category	Growth variable
Operating Performance	Size	Total assets
		Sales
	Investments	Fixed assets
	Profitability	EBIT
		EBITDA
		EBIT margin = EBIT / Sales
		EBITDA margin = EBITDA / Sales
		ROA = EBIT / total assets

4.2.2 PE Firm Skillsets

As discussed in section 3, the five different skillset categories are international expansion, experience and performance, (investment) strategy, educational background and professional experience. These factors are used to test hypotheses 3-7 as to whether PE firms with complementary skillsets impact operating performance improvements in SBOs. Only

complementary skillsets are measured as these are expected to create value for the target firm. The skillsets are described in the following of this section.

International expansion is distinguished between regional-oriented PE firms and global-oriented PE firms. This thesis assigns a PE firm to one of the categories based on the research by Degeorge et al. (2016). Qualifying a PE firm as a global or regional investor relies on information about the PE firm's portfolio firms and its (investment) strategy (Degeorge et al., 2016). The number of different countries each firm had invested in at the time of the SBO is counted to allocate the PE firms as a regional- or global investor. Firms that invested in less than three countries are classified as regional while investments in three countries or more are classified as global. Examples of a regional-oriented and global-oriented PE firm used in the dataset are Advanced Capital Invest and Bain Capital Private Equity. Information about international expansion is found on the websites of the PE firms and in the Preqin database. Only transactions are considered where a global-oriented PE firm acquires a company from a regional-oriented PE firm as only the acquiring sponsor can take the target company into a new strategic path.

As mentioned before, three different factors for experience and performance are used. These are PE fund size and recent fundraising rank. PE fund size is a widely used proxy for experience (Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2008; Achleitner et al., 2011). PE firms are considered larger when the value of the fund size is at least two times higher at the time of the buyout. The last proxy for experience and performance is recent fundraising. A dummy variable with a value of 1 is created for companies that are listed in the PEI300 ranking and 0 otherwise. This PE ranking lists the world's largest PE firms based on how much capital they raised in the last five years. For all experience and performance variables, only transactions are included where the acquiring PE firm has more experience compared to the selling PE firm as only these are expected to be complementary.

The third skillset used in this thesis divides PE firms between industry-specialised firms or more diversified firms. Cressy et al. (2007) show evidence that industry-specialised PE investors tend to have higher profitability after the buyout took place compared to non-specialised investors. Their findings suggest that an essential part of the success of PE investments is related to a PE firm’s strategic choices. This thesis measures industry specialisation based on the information about a PE firm's industry (investment) strategy presented on their website. A dummy variable

is created with a value of 1 if a PE firm is industry-specialised and 0 otherwise. Only transactions are included if an industry-specialised PE investor acquires a business from a non-specialised PE investor. As Cressy et al. (2007) show, industry-specialised investors complement diversified investors to create value.

Another proxy for a PE firm's skillset based on (investment) strategy is business stage specialisation. Business stage specialisation is one of the most common strategies for PE firms as PE firms typically only invest in companies within a specific price range. Business stage specialisation is divided into three categories and is based on a firm's total revenue. The smallest category consists PE firms investing in companies with a revenue lower than £25 million. The second category are mid-sized target companies, which are considered to have a total revenue between £25 and £500 million. Finally, large buyouts are considered when a PE firm invests in a company with a revenue larger than £500[10]. Information about the business stage specialisation of all PE firms is either found in the Preqin database or company websites. Only transactions are included where the acquiring PE firm invests in a larger firm size category compared to the selling PE firm. Only larger PE firms are considered to have complementary skillsets as these PE firms have more experience in value creation in larger companies (Alperovych, Amess, and Wright, 2013).

The last proxy for a PE firm's skillset related to its strategy is operational involvement. A distinction is made between PE firms primarily focusing on creating value by improving operations within the portfolio company and PE firms focusing more on other aspects as financial or governance engineering. A PE firm is measured as operational-specialised when managers, involved in the buyout, take executive board positions within the portfolio company, actively support the portfolio company in day-to-day operations or when the PE firm has in-house operational directors primarily focusing on supporting portfolio companies. This information about the roles of PE firm managers within portfolio companies involved in the buyouts is gathered from their company websites and LinkedIn profiles. As Acharya et al. (2013) show an overperformance of operational-specialised PE firms compared to other PE

[10] Company size classification obtained from the UK's government website: https://www.gov.uk/government/collections/mid-sized-businesses

firms, only operational-specialised PE firms are considered to have complementary skillsets when these firms acquire from non-operational-specialised PE firms.

Finally, educational background and professional experience are used as proxies for PE firm complementary skillsets. Educational background is either measured as financial or non-financial while professional experience is separated between financial and operational. This thesis evaluates the educational background of PE firms based on key partners involved in the SBO where accounting, business administration, economics, econometrics and finance are considered as a financial education and law, engineering, math, history and several other studies[11] as a non-financial education. Next, information was collected about the professional experience of the key partners involved in the portfolio company of the SBO in a similar way to educational background. Financial professional experience is considered when key partners had careers previous to the SBO in audit, banking or PE and operational experience when key partners had careers in consulting, corporate, entrepreneurship and legal professions. Degeorge et al. (2016) illustrate that financial and non-financial educational backgrounds and financial and operational professional experience provide different skillsets for PE firms to add new value to the portfolio company. Therefore, different skillsets between acquiring and selling PE firms related to educational background and professional experience are considered complementary skillsets. An overview of all PE firm skillsets is shown in the table on the next page. An overview of PE firm complementary skillsets is presented in Table 2 on the next page.

[11] Other studies include chemistry, computer science, behavioral sciences, natural sciences, philosophy, politics, modern languages, and Bachelor of Arts

Table 2: PE firm complementary skillset measurements to analyse operating performance improvements in SBOs

Category	Measurement	Definition	Complementary skillset requirement
International expansion	Regional or global-oriented (investment) strategy	Firms that invested in less than three countries are classified as regional while investments in three countries or more are classified as global.	Transactions with complementary skillsets are considered when a regional-oriented PE firm sells to a global-oriented PE firm
Experience and performance	PE firm size	Size of fund at time of the buyout	Transactions with complementary skillsets are considered when a PE firm with a small fund size sells to a PE firm with a fund size twice the size
	PE firm recent fundraising rank	Fundraising rank is based on the PEI300 list containing the 300 largest PE firms based on their fundraising over the last five years	Transactions with complementary skillsets are considered when a PE firm not listed in the PEI300 ranking sells to a PE firm listed in the PEI300 ranking
Industry specialisation	Industry-specialised or diversified (investment) strategy	Industry specialisation is based on a PE firm's industry (investment) strategy presented on their website	Transactions with complementary skillsets are considered when a diversified PE firm sells to an industry-specialised PE firm
Business stage specialisation	(investment) strategy based on the size of the portfolio companies	Business stage specialisation is divided into three categories: small (<£25 mln. revenue), mid (£25-£500 mln. revenue) and large (>£500 mln. revenue)	Transactions with complementary skillsets are considered when the acquiring PE firm buys from a PE firm that invests in companies within a smaller size range category

Category	Measurement	Definition	Complementary skillset requirement
Operational involvement	Operational-specialised or non-operational-specialised	A PE firm is measured as operational-specialised when managers take executive board positions within the portfolio company, actively support the portfolio company in day-to-day operations or when the PE firm has in-house operational directors primarily focusing on supporting portfolio companies	Transactions with complementary skillsets are considered when an operational-specialised PE firm acquires from a non-operational-specialised PE firm
Educational background	Financial or non-financial background	accounting, business administration, economics, econometrics and finance are considered as a financial education and other education[1] as a non-financial education for key partners	Transactions with complementary skillsets are considered when the acquiring PE firm's key partners have a different educational background than the selling PE firm's key partners
Professional experience	Financial or operational experience	Financial experience is considered when key partners had careers in audit, banking or PE and operational experience when key partners gained experience from other professions	Transactions with complementary skillsets are considered when the acquiring PE firm's key partners have different professional experiences than the selling PE firm's key partners

[1] Includes law, engineering, math, history, chemistry, computer science, behavioral sciences, natural sciences, philosophy, politics, modern languages, and Bachelor of Arts
[2] Includes consulting, corporate, entrepreneurship and legal professions

4.2.3 Control Variables

Several control variables were included in the regressions. At first, this thesis controls for company size by using the natural logarithmic function of total revenue as this can impact operational value creation through differences in economies of scale. Secondly, the growth in leverage from one year before to one year after the buyout is used as a control variable as an increase in leverage is associated with higher operating performance because it puts pressure on managers not to waste money and thereby increase value. Finally, industry and year fixed effects were added to the regressions to control for unobserved group heterogeneity. The BvD Orbis Database was used to extract data about the industry performance indicators based on SIC Code Divisions.

4.3 Empirical Models

4.3.1 Difference-in-Differences Model

This research attempts to find a causal relationship between the operational performance of target companies and complementary skillsets between the buying and selling PE firm in SBOs. However, several endogeneity problems might impose a threat on this causal relationship. One potential problem might be the presence of several omitted variables that influence the dependent variables resulting in biased results. To tackle this problem, multiple control variables, year and industry effects were included in the regressions. Next, a difference-in-differences (DiD) design was used to study causal relationships. The DiD method estimates the differential effect of a treatment by comparing the outcome over time between a treatment group and a control group (Angrist and Pischke, 2008). This effect is also called the average treatment effect on the treated (ATET) (Blundell and Costa Dias, 2009; Lechner, 2011; White and Raitzer, 2017). The ATET can only be estimated if the conditional independence assumption (CIA) holds. This assumption states that the treatment group's characteristics should match the characteristics of the control group. As mentioned in the previous section, propensity score matching ensures the CIA holds. Table 14 (appendix), however, shows a significant difference in the mean of total liabilities one year prior to the buyout between PBOs and their control group. This difference is a small limitation of this study as PBOs and control companies are not completely similar. In this thesis, multiple estimations of the ATET are calculated to answer the hypotheses. Next to this, the parallel trends assumption is required to hold to have a causal DiD estimator. This assumption states that in the absence of a treatment, the treatment and control group should experience the same change in outcome over time as otherwise the causal effect estimates are biased (Angrist & Pischke, 2008). Figure 3a-p (appendix) provides linear trends of all dependent variables in the event window used in this study for PBOs and SBOs to allow for a visual inspection of the parallel trends assumption as there is no statistical method for this assumption. The DiD method also relies on the assumption of homoscedastic variance of the error term as OLS regression assumptions apply equally to DiD. A HET test was performed to test for heteroskedasticity. The dependent operating performance variables were log transformed as heteroskedasticity was not rejected. Log transforming the dependent variables resulted in homoskedasticity of the error term.

To answer hypothesis 1 "Secondary buyouts show less operational performance improvements compared to first time buyouts", one treatment group includes companies following a PBO and the other treatment group companies following a SBO. The ATET of SBOs and PBOs is estimated by comparing the outcome to a non-buyout control group and by comparing SBOs to PBOs relative to the performance of their control group. To test hypothesis 1, the following regression is estimated in a DiD form:

$$(1) \qquad \Delta\mathrm{LN}(y_{g,t}) = \beta_0 + \beta_3 D_{g,t} + \beta_5 \Delta LN(Debt_{g,t}) + \beta_4 LN(Size_{g,t}) + \gamma_g + \lambda_t + \varepsilon_{g,t}$$

where the outcome variable $\mathrm{LN}(\Delta y_{g,t})$ reflects the natural logarithmic growth between one year prior to and the second year after the buyout in operational performance proxied as total assets, fixed assets, revenue, EBIT, EBITDA, EBIT margin, EBITDA margin and ROA. The time invariant average outcome of the operational performance indicators of either the treatment group or the control group is reflected as β_0 . Industry fixed effects are noted as γ_g and year fixed effects as λ_t. The most important effect is measured by the dummy variable $D_{g,t}$ which equals 1 when companies are in the treatment group and in the post-buyout period group and 0 otherwise. The control variables $Size$ and $\Delta Debt$ are included in the regressions as these effects are expected to influence operating performance where $Size$ is the total revenue of the target company and $\Delta Debt$ the growth in leverage from one year before the buyout to one year after. Finally, $g = 1$ is a group of firms following a buyout and g = 0 a control group of firms matched on propensity scores and $t = 1$ consists of firms in the post-buyout time period and $t = 0$ in the pre-buyout time period.

Second, to answer hypotheses 2-13 "Operational performance improvements in a SBO are realised when a buying PE firm has complementary skillsets to the selling PE firm", the ATET is estimated by comparing SBOs with PE complementary skillsets (treatment group) to a non-buyout control group and to PBOs relative to the performance of their control group. A similar regression model, as shown in equation (1), is used to answer hypotheses 2-13. In these regressions, a buyout belongs to a treatment group when the buying and selling PE firms have complementary skillsets as stated in Table 2.

4.2 Data

4.2.1 Data Collection and Summary Statistics

The regressions discussed in the prior section were estimated by using a dataset consisting of 78 SBOs and 40 PBOs executed by 78 different PE firms. This section describes the data used for the empirical tests and presents descriptive statistics for the samples divided into three subsections. The first part describes the buyout sample used in this thesis. The second part displays data on the financial performance indicators included in the study. Lastly, descriptive statistics of PE firm characteristics and skillsets are summarized.

4.2.2 Buyout Sample

As mentioned in this study, a dataset of 118 buyouts, of which 78 SBOs and 40 PBOs in the United Kingdom, was extracted from the Zephyr database from Bureau van Dijk. These buyouts took place between January 2012 and December 2017. All deals were individually checked to determine if the deal was a buyout or not as Zephyr often misreports deals as buyouts. This dataset only uses buyouts where (i) the target company has more than 5 million in revenue at the time of the buyout, (ii) the PE firm acquires a majority stake, and (iii) the acquirer and vendor were known.

Evaluating the number of buyouts in each year, Figure 2 on the next page shows a peak in 2013 following a sharp increase after 2012, which is in line with buyout activity following the financial crisis (Hurduzeu and Popescu, 2015). However, each year's number of buyouts are somewhat different between both buyout types. Most buyouts occur in 2013 and 2014 for PBOs (56%), while the number of buyouts is relatively more evenly spread across the years for SBOs. Figure 2 summarizes the number of buyouts for both buyout categories.

Figure 2: Number of buyouts between 2012 and 2017

The SIC classification system is used to determine the industry of the target companies. The buyouts in this study can be grouped into nine major industries. The majority of buyouts are active in Manufacturing (25%) and Services (42%), where these industries combined account for roughly 67% of all buyouts. Although relative quantities between industries for both PBOs and SBOs are similar, it is notable that only SBOs are active in Agriculture, Forestry and Fishing-, and Mining, and PBOs in Construction. Table 3 summarizes the SIC industries in the buyout sample. Data was collected from the Orbis database from Bureau van Dijk.

Table 3: PBO and SBO SIC Divisions

Table 3 presents an overview of the industries of the target companies involved in the PBOs and SBOs from the dataset by classifying industries based on SIC code divisions

SIC code	Industry division	PBO		SBO		Total	
		#	%	#	%	#	%
0100-0999	Agriculture, Forestry and Fishing	0	0%	2	3%	2	2%
1000-1499	Mining	0	0%	1	1%	1	1%
1500-1799	Construction	1	2%	0	0%	1	1%
2000-3999	Manufacturing	10	24%	19	25%	29	25%
4000-4999	Transportation, Communications, Electric, Gas and Sanitary service	3	7%	7	9%	10	8%
5000-5199	Wholesale Trade	1	2%	2	3%	3	3%
5200-5999	Retail Trade	7	17%	5	6%	12	10%
6000-6799	Finance, Insurance and Real Estate	3	7%	7	9%	10	8%
7000-8999	Services	16	39%	34	44%	50	42%
Total		41	100%	77	100%	118	100%

4.2.3 Operational Performance Indicators

The financial variables and operational performance indicators were obtained from the Orbis database using the Bureau van Dijk ID of each buyout target gathered from Zephyr's deal database. Before analysing the dataset, the financial variables were winsorized 1% in each tail. The descriptive statistics of pre-buyout and post-buyout financial variables used in this study are presented in Table 4 on the following page. Pre-buyout variables are reported from one year before the buyout and post-buyout variables from two years after the buyout. To test differences between PBOs and SBOs, a standard t-test is performed for means and a Wilcoxon rank-sum test for medians. This table shows significantly larger mean and median values in total assets and revenue for SBOs indicating that SBO target companies are larger in size. SBOs are also significantly larger in median values of fixed assets, EBIT, EBITDA and total liabilities (pre- and post-buyout), however mean values are not significantly different from PBOs. These findings could suggest that SBOs have different characteristics than PBOs, because PE firms involved in SBOs might invest in target companies based on specific characteristics. Although post-buyout leverage is significantly larger for SBOs, the post-buyout debt to assets ratio for mean and median values is not statistically different from PBOs which is not line line with previous literature suggesting PE firms increase leverage relatively more in SBOs to compensate for reduced operational value creation potential (Achleitner et al., 2014).

Table 4: Summary statistics of financial variables

Table 4 presents differences of the financial variables between PBOs and SBOs. Pre-buyout variables are reported from one year prior to the buyout and post-buyout values from two years after the buyout. All variables are winsorized at the 1% and 99% level. Differences between PBOs and SBOs are tested by a two-tailed t-test for means and a non-parametric Wilcoxon rank-sum test for medians. ***p < 0.01; **p < 0.05; *p < 0.10.

	PBO		**SBO**		**PBO vs SBO**	
	mean	median	mean	median	T-test (t-value)	Wilcoxon rank sum test (z-value)
Pre-buyout						
Total assets	49,957	16,827	113,726	39,497	-1.658*	-3.150***
Fixed assets	17,770	2,916	31,945	7,262	-1.249	-2.118**
Revenue	38,635	24,496	75,036	37,149	-2.370**	-1.797*
EBIT	5,079	2,132	6,935	4,179	--0.687	-2.297**
EBITDA	6,651	3,152	9,272	5,023	--0.883	-2.592***
EBIT margin	11%	10%	9%	10%	0.354	-0.202
EBITDA margin	16%	14%	14%	13%	0.566	-0.031
ROA	21%	17%	17%	15%	1.548	1.569
Total liabilities	33,569	13,360	78,258	19,264	-1.347	-2.166**
Debt to assets ratio	70%	65%	59%	57%	1.608	1.580
Post-buyout						
Total liabilities	52,477	16,333	103,564	29,612	-1.412	-2.951***
Debt to assets ratio	62%	56%	62%	58%	0.058	0.148

Table 5 on the next page presents an overview of mean and median compound annualised growth rates of the financial variables and operating performance indicators between one year prior to the buyout and the second year after the buyout for SBOs and PBOs. To test the differences in growth between PBOs and SBOs, a standard t-test is performed for means and a Wilcoxon rank-sum test for medians. As shown in Table 5, most growth financial variables show no statistical differences between PBOs and SBOs. Research suggested that SBOs use relatively more leverage to increase operational value creation, however the growth in total liabilities and debt to assets ratio is not statistically different between PBOs and SBO. This table, however, reports significantly more growth in EBIT margin, EBITDA margin and ROA for SBOs. These results contradict previous literature which state an underperformance of SBOs

because there is less operational value creation potential left after the first buyout (Sousa, 2010; Wang, 2012).

Table 5: Summary statistics growth in financial variables

Table 5 presents differences of the financial variables between PBOs and SBOs for the median and mean compound annualised growth rates between one year before the buyout and the second year after the buyout. All variables are winsorized at the 1% and 99% level. Differences between PBOs and SBOs are tested by a two-tailed t-test for means and a non-parametric Wilcoxon rank-sum test for medians. ***p < 0.01; **p < 0.05; *p < 0.10.

	PBO		SBO		PBO vs SBO	
	mean	median	mean	median	T-test (t-value)	Wilcoxon rank sum test (z-value)
Total assets growth	26.4%	17.8%	22.5%	15.2%	0.759	0.890
Fixed assets growth	50.9%	21.5%	47.5%	12.9%	0.216	0.475
Revenue growth	15.1%	9.4%	18.3%	12.4%	-0.663	-0.688
EBIT growth	-37.7%	2.6%	2.9%	8.9%	-0.832	-1.626
EBITDA growth	19.6%	6.3%	-15.8%	8.0%	1.601	0.063
EBIT margin growth	-3.5%	-0.9%	0.2%	-0.1%	-2.492**	-2.104**
EBITDA margin growth	-3.1%	-0.6%	0.2%	0.0%	-2.484**	-1.836**
ROA growth	-4.0%	-2.7%	-1.5%	-0.5%	-2.249**	-2.109**
Total liabilities growth	21.3%	14.3%	25.1%	12.9%	-0.620	-0.455
Debt to assets ratio growth	-0.6%	-1.7%	5.0%	1.5%	-1.317	-1.410

4.2.4 PE Firm Characteristics and Skillsets

Data was collected about the PE firms and their funds that engaged in the buyouts from the Orbis database, Private Equity International (PEI), and their firm websites. By using this data, the PE firms' skillsets could be determined as described in section 4.2.2. A unique dataset was developed as all the information was manually obtained to find the PE firms' skillsets and compared these skillsets between acquiring and selling PE firms to identify complementary skillsets.

This datataset contains a total of 78 different PE firms as either a buyer or a seller in the 118 PBOs and SBOs. A majority of these PE firms were located in the UK, however several other PE firms have its originations in other countries as The United States, France, and the

Netherlands. The average PE fund size was £3,770 million. In Table 6 below, a summary of the distribution of skillset proxies across the 78 PE firms is shown.

Table 6: Overview skillset measurements and number of PE firms

Fund size is in million pounds and other currencies were converted to British Pounds (£) with the exchange rates of the 24th of March 2021. Target size is in million British Pounds (£) and only PE firms involved in a SBO are included for skillsets based on operational involvement, educational background and professional experience. PE firms listed in the PEI300 ranking from June 2020 are stated as a high fundraising rank and if not listed in the PEI300 as a low fundraising rank.

Skillset	Measurement	Number of PE firms
International expansion	Regional	33
	Global	45
Experience and performance	*PE fund size*[1]	
	<500	35
	500-1,999	15
	2000-9,999	22
	>10,000	6
	PE firm recent fundraising rank	
	Listed in PEI300	47
	Not listed in PEI300	31
(investment) strategy	*Industry specialisation*	
	Industry-specialised	36
	Diversified	42
	Business stage specialisation (target size)[2]	
	<25	10
	25-500	48
	>500	20
	Operational involvement[3]	
	Operational-specialised	29
	Non-operational-specialised	89
Educational background[3]	Financial background	56
	Non-financial background	66
Professional experience[3]	Financial experience	75
	Operational experience	32

In Table 7 below, the distribution of the PE firms from the dataset across skillset measurements is presented. This table divides PE firms between PBOs and SBOs, and SBOs between acquiring and selling PE firms. When looking at Table 7, multiple differences between PBOs and SBO acquirers are noted. One of these differences between PBOs and acquiring SBOs is the difference in skillset related to international expansion as 61% of PBOs are regional-oriented PE firm and 39% global oriented. In comparison, SBO acquirers are 36% regional-oriented and 64% oriented. When it comes to a PE's fund size, acquiring PBOs tend to have a smaller fund size as roughly two-thirds have a fund size smaller than £500 million while SBOs report just roughly one-third with a fund size smaller than £500 million.

Table 7: PE firm skillset comparison between PBOs, SBO acquirors and SBO vendors

Table 7 differentiates acquiring and selling PE firms where PBO and SBO acquiror PE firms acquire target companies and SBO vendor PE firms sell target companies. Fund size is in million pounds and other currencies were converted to British Pounds (£) with the exchange rates of the 24th of March 2021. Target size is in million British Pounds (£) and only PE firms involved in a SBO are included for skillsets based on operational involvement, educational background and professional experience. PE firms listed in the PEI300 ranking from June 2020 are stated as a high fundraising rank and if not listed in the PEI300 as a low fundraising rank.

Skillset	Measurement	PBO	SBO acquiror	SBO vendor
International expansion	Regional	61%	36%	49%
	Global	39%	64%	51%
Experience and performance	*PE firm size*			
	<500	61%	31%	8%
	500-1,999	15%	27%	31%
	2000-9,999	20%	35%	32%
	>10,000	5%	6%	29%
	PE firm recent fundraising rank			
	Listed in PEI300	80%	49%	62%
	Not listed in PEI300	20%	51%	38%
(investment) strategy	*Industry specialisation*			
	Industry-specialised strategy	66%	51%	45%
	Diversified strategy	34%	49%	55%

Skillset	Measurement	PBO	SBO acquiror	SBO vendor
	Business stage specialisation (target size)			
	<25	20%	5%	8%
	25-500	66%	61%	84%
	>500	15%	34%	8%
	Operational involvement[3]			
	Operational-specialised	na	70%	46%
	Non-operational-specialised	na	30%	54%
Educational background[3]	Financial background	na	37%	47%
	Non-financial background	na	63%	53%
Professional experience	Financial experience	na	75%	83%
	Operational experience	na	25%	17%

5. Results and Discussion

Following the data and methodology discussed in the previous sections, the buyouts were analysed to examine whether complementary skillsets between the selling and buying PE firms could impact operating performance in SBOs. This section is split into two subsections, each going into one of the two different groups of regressions as discussed in the previous sections. The first section will analyse the difference in operational performance improvement between PBOs and SBOs by comparing both PBOs and SBOs to their unique control group and comparing the ATET of SBOs to the ATET of PBOs. Section 5.2 will examine whether SBOs, in which the acquiring PE firm has complementary skillsets, perform differently than non-buyout companies and PBOs. This section analyses operational value creation by comparing the operational performance of SBOs with complementary skillsets to non-buyout companies and comparing the ATET of SBOs with complementary skillsets to the ATET of PBOs

5.1 Operational performance improvements in PBOs versus SBOs

At first, a group of regressions was used to estimate both the effect of PBOs and SBOs compared to their unique control group on operational performance to test if PBOs and SBOs improve operational performance based on the selected operational performance indicators. Table 8 presents the results of these regressions and the estimated coefficients for the operating performance variables.

Hypothesis 1 states that the operational performance improvement following a buyout should be more pronounced in PBOs relative to SBOs. However, Table 8 shows a worse performance for PBOs compared to their control group than SBOs to their control group. For PBOs, growth in EBIT, EBIT margin and EBITDA margin are significantly negative compared to a control group based on propensity score matching where *Size* has a significant positive impact on EBIT margin and EBITDA margin. SBOs, on the other hand, only show a significant underperformance compared to a control group based on ROA. These results somewhat contradict hypothesis 1 as previous literature expected PBOs to perform better than SBOs.

The second group of regressions was estimated to provide a comprehensive answer to hypothesis 1. These regressions compare the ATET of SBOs directly to the ATET of PBOs. Table 9 provides a complete overview of this set of regressions and the estimated coefficients for the operational performance indicators. This table reports negative growth values for SBO compared to PBOs in total assets, fixed assets, revenue, EBIT and EBITDA and positive growth values in EBIT margin, EBITDA margin and ROTA. These results show a mixed performance of SBOs compared to PBOs, however all values are insignificant. Therefore, no conclusive evidence on hypothesis 1 can be drawn on whether PBOs create more operational value than SBOs.

Table 8: Difference-in-differences regressions on operational performance measurements for PBOs and SBOs

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO or SBO firm, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
PBO	-0.615	-0.004	-0.104	-0.0673*	-0.015	-1.926*	-1.886*	-0.036
	(0.628)	(0.635)	(0.757)	(0.028)	(0.036)	(0.738)	(0.723)	(0.665)
ΔLN(Leverage)	0.022	-0.064	-0.122	-0.001	0.003	-0.150	-0.146	-0.037
	(0.204)	(0.206)	(0.246)	(0.009)	(0.012)	(0.239)	(0.235)	(0.216)
LN(Size)	0.381	0.670*	-0.249	0.014	0.003	0.793*	0.798*	-0.226
	(0.303)	(0.307)	(0.365)	(0.014)	(0.018)	(0.356)	(0.349)	(0.321)
constant	-3.777	-6.650*	1.813	3.123***	2.859***	-7.816*	-7.951*	1.435
	(2.900)	(2.931)	(3.493)	(0.130)	(0.167)	(3.407)	(3.337)	(3.069)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	80	80	80	80	80	80	80	80
R-squared	0.164	0.229	0.161	0.266	0.132	0.220	0.222	0.171
SBO	0.260	0.353	0.462	-0.117	-0.045	-0.000	-0.386	-0.0780*
	(0.334)	(0.358)	(0.329)	(0.111)	(0.023)	(0.002)	(0.420)	(0.039)
ΔLN(Leverage)	0.154	0.115	0.016	-0.024	0.000	-0.000	-0.053	-0.024
	(0.111)	(0.119)	(0.109)	(0.037)	(0.008)	(0.001)	(0.139)	(0.013)
LN(Size)	-0.123	0.037	-0.391***	-0.002	0.011	0.000	0.475***	-0.012
	(0.112)	(0.121)	(0.111)	(0.037)	(0.008)	(0.001)	(0.141)	(0.013)
constant	0.930	-0.436	3.548**	3.250***	3.401***	2.848***	-5.376***	-0.157
	(1.113)	(1.193)	(1.094)	(0.369)	(0.077)	(0.007)	(1.397)	(0.131)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	156	156	156	156	156	156	156	156
R-squared	0.077	0.067	0.122	0.052	0.104	0.065	0.134	0.151

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Table 9: Difference-in-difference regressions on operational performance improvements for SBOs versus PBOs

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO or SBO firm, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
SBO	-0.247	-0.010	-0.803	-0.214	-0.858	0.420	0.877	0.699
	(0.494)	(0.025)	(0.414)	(0.436)	(0.559)	(0.427)	(0.505)	(0.528)
ΔLN(Leverage)	-0.007	0.004	-0.041	-0.069	0.003	-0.044	-0.150	-0.069
	(0.117)	(0.006)	(0.098)	(0.104)	(0.133)	(0.102)	(0.120)	(0.125)
LN(Size)	0.218	0.006	0.049	-0.087	0.370	0.250	0.277	0.278
	(0.192)	(0.010)	(0.161)	(0.169)	(0.217)	(0.166)	(0.196)	(0.205)
constant	-2.015	3.564***	3.275	3.992*	-0.924	-2.191	-3.580	-4.224
	(1.996)	(0.101)	(1.670)	(1.760)	(2.257)	(1.727)	(2.040)	(2.132)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	116	116	116	116	116	116	116	116
R-squared	0.087	0.108	0.136	0.067	0.118	0.106	0.111	0.187

5.2 Impact of complementary skillsets on operational performance improvements in SBOs

The third and fourth group of regressions were estimated to test if complementary skillsets between a buying and selling PE firm affect the target company's operational performance. First, a group of regressions was used to estimate both the ATET of SBOs where the buying PE firm has complementary skillsets to a non-buyout control group for the chosen operational performance variables. Second, the fourth group of regressions was estimated to test if the ATET of SBOs where the acquiring PE firm has complementary skillsets performs better than PBOs. Table 10-13 present the results of the regressions related to complementary skillsets and the estimated coefficients for the operational performance indicators.

Hypothesis 3. This study finds no conclusive evidence for hypothesis 3, which states that complementary skillsets related to international expansion between buying and selling PE firms improve the target company's operational performance. Table 10 shows that, SBOs with complementary skillsets related to international expansion show a growth increase in total assets, revenue and EBIT compared to a non-buyout control group and negative values for the other performance indicators. When compared to PBOs, SBOs with complementary skillsets related to international expansion show, on average, higher growth in total assets, EBITDA, EBIT margin, EBITDA margin and ROA and lower growth in fixed assets, revenue and EBIT. However, all reported coefficients are insignificant. This contradicts the findings of Degeorge et al. (2016) describing an overperformance SBOs complementary skillsets related to international expansion improve operational performance, therefore rejecting hypothesis 3.

Hypotheses 4a-b. Different results arise from the regressions for SBOs with complementary skillsets related to the proxies for experience and performance. When looking at Table 11, SBOs with complementary skillsets based on fund size show a significant higher growth in revenue where *Size* has a significant negative impact on revenue. However, when comparing these SBOs to PBOs, a significant negative coefficient is found for the growth in EBITDA where *Size* also has a significant positive impact on EBITDA. These results show that SBOs can improve operational performance compared to non-buyout companies in terms of growth in revenue, but underperform in terms of EBITDA growth compared to PBOs. As coefficients for the other performance variables show insignificant results, no complete conclusive evidence can be drawn on whether SBOs with complementary skillsets related to a PE firm's fund size increase operating performance, which results in a rejection of hypothesis 4a.

Next, hypothesis 4b is evaluated where a higher PE firm's fundraising rank is considered as a complementary skillset related to performance. When a PE firm with a higher fundraising rank acquires a target company from a PE firm with a lower fundraising rank, a significant positive growth in fixed assets compared to a non-buyout group is reported in Table 11. When SBOs with this type of skillset is compared to PBOs, no significant results are found. This finding leads to a rejection of hypothesis 4b as SBOs with complementary skillsets based on fundraising rank do not show a significant operational overperformance compared to PBOs. As hypotheses 4a-b are rejected, this thesis concludes no evidence on whether SBOs with complementary skillsets related to experience and performance create a superior operational performance.

Hypotheses 5a-c. This study finds mixed results of hypothesis 5a-c, stating that SBOs with complementary skillsets related to a PE firm's (investment) strategy improve the target firm's operational performance. When analysing SBOs where the acquiring PE firm is industry specialised, a proxy for (investment) strategy, the coefficients for the growth in fixed assets and revenue are significantly positive compared to a non-buyout control group. The coefficient for EBIT is also significantly positive when these SBOs are compared to PBOs. These results indicate that these SBOs can improve operational performance compared to non-buyout companies in terms of investments and size while operational performance can be improved through profitability compared to PBOs. These findings are in line with Cressy et al. (2007) showing that industry-specialised PE investors tend to have higher profitability after the buyout took place compared to non-specialised investors. As the other operating performance indicators show no significant results compared to PBOs, no conclusive evidence can be provided that SBOs with complementary skillsets related to industry specialisation increase all operating performance indicators. This finding leads to a rejection of hypothesis 5a.

The coefficients in Table 12 show different results for hypothesis 5b stating SBOs with complementary skillsets based on business stage specialisation, another proxy for a PE firm's strategy, improve operational performance. Compared to non-buyout companies, a significant positive sign is found for growth in fixed assets and revenue and a significant negative sign for EBITDA where *Size* affects growth in revenue negatively and EBITDA positively. These results indicate that SBOs can improve operating performance through size but decrease performance in terms of profitability. However, PE firms with complementary skillsets based on business stage significantly underperform PBOs in terms of growth in revenue and EBITDA while *Size* impacts EBITDA significantly positively. On the other hand, ROA shows a

significant positive sign. These results lead to a rejection of hypothesis 5b as the coefficients of operating performance variables differ in sign.

Finally, operational involvement, the last proxy for complementary skillsets related to a PE firm's investment strategy is tested. Hypothesis 5c states that SBOs with complementary skillsets related to operational involvement improve operating performance in the target company. Table 12 reports a significant increase in total assets growth for these SBOs compared to non-buyout companies while a significant negative coefficient is shows for a growth in EBITDA compared to PBOs. These results indicate that SBOs with these skillsets can improve operating performance through size more than non-buyout companies and underperform to PBOs in terms of profitability which is not in line with Acharya et al. (2013). As SBOs with complementary skillsets related to operational involvement do not outperform both non-buyout companies and PBOs, hypothesis 5c is rejected. By also rejecting hypothesis 5c, this thesis does not find evidence for superior operational performance improvements for SBOs with complementary skillsets related to a PE firm's (investment) strategy.

Hypotheses 6a-b. Mixed results for SBO value creation trhough complementary skillsets related to educational background are shown in Table 13, therefore rejecting hypothesis 6a and 6b. In this table, coefficients for this complementary skillset are significantly positive in terms of revenue growth when compared to non-buyout companies and significantly negative for a growth in fixed assets relative to PBOs. This reflects an overperformance of these SBOs in terms of size to non-buyout companies and an underperformance in investments to PBOs which is in line with Degeorge et al (2016).

Hypotheses 7a-b. Table 13 also provides mixed results for SBOs with complementary skillsets based on professional experience. On average, coefficients are positive for a growth in total assets, fixed assets, revenue, EBIT and EBITDA margin relative to non-buyout companies reflecting an overperformance of these SBOs. These results are, however, insignificant. Relative to PBOs, insignificant negative coefficients are found for total assets, fixed assets, revenue, EBIT margin and EBITDA margin, and positive coefficients for EBIT, EBITDA and ROA, showing mixed results regarding operating performance. Following the insignificant findings in Table 13, hypotheses 7a-7b are rejected stating SBOs with complementary skillsets related to professional experience create superior operating performance improvements contradicting findings by Degeorge et al. (2016).

To conclude, this thesis rejects hypothesis 2 as hypotheses 3-7 are rejected, resulting in no evidence on whether SBOs with complementary skillsets create superior operational performance improvements. This finding leaves the question open on why PE firms participate in SBOs. Wang (2012) might explain why PE firms participate in the SBO market, showing that the capital market conditions are the potential drivers of SBOs. These drivers were shown to have a significant impact on SBO activity. The possibility to create value for the PE firm by adding more debt to the target firm after the acquisition might explain the impact of the debt market conditions. Therefore, the operational performance of the target company might be not as important as increasing leverage caused by market conditions, which could mainly drive investment returns.

Table 10: Operational performance improvements for SBOs with complementary skillsets related to international expansion

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO firm and SBO firm with complementary skillsets related to international expansion, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). The complementary skillset independent variable is described in Table 2. Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
International expansion	0.562	-0.389	0.075	0.034	-0.043	-1.350	-1.335	-0.099
	(1.210)	(1.469)	(0.205)	(0.066)	(0.043)	(1.241)	(1.217)	(0.096)
ΔLN(Leverage)	0.242	1.281	-0.168	-0.015	-0.010	0.723	0.713	-0.070
	(0.976)	(1.184)	(0.165)	(0.054)	(0.035)	(1.000)	(0.981)	(0.078)
LN(Size)	-0.329	0.016	-0.126	-0.004	0.017	0.979*	0.964*	-0.016
	(0.363)	(0.440)	(0.062)	(0.020)	(0.013)	(0.372)	(0.365)	(0.029)
constant	2.227	-0.412	1.187	3.293***	2.691***	-10.05**	-9.970**	-0.112
	(3.458)	(4.198)	(0.586)	(0.190)	(0.123)	(3.545)	(3.476)	(0.275)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40	40	40	40	40	40	40	40
R-squared	0.215	0.130	0.312	0.102	0.210	0.376	0.376	0.421
PBO control group								
International expansion	0.417	-0.040	-1.091	-0.002	0.061	0.226	0.933	0.910
	(0.900)	(0.029)	(0.600)	(0.075)	(0.108)	(0.854)	(0.802)	(0.787)
ΔLN(Leverage)	0.019	0.000	0.050	-0.007	-0.003	0.092	-0.047	-0.179
	(0.233)	(0.008)	(0.156)	(0.020)	(0.028)	(0.221)	(0.208)	(0.204)
LN(Size)	0.211	-0.001	-0.121	0.019	0.0873*	0.430	0.703*	0.233
	(0.355)	(0.011)	(0.236)	(0.030)	(0.043)	(0.336)	(0.316)	(0.310)
constant	-2.199	3.633***	4.892*	2.997***	1.885***	-4.056	-7.816*	-3.793
	(3.640)	(0.117)	(2.427)	(0.303)	(0.436)	(3.453)	(3.242)	(3.181)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	59	59	59	59	59	59	59	59
R-squared	0.169	0.379	0.241	0.187	0.270	0.226	0.283	0.407

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Table 11: Operational performance improvements for SBOs with complementary skillsets related to experience and performance

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO firm and SBO firm with complementary skillsets related to experience and performance, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). The complementary skillset independent variables is described in Table 2. Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
PE fund size	0.254	0.328	0.819*	0.012	-0.725	-0.355	-0.327	-0.026
	(0.545)	(0.584)	(0.395)	(0.046)	(0.529)	(0.389)	(0.380)	(0.050)
ΔLN(Leverage)	0.039	0.440	-0.030	0.033	0.602	-0.136	-0.130	-0.117**
	(0.407)	(0.436)	(0.295)	(0.034)	(0.395)	(0.290)	(0.284)	(0.038)
LN(Size)	-0.146	0.082	-0.384*	0.027	0.484*	0.035	0.023	-0.027
	(0.208)	(0.223)	(0.151)	(0.017)	(0.202)	(0.148)	(0.145)	(0.019)
constant	1.103	-1.022	3.376*	2.952***	-2.180	-0.642	-0.615	-0.040
	(2.091)	(2.242)	(1.516)	(0.175)	(2.030)	(1.492)	(1.459)	(0.194)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	92	92	92	92	92	92	92	92
R-squared	0.102	0.087	0.201	0.151	0.246	0.073	0.068	0.223
PBO control group								
PE fund size	-0.035	-0.015	0.007	0.029	-1.242*	0.123	0.775	1.109
	(0.831)	(0.029)	(0.012)	(0.057)	(0.480)	(0.560)	(0.524)	(0.574)
ΔLN(Leverage)	0.025	-0.000	-0.002	0.008	0.158	0.009	-0.038	-0.054
	(0.243)	(0.008)	(0.003)	(0.017)	(0.141)	(0.164)	(0.153)	(0.168)
LN(Size)	0.099	0.009	-0.001	0.025	0.646**	0.363	0.366	0.165
	(0.331)	(0.011)	(0.005)	(0.023)	(0.192)	(0.223)	(0.209)	(0.229)
constant	-1.110	3.540***	3.533***	2.943***	-3.546	-3.260	-4.322*	-3.146
	(3.416)	(0.117)	(0.049)	(0.233)	(1.975)	(2.303)	(2.153)	(2.359)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	85	85	85	85	85	85	85	85
R-squared	0.076	0.178	0.136	0.191	0.333	0.180	0.248	0.232

Continued	**ΔLN(TA)**	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
PE firm fundraising rank	-0.116	0.499*	0.370	-0.109	-1.517	0.099	0.107	-0.029
	(0.242)	(0.226)	(0.185)	(0.076)	(0.918)	(0.069)	(0.070)	(0.097)
ΔLN(Leverage)	0.527*	0.047	0.274	0.020	0.490	-0.074	-0.066	-0.061
	(0.244)	(0.229)	(0.187)	(0.076)	(0.928)	(0.070)	(0.071)	(0.098)
LN(Size)	0.205*	0.144	-0.133	0.057	0.862*	-0.0572*	-0.0556*	-0.006
	(0.089)	(0.083)	(0.068)	(0.028)	(0.336)	(0.025)	(0.026)	(0.036)
constant	-1.891*	-1.358	1.288	2.739***	-5.429	0.256	0.156	-0.255
	(0.863)	(0.808)	(0.660)	(0.270)	(3.280)	(0.247)	(0.251)	(0.346)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	34	34	34	34	34	34	34	34
R-squared	0.517	0.641	0.477	0.246	0.373	0.298	0.313	0.254
PBO control group								
PE firm fundraising rank	-0.311	-0.044	0.013	-0.032	-0.546	0.206	0.819	1.593
	(0.676)	(0.032)	(0.018)	(0.080)	(0.334)	(0.380)	(0.889)	(0.933)
ΔLN(Leverage)	-0.044	-0.001	-0.002	-0.005	0.017	0.010	0.019	-0.107
	(0.159)	(0.007)	(0.004)	(0.019)	(0.079)	(0.089)	(0.209)	(0.219)
LN(Size)	0.137	0.001	-0.003	0.037	0.446***	0.142	0.470	0.259
	(0.244)	(0.012)	(0.007)	(0.029)	(0.121)	(0.137)	(0.321)	(0.336)
constant	-1.188	3.629***	3.546***	2.798***	-1.744	-0.746	-5.352	-4.231
	(2.514)	(0.119)	(0.068)	(0.297)	(1.244)	(1.413)	(3.309)	(3.470)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	54	54	54	54	54	54	54	54
R-squared	0.282	0.356	0.135	0.232	0.361	0.347	0.316	0.357

Table 12: Operational performance improvements for SBOs with complementary skillsets related to (investment) strategy

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO firm and SBO firm with complementary skillsets related to (investment) strategy, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). The complementary skillset independent variables is described in Table 2. Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
Industry specialisation	0.063	0.666*	0.579**	0.010	-1.233	0.109	0.135	0.077
	(0.223)	(0.262)	(0.173)	(0.045)	(1.325)	(0.092)	(0.102)	(0.106)
ΔLN(Leverage)	0.609	0.221	0.242	0.120	2.412	-0.019	-0.025	-0.000
	(0.280)	(0.330)	(0.217)	(0.057)	(1.667)	(0.116)	(0.129)	(0.134)
LN(Size)	-0.028	-0.002	-0.197	-0.030	-0.745	-0.097	-0.101	-0.093
	(0.132)	(0.156)	(0.102)	(0.027)	(0.786)	(0.055)	(0.061)	(0.063)
constant	0.353	0.279	1.757	3.558***	10.840	0.643	0.580	0.595
	(1.360)	(1.602)	(1.054)	(0.275)	(8.084)	(0.562)	(0.624)	(0.649)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	24	24	24	24	24	24	24	24
R-squared	0.724	0.622	0.724	0.592	0.458	0.516	0.533	0.356
PBO control group								
Industry specialisation	0.149	-0.045	0.011	0.155*	-0.569	0.114	0.635	1.211
	(0.715)	(0.041)	(0.021)	(0.065)	(0.423)	(0.472)	(1.051)	(1.404)
ΔLN(Leverage)	0.024	0.001	-0.002	-0.008	0.061	-0.027	-0.138	-0.184
	(0.147)	(0.008)	(0.004)	(0.013)	(0.087)	(0.097)	(0.216)	(0.289)
LN(Size)	0.167	-0.005	0.013	-0.000	0.178	0.522*	1.608**	0.940
	(0.372)	(0.021)	(0.011)	(0.034)	(0.220)	(0.245)	(0.546)	(0.730)
constant	-1.460	3.692***	3.385***	3.170***	0.998	-4.637	-17.02**	-11.340
	(3.806)	(0.217)	(0.113)	(0.346)	(2.251)	(2.511)	(5.591)	(7.475)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	50	50	50	50	50	50	50	50
R-squared	0.181	0.356	0.125	0.337	0.309	0.314	0.350	0.328
Continued	**ΔLN(TA)**	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**

Non-buyout control group								
Business stage specialisation	0.354	0.869*	0.442**	-0.074	-1.599*	0.117	0.126	-0.016
	(0.195)	(0.320)	(0.156)	(0.040)	(0.596)	(0.572)	(0.555)	(0.050)
ΔLN(Leverage)	0.373*	0.419	0.088	0.042	0.613	0.394	0.390	-0.032
	(0.140)	(0.229)	(0.112)	(0.029)	(0.427)	(0.410)	(0.398)	(0.036)
LN(Size)	-0.048	0.144	-0.169**	0.0560**	0.891***	0.463*	0.452*	-0.007
	(0.077)	(0.127)	(0.062)	(0.016)	(0.236)	(0.227)	(0.220)	(0.020)
constant	0.505	-1.357	1.778**	2.701***	-5.756*	-5.469*	-5.424*	-0.243
	(0.753)	(1.237)	(0.601)	(0.154)	(2.303)	(2.209)	(2.146)	(0.192)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	48	48	48	48	48	48	48	48
R-squared	0.413	0.469	0.594	0.447	0.436	0.588	0.592	0.193
PBO control group								
Business stage specialisation	-0.178	0.073	-1.355*	0.040	-1.406*	0.565	0.767	1.983*
	(0.685)	(0.047)	(0.580)	(0.056)	(0.542)	(0.591)	(0.796)	(0.861)
ΔLN(Leverage)	0.031	0.000	-0.092	-0.002	0.120	-0.010	-0.040	-0.124
	(0.159)	(0.011)	(0.135)	(0.013)	(0.126)	(0.137)	(0.185)	(0.200)
LN(Size)	-0.093	-0.009	0.412	0.039	0.971***	0.502*	0.708*	0.291
	(0.267)	(0.018)	(0.226)	(0.022)	(0.211)	(0.230)	(0.310)	(0.335)
constant	1.250	3.707***	-0.552	2.781***	-6.971**	-4.715	-7.855*	-4.718
	(2.746)	(0.187)	(2.326)	(0.225)	(2.175)	(2.370)	(3.192)	(3.450)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	59	59	59	59	59	59	59	59
R-squared	0.122	0.209	0.329	0.216	0.417	0.315	0.332	0.329

Continued	**ΔLN(TA)**	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
Operational involvement	-0.032	0.374	1.260*	-0.299	-0.935	0.051	0.104	0.046
	(0.144)	(0.225)	(0.618)	(0.201)	(0.535)	(0.062)	(0.056)	(0.045)
ΔLN(Leverage)	0.662***	0.063	0.183	0.014	0.207	-0.031	-0.041	-0.033
	(0.133)	(0.208)	(0.571)	(0.186)	(0.495)	(0.057)	(0.052)	(0.042)
LN(Size)	0.048	0.222*	-0.542*	0.114	0.601**	-0.012	-0.030	-0.026
	(0.056)	(0.088)	(0.242)	(0.079)	(0.209)	(0.024)	(0.022)	(0.018)
constant	-0.512	-2.194*	4.709	2.098*	-3.187	-0.186	-0.131	-0.063
	(0.575)	(0.897)	(2.465)	(0.801)	(2.134)	(0.246)	(0.222)	(0.180)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	58	58	58	58	58	58	58	58
R-squared	0.592	0.372	0.306	0.305	0.251	0.154	0.202	0.208
PBO control group								
Operational involvement	0.020	-0.038	0.016	-0.671	-1.229**	0.281	0.839	1.419
	(1.048)	(0.028)	(0.016)	(0.509)	(0.459)	(0.529)	(0.723)	(0.753)
ΔLN(Leverage)	-0.045	0.002	-0.002	0.095	0.040	-0.069	-0.126	-0.071
	(0.273)	(0.007)	(0.004)	(0.133)	(0.120)	(0.138)	(0.189)	(0.196)
LN(Size)	-0.266	-0.008	-0.007	-0.255	1.112***	0.422	0.662	0.334
	(0.492)	(0.013)	(0.007)	(0.239)	(0.215)	(0.248)	(0.339)	(0.354)
constant	2.418	3.722***	3.587***	5.913*	-8.462***	-3.814	-7.431*	-4.971
	(5.067)	(0.136)	(0.076)	(2.460)	(2.218)	(2.559)	(3.496)	(3.642)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66	66	66	66
R-squared	0.189	0.344	0.086	0.230	0.413	0.225	0.224	0.279

Table 13: Operational performance improvements for SBOs with complementary skillsets based on educational background and professional experience

This table reports the results of the DiD regressions on changes between one year before the buyout of two years after the buyout for the operating performance variables outlined in section 4.2.1. First, for each PBO firm and SBO firm with complementary skillsets related to educational background and professional experience, control companies are matched by industry in the same year prior to the buyout. Companies with the exact 4-digit SIC code of the buyout firms in a similar period are used as control companies. If no control companies with the same 4-digit SIC code exist, then buyout companies are matched to 3-digit SIC code control companies. Similarly, if no 3-digit SIC companies exist, then 2-digit companies are used as control companies. Finally, if there are no 2-digit SIC code companies then companies are matched by SIC division. Control companies are matched through nearest neighbour matching where the control company with the closest propensity score to the buyout company is considered. The dependent variables are total assets (TA), fixed assets (FA), revenue (REV), EBIT, EBITDA, EBIT margin, EBITDA margin and EBIT to total assets (ROA). The complementary skillset independent variables is described in Table 2. Standard errors are in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10

	ΔLN(TA)	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
Educational background	0.184	0.315	1.527*	-0.068	-1.356	-0.338	-0.264	-0.093
	(0.206)	(0.242)	(0.636)	(0.040)	(0.818)	(0.536)	(0.532)	(0.074)
ΔLN(Leverage)	0.169**	0.012	0.164	0.002	0.040	0.023	0.026	-0.020
	(0.054)	(0.063)	(0.167)	(0.011)	(0.215)	(0.141)	(0.140)	(0.019)
LN(Size)	-0.147*	0.068	-0.825***	0.022	0.284	0.891***	0.839***	-0.006
	(0.070)	(0.082)	(0.214)	(0.014)	(0.276)	(0.181)	(0.179)	(0.025)
constant	1.283	-0.654	7.121**	3.053***	0.262	-9.077***	-8.707***	-0.196
	(0.658)	(0.771)	(2.029)	(0.128)	(2.608)	(1.710)	(1.697)	(0.236)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	54	54	54	54	54	54	54	54
R-squared	0.531	0.246	0.398	0.329	0.244	0.505	0.486	0.182
PBO control group								
Educational background	-0.337	-0.0492*	-0.661	0.026	-1.114	0.498	0.923	0.606
	(1.096)	(0.024)	(0.531)	(0.049)	(0.644)	(0.510)	(0.690)	(0.891)
ΔLN(Leverage)	-0.052	0.002	0.019	-0.011	0.021	-0.034	-0.077	-0.242
	(0.232)	(0.005)	(0.112)	(0.010)	(0.136)	(0.108)	(0.146)	(0.188)
LN(Size)	0.095	0.001	-0.282	0.0537*	0.857**	0.341	0.738*	0.581
	(0.519)	(0.012)	(0.251)	(0.023)	(0.305)	(0.241)	(0.327)	(0.421)
constant	-1.211	3.632***	6.429*	2.622***	-5.930	-2.992	-8.134*	-7.514
	(5.320)	(0.118)	(2.580)	(0.237)	(3.126)	(2.475)	(3.351)	(4.323)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	63	63	63	63	63	63	63	63
R-squared	0.080	0.354	0.180	0.250	0.325	0.258	0.270	0.296

Continued	**ΔLN(TA)**	**ΔLN(FA)**	**ΔLN(REV)**	**ΔLN(EBIT)**	**ΔLN(EBITDA)**	**ΔLN(EBIT margin)**	**ΔLN(EBITDA margin)**	**ΔLN(ROA)**
Non-buyout control group								
Professional experience	0.026	1.083	1.361	0.060	0.007	-1.439	-1.333	-0.183
	(1.180)	(0.974)	(0.710)	(0.055)	(0.041)	(1.210)	(1.197)	(0.109)
ΔLN(Leverage)	1.241	1.020	-0.633	-0.012	0.013	1.663	1.613	0.026
	(1.319)	(1.088)	(0.793)	(0.061)	(0.046)	(1.352)	(1.337)	(0.122)
LN(Size)	-0.227	-0.368	-0.524**	-0.011	0.001	0.838*	0.799*	-0.008
	(0.309)	(0.255)	(0.186)	(0.014)	(0.011)	(0.317)	(0.314)	(0.029)
constant	1.763	3.093	4.248*	3.348***	2.852***	-8.512**	-8.261*	-0.180
	(2.986)	(2.464)	(1.795)	(0.139)	(0.104)	(3.061)	(3.028)	(0.276)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40	40	40	40	40	40	40	40
R-squared	0.155	0.213	0.407	0.125	0.097	0.328	0.314	0.375
PBO control group								
Professional experience	-0.284	-0.055	-1.207	0.110	0.008	-0.540	-0.073	0.330
	(1.165)	(0.035)	(0.662)	(0.067)	(0.115)	(0.920)	(0.808)	(1.086)
ΔLN(Leverage)	0.043	0.001	0.040	-0.016	-0.000	0.096	-0.009	-0.139
	(0.278)	(0.008)	(0.158)	(0.016)	(0.027)	(0.219)	(0.193)	(0.259)
LN(Size)	0.360	-0.000	-0.085	0.013	0.060	0.326	0.641*	0.298
	(0.439)	(0.013)	(0.250)	(0.025)	(0.043)	(0.347)	(0.305)	(0.409)
constant	-3.769	3.636***	4.544	3.037***	2.193***	-2.756	-6.864*	-4.569
	(4.496)	(0.134)	(2.555)	(0.257)	(0.444)	(3.550)	(3.117)	(4.190)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	57	57	57	57	57	57	57	57
R-squared	0.171	0.255	0.220	0.188	0.280	0.238	0.384	0.355

6. Limitations and Suggestions for Further Research

The following section is devoted to discussing the limitations of this thesis, which could pose a threat to the results' internal and external validity and provide suggestions for further research. Firstly, the validity of the data will be critically reviewed, after which the methodological limitations will be discussed.

6.1 Data Validity

An important limitation of this paper is the tested joint hypothesis by comparing PBOs and SBOs. As shown in section 4.2.3, the PBOs and SBOs in this study are somewhat different when comparing firm characteristics. Therefore, no conclusive evidence can be drawn on the impact of SBOs on operational performance improvement compared to PBOs, as PE firms investing in SBOs might acquire different target companies. Next to this limitation, this study used a sample of buyouts only located in the UK in a relatively short time span. Analysing other countries and periods is suggested as results might be different from this paper. In addition, the sample used in this study is relatively small if you consider the number of buyouts. Accordingly, it could be interesting to examine if the results from this thesis still hold when applying the same methodology to a larger sample of buyouts. Buyouts are also not evenly spread across all industries as buyouts in this dataset are predominantly active in Manufacturing and Services. This paper suggests further research to include operational performance improvements on SBOs with a sample covering all industries more evenly. It might also be interesting to see whether the prediction that SBOs with complementary skillsets improve operational performance when other operating performance proxies are used. Finally, other complementary skillsets could be tested to see whether other skillsets might explain superior operational performance for SBOs.

6.2 Methodological Limitations

To validate this study's findings, finding a valid causal relationship between operational performance indicators and complementary skillset measurements would be ideal. To reduce endogeneity, this paper used propensity score matching to find control companies similar to the target companies from the buyout sample. However, a limitation of this confounder control method is that although propensity score matching can match observed baseline covariates between a treatment and control group, it does nothing to match unmeasured characteristics and confounders. As a result, propensity score matching has the limitation that remaining unmeasured confounding variables may still be present, leading to biased results (Caliendo and

Kopeinig, 2008). Unmeasured confounding covariates might be other financial variables of the target company, management characteristics, or company strategy. Another limitation related to propensity score matching might be the type of method. This thesis chose 1:1 nearest neighbour propensity score matching where each buyout is matched to a control company with the smallest propensity score distance from the buyout. A common complaint regarding 1:1 matching is that it can discard many observations and thus reduce statistical power. A suggestion would be to create multiple control samples by using both a 1:1 and k:1 matching method. Next, this thesis uses difference-in-differences regressions which requires the parallel trends assumption to hold, however researchers are often not sure whether parallel trends assumption can be met. This assumption might limit the findings of this paper and also requires multiple time points to observe a parallel trend. Therefore, the visual representation in Figure 3a-p (appendix) of the operating performance variables beginning one year prior to the buyout might not be sufficient. Future research should, therefore, include multiple years before the buyout to visually inspect whether the parallel trends assumption holds. Furthermore, a limitation on the measurement of operational value creation might be the impact from the selection of a specific event window. This paper chose an event window of one year before the buyout to two years after. Thus, this approach estimated the impact of PE ownership only after two years of ownership. As PE firms typically have a longer holding period, this event window fails to capture the total operational value creation as PE funds may not have implemented their plans yet, or their effect has not fully materialised. This study suggests further research to estimate operational performance improvements after the PE firm has fully exited its portfolio company. Further research could also test whether multiple complementary skillsets influence SBO operational value creation as one complementary skillset might not be sufficient to improve the target company's operating performance. Finally, results might be biased as operational value creation in target companies might not be caused by a PE firm, but by its ability to pick winning companies.

7. Conclusion

Secondary buyouts have increased over the past few years, however, it is still unknown what motivates PE firms to participate in SBOs. First-time buyouts are expected to exploit most of the possible operational performance improvements, making it unclear how secondary buyouts can improve the target firm’s performance. This thesis aims to shed light on how SBOs could improve target companies' operational performance by examining the possible effect of complementary skillsets between the buying and selling PE firms with a dataset of buyouts

between 2012 and 2017 in the UK. Operational value creation was defined based on the growth in financial measures grouped into two categories: size and profitability. The analysis was structured into two distinctive layers. The first layer examined whether SBOs with complementary skillsets improve operational performance relative to a control group of non-PE-backed firms. The second layer investigated whether selected PE firm- or fund-specific complementary skillsets influenced the relative value creation between SBOs and PBOs.

This paper contributes to current research in multiple aspects. At first, research on value creation in SBOs is a limited topic and especially scarce on operational performance improvements in SBOs. Second, the sample used in this study consists of buyouts between 2012 and 2017 which investigates more recent buyouts than previous literature (i.e., Bonini (2015) used a sample of buyouts between 1998 and 2008). This study is also the first to empirically test the effects of SBOs with complementary skillsets based on a PE firm's fund size, fundraising rank, industry specialization, business stage specialisation and operational involvement on operational value creation. Next to this, new and more operating performance indicators are used in this study compared to previous literature on SBO value creation. Finally, most literature on either primary or SBO value creation uses industry benchmarks different from this study. This research is one of the first studies to use a DiD regression with a propensity score matching method to balance the buyout sample to a non-buyout control sample on multiple confounding factors. This method is more suitable as it eliminates treatment selection bias and ensures that both samples are comparable.

After analysing the impact of SBOs with complementary skillsets related to international expansion, experience and performance, (investment) strategy, educational background and professional experience on operational value creation in target companies, this thesis finds no conclusive evidence. Although SBOs with complementary skillsets based on fund size, industry specialisation, business stage specialisation, operating performance and educational background find significant overperformance in some operating performance variables compared to non-buyout companies, several other performance indicators are significantly negative while most variables have insignificant coefficients. Significant positive results are also found for SBOs with complementary skillsets based on fund size, industry specialisation and business stage specialisation relative to PBOs, however significant negative and insignicant results are also found for other complementary skillsets and operating performance indicators. These mixed results contradict previous literature on SBO value creation through

complementary skillsets. Further research should be conducted on why PE firms are active in the SBO market and how SBOs create superior operational performance improvements in target companies.

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Appendix

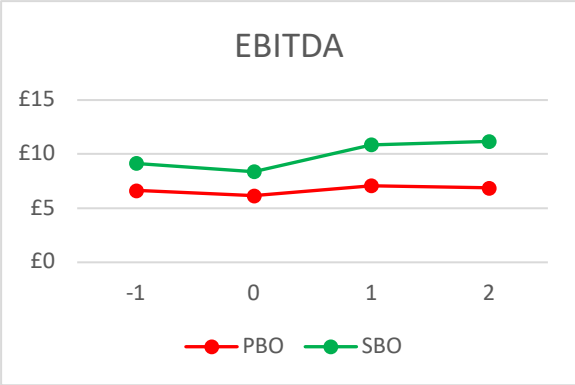
Table 14: Summary Statistics PBOs vs control group and SBOs vs control group

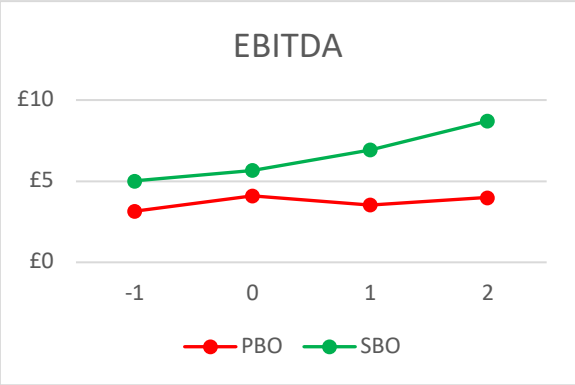
Table 14 presents differences of the financial variables between PBOs and SBOs and their unique control group. The control group is constructed by using propensity score matching. All variables are winsorized at the 1% and 99% level. Differences are tested by a two-tailed t-test for means and a non-parametric Wilcoxon rank-sum test for medians. ***p < 0.01; **p < 0.05; *p < 0.10.

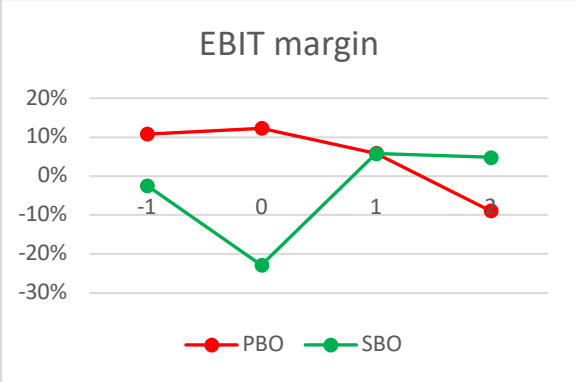
	PBO vs control		**SBO vs control**	
	T-test (t-value)	Wilcoxon rank sum test (z-value)	T-test (t-value)	Wilcoxon rank sum test (z-value)
Total assets	0.668	-2.184**	0.705	-4.452***
Fixed assets	0.282	-1.116	0.509	-2.614**
Revenue	0.614	-3.570***	0.865	-3.956***
EBIT	0.338	-1.482	0.223	-3.096***
EBITDA	0.250	-2.223**	0.602	-3.933***
EBIT margin	0.851	-0.019	0.296	0.066
EBITDA margin	0.524	-0.500	0.248	-0.250
ROA	0.333	-1.058	0.825	-1.212
Total liabilities	0.607	-3.608***	0.694	-4.664***
Debt to assets ratio	0.017**	-2.983***	0.250	0.139

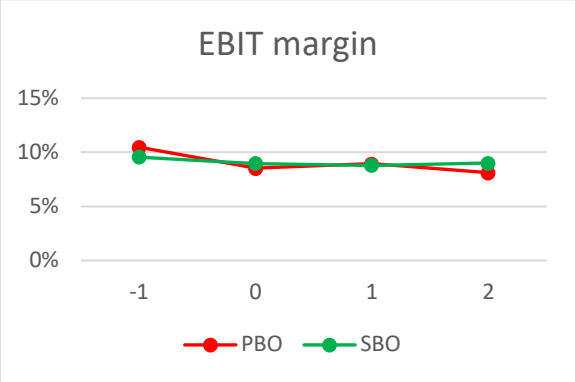
Figure 3a-p: Parallel trends visual linear representation

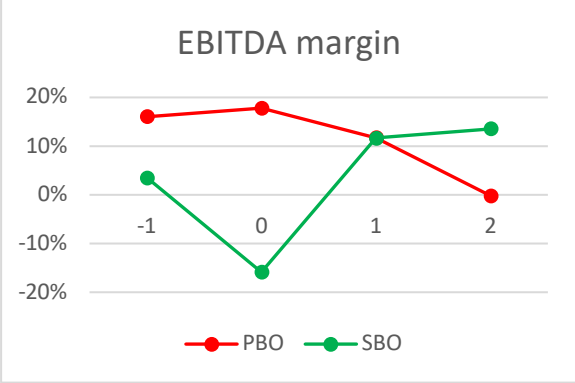
Mean (left) and median (right) values of all operating performance variables within event window of one year before the buyout to two years after.

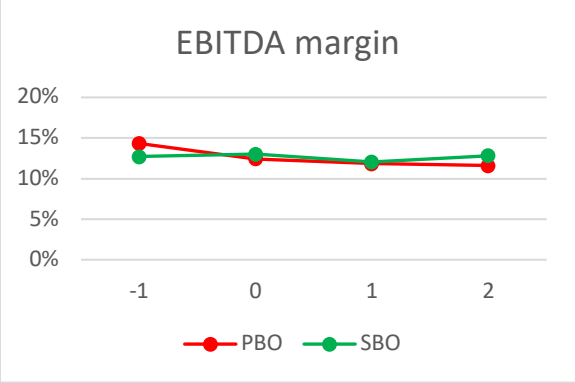

EBITDA
£15
£10
£5
£0
-1
0
1
2
PBO
SBO

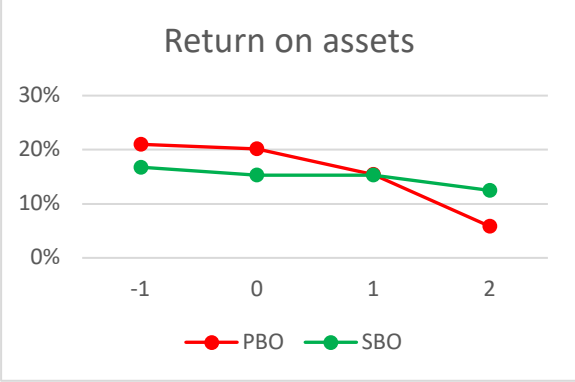

EBITDA
£10
£5
£0
-1
0
1
2
PBO
SBO


EBIT margin
20%
10%
0%
-10%
-20%
-30%
-1
0
1
PBO
SBO


EBIT margin
15%
10%
5%
0%
-1
0
1
2
PBO
SBO


EBITDA margin
20%
10%
0%
-10%
-20%
-1
0
1
2
PBO
SBO


EBITDA margin
20%
15%
10%
5%
0%
-1
0
1
2
PBO
SBO


Return on assets
30%
20%
10%
0%
-1
0
1
2
PBO
SBO

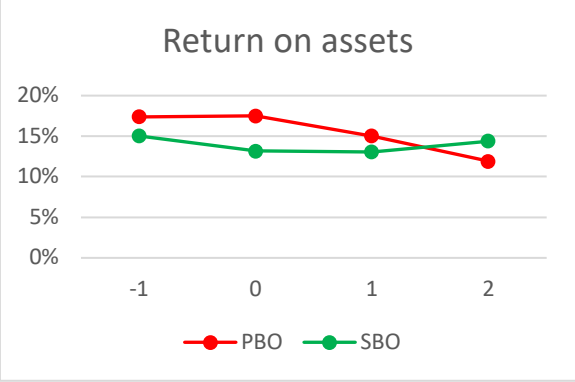

Return on assets
20%
15%
10%
5%
0%
-1
0
1
2
PBO
SBO

Table 15: Correlation matrix

	ΔLN(TA)	ΔLN(FA)	ΔLN(REV)	ΔLN(EBIT)	ΔLN(EBITDA)	ΔLN (EBIT margin)	ΔLN (EBITDA margin)	ΔLN(ROA)	ΔLN(Leverage)	LN(Size)	SBO
ΔLN(TA)	1										
ΔLN(FA)	0.4694	1									
ΔLN(REV)	0.1208	0.0576	1								
ΔLN(EBIT)	0.009	0.0185	-0.0286	1							
ΔLN(EBITDA)	0.0157	0.0004	-0.0357	0.6736	1						
ΔLN(EBIT margin)	0.0556	0.0018	-0.1222	0.0069	0.0029	1					
ΔLN(EBITDA margin)	0.0071	0.0057	-0.1284	0.0202	0.0114	0.9929	1				
ΔLN(ROA)	0.0671	-0.0308	0.025	0.0462	0.0172	0.0088	0.0088	1			
ΔLN(Leverage)	0.0765	0.059	0.0186	-0.0179	-0.0043	-0.03	-0.0308	-0.0251	1		
LN(Size)	-0.0414	0.1156	-0.277	-0.0057	0.0336	0.3861	0.3851	-0.0036	-0.0401	1	
SBO	0.0202	0.0211	0.0827	-0.0741	-0.1061	0.1219	0.144	0.194	0.0142	0.1228	1
International expansion	-0.1124	-0.1397	0.0222	0.0736	0.0579	0.0044	0.0489	0.0561	0.0661	0.0551	0.286
PE firm recent fundraising rank	0.0511	0.0623	0.1095	0.0475	0.0259	0.0538	0.0515	0.0635	0.0537	0.0228	0.254
PE firm size	-0.0221	-0.0307	0.1335	0.11	-0.0526	0.0563	0.0873	0.1141	0.018	0.1623	0.572
Industry specialisation	0.0392	0.0896	0.0682	0.0476	-0.1597	0.0407	0.0394	0.059	0.0409	0.0119	0.241
Business stage specialisation	0.1149	0.1735	0.1666	0.0629	0.0414	0.0575	0.0522	0.0806	-0.0052	0.1282	0.273
Operational involvement	0.046	0.075	0.1064	-0.0841	0.0523	0.0697	0.0653	0.101	0.0998	0.1782	0.409
Educational background	0.0148	0.0238	0.0887	0.0582	-0.1088	0.067	0.0624	0.0821	-0.0649	-0.0461	0.39
Professional experience	-0.1022	0.0233	0.0582	0.074	0.0646	-0.0001	0.0448	0.0371	0.0691	0.0351	0.324

Table 15: Correlation matrix (continued)

	International expansion	PE firm recent fundraising rank	PE firm size	Industry specialisation	Business stage specialisation	Operational involvement	Educational background	Professional experience
International expansion	1							
PE firm recent fundraising rank	0.2956	1						
PE firm size	0.3095	0.3858	1					
Industry specialisation	-0.0832	0.2472	0.191	1				
Business stage specialisation	0.0952	0.1955	0.4163	0.1086	1			
Operational involvement	0.1461	0.4148	0.3913	0.3289	0.2495	1		
Educational background	0.1685	0.1056	0.1851	0.017	-0.0748	0.1108	1	
Professional experience	0.2622	0.1853	0.1947	0.0722	-0.0038	0.0569	0.2379	1