

Dressed for Long-Term Success

Evidence from Sweden Regarding the Long-Term Value Creation of Private Equity Sponsors

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ABSTRACT

The long-term value-creating ability of Private Equity (PE) sponsors has received a lot of attention during recent years and a large number of studies examine this by evaluating the post-IPO stock performance of previously PE-sponsored firms. At the same time, many studies analyse what value-creating initiatives that PE sponsors are implementing in their portfolio firms during the holding period, in order to maximize their payoff at the time of their exit. However, there is currently a lack of literature attempting to connect these areas by examining the relationship between what PE sponsors do during their holding periods and the performance of the target firm after the sponsors have exited their position. This study aims to fill this void by examining what value-creating strategies implemented by PE sponsors that have an impact on the post-IPO stock performance of portfolio firms. By considering Swedish PE buyouts between 1996-2019, for which the sponsor subsequently exits via an IPO, this study finds that PE-sponsored firms increase both the productivity of the workforce, and the overall profitability, relatively more than their peers during their holding periods. Additionally, it is found that the workforce of PE-sponsored firms grows slower than the workforce of non-PE-sponsored firms, while the wages in the target firm are positively influenced by the buyout. This study further suggests that overall, the operational structures imposed by the PE sponsors generate lasting value in the form of superior yearly excess returns during the one- and two-year period following their IPO, when compared to an appropriate control group. However, this study cannot with certainty confirm what effect the specific value-creating initiatives identified in the considered sample have on the post-IPO returns.

Keywords: Private Equity, Buyouts, Operational Engineering, Long-Term Value Creation, Initial Public Offerings

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1. Definitions

In order to avoid any confusion regarding terminology, we here present the definitions used in this study for some of the key concepts covered:

Private Equity (PE) sponsor or sponsor: A Private Equity firm primarily focusing on acquiring a controlling interest in private- or public firms.

Private Equity (PE) buyout or buyout: The transaction in which the Private Equity sponsor acquires a business from their current owner. Oftentimes, the transaction is supported with extensive amounts of debt. Private Equity buyout and buyout is used interchangeably in this study.

PE-sponsored-/ target-/ portfolio firm: The private- or public firm being acquired by the Private Equity sponsor in the buyout.

Holding period: The time period in between the Private Equity buyout and the time when the Private Equity sponsor exits its position in the target firm.

2. Introduction

The Private Equity industry in Sweden is one of the most active and largest in Europe when measured as a percentage of the national GDP (SVCA) and research regarding various aspects of the sector has been growing during recent years. One topic that has received a lot of attention is the value-creating abilities of PE sponsors. Throughout the holding period, sponsors implement various value-creating strategies to maximize their payoff at the time of their exit. However, the question remains whether the operational structures implemented by PE sponsors, aimed at maximizing their payoff in the short term, can also deliver lasting value in the longer term, even after they have exited their position. In this paper, we examine if these value-creating initiatives launched by PE sponsors have an impact on the long-term performance, which in this study is measured by the post-IPO performance, of portfolio firms. To do this, we construct a sample consisting of 42 Swedish firms that have been the subject of a Private Equity buyout for which the sponsor subsequently exits via an IPO sometime between 1996-2019.

A large number of papers focus specifically on the long-term performance of previously PE-sponsored firms by examining their post-IPO stock performance compared to non-PE-sponsored companies. Many of these papers present different results and there is currently no consensus on if, and why, PE-sponsored and non-PE-sponsored firms perform differently. Furthermore, these studies oftentimes disregard the previous engagement of the sponsors in their holdings and the long-term consequences of such previous active ownership. Thus, there is a lack of literature attempting to explain why PE-sponsored firms perform differently in the long term. To contribute to this ongoing discourse, our thesis aims to find what value-creating strategies implemented by PE sponsors that have an impact on the post-IPO stock performance of portfolio companies. By doing so, we hope to offer an additional dimension to the existing literature by connecting what PE sponsors do during their holding periods to the performance of the target firm after the sponsors have exited their position. Given the size of the PE industry in Sweden and the continuous debate regarding if PE sponsors tend to be too short-sighted in their investments, and are only reaping quick profits instead of generating lasting value, (Fanelli, 2017), this remains an ever-relevant question.

In our study, we first identify what value-creating strategies, and subsequent changes in firm behaviour in the portfolio companies, that are present in our sample. To do this, we use Coarsened Exact Matching to assign each PE-sponsored firm in our sample a comparable, non-PE-sponsored company based on their pre-buyout characteristics. We then apply a multilevel

specification to a time-series panel data set and find that PE-sponsored firms increase both the productivity of the workforce as well as the profitability relatively more than comparable non-PE-sponsored firms. We also find that the workforce of PE-sponsored firms grows slower than the workforce of their peers, while the wages in the target firm are positively influenced by the buyout.

After having established the PE sponsors' impact on their portfolio firms during their holding periods, we also show that PE-sponsored IPOs outperform other non-sponsored IPOs over the one- and two-year period following the listing. This is done by using a fixed effects multiple regression model which estimates the sample firms' yearly excess returns after their IPO. Thus, our results suggest that overall, the operational structures imposed by the PE sponsors can generate lasting improvements and sustained value in the target firm even after the sponsors have exited their position. However, we cannot with certainty confirm what effect the specific value-creating initiatives identified in our sample have on the post-IPO returns, but our results indicate that the PE-initiated reductions in the growth of the workforce during the holding period can explain part of this lasting value creation.

Even though the investment class labelled Private Equity can be broadly categorised as either Venture Capital or Buyout Capital, this paper only considers majority investments done by Buyout firms when analysing the characteristics and performance of PE-sponsored companies. In contrast to a Venture Capital sponsor, the typical Buyout firm acquires majority shares in mature companies, oftentimes using substantial amounts of debt (Kaplan and Strömberg, 2009). As these sponsors typically gain majority control in their holdings, they are assumed to be able to freely and efficiently implement the changes they feel are necessary during their holding periods. On the contrary, sponsors that acquire a minority stake have a restricted control over their investments and their impact is thus limited (Puche and Lotz, 2015). Therefore, considering Venture Capital sponsors, or minority investments, would be detrimental to our study.

3. Literature Review

Since our study aims to find if the value-creating strategies implemented by PE sponsors have an impact on the long-term performance of portfolio companies, there are two main categories of literature related to Private Equity that are relevant to us. These two categories are on the one hand literature that is investigating how, and if, PE sponsors can generate value in their holdings during the holding period and on the other hand, literature that is focusing on the post-IPO performance of previously PE-sponsored firms. In this section, we will first present a theoretical and empirical understanding regarding how PE sponsors can create value in, and impact the behaviour of, their holdings. We will then present the conclusions of studies focusing on the post-IPO performance of PE-sponsored firms, before outlining the contribution of our study.

3.1 Private Equity and value creation

The paper “Leveraged Buyouts and Private Equity” by Kaplan and Strömberg (2009) examines, among other things, the general dynamics of the Private Equity industry and how PE sponsors are generally acting to create value in their holdings after a buyout. Kaplan and Strömberg assert that the changes that PE sponsors can apply in the target firm can be categorized into three broad categories, namely: financial engineering, governance engineering, and operational engineering, where the first two are somewhat overlapping. Historically, PE sponsors have mainly used financial and governance engineering as means of adding value to their investments, where many of these changes are intended to assure alignment of the incentives between the sponsor and the management of the target firm. According to the authors, this is often achieved by the PE sponsor by increasing the ownership stake of the target firm’s management and increasing the leverage in the target firm to reduce “Free Cash Flow problems” as highlighted by Jensen (1986). During recent years, the focus has shifted and most Private Equity firms are now also using operational engineering to generate value. Operational engineering is described as a broad set of changes through which PE sponsors attempt to improve the operational performance, such as the profitability and productivity, of the target company by using their operational and industry expertise in the holding’s operations.

3.1.1 Operational engineering

By combining their broad industry expertise with operational knowledge, PE sponsors strive to develop and implement optimal operational plans for their portfolio firms including cost-cutting plans, plans aimed at improving operational productivity or plans to pursue attractive investment opportunities. These operational changes can manifest themselves in several ways.

One study examining if PE sponsors are able to create value in their portfolio companies is the study “The Operating Impact of Buyouts in Sweden: A Study of Value Creation” conducted by Bergström et al. (2007). In this paper, Bergström et al. apply an event study methodology in which the buyout is the event of interest, to measure the impact of Private Equity buyouts on the operating performance of the target firm, as proxied by the EBITDA-margin, Return on Invested Capital (ROIC) and growth in operating turnover. The considered sample consists of Swedish buyouts completed sometime between 1993-2006. The authors show that buyouts have a significantly positive impact on the average EBITDA-margin of 3.07 percentage points and on the median values of ROIC of 4.01 percentage points during the holding period when compared to an appropriate peer group. In terms of growth in sales, the study does not find any significant difference between the considered groups. Nonetheless, Bergström et al. conclude that Private Equity buyouts, in general, have a positive impact on the true operating performance of target firms. Similarly, the Swedish Private Equity and Venture Capital Association (SVCA) (2017) finds that PE sponsors' effect on EBITDA-margins in the target is +3-5% compared to non-PE-sponsored companies when considering the Swedish market.

Beyond the Swedish market, another study that attempts to measure the impact of Private Equity buyouts on the target firm during the holding period is “Growth LBOs” by Boucly et al. (2011). While Bergström et al. focus solely on estimating the impact of buyouts on the operating performance of the target firm, Boucly et al. (2011) take a wider perspective on the phenomenon and evaluate the change in the overall firm behaviour. By using a sample of 839 French buyouts, the authors show that among other things, PE-sponsored firms become more profitable during the three-year period following the buyout as Return on Assets (ROA) increases with 4.4 percentage points, EBITDA grows 18% and that PE-sponsored firms grow faster compared to a control group in terms of sales, employment and employed capital. Additionally, it is shown that the target firms increase their Capital Expenditure (CapEx) by 24% more than the control group in this post-buyout period. Similarly, Shapiro and Pham (2009) find that PE-sponsored firms on average substantially increase their CapEx following a buyout, when looking at the US.

Returning to the Swedish market, Bergström et al. (2007) also attempt to estimate the impact of Private Equity buyouts on employment- and wage levels in the target firm, but are unable to prove any impact on these variables. Interestingly, however, a similar study conducted by Olsson and Tåg (2012) focusing on the Swedish market between 1998-2004 finds that Private Equity buyouts have a negative effect on employment growth of minus 6 percentage points cumulatively over the four years following a buyout, mostly due to a drop in hiring. Similarly, a study by Copenhagen Economics commissioned by the SVCA (Naess-Schmidt, 2017) finds that the yearly effect of Private Equity buyouts on job creation is minus 1.3% when compared to non-PE-sponsored companies. Beyond the Swedish market, despite this being an extensively covered topic, the evidence regarding the effect of buyouts on job creation tends to differ depending on the geographical market considered (Davis et al., 2014). This also applies to buyouts' effect on wage levels, but the majority of the literature suggests that Private Equity buyouts, in general, have a negative effect on wages. Davis et al. (2019) find that target firms in the US on average experience a 1.7% wage drop during the two-year period following a buyout, when compared to similar non-PE-sponsored firms. Similarly, Amess and Wright (2007), who focus on the UK, find that target firms are increasing their wages more slowly compared to other similar non-PE-sponsored firms. In Sweden, however, the results seem to differ. While some studies are unable to identify any significant changes in wage levels, Olsson and Tåg (2012) find an increase in labour income of 1.4% annually following a buyout. Hence, the impact of Private Equity buyouts on wage growth is expected to be positive in Sweden.

Continuing on PE sponsors' effect on the workforce of its holdings, evidence from the US suggests that average labour productivity, defined as real revenue per worker, rises 8% for the target company during the two-year period following the buyout (Davis et al., 2019). Previous empirical findings further suggest that PE sponsors do not solely increase the productivity of the workforce, but also increase the capital productivity by e.g. reducing the working capital requirements in the target firm. As shown by Holthausen and Larcker (1996), PE-sponsored firms on average have less amounts of working capital compared to their industry peers and according to PwC (2015), PE sponsors can, in general, reduce working capital requirements with approximately 15-30%. Through this, the PE sponsor can free up cash to e.g. support its often assumed high leverage or to pursue other investment opportunities for the target firm without having to rely on external financing sources.

However, it has recently been suggested that cost-cutting and efficiency-enhancing measures alone are no longer enough to secure good returns for PE sponsors. Torres (2015)

shows that buyouts also have a positive effect on firm innovation, which could be a way for sponsors to increase the revenues and broaden the sources of income in their portfolio companies. Supporting this, empirical findings suggest that the patent-stock of target companies on average increases 6% during the three-year period following a buyout (Amess et al., 2015).

3.1.2 Financial and governance engineering

Beyond implementing changes related to operational engineering, PE sponsors are still enacting several initiatives relating to financial and governance engineering when acquiring new businesses, as argued by Kaplan and Strömberg (2009).

Leverage is an important and well-documented driver of value for PE sponsors, as it constrains “Free Cash Flow problems” (Jensen, 1986) which hypothesize that managers endowed with excess free cash are more likely to extensively consume corporate perks or invest in suboptimal projects instead of returning the cash to their shareholders. In addition to this, extensive debt levels also increase the risk of bankruptcy for the target firm, which would entail large personal costs for the firm’s managers. As a result, the managers are further incentivised to avoid non-value-maximizing behaviour, meaning that agency costs are further reduced. Boucly et al. (2011) find that on average, the target’s leverage (excluding deal-related debt) increases by about 2.6 percentage points more than the leverage of similar non-PE-sponsored firms when considering French LBOs. This indicates that after the buyout, the target firm issues additional debt to finance part of its asset growth.

Beyond leverage, another way for PE sponsors to reduce agency costs is to ensure that the goals of the managers in the target firm and those of the sponsor are aligned. This is commonly achieved by increasing the equity holdings and the compensation for the management in the target firm. Additionally, the management of the target is oftentimes also required to make a substantial private investment in the firm. By doing so, the management has a significant personal downside, not just a significant equity upside. Having the management more personally tied to the performance of the business could also incentivise them to take uncomfortable, yet beneficial, decisions such as e.g. reducing the workforce (Kaplan and Strömberg, 2009). Brubaker and Durrant (2016) argue that such an alignment of goals could also be achieved by replacing the managers of the target firm. Previous findings from the US and the UK suggests that on average, approximately 15% of the equity in the target goes to the management following a Private Equity buyout, and that out of these 15%, around 5% goes immediately to the CEO of the target (Kaplan & Strömberg, 2009).

3.2 Private Equity and post-IPO performance

After having implemented the changes the PE sponsor feels are necessary in their holding, there are numerous ways in which they can exit their position. Kaplan and Strömberg (2009) find that approximately 14% do so by listing their portfolio firm on a public stock exchange but assert that the number of exits via IPOs have decreased during the 2000s. For PE sponsors, the main reason for going public is to enable them to divest their position in the target firm, as argued by Black and Gilson (1998). Furthermore, Ang and Brau (2003) show that one of the main sellers in an IPO often is the management of the firm, meaning that an IPO enables PE sponsors to compensate managers that have been given equity stakes in the business as a part of the sponsor's governance engineering initiatives.

Turning to the literature focusing on the post-IPO performance of previously PE-sponsored firms, many studies suggest that PE-sponsored and non-PE-sponsored firms tend to perform differently, with a majority of the current literature suggesting a positive effect of being PE-backed. Yet, other studies are indicating that the opposite could hold true and there is currently no consensus on the topic.

One study suggesting a positive effect of being PE-backed is "The performance of reverse leveraged buyouts" by Cao and Lerner (2007). By analysing the three-year and five-year post-IPO stock performance of 526 PE-sponsored IPOs in the US between 1981 and 2003, Cao and Lerner suggest that Private Equity-backed IPOs on average outperform other newly publicly listed, non-sponsored firms. They find that PE-sponsored IPOs on average outperform the market by between 0.3%-0.5% monthly during the five-year period following the IPO, but that these superior returns tend to deteriorate over time. Similarly, Levis (2011) examines the post-IPO performance of Private Equity-backed IPOs completed on the London Stock Exchange between 1992 and 2005. In this study, Levis compares the post-IPO performance of Private Equity-backed, Venture Capital-backed and non-sponsored IPOs. By doing so, the author finds that PE-sponsored IPOs on average generate superior returns compared to Venture Capital-backed and non-sponsored IPOs over the 12-, 24-, and 36-month period following the listing. Interestingly, Levis further suggests that on average, the PE-backed IPOs in the considered sample were to a lesser degree suffering from underpricing, compared to the other subgroups in the sample. Similar findings have been presented by Bergström et al. (2006), who examine the underpricing of PE-sponsored IPOs in Europe between 1994 and 2004. Beyond the comparison of returns, Cao and Lerner (2007), as well as Levis (2011), find another feature

that distinguishes Private Equity-backed IPOs, namely that they tend to be larger in terms of size, as measured by the amount raised in the IPO and the total asset value of the target firm.

However, new research by Bain & Company suggests that PE-backed IPOs in general actually underperform their industry peers. By analysing 90 PE-backed IPOs completed between 2010-2014, the authors MacArthur and Lerner (2020) conclude that over 70% of these listings underperform their relevant benchmark during the five-year period following their IPO. Additionally, Chen and Liang (2016) find that firms backed by Venture Capital sponsors underperform their non-sponsored peers with regards to ROA after their IPOs. Even though they do not examine the development of the post-IPO stock price, Chen and Liang's findings could indicate that the sponsors' active ownership fails to generate value after they have exited their positions. Yet, as mentioned previously, most papers in the current literature appear to conclude that on average, Private Equity-backed IPOs tend to outperform comparable non-PE-sponsored IPOs. Nonetheless, there is a lack of a clear consensus on the topic.

3.3 Contribution to current literature

As illustrated above, there exist a lot of papers investigating the impact of PE sponsors on the characteristics of the target firm as well as studies analysing the post-IPO performance of PE-sponsored firms compared to non-PE-sponsored firms. Yet, there is currently a lack of studies examining the connection between these two. For instance, as acknowledged by Cao and Lerner (2007) as well as by Levis (2011), both of their studies disregard the previous engagement of the PE sponsors in their holdings and the long-term consequences of such active ownership. Thus, the fundamental question regarding why PE-sponsored listings tend to perform differently compared to non-PE-sponsored IPOs remains largely unexplained in most of the current literature. Our study contributes to the discourse by trying to fill some of the void concerning the relationship between what PE sponsors do during their holding periods and the performance of the target firm after the PE sponsor has exited their position. We do so by identifying which initiatives implemented by PE sponsors that have the largest impact on the behaviour of portfolio companies, and then examine if these initiatives provide the right conditions for the PE-sponsored firms to generate superior post-IPO returns. Thereby, we believe that we will add to the current literature by offering an additional dimension regarding Private Equity sponsors' impact on long-term value creation. Lastly, there is also a current lack of understanding regarding what types of firms that PE sponsors select for each form of exit, as highlighted by Cao and Lerner (2007). By solely considering PE-sponsored firms that have

been exited via an IPO, we hope to shed some light on what characterizes these firms and thereby offer some insight regarding why PE sponsors exit their holdings in different ways.

4. Hypotheses

4.1 Hypotheses regarding PE sponsors' effect on the behaviour of target firms

In the following section, we provide the hypotheses that we aim to test in the first part of our study regarding PE sponsors' value-creating initiatives and the consequent changes in portfolio companies' behaviour. The hypotheses are formulated based on previous empirical findings, as presented in the previous section, and the rationale underlying each value-creating strategy, as presented below. While acknowledging that PE sponsors can implement various value-creating initiatives in their portfolio firms, we focus on initiatives which previous studies have shown are the most commonly applied. We further limit ourselves to value-creating strategies which theoretically have a measurable and significant impact on the behaviour of target firms.

4.1.1 Operational engineering

PE sponsors' effect on employment and wages PE sponsors often affect the employment practises of target firms by e.g. laying off redundant parts of the corporate staff or restricting hiring, in order to increase workforce productivity or as part of cost-cutting efforts. Additionally, as part of the organisational changes often occurring after a buyout, PE sponsors have been shown to use the opportunity to adjust the wage levels downwards in the target company by e.g. neglecting or renegotiating implicit contracts (Olsson and Tåg, 2012). Yet, in a Swedish context, buyouts have been shown to be followed by an increase in wages. Therefore, we expect a decrease in employment growth and an increase in wage levels in the target firm following a Private Equity buyout, when examining the following variables: *Number of employees*, *Personnel expenses per Employee* and *Salaries per Employee*. Thus, with regards to PE sponsors' effect on employment levels and wages, we formulate the following hypothesis:

H1: The workforce of PE-sponsored firms have a lower employment growth and a steeper increase in average wages than comparable non-PE-sponsored firms following a buyout

PE sponsors' effect on productivity The increased workforce productivity observed in PE-sponsored firms after buyouts can be accomplished by the PE sponsor in other ways than merely laying off less productive employees. For instance, enhancing the quality of new employees through more rigorous recruitment processes or improving the skills of the current workforce through employee training and development could also increase the labour

productivity of portfolio firms. One additional value-creating strategy often applied by PE sponsors that also aims to ensure that the target firm's resources are used most efficiently is to increase the capital productivity of the portfolio firm, by e.g. reducing working capital requirements. Given this, we expect to observe enhancements in both labour- and capital productivity in the target firms following a Private Equity buyout. To examine this, we consider the development in the variables *Sales per Employee* and *Capital Turnover ratio* to test the following hypothesis:

H2: PE-sponsored firms use factors of production more efficiently compared to non-PE-sponsored firms following a buyout

PE sponsors' effect on investments As a way to maximize the value of the target company during the holding period, PE sponsors tend to increase the CapEx of their portfolio firms. In general, such a strategy is aimed at facilitating increased sales or overall production in the target company and could indicate an execution of plans of rapid expansion, such as a buy-and-build strategy applied by the PE sponsor. Yet, previous literature suggests that the growth in CapEx is most likely attributable to facilitating organic growth rather than M&A activities (Boucly et al., 2011). Furthermore, it has recently been shown that PE sponsors invest in improving firm innovation practices by increasing their holdings' patent stocks, in order to increase the revenues and broaden the sources of income in their portfolio companies. Thus, we expect an increase in target firms' *CapEx*, patent stock (as measured by the reported value of *Patents and Licenses*) and *Net Sales* following the buyout. Given this, we formulate the following hypothesis:

H3: PE-sponsored firms invest relatively more in projects aimed at facilitating sales growth compared to their peers following a buyout

PE sponsors' effect on firm profitability As presented in the previous section, many studies show that PE ownership leads to an improvement in target firms' profitability. While not being a value-creating strategy per se, this is oftentimes the result of many of the value-creating initiatives highlighted above. Nevertheless, the question remains if this value creation achieved during the holding period of the PE sponsor remains in the long term, by for example creating improved conditions for long-term value creation by establishing sustainable operational structures. By considering metrics of profitability, we can indirectly examine the impact of PE sponsors' firm-level initiatives without having to identify the specific channels leading to potential profitability improvements. This also allows us to examine if improved profitability

during PE sponsors' holding periods is associated with long-term value creation in the target firm. More specifically, we analyse the development of the variables *Return on Assets*, *EBITDA* and *EBITDA-margin* to test the following hypothesis:

H4: PE-sponsored firms are becoming relatively more profitable compared to similar non-PE-sponsored firms following a buyout

4.1.2 Financial and governance engineering

PE sponsors' effect on leverage and management compensation By imposing a lot of debt, and the obligations that come with it, on the target firm, PE sponsors delimit the target's managers' possibilities to waste money through any non-value maximizing activities. Another way for PE sponsors to reduce agency costs is to ensure that the goals of the managers in the target firm and those of the sponsor are aligned by increasing the equity holdings and the compensation for the target's management or by hiring new managers. To hire new, more well-suited managers, PE sponsors most likely have to attract these with higher salaries. Thus, management salaries in PE-sponsored firms could be hypothesized to exceed those in non-PE-sponsored firms. As we do not have access to ownership data and can therefore not test if PE sponsors increase the management ownership stakes in our sample, we will solely consider the variables *Salary to the CEO and the Board of Directors* and the *Debt-to-Equity ratio* to test the following hypothesis:

H5: PE sponsors attempt to reduce agency costs in their holdings by increasing the leverage and the compensation to management during their holding periods

4.2 Hypotheses regarding PE sponsors' ability to create lasting value

In this section, we present hypotheses regarding the long-term value-creating ability of PE sponsors in their holdings, as measured by the post-IPO stock performance of the target companies. The hypotheses are aimed to help us test if the operational structures imposed by the PE sponsors, to maximize their payoff at the time of the exit, are creating sustained value even after the sponsors have exited their majority position in the target firms. These hypotheses are formulated based on our previous hypotheses regarding holding period value creation, as listed above, and previous empirical findings on the subject.

As presented in Section 3.2, a majority of the current literature suggests that PE-sponsored IPOs outperform other non-sponsored listings in terms of excess returns. Although it is unclear where these superior returns originate from, we still want to initially test if PE-

sponsored IPOs outperform their peers to assess if sponsors generate long-term value in our sample. Thus, we formulate the following hypothesis:

H6: PE-sponsored IPOs generate superior excess returns compared to similar non-PE-sponsored IPOs

After having established if PE-sponsored IPOs perform differently compared to non-PE-sponsored IPOs, we want to test whether the potentially identified changes made by the sponsors during their holding periods, as hypothesized in H1-H5, can explain such differences. Given that PE sponsors are able to implement operational structures in their portfolio firms that generate value during their holding periods, we expect that such operational structures will remain even after the owners exit their position and that these structures continue to generate value for the previously PE-owned firms.

H7: The operational structures implemented by PE sponsors during their holding periods can explain differences in excess returns between PE-sponsored IPOs compared to similar non-PE-sponsored IPOs

5. Data

This section describes the data and data gathering methods used to test our hypotheses listed in the previous section. It also presents some descriptive statistics of the final sample.

5.1 Constructing the treatment group

To conduct our study, we construct a treatment group consisting of companies that have been owned by a PE sponsor who have subsequently exited their position via an IPO. To do this, we gather data from the following databases: Capital IQ, Securities Data Company (SDC) Platinum and Serrano.

As a first step in the data construction process, we use Capital IQ to gather data on IPOs that have been completed on any of the following Swedish stock exchanges: Spotlight (previously AktieTorget), Nordic Growth Market, Nasdaq First North or Nasdaq Stockholm, between January 1996 and December 2019. There are 512 IPOs with these characteristics. The year 1996 is chosen because it is the first year for which data on Swedish firms are available in Serrano. IPOs completed in 2019 are included in the dataset to maximize the number of Private Equity buyouts in our sample. Even though we will have limited stock data for those IPOs completed most recently, we can use the firm-level data for these companies to examine the change in target firm behaviour prior to the IPO.

Next, we collect data on Private Equity buyouts from Capital IQ meeting all of the following criteria:

- i. The target firm is incorporated in Sweden. This is done because we want to investigate what value-creating effect PE sponsors have on Swedish companies, independently of the origin of the PE sponsor.
- ii. The transaction was completed between January 1996 and December 2019.
- iii. The Private Equity investors are investing in the following segments according to Capital IQ's classification: "Turnaround", "Middle Market", "Mature" or "Later Stage". Since these segments are mostly covered by Private Equity Buyout investors, and not Venture Capital firms, this is done to ensure that the latter is not included in the analysis.

660 transactions meet these criteria. However, the retrieved dataset from Capital IQ contains noise in the form of duplicates, acquisitions of minority interests and some

transactions where the buyer is a Venture Capital investor. After cleaning the data, 554 unique transactions remain. To improve our coverage of relevant buyouts, we complement the retrieved data with additional transactions from SDC Platinum which meet the criteria listed above. This additional list contains 624 transactions. In the next step of the data-preparing process, we merge the two lists containing Private Equity buyouts with the IPO-dataset gathered from Capital IQ. By doing so, we generate a list containing Swedish firms which have been involved in both a buyout and an IPO between the years 1996 and 2019. After this, we manually control for duplicates and incorrect matches, while also ensuring that each observation meets the following, additional criteria:

- i. The holding period of the PE sponsor, which is initiated at the time of the buyout, is ended at the time of the IPO meaning that the PE sponsor exits its position via the IPO.
- ii. The PE sponsor involved in the buyout acquires a majority stake in the holding.

We introduce the second criteria to ensure that the sponsors are able to freely and efficiently implement the changes they feel are necessary during the holding period. As shown by Puche and Lotz (2015), PE sponsors which acquire a minority stake have a restricted control over their investments and their impact is thus limited, meaning that including such buyouts would be detrimental to our study. By ensuring that these additional criteria are met, we end up with a dataset containing 45 firms. To further increase our coverage, we complement this dataset with firms listed in the SVCA report “Analysis of Swedish IPOs 2001-2014” from 2015. In doing so, we add 6 additional firms which were not previously included in our dataset but meet our criteria, meaning that the final list containing Swedish Private Equity buyouts which were exited through an IPO consists of 51 unique firms. These firms make up our treatment group.

Next, to be able to measure the change in firm behaviour during the holding period, we gather financial statement data for the firms in our sample from Serrano, available at the Swedish House of Finance’s website. When doing so, we account for the concern that some firms in our sample are part of complex group structures, where a holding company owns many subsidiaries in the group but has no real operations of its own. Examining such holding companies would entail difficulties in measuring changes in firm behaviour and hence the impact of the PE sponsor. To account for this, we collect the organisation number of the entity which is most representative of the group in terms of their activities and use this to match the accounting data with the firms in our sample. To determine which organisation number to use

for each firm, we use annual reports in addition to looking at employment and sales figures to identify the underlying activities of the firm. We acknowledge that this is subjective but consider it to be the most effective way of handling the problem regarding complex group structures.

When each firm in our dataset has been assigned the correct organisation number, we collect the following variables from Serrano: Industry classification (two-digit), Number of Employees, Return on Assets, Personnel Expenses, Salaries, Salaries to the CEO and Board of Directors, Net Sales, Operating Income, Depreciation and Amortization, Tangible Fixed Assets, Current Assets, Current Liabilities, Earnings before Tax (EBT), Taxes, Value of Patents and Licenses and Debt-to-Equity-ratio. These variables are used in the ensuing quantitative analysis, in addition to other variables calculated using this imported data.

5.2 Constructing the control group

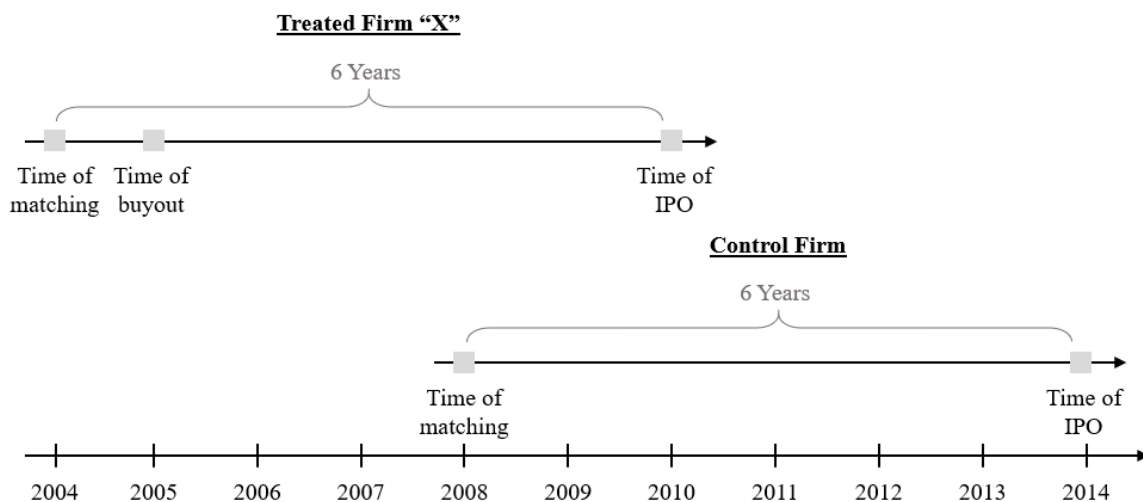
To be able to estimate the effect which PE sponsors have on their holdings and their long-term value creation, we compare the firms in our treatment group with similar companies that have completed an IPO but have not been the subject of a Private Equity buyout. To account for the fact that buyouts are not completely exogenous events, meaning that PE sponsors often target firms with certain characteristics such as high profitability or firms belonging to certain industries, we compare each treated firm with a company that is comparable the year before the PE sponsor invests. This is done by assigning each treated firm one or several control firms which meet the following criteria one year before the treated firm is acquired by a PE-sponsor:

- i. It belongs to the same cluster of industries as the target firm.
- ii. It is similar to the target firm in terms of profitability, as measured by ROA.
- iii. It is similar to the target in terms of size, measured as the number of employees.
- iv. It is in the same part of its life cycle, as proxied by the number of years remaining until its IPO.

These criteria are chosen due to data availability and because they ensure that treated firms and their controls are relatively similar by being firms in the same industry, of similar size and profitability and in the same part of their lifecycle as proxied by the time until their IPO. Additionally, this specification of the matching criteria enables us to handle the trade-off of having similar pre-buyout characteristics between treatment and control firms, and having sufficiently flexible criteria to enable all treatment firms to have matches.

With regards to profitability and size, we divide the dataset into quartiles based on the firms' values for ROA and number of employees, respectively. Thus, a control firm is similar to a treated firm in terms of profitability and size if it belongs to the same profitability- and size quartile. Beyond ensuring relative similarity, dividing these linear variables into quartiles enables us to use Coarsened Exact Matching (CEM) when applying the criteria above (Blackwell et al., 2010). Furthermore, ensuring that the firms are in the same stage of their lifecycle makes them more comparable to each other, as firm behaviour has been shown to differ depending on the age of the company (Habib and Hasan, 2015). Using the year of the IPO as a proxy for the stage of the firm's life cycle allows us to ensure this, as e.g. Maug (2001) shows that firms tend to go public at a certain stage of their lifecycle. Regarding the timing of the matching, firms are matched based on the number of years remaining until their IPO. For each treated firm, the time of matching also constitutes the year before they were acquired by a PE sponsor. To illustrate this, consider treated firm "X" in our sample which was bought by a PE sponsor in 2005. Subsequently, the PE sponsor exited its position in the target firm through an IPO in 2010, ending an approximately five-year-long holding period. We match firm "X" based on its 2004 firm characteristics with one or several control firms in our sample meeting criteria i-iii six years before completing their IPO. For an illustration of this example, see Exhibit 1 below.

EXHIBIT 1
 Illustrative example of the timing of matching



Note: This exhibit shows an illustrative example of the timing of our matching approach.

Thus, in our matching, we do not impose that the control firms complete their IPO in the same year as the treated firm. This could introduce some bias in our sample as changes in firm characteristics could be influenced by time variances such as business cycles. This will have to be controlled for by introducing time fixed effects in our ensuing regression set-up, as further detailed in Section 6.1.1.

By subtracting the treatment group from the dataset containing Swedish IPOs, we find that there are 464 potential control firms, meaning firms that have completed an IPO but have not been the subject of a Private Equity buyout. When preparing our dataset for the matching process, six treatment firms are removed due to not having reported data the year before, or the year of, their PE-buyout. Additionally, for twelve treated firms which have no data the year before they were acquired by a PE sponsor, we match them with a control firm based on their characteristics the year of their buyout.

Next, we use Coarsened Exact Matching (CEM) to identify and match control firms to treated firms based on the criteria described above. The matching is done with replacement, meaning that a control firm can be assigned to several treated firms, to ensure that as many treated firms as possible are assigned at least one match. We acknowledge that matching with replacement might introduce errors in our results due to matched controls not being completely independent, but argue that this is not a large concern in our case as firms are matched on specific years before their IPO. That is, one control firm might occur in several matched groups, but with different years of data. This means that even though a control firm is matched to several treatment firms, the degree of dependence among the controls is lower compared to a case where all firms are matched on the same year. The concern regarding matching with replacement is further addressed by limiting the number of controls per treated firm to a maximum of three companies. As a result of this, 52% of the control firms are matched to more than one treated firm, while 90% of the control firms are matched to less than four treated firms. Furthermore, the maximum number of replacements of a control firm in our sample is five (see Exhibit 2 in *Appendix*). As a result of the matching, 42 out of the 45 remaining treated firms are assigned at least one, with a maximum of three, control firms. Due to the matching occurring with replacement, the total number of unique control firms is 60. Thus, our final sample consists of 102 unique companies.

Exhibit 3 below presents pre-buyout descriptive statistics for treatment and control firms. As can be seen, the two groups are similar in terms of the average ROA, with a difference of one percentage point. Furthermore, despite our matching, firms in the two groups are relatively different in terms of number of employees. However, this discrepancy is in line with

the matching requirements of previous studies, e.g. Boucly et al. (2011) who match a company to a treated firm if its number of employees is within the +/- 50% range of the treated firm. Furthermore, by looking at the other statistics shown in the table, the two groups are relatively similar. Therefore, given the trade-off between similarity in pre-buyout characteristics and having sufficiently flexible criteria to enable as many matches as possible, these summary statistics show that the matching process generates acceptable results. Furthermore, as shown in the table, the average holding period of PE sponsors in our sample is 5.3 years, which is similar to previous findings for Swedish as well as European PE sponsors (SVCA, 2017) (Preqin, 2015).

EXHIBIT 3

Pre-buyout descriptive statistics for the sample

VARIABLES	PE-sponsored firms		Control firms	
	Median	Mean	Median	Mean
ROA	5.8%	6.22%	6.2%	5.22%
Number of employees	309	880	105	519
Net sales (mSEK)	362	929	185	726
Tangible fixed assets (mSEK)	41	303	12	328
Average holding period (years)	4.5	5.3	-	-

Note: This table shows pre-buyout descriptive statistics for PE-sponsored firms and control firms in our sample, adjusted for outliers.

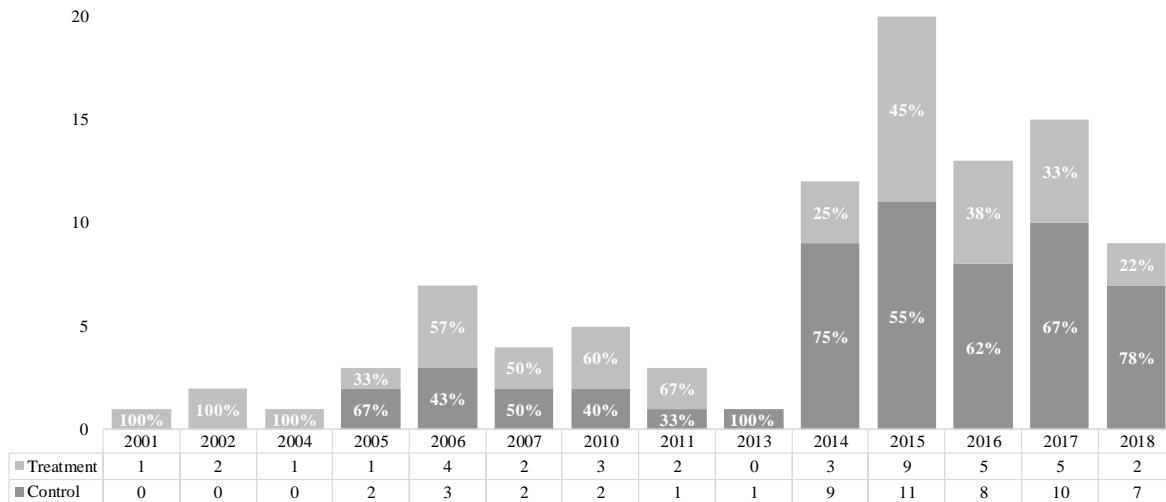
5.3 Collecting relevant stock and index data

To examine if the initiatives launched during the holding period by the PE sponsors have an impact on the long-term value creation of the portfolio companies, as proxied by the post-IPO stock performance, we use the same sample of firms as described in the previous section. That is, the sample consists of the same 102 unique Swedish companies, out of which 42 companies have previously been backed by a PE sponsor and 60 companies which have not. As mentioned previously, all these 102 companies have completed an IPO on a Swedish stock exchange sometime between 1996 and 2019.

One concern with including listings completed on different exchanges is that differences between exchanges could be affecting our results. For example, Östlund (2009) shows that companies listed on Nasdaq OMX Stockholm, in general, have higher liquidity than e.g. firms listed on Spotlight, which according to Amihud et. al (2005) could impact their stock returns. However, as can be seen in Exhibit 4 (*Appendix*), a vast majority of the companies in our sample have completed their IPO on the stock exchange Nasdaq OMX Stockholm. This means that differences among exchanges is not a large concern for us. Nonetheless, any liquidity differences between firms stemming from other factors will be controlled for by introducing liquidity fixed effects in our regression set-up, as further detailed in Section 6.2.1. Furthermore, by looking at Exhibit 5 below, we can see that there is some cyclicalities in completed IPOs in our sample. However, this is to be expected given the extensively covered dynamics of IPO-cyclicalities, as highlighted by e.g. Yung et al. (2008). It is evident that a majority of the IPOs in our sample was completed during the Swedish IPO boom between 2014 and 2018 (FactSet Insight, 2018). Additionally, there is a relatively even distribution between PE-sponsored and non-PE-sponsored IPOs, given the larger size of the control group compared to the treatment group, for most of the years considered in our study.

EXHIBIT 5

Distribution of IPOs over the considered Years



Note: This exhibit shows the distribution of IPOs in our sample over the years 1996-2019, in absolute as well as relative numbers. The exhibit only shows the years in which at least one sample firm has completed their IPO.

As a first step of collecting relevant stock and index data, we collect daily stock performance data for each company in the sample using FinBas, available at the Swedish House of Finance’s website.¹ We collect data on the daily last traded price for each stock, adjusted for corporate actions, e.g. stock splits, and hence ensure that the retrieved stock data is comparable over time. Furthermore, we collect additional data for each firm regarding the total number of shares traded for each day, also adjusted for corporate actions, to enable us to control for liquidity fixed effects. The stock price data is collected for the last trading day of the year of the IPO and the two following whole years. That is, for a company that completed their IPO sometime during 2015, we collect stock data for the last trading day of 2015 and the whole year of 2016 and 2017. In this hypothetical case, we will evaluate the stock performance for the whole year of 2016 and 2017. There is a trade-off when deciding on which horizon to consider when evaluating the post-IPO stock performance and the potential impact of previous PE ownership. On the one hand, looking at a too-short post-IPO period starting at the time of the IPO could entail, for instance, that the stock performance is heavily influenced by various degrees of underpricing which would invalidate the comparability between firms, as highlighted by for example Loughran and Ritter (2002) and Bergström et al. (2006). On the other hand, evaluating the post-IPO stock performance over a too long period following the IPO could potentially

¹ For those companies for which we are unable to collect the stock data from FinBas, we collect the data primarily from Yahoo Finance. The stock data from Yahoo Finance is adjusted for corporate actions and is thus comparable with the data from FinBas. Since stock data in FinBas is only available up until the trading day on the 30th of January 2019, supplementary data for the year 2019 is also collected from Yahoo Finance.

mean that the stock performance is not reasonably attributable to changes made by the PE sponsors and is influenced by too many other factors. Additionally, the whole calendar year following the IPO, rather than the year of the IPO, is chosen as the first year of the evaluation to ensure a better comparability between firms.

We acknowledge that the PE sponsors might still be involved in the target firm during the two-year period following the completed IPO, as it is unlikely that the PE sponsor is allowed to, or deliberately chooses to, sell all of its holdings at the time of the IPO. This could mean that the PE sponsor is still able to influence the behaviour of the firm during the first- and second-year post-IPO period that we are considering. However, since the PE sponsors are likely losing their majority influence through the IPO or during the months following the IPO, their ability to influence the target decreases significantly in the post-IPO period (Bradley et al. 2001). Thus, this is not considered a big concern for the sake of our study.

Out of the 102 unique companies in our sample, 6 companies are discarded when we collect stock related data due to either having completed their IPO in 2019, meaning that there is an insufficient amount of data available, or due to having a lack of reliable stock data. As a result, the final sample for which we have relevant stock data consist of 96 companies, out of which 40 are treatment firms and 56 are control firms. However, since 16 companies in our sample completed their IPO in 2018 or lack reliable second-year data, we can only use these 16 companies to evaluate the stock performance during the first whole year after the IPO. The sample for which we can test the two-year stock performance thus consists of 80 firms.

Next, to enable us to calculate the excess return for each listed company and year in our sample, relevant index data is collected for the years 1996-2019. The reason why we want to calculate excess returns is related to the fact that the firms in our sample have completed their IPO in different years, which could mean that they have been listed under different market conditions. By considering the excess returns, rather than raw stock returns, we account for such differences as variations in broad indices should reflect changes in market conditions (DeStefano, 2004). Given that our sample consists of companies of various sizes from different sectors and industries, the index chosen for our study is the OMX Stockholm PI (OMXSPI), also known as OMX Stockholm all-share. OMXSPI is a value-weighted price index for all firms listed on Nasdaq OMX Stockholm and hence presents a relevant indication of the development of the overall Swedish stock market. The fact that the vast majority of the firms in our sample completed their IPO on Nasdaq OMX Stockholm further reinforces our belief that OMXSPI is a valid index to use. The index data is collected from Nasdaq OMX Nordic's website and is adjusted for corporate actions (Nasdaq OMX Nordic, 2018). For each year, the

yearly index return is then calculated. The dataset containing firm-specific stock data and the dataset containing the yearly OMXSPI returns are then merged, thus enabling us to calculate the yearly excess returns over the OMXSPI for the relevant years following the IPOs for each company in our sample.

6. Empirical Strategy

As the aim of our study is to find if, and which, value creation strategies implemented by PE sponsors that have an impact on the long-term performance of portfolio companies, our empirical strategy is divided in two parts. First, we identify which initiatives that have been implemented by PE sponsors that have the largest impact on the behaviour of portfolio companies during their holding period. Secondly, we examine if these initiatives, and the subsequent changes in operational structures, affect firms' post-IPO stock performance.

6.1 Estimating PE sponsors' effect on the behaviour of target firms

To analyse PE sponsors' effect on the behaviour of target firms, we specify a model which estimates the change in treated firms' characteristics over the change of the control firms. The firm characteristics described in hypothesis 1-5 under Section 4.1 are the dependent variables which the PE sponsors are hypothesized to impact. To test these hypotheses, we look at the yearly changes in the selected firm characteristics for treated firms starting from the time of their buyout and ending at the time of their IPO, and compare them to the equivalent measures of their control firms. Thus, the treatment effect which our analysis aims to investigate is the potential impact that PE sponsors have on these measures.

There is a concern regarding potential survivorship bias in our sample as only firms that have not gone bankrupt after the buyout are included. That is, the least successful buyout cases are not included in the sample. Nonetheless, as highlighted by Bergström et al. (2007), Swedish PE-sponsored firms have historically rarely experienced bankruptcy and thus, this issue is not of big concern for our study. Additionally, there are some further concerns regarding selection bias in our sample stemming from the fact that we are merely considering buyouts for which the PE sponsors have subsequently exited their position through an IPO. This could potentially distort our results if there is a significant difference between the holding period performance of target companies that are divested by the sponsor through an IPO and those that are exited through other channels. For instance, Bergström et al. (2007) argue that target firms that have suffered weakened profitability during the period under PE ownership are less likely to be exited through an IPO, meaning that there could be an upward bias in our sample. On the contrary, exiting through an IPO could be seen as a last resort for the sponsor if they are to promptly exit their holding or if there is a lack of other buyers. However, the evidence for this is lacking, as highlighted by Michala (2016). Given this, there is a suspicion that our sample

does not include the “worst-performing” target companies, creating a potential upward bias in our sample. Yet, the presence and magnitude of such bias is hard to confirm and as highlighted by Cao and Lerner (2009), what type of firms that are selected for each exit option is still poorly understood.

6.1.1 Regression set-up and model specification

To measure the yearly changes in the selected firm characteristics, we use the first difference of the logarithmic values of each characteristic as the dependent variables. This is done to normalise the data but also for the sake of interpretability as it entails that the coefficients in the regression output are read as yearly differences in percentages. In addition to this, we also calculate the yearly percentage growth for these characteristics as a robustness check and use this as the dependent variable in separate regressions. For these regressions, the coefficients are read as yearly differences in percentage points. Additionally, we handle characteristics which take the form of percentages (ratios and margins) differently. For these measures, we take the first difference directly, meaning that the coefficients in the regression output are read as yearly differences in percentage points. In all regressions, we remove outliers to avoid having extreme values affect our estimations.

To estimate the treatment effect, we use a multilevel specification applied to a panel data set containing time series data for both the treated and the control firms. The multilevel model setup allows us to group residuals on both firm-level and matched group-level, which ensures that treated firms are only compared to the control firms which they have been matched to. Furthermore, the model controls for time-fixed effects as the development of some firm characteristics have been shown to be affected by changes in the business cycle (Fort et al., 2013). This is done by introducing dummy variables which group the yearly observations into business-cycle-clusters, where the grouping is based on OECD’s recession indicators for the Swedish economy (FRED, 2019; OECD, 2019).

The model, which estimates the effect of PE ownership on changes in firm characteristics, is denoted by the following regression set-up:

$$\Delta y_{it} = \beta * Treatment_i + \alpha_j + \varepsilon_{it}$$

where t indexes years, i indexes firms and j indexes business cycle categories. Δy_{it} is the dependent variable of interest (the yearly change in the firm characteristic of interest), α_j is

the time fixed effects and $Treatment_i$ is a dummy variable that equals one for treated firms. The main coefficient of interest is β , which measures the average difference in yearly change between treated and control firms.

6.2 Estimating PE sponsors' effect on post-IPO excess returns

Next, we want to examine whether previously PE-owned firms perform better than comparable firms in the post-IPO period. This is done as an initial step in determining if the operational structures imposed by PE sponsors create lasting value even after the sponsors have exited their position. To do this, we use a fixed effects multiple OLS model which estimates the sample firms' yearly excess returns after their IPO.

6.2.1 Regression set-up and model specification

To measure treated and control firms' stock performance after their IPOs, we look at their yearly excess returns. Here, excess returns are defined as firms' accumulated stock returns during a full calendar year, less the returns of the index OMXSPI during the same period. To fully understand how previous PE ownership affects post-IPO returns, we run two regressions. First, we compare the returns for the first full calendar year following the sample firms' IPOs. Secondly, we compare the yearly returns for both the first and the second full calendar years after the IPOs. As mentioned previously, these different time horizons are chosen in order to reduce the noise in the stock price data and for the sake of comparability between firms.

To estimate the treatment effect of interest, meaning how much previous PE ownership explains post-IPO stock returns, we apply a fixed effects multiple OLS model to a panel data set containing time series stock data for both the treated and the control firms. The firms included in the dataset are the same as in Section 6.1. However, worth noticing is that for these regressions, we no longer use the same matching approach as applied before. This is mainly because firms could have changed their operations drastically since the time of the matching, meaning that the matching is not relevant at the time of the IPO or for the following post-IPO period. It could be argued that such changes are part of the PE treatment effect that we want to measure, but due to the risk of such changes being driven by other factors than PE ownership, we do not incorporate the previous matching in this model. For instance, it could be the case that a control firm has changed the nature of its operations, making the previous matching obsolete. Instead, we use dummy variables to control for fixed effects which are expected to affect the excess returns of firms. More specifically, time fixed effects are controlled for by

introducing dummy variables for each year present in our data. This controls for differences in excess returns driven by e.g. yearly fluctuations in the market and the cyclical nature of IPOs, which have been shown to affect post-IPO returns through severe underpricing and oversubscription of offerings (Helwege and Liang, 2004). Secondly, the model controls for industry fixed effects to enable comparison between firms in different sectors. Similarly, size fixed effects are controlled for by grouping the firms into five categories based on their yearly net sales for the year of their IPO. This controls for differences in returns stemming from firm-size differences, which has been widely covered in the literature (Fama and French, 1996). Lastly, the model controls for liquidity fixed effects, as studies have shown that liquidity is a factor affecting stock returns (Amihud et al., 2005). This is controlled for by the use of a dummy variable which groups the firms based on their stock turnover, or trading volume, the first full year of trading. See Exhibit 7 (*Appendix*) for the intervals used for the groupings of size- and liquidity fixed effects.

The model reports robust standard errors to control for potential heteroskedasticity present in our sample. For the regressions focusing on the two-year period following the IPO, we also run a regression with standard errors clustered on the firm level. This is done because the data structure in this regression allows us to control for within-firm variation, and the result of this additional regression is seen as a robustness check of our overall results.

The model, which estimates the PE sponsors' effect on firms' post-IPO stock performance, is denoted by the following regression set-up:

$$r_{i,t \rightarrow t+h} = \beta * Treatment_i + \alpha_t + \alpha_s + \alpha_g + \alpha_v + \varepsilon_{it}$$

where t indexes years, h indexes the time period of interest (the first or both first and second full calendar year after the sample firms' IPOs), i indexes firms, s indexes industries, g indexes size categories and v indexes liquidity categories. $r_{i,t \rightarrow t+h}$ is the dependent variable of interest (the yearly excess return over the time period of interest), α_t , α_s , α_g and α_v are time-, industry-, size-, and liquidity fixed effects and $Treatment_i$ is a dummy variable that equals one for treated firms. The main coefficient of interest is β , which measures the average difference in yearly excess returns between treated and control firms measured in percentage points.

6.3 Explaining post-IPO excess returns using pre-IPO changes in firm characteristics

Next, given that we are able to identify an effect of PE ownership on changes in pre-IPO firm characteristics, in addition to identifying that previously PE-sponsored firms perform differently compared to their peers post-IPO, we want to test hypothesis 7. That is, we want to examine what operational structures implemented by PE sponsors during their holding periods that can explain differences in post-IPO excess returns. To do this, we use a similar model as in the previous section, with the only difference that we replace the treatment dummy with independent variables measuring the holding period change in the firm characteristics that we identify. This allows us to investigate whether changes in these characteristics, which are initiated by the PE sponsors, can explain excess returns.

6.3.1 Regression set-up and model specification

In this regression, the variables of interest are the holding period changes in the firm characteristics that we have identified. This means that the previous treatment variable is replaced by a more granular way of accounting for PE ownership. To do this, we first calculate each treated firm's holding period, defined as the year of the IPO minus the year of the Private Equity buyout. Next, each treated firm's assigned control firm (based on the matching procedure explained in Section 5.2) is given the same holding period as their respective treated firm.² After this, the holding period change in the identified firm characteristics is calculated using the last and the first observation of these characteristics for each firm.

As previously mentioned, the only thing separating this model from the model described in the previous section is that the treatment variable is replaced. This means that the model uses the same dependent variable as before and that two separate regressions are run with different time horizons. Additionally, the model controls for the same fixed effects while reporting robust and clustered standard errors in the same manner as previously described. When running the regressions, we do not use the matching approach as applied in the regression explained in Section 6.1. The reasons for doing so are the same as explained in Section 6.2. The model, which estimates the effect of the identified changes in firm characteristics on firms' post-IPO stock performance, is denoted by the regression set-up below:

² Control firms that have been matched to several treated firms are assigned the average holding period of its peers, to ensure that each firm has one measurement of its holding period.

$$r_{i,t \rightarrow t+h} = \beta_x * pre - IPO\ period\ change_{ix} + \alpha_t + \alpha_s + \alpha_g + \alpha_v + \varepsilon_{it}$$

In this regression setup, t indexes years, h indexes the time period of interest (the first or both first and second full calendar year after the sample firms' IPOs), i indexes firms, x indexes the firm characteristics of interest previously identified, s indexes industries, g indexes size categories and v indexes liquidity categories. $r_{i,t \rightarrow t+h}$ is the dependent variable of interest (the yearly excess return over the time period of interest) and α_t , α_s , α_g and α_v are time-, industry-, size-, and liquidity fixed effects. $pre - IPO\ period\ change_{ix}$ is a linear variable showing the changes in the firm characteristics previously identified, denoted in percentages. For treated firms, the pre-IPO period corresponds to the holding period of its PE sponsor. For control firms, this period is of the same length as the holding period of their previously assigned treated firm. The main coefficient of interest is β_x , which measures the average change in excess returns per a one percentage point increase in the firm characteristic of interest.

7. Results and Analysis

7.1 Results regarding PE sponsors' effect on the behaviour of target firms

In the following section, we will present the results from our regressions regarding the effect of Private Equity buyouts on firm behaviour. In Exhibit 7, we present the variables which the PE sponsors have the largest impact on in our sample. For these variables, the coefficients are significant at the 10% level or higher and the variables of interest are the treatment coefficients shown in column A1, except for the coefficient regarding ROA which is shown in column B1. In the remaining part of this section, we will primarily focus on these variables. The result from the regressions where the yearly changes in percentage points are the dependent variables are shown in column B1. For the remaining variables considered in this study, we do not identify any significant impact stemming from PE ownership. The results for these variables are shown in Exhibit 8 (*Appendix*).

EXHIBIT 7
PE sponsors' effect on the behaviour of target firms

VARIABLES	Expected Sign	Yearly changes in percentages		Yearly changes in percentage points	
		A1	A2	B1	B2
		Estimated Coefficient	95% Confidence Interval	Estimated Coefficient	95% Confidence Interval
Number of employees	-	-4.79** (2.16)	[-9.04, -0.55]	-5.73 (3.51)	[-12.6, 1.14]
Personnel expenses/employee	+	6.20** (2.96)	[0.40, 12.00]	14.60** (5.77)	[3.30, 25.91]
Salary/employee	+	4.89** (2.03)	[0.92, 8.86]	9.22** (3.81)	[1.75, 16.69]
Sales/employee	+	6.68*** (2.59)	[1.60, 11.76]	9.91** (3.96)	[2.15, 17.68]
ROA	+	-	-	1.94* (1.06)	[-0.13, 4.01]

Standard errors are clustered by two levels: matched pairs and firms. The standard errors are reported in parentheses.

*p<0.1, **p<0.05, ***p<0.01

Note: This table shows PE sponsors' effect on selected firm characteristics. In column A1-A2, the table reports the treatment effect for regressions where the yearly first difference of the logarithmic value of the characteristic of interest is the dependent variable, meaning that the coefficients are denoted in percentages. In column B1-B2, the yearly percentage change of the characteristic of interest is the dependent variable, meaning that the coefficients are denoted in percentage points. For each firm characteristic of interest, the table reports the average treatment effect and the 95% confidence interval of the average treatment effect. All regressions controls for time-fixed effects and are adjusted for outliers. For further details about the model used to generate the results, see section 6.1.1.

According to our results, the PE sponsors are successful in generating the desired outcomes for some of their operational changes and our estimates of the treatment coefficient confirm some of our prior beliefs of the impact of Private Equity buyouts.

Starting off by looking at PE sponsors' effect on the number of employees in the target firm, our results suggest that on average, the workforce in treated firms grows less per year compared to similar non-PE-sponsored firms. As shown in column A1, treated firms grow on average 4.79% less per year, where the result is significant at the 5% significance level. Even though the coefficients shown in column B1 are not significant at the 10%- significance level, these results also seem to suggest that, on average, PE-sponsored firms grow at a slower pace than their peers and thus confirm previous empirical findings. Olsson and Tåg (2012) argue that the negative impact of PE sponsors on employment growth could reflect the rigidity of the labour laws in Sweden as highlighted by OECD (2004). That is, the results could suggest that rather than laying off large parts of the workforce in the target firm, PE sponsors affect the recruitment practices in a way that restricts the hiring of new employees. Our results seem to confirm this interpretation, but our estimation of the impact of PE sponsors is slightly larger than what is found by Olsson and Tåg. This could potentially be explained by the different time periods considered in the studies, meaning that the impact of PE sponsors on employment growth has increased in recent years.

Additionally, our results suggest that while the PE sponsors do not increase the size of the workforce in the target company at the same rate as comparable non-PE-sponsored firms, they tend to increase the productivity of the workforce relatively more. According to our results, PE sponsors have a positive effect on the annual productivity per employee as measured by sales per employee. As shown in column A1, PE-sponsored firms have on average 6.68% higher annual growth in sales per employee at the 1% significance level. The sign and the extent of the effect present in our data are very much in line with the findings stemming from Private Equity buyouts in the US as presented by Davis et al. (2019). Thus, as hypothesized, it seems like PE sponsors tend to assert a larger focus on increasing the productivity of the workforce in the target company, rather than increasing the size of the workforce per se, compared to similar non-PE-sponsored firms.

Continuing on the effect of PE sponsors on the employees of the target firm, our results show that PE-sponsored firms on average have a 4.89% higher annual growth in salary per employee, at the 5% significance level. Again, despite the different time periods considered, our results are in line with the previous finding by Olsson and Tåg (2012) that Private Equity buyouts in Sweden have a positive effect on the wage level of the target company. This result

is further confirmed by our finding regarding PE sponsors' effect on personnel expenses per employee as also shown in column A1. Our results show that treatment firms on average have 6.20% higher growth in annual personnel expenses per employee, also significant at the 5% significance level. Since salaries and personnel expenses tend to be highly correlated, the result regarding personnel expenses could be considered a robustness check of our results on salary per employee. The increased growth in salary per employee could potentially indicate that PE sponsors put more emphasis on retaining current employees by increasing the incentives for them to remain in the firm and reward their accumulated skills with a steeper increase in salaries compared to non-PE-sponsored firms. By doing so, PE sponsors can minimize the cost related to educating new employees.

Our results further suggest that PE sponsors have a positive effect on the profitability of the target firm. According to our results, treated firms on average increase their ROA 1.94 percentage points more annually than similar non-PE-sponsored firms at the 10% significance level. Again, the sign of the effect of the Private Equity buyout on the profitability of the firm is as hypothesized and the magnitude of the effect resembles many of the previous empirical findings on the topic. For instance, as mentioned previously, Boucly et al. find that PE-sponsored firms improve their ROA with 4.4% more than similar non-PE-sponsored firms over the three-year period following an LBO, when examining French buyouts. Yet, explaining where exactly our results originate from is hard as it is probably the result of many initiatives launched by the PE sponsor.

Lastly, we do not identify any significant impact stemming from the value-creating initiatives launched by the PE sponsor with the purpose of reducing agency costs or improving the innovation practices of the target firm. As mentioned previously, the results for our remaining variables of interest are shown in Exhibit 8 (*Appendix*). There can be many reasons why we are not able to do so for these variables. For instance, it could be the case that the underlying data is insufficient, or it can be the case that the PE sponsors in our sample do not have the effect on these variables as we expected ex-ante, hence making it hard for us to capture any significant impact on these firm characteristics. Perhaps most surprisingly, we are not able to generate any significant result regarding the effect of a Private Equity buyout on the leverage in the target firm. However, as highlighted Boucly et al. (2011), this can potentially be explained by the fact that the debt raised by PE sponsors to support deals is not consistently capitalized in the balance sheet of the target firm, but rather in e.g. a pure holding company. If so, capturing the effect of PE sponsors' ownership on the leverage in the target firms becomes troublesome.

To conclude, it seems like the PE sponsors in our sample are focusing primarily on enhancing the quality of the workforce in the target companies that they invest in. Since our results suggest that PE-sponsored firms grow their workforce at a slightly slower pace compared to similar non-PE-sponsored firms, it could be that the productivity enhancement observed is achieved by laying off redundant parts of the workforce and subsequently reduce the pace of new hiring, by for example using more thorough recruitment processes. We also notice a higher annual salary increase in PE-sponsored firms. This could indicate that PE sponsors put more emphasis on retaining current employees and reward their accumulated skills with a steeper increase in salaries, thereby increasing the incentives for current employees to remain in the firm. The observed productivity enhancement within the PE-sponsored firms are as shown above also accompanied with an improvement in profitability as measured by ROA. As previously mentioned, the effect on ROA could originate from many different value-creating strategies. However, it is likely that the increased productivity in the workforce entails profitability improvements and thus contributes to the enhanced ROA as well.

Given that PE sponsors in our sample on average increase the productivity of the workforce and the profitability in the target firm that they invest in, the question remains if these improvements will continue even after the PE sponsors have divested their position. The improvements made during the holding period, by e.g. increasing the productivity of the workforce, could create value in the long run if the improvements can be sustained after the PE sponsors have left the target firm. Thus, theoretically, a company that is improving their productivity and profitability relatively faster than comparable firms should be able to generate superior returns. Our results and analysis regarding the post-IPO performance of our sample is presented in the following section.

7.2 Results regarding PE sponsors' effect on post-IPO excess returns

The results from our regressions regarding the post-IPO performance of previously PE-sponsored and non-PE-sponsored firms are shown in Exhibit 9 below. Again, the variable of interest is the treatment coefficient.

EXHIBIT 9
PE sponsors' effect on post-IPO excess returns

	First Year	First and Second Year	
	Yearly Excess Returns	Yearly Excess Returns	
	A1	B1 (Robust Standard Errors)	B2 (Clustered Standard Errors)
Treatment effect	18.36* (9.83)	12.52* (6.86)	12.52* (6.88)
<u>Fixed effects</u>			
Time fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Size fixed effects	Yes	Yes	Yes
Liquidity fixed effects	Yes	Yes	Yes
R-squared	0.40	0.24	0.24
Observations	91	171	171

Robust standard errors are reported in parentheses in all column except column B2, where the standard errors shown in the parentheses are clustered on firm level.

*p<0.1, **p<0.05, ***p<0.01

Note: This table shows PE sponsors' effect on firms' post-IPO excess returns, measured in percentage points. Excess returns are defined as accumulated stock returns during a full calendar year, less the return of the index "OMX Stockholm PI" during the same period. The table reports the treatment effect when looking at the first and both the first and second full calendar years after a firm's IPO. For each time horizon, regressions have been run which controls for time-, industry-, size-, and liquidity fixed effects. All regressions control for outliers. In addition to this, the full model specification focusing on the two year time horizon has been run with both robust standard errors and standard errors clustered on the firm level. For further details about the model used to generate the results, see section 6.2.1.

Our results appear to indicate that the value-creating impact by the PE sponsors differ depending on the post-IPO period considered, but we cannot with certainty assert that this is the case given the relatively large standard errors of our estimates. However, previous studies, by e.g. Cao and Lerner (2007), have found that excess returns generated by PE-sponsored IPOs tend to deteriorate over time. Therefore, given the difference between our estimates, in addition to the findings of previous studies, we have reasons to believe that our results actually suggest that the impact of PE ownership diminishes over time.

Starting off by looking at the results regarding the excess returns generated the first whole calendar year following the year of the IPO, our results suggest that on average, previously PE-sponsored firms generate 18.36 percentage points higher excess returns compared to previously non-PE-sponsored firms, at the 10% significance level. Our findings are hence in line with previous findings by SVCA who found that on average, PE-sponsored IPOs between 2001 and 2014 outperformed comparable non-PE-sponsored IPOs when

examining the 1-year excess return (SVCA, 2015). Furthermore, the identified differences in SVCA's study were of similar magnitude as our findings.

Additionally, our analysis shows that PE-sponsored IPOs produce superior yearly results not just over the first whole calendar year following the year of the IPO, but also over the two-year period following the year of the listing. According to our results, previously PE-sponsored firms generate 12.52 percentage points higher yearly excess returns during this two-year period over comparable firms, as shown in column B1. This result is also significant at the 10% significance level. Again, this result is in line with the previous findings by SVCA (2015). When accounting for clustered standard errors, the full model generates the same estimation of the treatment coefficient at the same significance level, making us consider the result to be robust.

Given the diminishing differences in excess return, it seems like the superior performance of previously PE-sponsored firms over the two-year period following the IPO-year are mostly attributable to the excess returns generated during the first year. However, identifying exactly where these differencing results depending on the time period considered originates from is difficult. Potentially, it could be the case that the excess returns generated during the second whole year following the year of the IPO are influenced by too many external factors, thus making it hard to sort out the treatment effect in the potentially noisy data. It could also be that the improvements and changes in operational structures made by the PE sponsors during the holding period, which according to our results are rewarded during the first full year following the listing, diminishes in comparison to the control firms during the second year following the IPO year. That is, the operational structures imposed by the PE sponsors during the holding period could be leading to continuous operational improvements during the first year after the public listing and then diminish over time. If so, it cannot be rejected that the superior excess returns during the first year are to some extent attributable to the fact that the PE sponsors are involved in the firm during the first year after the IPO and help to maintain the pre-IPO improvements, even though without a majority interest in the firm. Alternatively, it could also be the case that control firms are conducting some of the changes made by PE sponsors during the pre-IPO period, thereby causing the relative differences between non-PE-sponsored and PE-sponsored firms to shrink. However, as mentioned above, we cannot know for sure what drives these varying results.

7.3 Results regarding the pre-IPO initiatives' impact on post-IPO excess returns

After having established that PE-sponsored IPOs realize superior excess returns over the considered time period compared to the control group, we now turn to the results regarding whether the identified specific changes made by the PE sponsors during their holding periods can explain these superior returns. Before running these regressions, we confirm that there is no multicollinearity among the changes in firm characteristics that we have identified (see Exhibit 10 in *Appendix*). The results from the regressions in which we have replaced the treatment coefficient with a more granular measurement of the pre-IPO changes that we have proved are present in our sample, are shown in Exhibit 11 below. Here, the variables correspond to the pre-IPO period changes in the firm characteristics which we have shown that PE sponsors have the largest significant impact on. As previously explained, these regressions are conducted without using the matching approach applied before (see Section 6.3).

EXHIBIT 11

The pre-IPO initiatives' impact on post-IPO yearly excess returns

VARIABLES	First Year	First and Second Year	
	Yearly Excess Returns	Yearly Excess Returns	
	A1	B1 (Robust Standard Errors)	B2 (Clustered Standard Errors)
Δ Number of employees	-0.0494 (0.0307)	-0.0554*** (0.0179)	-0.0554*** (0.0146)
Δ ROA	0.0246 (0.0218)	0.0203 (0.0161)	0.0203* (0.0114)
Δ Sales/employee	0.0491 (0.0499)	0.0166 (0.0530)	0.0166 0.0573
Δ Salary/employee	0.0324 (0.0801)	0.0180 (0.0666)	0.0180 (0.0610)
<u>Fixed effects</u>			
Time fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Size fixed effects	Yes	Yes	Yes
Liquidity fixed effects	Yes	Yes	Yes
R-squared	0.51	0.31	0.31
Observations	81	157	157

Robust standard errors are reported in parantheses in all column except column B2, where the standard errors shown in the parantheses are clustered on firm level.

*p<0.1, **p<0.05, ***p<0.01

Note: This table shows the pre-IPO initiatives' impact on firms' post-IPO excess returns, measured in percentage points. Excess returns are defined as accumulated stock returns during a full calendar year, less the return of the index "OMX Stockholm PI" during the same period. The table reports the effects when looking at the first and both the first and second full calendar years after a firm's IPO. For each time horizon, regressions have been run which controls for time-, industry-, size-, and liquidity fixed-effects. All regressions control for outliers. In addition to this, the full model specification focusing on the two year time horizon has been run with both robust standard errors and standard errors clustered on the firm level. For further details about the model used to generate the results, see section 6.3.1.

Starting off by analysing whether the identified pre-IPO changes can explain the first-year excess returns, we cannot with certainty conclude what effect these changes have. Because the estimates in column A1 are not significant at the 10% significance level or higher, we cannot with certainty isolate the post-IPO effects of these value-creating initiatives during the first full year following the IPO. Given our findings regarding the superior returns generated by PE-sponsored IPOs, which are primarily realized during the first year following the IPO-year, we believe that this is somewhat surprising.

Interestingly, however, when treating the yearly excess returns for the two whole years following the IPO-year as the dependent variable, we generate significant results regarding the pre-IPO changes in number of employees at the 1% significance level. As shown in column B1, the coefficient is approximately -0.055 and when accounting for clustered standard errors, this estimation is unchanged. Interpreting these results, this means that a 1 percentage point increase in the growth of the workforce during the pre-IPO period entails an average negative effect of 0.055 percentage points in the yearly excess return during the two-year period following the year of the listing. Thus, given our finding that PE sponsors tend to decrease the growth of the workforce in their target firms by restricting the amount of new hiring and/or laying off less productive workers, our results indicate that these changes in firm behaviour imposed by PE sponsors are being rewarded after going public. This could potentially be explained by the operational structures, relating to the workforce, remaining in the post-IPO period and resulting in a continued increase in productivity per employee and a potential increase in profitability. That is, even after the PE sponsor has exited the firm, the structures imposed by the PE sponsor allows the company to continue to focus on increasing the productivity of workers, by for example maintaining thorough recruitment processes. This means that the structures initiated by the PE sponsor during the holding period allows the firm to continuously improve, and therefore generate higher excess returns than comparable firms. However, this explanation is not confirmed by the rest of our estimated coefficients, as we are not able to generate any significant results for the profitability nor the productivity coefficients. This could potentially be explained by the poorer data availability for these variables.

In contrast to our findings, one would intuitively expect that the post-IPO impact of the operational structures imposed by PE sponsors during their holding periods would decrease over time, especially given our findings suggesting that the superior returns generated by PE-sponsored IPOs on average do so. Therefore, as our analysis seems to suggest the opposite, the time dependence of our findings is hard to conceptually explain and our results regarding the long-term implications of pre-IPO changes in the workforce should be interpreted with care.

Potentially, however, this could indicate that firms with more restrictive pre-IPO employment growth have a hard time sustaining such operational structures in connection with becoming publicly listed. Our results further suggest that such firms return to their pre-IPO behaviour and the accompanying improvements stemming from these operational structures during the second year following the listing. Once again, it is difficult to confirm such dynamics explaining the time dependence of our results.

Beyond the pre-IPO change in employees, we are not able to generate any further significant results for either ROA, productivity per employee or salary per employee, independently of the post-IPO considered. Thus, we are unable to statistically sort out the effect of these pre-IPO changes on the post-IPO performance of target firms.

8. Conclusion

In this study, we aim to answer the question if PE sponsors create long-term value in the portfolio companies that they invest in, focusing solely on the Swedish market in the time period between 1996-2019. To do so, we measure the effect of the PE sponsors by looking at the change in firm behaviour during the holding period and examine if these operational structures can generate lasting value in the target firm, as measured by the post-IPO stock performance, even after the sponsors have exited their position.

In line with our first set of hypotheses, we find that during the holding period, PE-sponsored firms grow their workforce at a slightly slower pace, while also increasing their wages at a higher rate, compared to similar non-PE-sponsored firms. Simultaneously, PE-sponsored firms are able to increase the productivity of the workforce (as measured by sales per employee) as well as the profitability (as measured by return on assets). Altogether, our findings suggest that PE sponsors are achieving these improvements by focusing primarily on enhancing the quality of the workforce in the companies that they invest in and subsequently increasing the incentives for current employees to remain in the firm. However, we acknowledge that the superior improvements in profitability generated by PE-sponsored firms during the holding period can originate from many different value-creating strategies. However, it is likely that the increased productivity in the workforce entails profitability improvements and thus contributes to the enhanced ROA as well.

We further hypothesize that the operational structures imposed by the PE sponsors, which generate value during their holding periods, can also generate lasting value in the target firm after the PE sponsors' exit. We find that PE-sponsored IPOs are able to generate superior excess returns over the two-year period following the IPO, suggesting that overall, the operational structures imposed by the PE sponsors generate lasting improvements and sustained value in the target firm even after the PE sponsors have exited their position. Our analysis also provides indications that reductions in the growth of the workforce during the holding period can explain part of the differences that we observe in post-IPO excess returns. However, we cannot with certainty confirm what effect the value-creating initiatives present in our sample have on the post-IPO returns.

Thus, our study suggests that PE sponsors are able to generate long-term value in their holdings, even after they have exited their positions. We cannot with certainty conclude what specific initiatives that can explain this long-term value creation, but our findings indicate that

PE-initiated reductions in the growth of the workforce during the holding period can explain part of this sustained value.

8.1 Unanswered questions and further research

Given the difficulties to generate results regarding exactly what is underpinning the superior excess returns generated by PE-sponsored IPOs when taking a quantitative approach, it could be interesting to conduct a more qualitative study evaluating the reasons for the difference in post-IPO performance. This could perhaps further mitigate one of the drawbacks related to our study, namely that some of the value-creating strategies implemented by PE sponsors are hard to quantify, and thus hard to include in a study of our nature. For instance, focusing on a smaller sample could make it more feasible to incorporate qualitative aspects of the PE sponsors' value creation. Furthermore, this could also provide an opportunity to further investigate the surprising time dependence of our findings regarding the effect of pre-IPO reductions in the growth of the workforce on post-IPO excess returns. As it is hard for us to conceptually explain these findings, it would be of interest to examine this phenomenon in more detail.

Additionally, to further examine how the operational structures imposed by the PE sponsors are affecting the long-term value creation in the target firm, it could be of interest to examine how the firm characteristics affected by the PE ownership develops after the owners' exit. Due to time limitations and data constraints, stemming from the fact that our sample consists of a majority of companies that have completed their IPO very recently, we are not able to conduct this kind of analysis.

Furthermore, it should be highlighted that there could be some drawbacks in using stock performance as a proxy for long-term value creation. It could be the case that the stock performance is influenced by too much noise in the data, even after controlling for various fixed effects, hence making it hard to accurately measure the effect of interest. Going forward, it could thus be interesting to consider other "non-conventional" measures to estimate the effect of PE ownership, by e.g. evaluating the broader societal impact, as we believe this will become an ever more relevant topic in the near future.

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10. Appendix

EXHIBIT 2

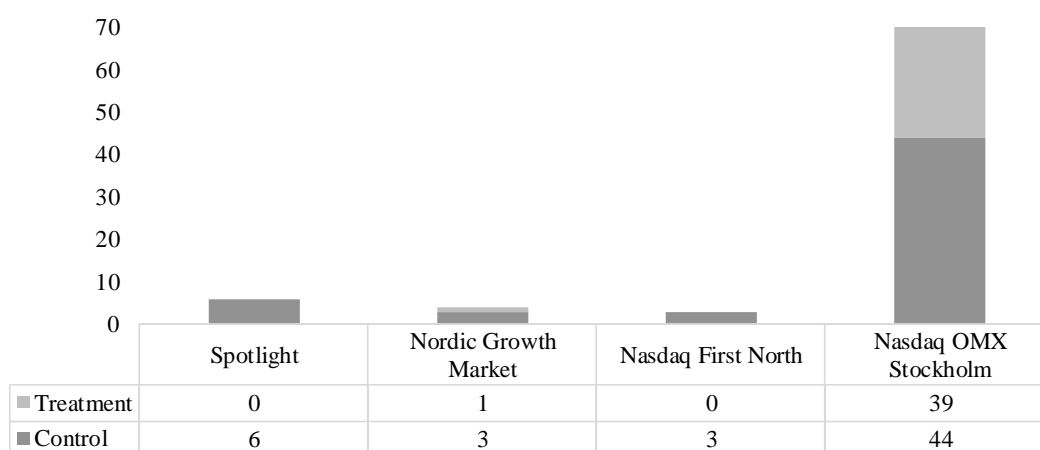
Distribution of replacements per Control Firm

# of matched pairs the Control Firm belongs to	Frequency	% of Control Group	Cumulative
1	29	48%	48%
2	12	20%	68%
3	13	22%	90%
4	5	8%	98%
5	1	2%	100%
Total	60	100%	100%

Note: This Exhibit shows the number of replacement per control firm present in our sample following our matching procedure.

EXHIBIT 4

Distribution of IPOs on the considered Stock Exchanges



Note: This exhibit shows the distribution of IPOs in our sample on the Swedish stock exchanges Spotlight, Nordic Growth Market, Nasdaq First North and Nasdaq OMX Stockholm. The exhibit only includes firms for which we gather stock-related data.

EXHIBIT 7

Intervals used for the groupings of firms based on Size and Liquidity

Size	
Category	Net sales (TSEK) - "X"
1	$> 5,000,000$
2	$5,000,000 \geq X > 1,000,000$
3	$1,000,000 \geq X > 500,000$
4	$500,000 \geq X > 50,000$
5	$500,000 \geq X > 0$

Liquidity	
Category	Annual trading volume (Thousands) - "Y"
1	$> 100,000$
2	$100,000 \geq Y > 50,000$
3	$50,000 \geq Y > 10,000$
4	$10,000 \geq Y > 1,000$
5	$1,000 \geq Y > 0$

Note: This Exhibit shows the intervals used for the grouping of firms based on Size and Liquidity. Size is based on the firms' Net sales the year of their IPO. Liquidity is based on the annual trading volume during the first full year of trading.

EXHIBIT 8

PE sponsors' effect on the behaviour of target firms - *Results not considered in study*

VARIABLES	Expected Sign	Yearly changes in percentages		Yearly changes in percentage points	
		A1	A2	B1	B2
		Estimated Coefficient	95% Confidence Interval	Estimated Coefficient	95% Confidence Interval
Net sales	+	3.25 (3.46)	[-3.53, 10.02]	1.37 (5.73)	[-9.87, 12.60]
EBITDA	+	-	-	3.99 (29.26)	[-53.35, 61.34]
EBITDA-margin	+	-	-	-0.39 (5.21)	[-10.61, 9.83]
Effective tax rate	-	-	-	-2.60 (8.32)	[-18.90, 13.70]
CAPEX	+	-	-	-51.63 (37.05)	[-124.24, 20.99]
NWC turnover ratio	+	-	-	5.06 (5.24)	[-5.21, 15.34]
Patent value ¹	+	-35.30*** (12.89)	[-60.57, -10.04]	-72.74*** (22.87)	[-117.56, -27.92]
Salary to the CEO and the BOD ²	+	0.24 (4.40)	[-8.38, 8.87]	3.39 (6.33)	[-9.01, 15.79]
Debt-to-Equity ratio	+	1.77 (6.10)	[-10.19, 13.73]	0.14 (9.33)	[-18.16, 18.43]

Standard errors are clustered by two levels: matched pairs and firms. The standard errors are reported in parentheses.

p<0.1, **p<0.05, *p<0.01

Note: This table shows PE sponsors' effect on selected firm characteristics. In column A1-A2, the table reports the treatment effect for regressions where the yearly first difference of the logarithmic value of the characteristic of interest is the dependent variable, meaning that the coefficients are denoted in percentages. In column B1-B2, the yearly percentage change of the characteristic of interest is the dependent variable, meaning that the coefficients are denoted in percentage points. For each firm characteristic of interest, the table reports the average treatment effect and the 95% confidence interval of the average treatment effect. All regressions control for time-fixed effects and are adjusted for outliers. For further details about the model used to generate the results, see section 6.1.1.

¹ Even though we find a treatment effect which is significant at the 1% level for Patent value, we do not include this result in our analysis as the sign of the coefficient contradicts our expectations and because this value is driven by shortcomings in the data, in the form of missing values and large skewness.

² Board of Directors

EXHIBIT 10

Pairwise correlations between independent variables

	Δ Number of employees	Δ Salary/employee	Δ Sales/employee	Δ ROA
Δ Number of employees p-value	1.00			
Δ Salary/employee p-value	-0.05 0.26	1.00		
Δ Sales/employee p-value	-0.05 0.30	0.18 0.00	1.00	
Δ ROA p-value	-0.02 0.61	0.01 0.78	0.27 0.00	1.00

Note: This table shows the pairwise correlations between the independent variables used in the regression set-up shown in Section 6.3.1

Before running the regressions in Section 7.3, we test for potential multicollinearity among the changes in firm characteristics that we have identified. This is done due to the concern that the previously identified changes in firm characteristics might be correlated, which could make it difficult to isolate the effect of each of the variables on the dependent variable, meaning excess returns. A sign of multicollinearity could be high pairwise correlations between the independent variables. Here, high correlation means several correlation values above 0.5 or one correlation value above 0.8 (Bergström et al., 2007). Therefore, we test for multicollinearity by examining the pairwise correlation between the previously identified yearly changes in firm characteristics, as these changes will be the independent variables in the following regressions. As shown above, we do not find any correlation exceeding 0.5. Thus, we conclude that multicollinearity in our sample is not a significant concern and should therefore not influence the results of our regressions.