

COMPARING APPLES AND APPLES

THE IMPACT OF OPERATIONAL CHANGES ON OPERATIONAL
PERFORMANCE POST LBO

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Abstract:

This paper aims to determine whether operational changes in pursuit of increased efficiency, are the mechanisms through which PE firms increase target firm performance, post leverage buyouts. This is done using a dataset of 56 Swedish firms which have been targets of leveraged buyouts. Their accounting data between the years 1998 and 2017 is examined, and the statistical method of mediation analysis is then applied. Although our findings suggested that increases in average personnel cost might be a partial mediator of LBOs on EBITDA, our findings did not support the notion that operational changes in pursuit of increased efficiency, is the method through which PE firms increase performance of their targets.

Keywords:

Private equity, Leverage buyouts, Operational performance, Operational changes, Swedish private equity market

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1. Introduction

1.1 Introduction of the Thesis

The private equity industry has for a long time played a crucial role in facilitating the growth of companies, by allowing access to capital, thus bridging the gap between venture capital and public markets. One important tool at the disposal of private equity (PE) firms is the leveraged buyout (LBO), wherein the PE firm uses a significant amount of debt to finance the acquisition of the target firm. With a low equity to debt ratio, the PE firm can achieve a higher return on equity (ROE), making LBOs attractive for PE firms. In Sweden in recent years, although the number of firms acquired through LBOs have remained relatively constant, there has been a substantial spike in the total value of these LBOs. Comparing 2013 to 2018, the total value invested in LBOs increased from SEK 5.30 billion to SEK 23.99 billion (SVCA, 2019), a more than 3.5-fold increase. The fact that private equity is a major force in the Swedish economic landscape, becomes even more apparent when one learns that Sweden has Europe's sixth highest level of private equity investments as a percentage of GDP (SVCA, 2019).

With these facts in mind, it should come as no surprise that the impact LBOs have on the operating performance and value of the target firm has been a topic of discussion for a long time. By now, there is both a well documented and widely accepted view within the research community, that LBOs have a positive impact on target firm's operating performance (Kaplan; 1989b; Berg & Gottschalg, 2003; Bergström et al., 2007).

Our paper aims to further expand on this research, by using a slightly different statistical approach than most existing literature does. While most existing literature compares data from firms who have been targets of LBOs, with a control group of firms, our data consist of only LBO firms. We include accounting data from pre LBO, during the holding period, and post exit, thus comparing the *same* set of firms under different ownership, or comparing apples and apples if you will.

By using this method, we hope to isolate the treatment effect of LBOs on target firms, i.e. PE firms making operational changes like decreasing the number of employees, from the selection effect, i.e. PE firms "picking winners" - choosing firms which anyway would have outperformed its competitors. After all, which firms are chosen for LBOs is not a stochastic variable. PE firm partners are not compensated handsomely for randomly picking targets. Instead one would expect them, through thorough due diligence and innate ability, to be able to identify firms who will perform better than peers, or who at the time of the acquisition are undervalued. Private equity investors are more sophisticated than the average investor and their ability to predict which the best performing firms will be, should thus be higher. Suggestions have been made that private equity investors simply pick superior companies and thus merely shift value from one stakeholder to the next, rather than increasing value (Tykvová & Borell, 2012).

It is only by isolating the treatment effect, one can make statements about the value a PE firm generates through an LBO. Otherwise, it could be the case that the increase in operational performance post LBOs, which is so well documented in the existing literature, has nothing to do with any operational changes that the PE firms implement, but rather comes from their ability to predict operational performance improvements.

We have chosen recent LBOs in Sweden for a few reasons. Firstly, as previously outlined, Sweden is a country in which private equity is of major importance in the economic landscape, and the effects and outcomes of LBOs will thus have major societal implications. If empirical evidence supports positive operational impact on target firms from LBOs, it should for instance from a public policy standpoint be of interest to incentivize a more beneficial investment climate. One way of doing this could for instance be through more favorable taxation systems, which could increase LBO activity at large, but also make international investors more willing to allocate their equity to the Swedish market (SVCA, 2017).

Moreover, Sweden is an interesting case to study since the strong labour laws in place, and the historically strong unions, might pose significant difficulties for PE firms when it comes to implementing operational changes pertaining to employees and wages. The issue of the existing literature not separating the treatment effect from the selection effect, hence becomes more compelling in a Swedish setting, where it is interesting to examine whether the treatment effect is significant despite restrictions posed by labor laws and unions.

1.2 Private Equity Overview

Private equity is an alternative investment form which usually consists of direct investments in private firms. Instead of investing in the stock exchange, private or institutional investors choose to allocate their capital to a fund established by the private equity firm. The typical structure of a fund is such that the majority of the raised capital is contributed by private investors, while a minority is invested by the management of the private equity fund. The private investors are called Limited Partners (LP), with limited liability of the PE fund's actions and obligations. Hence, they often have a limited to non-existent influence over the PE fund's investment decisions. The decision-making is executed by the management of the PE firm, the General Partner (GP). They are compensated with a management fee for managing the fund. Since the LPs rarely have any decision-making power when it comes to which investment opportunities to pursue, instead, the PE firm will in almost all cases establish a required internal rate of return (IRR) towards the limited partners.

When it comes to corporate governance, a common practice is that the PE firm establishes a “deal team” for each acquisition. This is a select group of managers and employees who are responsible for that specific deal, following up the target firm's performance. The acquiring PE firm usually attains one or multiple board seats in its target, and it is usually people from the deal team of that deal, which populate those seats. Through

its board positions, the PE firm can influence the operations of the firm by appointing managers and by the overall decision-making on a strategic level. For questions decided by shareholders rather than the board, the PE firm will exercise its control through its voting rights. When voting time arrives, the entire PE firm, or the investment committee in a larger PE firm, will discuss how to vote and reach a consensus.

Even though most PE firms set a required rate of return, the characteristics of the investments and strategies can differ significantly between different PE firms. Some common types of LBOs are management buyouts (MBOs), where the management of the target firm take part in the acquisition, and public buyouts, where the PE firm acquires listed companies from the stock exchange. The deals can be of enormous monetary amounts, like EQT's acquisition of SUSE Linux for USD 2.5bn (EQT, 2018). Deals can also be acquisitions of distressed assets on the edge of bankruptcy, like when Thomas Cook Group Plc divested "Vinggruppen", their Nordic business, to Altor, Strawberry group (Petter Stordalen) and TDR Capital, following their bankruptcy (Thomas Reuters, 2019).

Although the types of investments and structures may differ, a commonality is that generally, PE firms use a significant amount of debt to finance the investments, hence the name leveraged buyout. By using a higher ratio of debt, the PE firm receives "cheaper" financing, since the cost of equity is often higher than the cost of debt. Financing a larger fraction of the deal through debt, i.e. increasing leverage, will also of course increase the return on equity, something which without a doubt is interesting for investors looking to maximize returns.

A common way deals are structured, is that the PE firm will establish a holding company as an intermediary between them and the target firm, and the debt financing of the deal is kept on this holding company's balance sheet. The acquired firm will then typically send cash flows up to the holding company, which could be looked at as de facto amortizing the debt. Hence, PE firms will often look for profitable targets with strong cash flow. The cash flow generation is an important attribute as this gives greater comfort to the PE firm, that it can sustain a higher level of debt without the risk of experiencing financial distress. This is of course an additional incentive for the PE firm to identify target firms which will perform well regardless of the actions of the acquirer. Such incentives make this analysis extra interesting, as it aims to isolate the treatment effect, by comparing only target firms with themselves.

PE firms are often portrayed as somewhat predatory with aggressive cost cutting strategies affecting the employees and the overall company culture. The prejudice is that PE firms come in to restructure, fire employees and take other cost-cutting actions to maximize their own returns. With this paper, we aim to analyze whether this is a fair portrayal, by examining to what extent LBOs are followed by operational changes in search of increased efficiency. If this is the case, we then want to determine to what extent these operational changes actually lead to increased firm performance, both in the short term, during the holding period, and in the medium term, post exit.

This paper will proceed as follows; *Section 2* discusses the existing literature of relevance, *Section 3* presents the data and our empirical methodology, *Section 4* shows our results and analysis of said results, and finally *Section 5* concludes the paper.

2. Literature Review

2.1 Operational Efficiencies as a Source of Value

Steven Kaplan (1989b) examined the effects of management buyouts, a type of LBO where the buyers are the firm's managers, as early as 1989. Although dating back several decades now, this paper has been highly consequential as it in many ways laid the foundation for the future research on this topic, and still holds a lot of relevance today. The data in Kaplan (1989b) consists of 76 management buyouts completed between the years 1980 and 1986, in the US. Kaplan (1989b) is one of few papers where the dataset consists of only LBO target firms. His methodology consists of collecting accounting data for these firms, two years and one year before the LBO, as well as one year, two years and three years after the LBO.

By using this methodology, Kaplan (1989b) is able to compare the change in operational performance before and after the LBO, by looking at metrics like operating income capital expenditures, and net (operating) cash flow. Kaplan (1989b) looks at these metrics in three different ways, as levels, as a fraction of total assets, and as a fraction of annual sales. Kaplan (1989b)'s findings show that the sample companies experience an increase in both operating income and net cash flow, as well as a decrease in capital expenditures. These findings hold true both when looking at the changes in the metrics net of industry changes, and also when looking at the metrics as ratios of total assets and annual sales.

Kaplan (1989b) looks at several factors which could lead to the improvements in these operational performance metrics, but when it comes to improved operational efficiencies, he looks specifically at change in the number of employees. Contrary to the notion that a large number of employees suffer lay-offs post buyouts, Kaplan (1989b) finds no evidence that there is a decrease in the number of employees, neither in absolute terms, nor compared to each firm's industry median change in employment. Thus, he could not conclude that the increase in operational performance had its explanation by efficiencies realized from lay-offs. Kaplan (1989b) did not have access to wage data, and was thus unable to test for wage reductions as a variable impacting the operational performance of the firm.

Although this paper still is of significant importance, since the study was conducted more than three decades ago, it is highly relevant to examine whether these findings would hold true today as well. It is also interesting to question whether the results are true in a general sense regardless of geographical location, or whether looking at LBOs in a different country might change the outcome.

Bergström et al. (2007) studies the operating impact of buyouts in Sweden specifically. To do this, they looked at a sample containing all private equity sponsored exits between 1998 and the first half of 2006, with a deal value exceeding USD 5 million. To each LBO firm, a peer group was assigned consisting of the 20 largest (by sales) Swedish companies within the same industry as the LBO firm. The statistical significance of any changes in operational performance was then tested with a J1-statistica, comparing the LBO

firm with its assigned peer group. Their findings suggest that there is a positive operational performance effect from the LBO process.

They define operating performance as three specific metrics which they look at, EBITDA margin, return on invested capital and compounded annual growth in operating turnover. To explain the positive impact LBOs have on operational performance, defined as these three metrics, they outline two specific hypotheses which would be characterized as increased operational efficiencies - that the buyouts have been followed by a decrease in wages, and that they have been followed by a reduction of the labour force. By running a regression with change in EBITDA margin pre compared to post LBO as the dependent variable, they find that both a decrease in wages and a decrease in labour force would have a positive impact in the EBITDA margin. However, only the impact of the decrease in wages is significant on a 5% level. Perhaps more importantly to note however, is that they much like Kaplan (1989b), could find no significant relation between LBOs and a decrease in the labour force, nor could they find a relation with decrease in wages. This would suggest that although decreasing wages would increase operational performance, the explanation for why firms perform better post LBO is to be found elsewhere.

2.2 Taxes as a Source of Value

One aspect of value creation through LBOs which has been hypothesized about, is the tax effect the buyout has for the target firm, and the impact this has on firm value. This is something Kaplan (1989a) examines in detail. He does this by examining the same set of 76 management buyout target firms as in Kaplan (1989b). Kaplan (1989a) describes two major sources of tax benefits which could arise from LBOs. Firstly, increased levels of debt from the buyout would generate substantial interest deductions, which in turn would result in tax benefits. Secondly, higher depreciation deductions resulting from increasing the tax basis of the assets of the firm, would also yield tax benefits.

Kaplan (1989a) finds empirical support for the hypothesis that tax benefits are an important source of value creation in buyouts. Kaplan (1989a)'s findings show that the actual debt repayment schedules which can be observed, are consistent with high levels of debt. Furthermore, the data shows that a typical firm in the sample pays very low levels of federal tax in the first and second year post LBO, before typically paying slightly higher taxes in the third year.

2.3 Reduced Agency Costs as a Source of Value

Something which often occurs after LBOs, is that the leverage of the target firm is increased. Bergström et al. (2007) hypothesize that increasing leverage will positively impact operational performance, by way of reducing the agency costs. They argue that the increased levels of debt payments associated with the higher leverage, will decrease the cash flows at disposal.

This will in turn limit behavior which does not maximize value, like waste of free cash flows. They also argue that the higher leverage will increase the risk of bankruptcy, thus forcing the management of the firm to optimize their investment decisions and reduce their perquisites. However, they note that because of this, in some cases risk-averse managers might favour investments which reduce the risk of bankruptcy at the expense of firm value. Despite this caveat, Bergström et al. (2007) still stick to their hypothesis that increased leverage will increase operational performance.

Interestingly enough, although regressing EBITDA margin on leverage produces the expected sign, that increased leverage leads to increases in EBITDA margin, the result is not significant on the 5% level. There is thus no support in the data that increased leverage would improve operational performance, through the reduction of agency costs.

3. Data and Methodology

3.1 Identifying LBO firms

To obtain our sample of LBO firms, we start by retrieving a list of the 20 largest PE firms from Mergermarket, based on total volume of deals with Swedish firms, between the years 1998 and 2015 (see Table A in Appendix). To clarify, the PE firm doesn't have to be based in Sweden to be included in our sample. However, only deals with a Swedish target firm are included. One could potentially make the case that including only the largest PE firms would cause a bias in our sample, as their larger size might be the result of them being relatively better at increasing target firms' operational performance, thus being able to attract a larger volume of deals. We must however, limit our scope somehow, and these 20 PE firms account for 49% of all LBOs performed, while a majority of the excluded PE firms only performed one exit during the period. An even more important point, is that since we must limit our scope in some way, it makes sense to include the largest PE firms and exclude the smallest ones. Looking at the PE industry from a societal perspective, it is of course most interesting to look at the actors who account for most of the activity. We believe this makes our analysis more meaningful than if we had made a random selection of PE firms, since these PE firms will in all likelihood continue being active players in the industry. A PE firm which only performed one LBO during these almost two decades, will probably continue being less active, meaning the effects of the actions of such a PE firm will have less implications.

Our timespan of 1998 to 2015 is chosen because the earliest available accounting data is from the year 1998, and thus any events prior to 1998 wouldn't be interesting for our analysis. There is also no need to include years after 2015, because divestments made after 2015 are not included in our data for reasons explained later in this section.

Once the "league table", of top 20 PE firms has been defined, we obtain the PE firms' portfolio firms (LBO firms) that have been divested (the PE firm has made an exit) between the years 2008 and 2015. A divestment is defined as the PE firm realizing its investment in the company (the LBO firm). This is usually achieved by selling its stake to a trade buyer or another financial buyer, or by floating the company on the stock exchange (IPO). The above information is gathered from the database Mergermarket, and complemented when necessary by examining press releases from the acquisitions and divestments.

The reason we choose the timespan of 2008-2015 for the divestments, is because this gives us a sufficient number of exits to have enough LBO firms for our analysis. As we are interested in comparing performance before, during and after the PE firm is the majority owner, this timespan also allows us to collect accounting data for these three different periods, for the LBO firms in our sample. In addition to needing to have been divested between 2008 and 2015, to be included in our dataset as an LBO firm, the following three criteria need to be met; (1) there is obtainable information regarding, not only the exit date, but also the acquisition date of the target firm, (2) the PE firm acquired the majority of the

shares (>50%) of the target firm, and (3) the target firm remained an independent firm during and after the holding period, and was not part of any mergers.

We include the first criterion to be able to define three different periods, pre LBO, holding period, and post exit. These three different periods form the basis of our comparison. The second criterion is included since we are interested in the operational changes the PE firm can implement. If the PE firm is the majority shareholder, it has significantly more ability to exercise control and implement changes, in comparison to if it had been a minority shareholder. Cases where the PE firm is the majority shareholder are thus the most interesting to focus on. We do note that although we have data on the ownership of the firm, we do not have data of the voting rights. Because there can be different classes of shares, where classes can have more than one vote per share, the ownership a PE firm has in the firm it has acquired, doesn't necessarily have to be the same as the share of voting rights it has. However, since we set the bar at >50% ownership, all PE firms who meet this criterion will have at least 50% share of voting rights as well, as every share will be associated with at least one voting right. We might thus be including PE firms which have a significantly higher share of voting rights compared to ownership stake in the acquired firm, but never lower, and we will as such never by mistake include a target firm in which the PE firm does not have a controlling majority. We include the third criterion because we want to examine any changes in performance resulting from changes in the operations of the target firm, and not from changes in scope which would follow from a merger.

A total of 56 LBO firms met these criteria, and these firms consequently define the scope of our analysis (see Table B in Appendix). Something which our data does not include, are the companies which have suffered from bankruptcies while being owned by PE firms, and thus were never divested and therefore not available in the data from Mergermarket. This could cause a potential survivorship bias. As our analysis includes the years of the great recession, this potential bias is important to keep in mind when conducting the analysis of our results.

3.2 Collecting Accounting Data

Once the list of LBO firms has been established, the next step is to obtain each firm's accounting data. We start by using the database Retriever, where we can search by company name, and obtain each firm's corporate identity number. Something to note is the frequent use of group structures in Swedish businesses, which could potentially make our analysis more difficult. We handle this by defining the main operating entity as the LBO firm and the basis for our analysis, in cases where there is a group structure. The main operating entity within the group is identified by looking at sales and number of employees, and the corporate identity number for this entity is collected.

Once each firm's corporate identity number has been obtained, we then turn to Serrano, a database published by the Swedish House of Finance, with legal and financial information of Swedish firms. The data is based on financial statement data from the Swedish Companies Registration Office (Bolagsverket), where most Swedish companies are required to submit an audited financial statement. From Serrano we then obtain accounting data for the 56 firms within our scopes, between the years 1998 and 2017 (the latest financial year available). We do this by filtering in Serrano on the corporate identity number corresponding to each company on our list of 56 firms.

3.3 Methodology

In *Section 4.1* of the Analysis, we give an overview of the data at hand, presenting some summary statistics and visualizing some of the data, in order to help the reader understand our sample set. Our methodology is after this split into three different parts, where we in *Section 4.2* examine whether there is a link between LBOs and the operational performance of the target firm. In *Section 4.3*, we look at whether there is a link between LBOs and operational changes being implemented. Exactly which metrics and variables we use to define operational performance and changes is explained below. Finally, we are of course interested in examining to what extent any operational changes can explain increased operational performance, which is what we look at in *Section 4.4*. This will be done by way of mediation analysis, which is a method of explaining the process or mechanism by which one variable affects another. In our case, we hypothesize that there is a causal link between LBOs and operational performance, and we want to check whether operational changes implemented by the PE firm is the mechanism by which this happens.

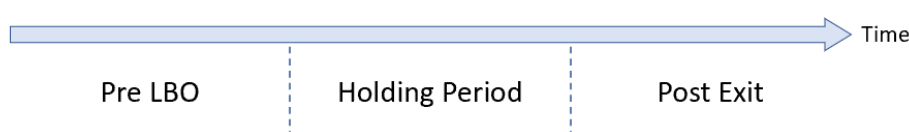
In order to make credible claims about PE firms adding value to its target firms, and the causality of this, there needs to be a link in each of these three steps. Firstly, LBOs have to be linked with an improvement in operational performance for the target firm, otherwise it is of course difficult to claim that PE ownership adds value. Secondly, if there is no link between LBOs and operational changes, then whatever potential performance improvements are found, must have another explanation. This could for instance be the PE firm being able to predict the improved performance and picking that firm as a target. Finally, the mediation analysis must show that the operational changes are the mechanisms through which performance is improved.

3.3.1 The Impact of LBOs on Operational Performance

Starting out with the first part of the analysis, we begin by defining two dummy variables, *holding_per* and *post_exit*, to distinguish the ownership status of the firm at any given year. As there are three different categories of interest here, pre LBO, the holding period, and post exit, we define two variables so that our model is not saturated. We set

holding_per = 1 if the accounting data is from a year in which the LBO firm was under ownership of the PE firm, i.e. after the LBO but before the exit, and 0 otherwise. Similarly, we put *post_exit* = 1 if the accounting data is from a year after the exit took place, and 0 otherwise. If the acquisition is made between January 1st and June 30th, we count that year towards *holding_per*, whereas if it is made between July 1st and December 31st, we do not count it. The same logic applies for the exit. The below illustration visualizes the timeline with the three different periods of ownership we have defined.

Figure 1. Timeline of Three Different Periods of Ownership



To determine whether LBOs have an impact on operational performance, we need a specific definition of operational performance to measure. In general, we are interested in key performance indicators which give insights into the efficiency of the organisation. The first key performance indicator we look at to make judgements on the operational performance is EBITDA. This is a relevant metric to examine, as it encapsulates many aspects of value creation. Both improvements in top-line sales, for example from growth and expansion into new markets, and improvements in operational efficiency, for instance optimizing the personnel costs, will impact EBITDA. Furthermore, since the EBITDA multiple (Enterprise Value/EBITDA) is frequently used in the private equity industry to value firms, it will be in the interest of each PE firm to implement operational changes to add value, which ultimately increase EBITDA. If EBITDA increases and the multiple is kept constant, the enterprise value will increase, giving higher returns to the PE firm when exit occurs.

Secondly, we look at the EBITDA margin. This is a relevant metric to look at, since it is the EBITDA-to-sales ratio, and increasing this ratio means the firm is able to keep a larger portion of its sales as profit. In other words, it is more efficient. Finally, we look at return on invested capital (ROIC) to determine operational performance. In layman's terms, this metric measures how much a firm gets back for every dollar invested in its business, or how efficiently it uses what it has. It is a similar metric to return on assets, but does not take into account assets which have nothing to do with the operations, and is as such more relevant when making inferences about operational performance.

To see whether LBOs have a positive impact on operational performance, we define the following three fixed effect regressions:

$$EBITDA_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \widetilde{u}_{it} \quad (1)$$

$$EBITDA_margin_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \widetilde{u}_{it} \quad (2)$$

$$ROIC_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \widetilde{u}_{it} \quad (3)$$

Note that no control variables have been included. Instead we opt for using a fixed effects (FE) model, something we are able to do since we have panel data, which is denoted by the accents on each of the variables. We thus do away with the issue of all firms having different characteristics across time, many of which are difficult to control for, which will impact our performance variables. With our FE model, we only compare differences *within* firms, and variables differing across firms becomes a non-issue. The drawback of this is of course that there is less variation in our data, as we are only making comparisons from year to year within each firm, meaning the statistical power is lower. On the other hand, by using fixed effects, we avoid making the somewhat strong assumption that not a single one of the multitude of differences across firms are correlated with which type of ownership the firm is under. Furthermore, the interpretation of the coefficients do not change in the fixed effects case compared to in a pooled cross sectional one. In both cases, the coefficients show the average difference in performance (EBITDA, EBITDA margin and ROIC), during the holding period and post exit period respectively, compared to the pre LBO period.

Something which is relevant for our analysis, is whether any LBOs were secondary buyouts (SBOs), wherein the acquirer and seller both are PE firms, and the seller previously has acquired the firm it is selling through an LBO. If the LBO in our dataset is a secondary buyout, and it is true that LBOs are followed by operational improvements, then these operational improvements will have been realized during the first LBO and there would be less room for improvement during the secondary buyout. With this in mind, ideally we would want to include a control variable for SBO. With the fixed effects model we have opted for, this is however not possible. Since we are only running the regression based on differences *within* firms, and not across firms, there would be no variation in a dummy variable for SBO, since it would not differ across years for the same firm. Each LBO is either an SBO or not, independent of what year it is. In our dataset, 8 out of 56 LBOs, or roughly 14% are secondary buyouts. This relatively small fraction, means that not including a dummy variable for SBOs, will have a limited effect on the outcomes of our regressions. Nonetheless, it is important to note that by excluding this variable, we might be ever so slightly underestimating the effects of LBOs on our dependent variables, which we keep in mind for our subsequent analysis.

If we expect PE firms to implement operational changes which improve performance, these changes would be implemented during the holding period, and

operational performance would be improved throughout the holding period. Post exit, the operational changes will have already been implemented and operational performance will have already been improved, if these effects are permanent. If these assumptions are true, we would expect: $\delta_0 > 0$ and $\delta_1 > 0$ for each of the three regressions above. In other words, the performance of each of these metrics during the holding period and the post exit period, is higher than during the period prior to the LBO. We define our first hypothesis as;

H1: Target firms experience improvements in operational performance post LBOs.

3.3.2 The Impact of LBOs on Operational Changes

For the next part of our analysis, we examine whether LBOs are typically followed by operational changes. As previously described, if there aren't any operational changes, then any operational performance improvements we might find, must come from another source.

Operational changes are of course difficult to define and quantify. Improvements to things like processes, supply chains and decision-making would of course impact the performance of the firm, but these changes will not show up in our accounting data. Studying these changes and their effects would regardless be quite interesting, but would be better suited for a qualitative study rather than a quantitative one like this. Instead we've chosen to focus on employees and personnel costs and personnel cost per employee, as they are undoubtedly an integral part of the operations of the firm. We are interested in operational changes which would lead to efficiencies. For the variables we are examining this would mean reductions, i.e. decreases in the number of employees, personnel costs and personnel cost per employee. Increases in these metrics, although certainly operational changes, could not be considered realizing efficiencies. Thus, we do not consider them operational *efficiency* changes.

Firstly, we look at the number of employees, *emp*. Here we would want to include sales as a control variable. As sales increase, we would expect the number of employees to increase as well, as a result of the size of the firm growing. It is logical to control for this increase, as it would not be part of a concerted effort from the PE firm to realize efficiencies by optimizing the number of employees. Secondly, we look at personnel costs, *pers_cost*. We choose this metric rather than wages, as we believe it is a much more interesting one to look at. Any measures to optimize personnel costs which are not by simply lowering wages, for instance restructuring so that social security costs are minimized for any given level of wage, will not be picked up if we examined wages. An example of this would be to hire relatively more people under the age of 26. This would decrease personnel costs for any given wage level, as they prior to 2016 cost about half in social security expenses. Ignoring such potential restructuring would mean we are missing ways of achieving increased operational efficiency should we only look at wages. By the same logic as previously with the number of employees, here we will also want to control for sales. Thirdly, we look at the personnel cost per employee, *avgpers_cost*. The two first metrics are interesting as they

are on firm level, and we are also studying the operational performance on firm level. However, it could very well be the case that both the number of employees and personnel costs increase post LBO, but the number of employees increase by much more. If this is the case then it could very reasonably be argued that the firm has increased efficiency, and thus we want to include this metric in our analysis as well. Since this variable represents a ratio, we no longer need to control for sales. We define the following fixed effect regressions:

$$\widetilde{emp}_{it} = \gamma_0 \widetilde{holding_per}_{it} + \gamma_1 \widetilde{post_exit}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (4)$$

$$\widetilde{pers_cost}_{it} = \gamma_0 \widetilde{holding_per}_{it} + \gamma_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (5)$$

$$\widetilde{avgpers_cost}_{it} = \gamma_0 \widetilde{holding_per}_{it} + \gamma_1 \widetilde{post_exit}_{it} + \widetilde{u}_{it} \quad (6)$$

To further clarify, any statistically significant result where $\gamma_0 \neq 0$ and $\gamma_1 \neq 0$ would constitute operational changes. This means that if the number of employees (keeping sales constant), total personnel costs (keeping sales constant), or personnel costs per employee either increase *or* decreases during the holding period, this would count as an operational change. However, as previously explained, we hypothesize that PE firms will implement changes in search of realizing efficiencies, thus decreasing these metrics. If we expect PE firms to implement operational changes to increase efficiency, we would expect: $\gamma_0 < 0$ and $\gamma_1 < 0$ for each of the three regressions above, i.e. the number of employees and the personnel cost are lower post LBO and post exit compared to pre LBO, keeping sales constant, and the personnel cost per employee is lower post LBO and post exit compared to pre LBO. We call such an operational change an operational *efficiency* change, and from this we define our second hypothesis as;

H2: Target firms experience operational efficiency changes post LBOs.

3.3.3 The Impact of Operational Changes on Operational Performance

In the final part of our analysis, we want to examine whether improvements in operational performance can be explained by operational changes. To address this question, we will be conducting mediation analysis. If we in *Section 4.2* establish a relationship between LBOs and operational performance, we now want to check whether this relationship is due to any intermediary variables. We examine the number of employees, the personnel costs and the personnel cost per employee to see whether these function as the mechanisms through which LBOs affect operational performance.

To do this, we define a set of fixed effect regressions, where we as dependent variables have our operational performance metrics, EBITDA, EBITDA margin and ROIC respectively. As independent variables we include both the dummy variables for holding period and post exit period, as well as the variables for operational changes, making sure to include only one variable for operational change per regression. The reason we are careful not to include multiple operational efficiency variables in the same regression, is that this would be over controlling. If we for instance included both the number of employees and personnel costs as independent variables, the coefficient for number of employees would be interpreted as the change in the dependent variable keeping personnel costs constant. This of course would make no sense, as one of the main ways reducing the number of employees would impact operational performance would be through a reduction in personnel costs. However, we will for the same reason as in the previous section still want to include sales as a control variable when looking at the number of employees and personnel costs. We thus define the following three fixed effect regressions with EBITDA as the dependent variable;

$$EBITDA_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{emp}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (7)$$

$$EBITDA_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{pers_cost}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (8)$$

$$EBITDA_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{avgpers_cost}_{it} + \widetilde{u}_{it} \quad (9)$$

The following three regressions are defined with EBITDA margin as the dependent variable:

$$EBITDA_margin_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{emp}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (10)$$

$$EBITDA_margin_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{pers_cost}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (11)$$

$$EBITDA_margin_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{avgpers_cost}_{it} + \widetilde{u}_{it} \quad (12)$$

Finally, these three fixed effect regressions are defined with ROIC as the dependent variable:

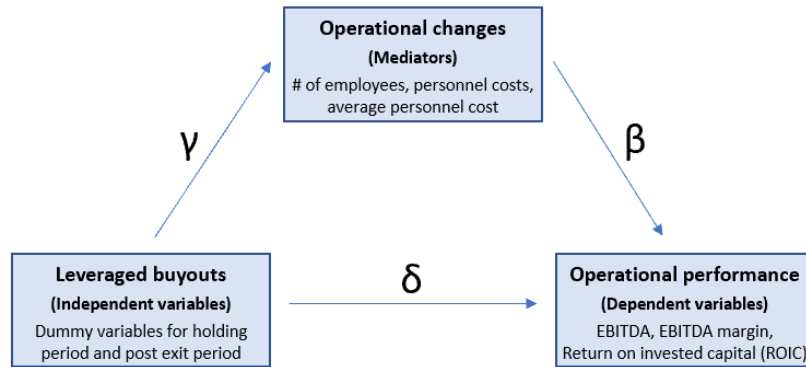
$$\widetilde{ROIC}_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{emp}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (13)$$

$$\widetilde{ROIC}_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{pers_cost}_{it} + \beta_2 \widetilde{sales}_{it} + \widetilde{u}_{it} \quad (14)$$

$$\widetilde{ROIC}_{it} = \delta_0 \widetilde{holding_per}_{it} + \delta_1 \widetilde{post_exit}_{it} + \beta_1 \widetilde{avgpers_cost}_{it} + \widetilde{u}_{it} \quad (15)$$

We note that although nine regressions have been defined, it might very well be the case that when we arrive at *Section 4.4*, not all regression will be run. This is because we only run the regressions where the variable for operational changes had a statistically significant link with LBOs. In layman's terms, if we for instance find that there is no change in the personnel cost per employee following an LBO, then it would of course not make sense to check whether change in personnel cost per employee is the mechanism through which LBOs impact operational performance. The mediation analysis is visualized below.

Figure 2. Mediation Analysis Visualized, Operational Changes as Mediators



When defining our third hypothesis, we will be very specific when it comes to the exact formulation. We are specifically interested in examining if we can explain *improvements* in operational performance. We will thus only include the operational performance variables which experience a statistically significant increase in the analysis described in *Section 3.3.1*. As mediators we include the variables for operational changes. Although we have hypothesized that these variables will decrease during the holding period and post exit period, in this section we choose to include any operational changes, regardless if they are increases or decreases, to check whether they are mechanisms for increased performance. In other words, we will examine operational changes, and not just operational *efficiency* changes. We thus define the following third hypothesis;

H₃: Operational changes are the mechanisms through which improvements in operational performance occur.

3.3.4 Non-Random Timing of LBOs as a Factor in our Analysis

Although we are solving any potential issues of the non random sampling of LBO firms compared to other firms, by only including LBO firms in our sample, there is another potential issue which must be addressed; the fact that the timing of the exit also is not a random event. A PE firm will want to optimize the timing of the entry and exit, buying at a low valuation and selling when performance is as high as possible to maximize the sale value. One could thus imagine a case where firm performance during the holding period increases due to completely exogenous factors and variables, and the PE firm seized this opportunity to make an exit. In such cases, there would be no causality between LBOs and increased performance, but the data would show a link between the two.

So what does this mean for our analysis? First of all, it is important to note that no inferences will be made about the causal link between LBOs and operational performance, solely based on the results in *Section 4.2*. Due to this timing issue, any potential link will be evidence of just that, a link, and not a causal link.

For the continuation of the analysis, the non-randomness of the timing does not pose an issue. As all PE firms have controlling majority of the firms in our sample, any operational changes will ultimately be due to direct or indirect decision-making from them. Although one could possibly imagine exogenous factors like swings in the market, which would force PE firms to implement operational changes, for instance austerity measures like lay-offs, these changes are unlikely to be strongly correlated with the timing of entry or exit. PE firms will be interested in optimizing timing in terms of performance, but it is a reasonable assumption that the number of employees or personnel costs for a given level of sales, or personnel cost per employee, will not be significant factors taken into account when deciding when to buy or sell.

One could however imagine a potential exogenous shock, which is correlated with performance, operational changes and the timing of exit. A market crash for instance, might lead to worse performance, force the PE firm to make operational changes like letting people go, and might lead the PE firm to seek divestment opportunities. Although this might certainly seem like an issue for our analysis, here we need to keep in mind that we are including sales as a control variable. We are looking at the number of employees and personnel costs for a given level of sales. Any shock like a market crash will affect sales as well, so this is taken into account. If for instance sales decrease but the number of employees decrease relatively more, then this would still be an organization having become more efficient and we would like to analyze this.

The takeaway is thus, that for the totality of the analysis, the non-randomness of the timing is not an issue. As long as the analysis is holistic, taking into account *Sections 4.2, 4.3* and *4.4* together, and no inferences about causality are made using only parts of the results, the foundation which this analysis rests on maintains solid.

4. Empirical Results and Analysis

To assess our hypotheses regarding LBOs, we present and analyze the empirical findings on the results of Swedish buyouts with accounting data from the period 1998-2017. *Section 4.1* presents some summary statistics to contextualize our analysis and provide insights into the characteristics of the firms which we base our analysis on. *Section 4.2* shows our empirical findings on the effects of LBOs on the operational metrics EBITDA, EBITDA-to-sales (EBITDA-margin), and Return on Invested Capital (ROIC), all of which have been further described in the previous section. *Section 4.3* presents our empirical findings on the effects of LBOs on the metrics we have chosen to show operational changes in search of efficiency, i.e. the number of employees, personnel costs and personnel cost per employee. *Section 4.4* presents our empirical findings on whether improvements in operational performance can be explained by operational changes, by means of mediation analysis.

4.1 Summary Statistics

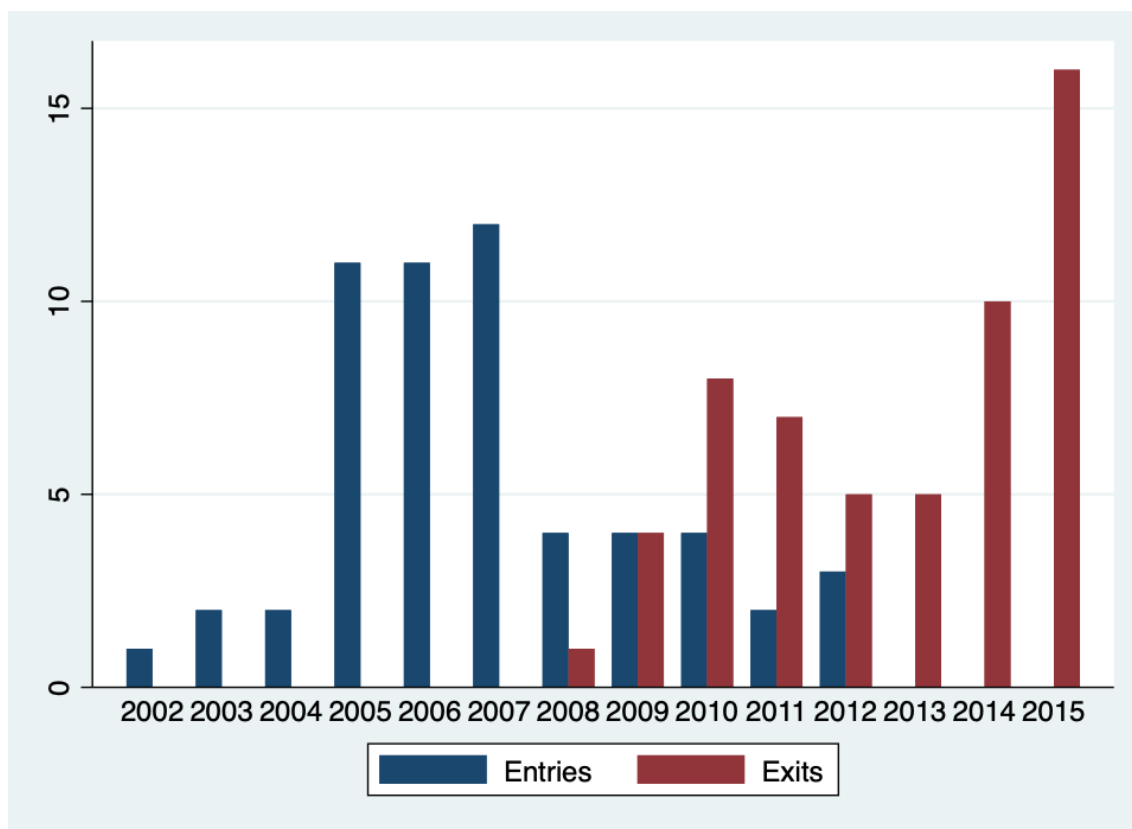
Table 3. Descriptive statistics for all firms, 1998-2017

Descriptive Statistics					
Variable	Obs	Mean	Std.Dev.	Min	Max
Sales	1056	754000	1210000	0	6130000
Employees	1058	418.483	1001.918	0	7423
Total Assets	1056	481000	585000	3725	2660000
EBIT	1056	43112.29	77128.08	-101000	386000
EBITDA	1056	56761.5	86201.18	-57500	418000
EBITDA Margin	1020	.115	.155	-.333	.785
ROIC	1056	.298	.458	-.997	2.607

Accounting data for all sample firms. n=56, t=21. Variables for Sales, Total Assets, EBIT, EBITDA, EBITDA Margin, and ROIC are winsorized at 1st and 99th percentile.

Table 3 shows an overview of the accounting data of the LBO firms in our sample, showing central characteristic metrics. Our sample firms have mean sales of SEK 754m. The average firm in our sample meets the European Union's definition of a large firm, where sales need to be above EUR 50m and the number of employees need to be above 250. The mean level of sales and number of employees for our firms are SEK 754m and 418 employees respectively, which falls comfortably above the EU's thresholds. Given that we are analyzing companies acquired by PE firms, this is not an unexpected result. PE firms often acquire mid-sized to large companies, which have grown to a decent size with good profitability.

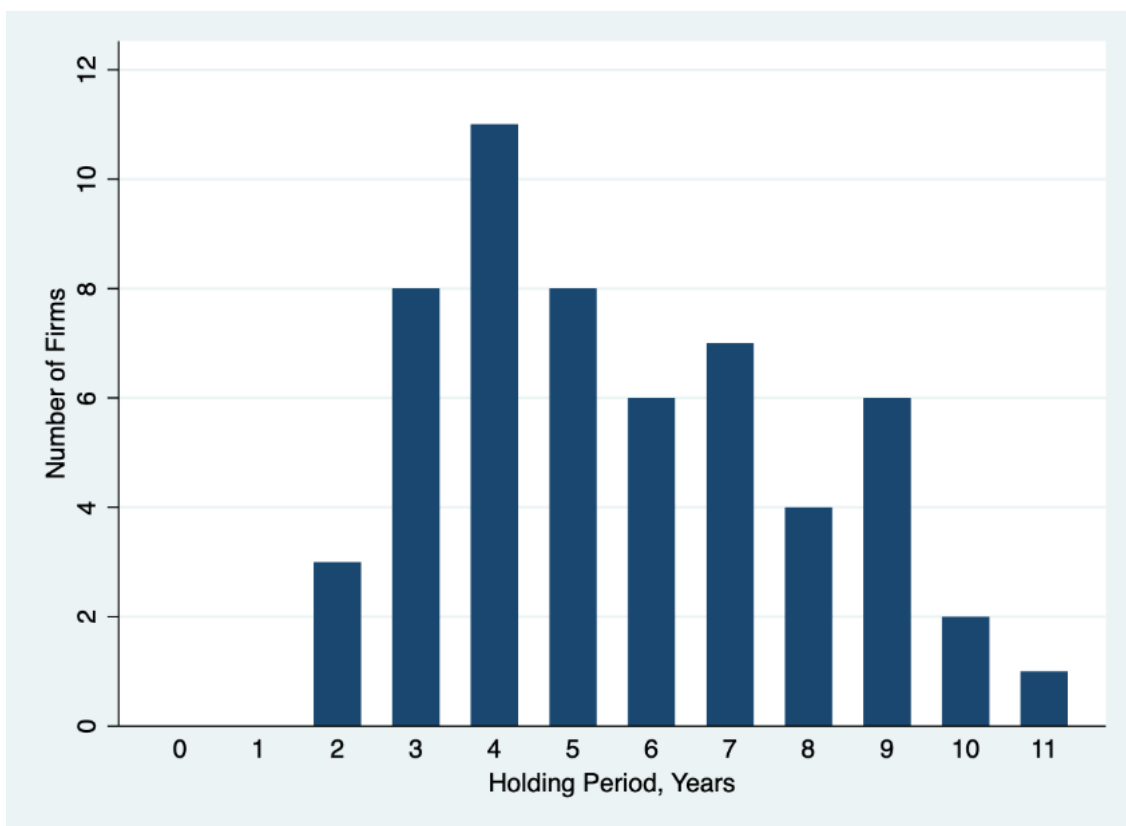
The profit metrics shown in Table 3 are also not particularly surprising. For PE firms, profitability is of significant importance in the acquisition discussions, the reason for which have already been described in *Section 1.2*. Our sample of firms have a mean EBITDA of SEK 56m, a mean EBITDA margin of 11.5%, and a mean ROIC of 29.8%. In most industries, a firm with these numbers would be considered a well-performing and profitable business, although the average performance differs significantly across industries.

Figure 4. Distribution of LBO Entries and Exits, 2002–2015

$n_{\text{entry}}=56$, $n_{\text{exit}}=56$

Moving onward to Figure 4, we can clearly see that the majority of entries, i.e. the target firm being acquired by the PE firm, occurred between 2006 and 2008. This could be explained by the prevailing bull market during that time, where business boomed across the board with banks not hesitating to lend out money to private customers, and definitely not to the private equity market. The general optimism of the financial markets at the time would not only allow access to debt to be plentiful for PE firms, but there would also be a willingness by the PE firms to be as invested as possible in the market in fear of missing out on the high returns the bull market would allow. This would mean they perform more LBOs. During the chaotic years following the Great Recession, the number of firms acquired dropped significantly. This is also to be expected, as access to debt was much more limited, and the uncertainty would lead PE firms to act in a more risk averse manner, being more cautious about making investments.

Figure 5. Distribution of Length of Holding Period by Number of Firms



n=56, mean=5 years & 7.0 months, median=5 years & 2.5 months

In Figure 5, we see that the average holding period in our sample is approximately 5 years, ranging between 2 years as the shortest holding periods and 11 years as the longest ones. It is important to note that the dummy variables we have created for the different ownership periods, will include different years across firms, since the entry and exit will occur at different times. The different dummy variables will also include different *numbers* of years, not only because the entries and exits will occur at different times, but also since the length of the holding period differs across firms. This is something which the above figure illustrates.

4.2 The Impact of LBOs on Operational Performance

Table 6. Fixed Effects Regressions - Operational Performance

VARIABLES	(1) EBITDA	(2) EBITDA Margin	(3) ROIC
Holding Period	38,728*** (9,121)	0.0374** (0.0152)	0.0730 (0.0544)
Post Exit Period	55,578*** (12,729)	0.0331* (0.0178)	0.0825 (0.0822)
Constant	31,634*** (5,488)	0.0965*** (0.00767)	0.257*** (0.0331)
Observations	1,056	1,020	1,056
R-squared	0.162	0.025	0.010
Number of Firms	56	55	56

All regressions include firm fixed effects. n=56, t=21. Variables for EBITDA, EBITDA Margin and ROIC are winsorized at 1st and 99th percentile. Robust standard errors in parentheses.

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

Table 6 shows the effect of LBOs on the three variables chosen as metrics for operational performance, EBITDA, EBITDA margin and ROIC. Starting with EBITDA, we see the result we expected, based on the existing literature. The effects of LBOs on EBITDA, both during the holding period and post exit, is positive. The coefficients can be interpreted in the following manner; for the target of an LBO, the EBITDA is on average SEK 38.7m higher during a year in which the firm is under PE ownership, compared to a year before the LBO. Similarly, the EBITDA is on average SEK 55.6m higher during a year post exit, compared to a year before the LBO. Both of these results are statistically significant at the 1% level.

A potential explanation for the difference in EBITDA being larger post exit compared to during the holding period, is that the performance improvements might occur gradually throughout the holding period, while the improvements will have already happened when the exit occurs. The coefficient will then quite naturally be lower for the holding period variable, as here we are including years towards the end of the period when improvements will have been large, but also years in the very beginning of the holding period, where improvements will be lower. What we thus observe, is a positive effect on EBITDA which starts to be realized during the holding period, and which is permanent as it is observable post exit as well.

Moving on to EBITDA margin, we see that this metric improves during the holding period and post exit period, compared to the pre LBO period. The increase during the holding period is statistically significant on the 5% level, and the increase during the post exit period is significant on the 10% level. We can interpret the coefficient for the holding period in the following way; for the target of an LBO, the EBITDA margin is on average 3.7% higher during a year in which the firm is under PE ownership, compared to a year before the LBO. Similarly, the EBITDA margin is on average 3.3% higher during a year post exit, compared to a year before the LBO.

As previously explained in *Section 3.3.4*, we are making no inferences about any causality between LBOs and the performance increasing yet, due to the non-random timing of the entries and exits. Instead, we are at this stage merely checking whether the performance increases or not, and for which variables they do. Later, in *Section 4.4*, we will try to see if we can find the mechanism through which LBOs increase performance, and only at that stage would we *potentially* be able to make inferences about causality.

We finally turn to ROIC, where we in accordance with our expectations see an increase during the holding period and post exit period compared to the pre LBO period, although these results are not statistically significant. Because of this, we can't make any definitive statements about whether the ROIC is higher during PE ownership and post exit compared to pre LBO.

A possible explanation for the increase in ROIC not being significant might for instance be differing strategies across PE firms. Although most PE firms are probably interested in maximizing ROIC in their targets, some might also be interested in seeking additional investment opportunities thus increasing the capital base. This would of course increase the denominator in the ROIC metric, muddying the waters for our analysis, and *potentially* explain the absence of statistical significance.

Even though not all of the results were statistically significant, a majority of them were, and we did not see any coefficients with the opposite sign of what we expected. We can thus make an overall assessment of the results in Table 6 which leads us to make the conclusion that hypothesis 1 is accepted, *target firms do experience improvements in operational performance post LBOs*.

4.3 The Impact of LBOs on Operational Changes

Table 7. Fixed Effects Regression - Operational Changes

VARIABLES	(1) Employees	(2) Personnel Costs	(3) Avg. Personnel Cost
Holding Period	-2.930 (41.80)	-1,433 (19,594)	111.8*** (10.12)
Post Exit Period	-57.82 (66.30)	13,017 (30,573)	196.5*** (13.19)
Sales	0.000512*** (0.000170)	0.275*** (0.0727)	
Constant	48.41 (121.0)	-22,440 (50,432)	451.1*** (5.243)
Observations	1,056	1,056	1,004
R-squared	0.411	0.564	0.440
Number of Firms	56	56	55

All regressions include firm fixed effects. n=56, t=21. Variables for Personnel Costs, Avg. Personnel Cost and Sales are winsorized at 1st and 99th percentile. Robust standard errors in parentheses.

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

Table 7 shows the effect of LBOs on the three variables chosen as metrics for operational change, the number of employees, personnel costs and personnel costs per employee, with the inclusion of a control variable for sales in each of the first two regressions. The data shows that the number of employees are fewer both during the holding period and the post exit period, compared to pre LBO, for any given level of sales. These results are however not statistically significant, and as such, no real conclusions can be made from these results. The data would also suggest that the total personnel cost decreases during the holding period compared to pre LBO, but increases post exit compared to pre LBO. Once again however, the results aren't statistically significant and as such, we won't make inferences based on these results.

Looking at the personnel cost per employee however, here we do find some statistically significant results. During the holding period the average personnel cost per employee increased by about SEK 111,800, and post exit by about SEK 196,500, compared to pre LBO. These results are both statistically significant on the 1% level.

Our hypothesis from *Section 3.3.3*, stated that we expected a decrease in personnel cost per employee, but here we see the opposite. In other words, our sample firms invest more in their employees on a per employee level after being acquired by a PE firm and after said PE firm divests, compared to before the acquisition.

Given these results, that many were statistically insignificant, and that the ones that were statistically significant although showing evidence of operational changes, didn't

show evidence of operational *efficiency* changes, we reject the second hypothesis that *target firms experience operational efficiency changes post LBOs*.

4.4 Mediation Analysis

Now the time has arrived for us to conclude our mediation analysis. In *Section 3.3.3*, nine different regressions were defined, but as we explained in that section, all nine of these regressions wouldn't necessarily be run once we had arrived here. Firstly, we would only include as dependent variables the metrics from *Section 4.2* which increased during the holding period and/or the post exit period. Since the metric ROIC didn't show a statistically significant increase, we will exclude this variable from the analysis in this section, including only EBITDA and EBITDA margin as dependent variables.

Furthermore, when examining potential mediators, the same logic applies. As neither the number of employees nor personnel costs changed in a statistically significant way during the holding period or post exit period, there is no point in examining whether these function as mediators. Personnel cost per employee however, did see a statistically significant change during the holding period and post exit period. This variable saw an increase, rather than a decrease which we had hypothesized, which made us reject our second hypothesis. Nonetheless, as explained in *Section 3.3.3*, regardless of whether the operational change variables would increase or decrease, we would include them in the mediation analysis in this section. As such, we will now examine if, and to what extent, the increase in personnel cost per employee functions as a mechanism through which LBOs impact EBITDA and EBITDA margin.

Table 8. Mediation Analysis - Personnel Cost per Employee as Mediator

VARIABLES	(1) EBITDA	(2) EBITDA	(3) EBITDA Margin	(4) EBITDA Margin
Holding Period	38,728*** (9,121)	28,241*** (8,214)	0.0374** (0.0152)	0.0288* (0.0149)
Post Exit Period	55,578*** (12,729)	44,139*** (11,484)	0.0331* (0.0178)	0.0322 (0.0206)
Avg. Personnel Cost		65.28** (27.22)		3.67e-05 (8.95e-05)
Constant	31,634*** (5,488)	6,248 (15,047)	0.0965*** (0.00767)	0.0727 (0.0434)
Observations	1,056	1,004	1,020	1,002
R-squared	0.162	0.177	0.025	0.033
Number of Firms	56	55	55	55

All regressions include firm fixed effects. n=56, t=21. Variables for EBITDA, EBITDA Margin and Avg. Personnel Cost are winsorized at 1st and 99th percentile. Robust standard errors in parentheses.

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

In order to facilitate easy comparison, we have included columns 1 and 3, in Table 8, which are the same as columns 1 and 2 respectively in Table 6. In columns 2 and 4, we have added personnel cost per employee to each of the regressions as an independent variable. Looking at the coefficient for personnel cost per employee in column 2, we see that an increase in personnel cost per employee is associated with a statistically significant increase in EBITDA on the 5% level. Comparing columns 1 and 2, we see that the coefficients for holding period and post exit period are still positive and statistically significant, but they have decreased in column 2 compared to column 1.

So how do we interpret these results? Well, the fact that the coefficient for personnel cost per employee is positive and statistically significant, while the coefficients for holding period and post exit period simultaneously decrease when introducing this new variable, means that some of the effect of LBOs on EBITDA can be explained by personnel cost per employee. However, since we still in column 2 have statistically significant positive coefficients for the dummy variables, there are still other ways in which LBOs are associated with higher EBITDA, which can't be explained by higher average personnel costs. This could for instance be other changes implemented by the PE firm, like improved process or changes in strategy, just to mention a couple of the myriad of changes that could be explanations. It could also represent a non-causal link, like the timing effect described in *Section 3.3.4*. We can however conclude that for average personnel cost as a mediator for LBOs on EBITDA, we have partial mediation.

Moving on to the columns 3 and 4, we see that an increase in personnel cost per employee is associated with an increase in EBITDA margin, but these results aren't statistically significant. We do see that the coefficients for the dummy variables decrease both in significance and as values, hinting towards the fact that personnel cost per employee works as a partial mediator for LBOs on EBITDA margin as well. However, since the coefficient for personnel cost per employee isn't statistically significant on any level, we will have to call these results inconclusive, as to whether average personnel cost works as a mediator for LBOs on EBITDA margin.

Going back to the results in column 2, how could we explain average personnel costs being a partial mediator for LBOs on EBITDA? One way of looking at it is that PE firms during the holding period invest more on a per employee basis in the staff, and this leads to increased performance. Higher wages would of course lead to increased satisfaction among employees, which in turn could lead to increased productivity. Another possible explanation is that the PE firms leverage their extensive network in hiring processes, to increase competence among staff. Hiring high competence would naturally lead to higher wages, but would also reasonably lead to increased performance. Why else would firms seek high competence, if not to increase firm performance?

These results don't necessarily need to represent a causal relation however. The causality could very well be the opposite. It could be the case that compensation is heavily tied to firm performance, through bonus programs and other incentive systems, and as

performance increases so does average personnel cost. Since the results in *Section 4.3* were the opposite of what had been hypothesized, the subsequent analysis was not what was first intended, since we primarily wanted to examine whether changes in pursuit of efficiency, i.e. decreases in our metrics, could explain increased operational performance. As such, examining whether the relation between *increases* in average personnel costs and increased operational performance represents a causal one, is an excellent topic for an extension to this paper.

Let's conclude by looking at what the results in Table 8 mean in terms of our third hypothesis. Since the results from column 4 were inconclusive, we shouldn't accept our hypothesis. However, since we did find that the variable for average personnel costs works as a partial mediator for LBOs on EBITDA specifically, it would be somewhat misleading to completely reject the hypothesis. Thus, we partially accept the hypothesis *operational changes are the mechanisms through which improvements in operational performance occur*, with the very important notes that it is true for the variables personnel cost per employee and EBITDA specifically, the mediation is partial, and that this does not necessarily represent a causal relationship.

5. Conclusion

5.1 Conclusion and Implications

The purpose of this study has been to analyze the effect a private equity firm has on the acquired firm's operational performance, through its implemented operational changes post LBO. Our sample consisted of 56 LBO firms that were divested during the years 2008-2015 by one of the 20 largest private equity firms. The PE firms were ranked based on their activity on the Swedish market (see firms in Table B in Appendix).

The applied methodology was divided into three steps. The first step was to examine whether the LBOs were linked with improvements in operational performance for the target firm. The data showed that all three operational performance metrics we chose to examine increased during both the holding period and the post exit compared to the pre LBO period. However, only EBITDA and EBITDA margin showed statistically significant increases while ROIC did not. Of important note is that we at this stage made no inferences about causality between LBOs and operational performance, the purpose of this stage was merely to establish a link between the two, to facilitate the subsequent mediation analysis.

Secondly, we looked at whether LBOs can be linked with the implementation of operational changes, by looking at the metrics number of employees, personnel costs and personnel cost per employee. No statistically significant change in number of employees or personnel costs could be seen, but we did see a statistically significant change in the average personnel cost. However, this change was in the form of an increase, and not a decrease as had been hypothesized.

Finally, we concluded with a mediation analysis, where we found that increases in personnel cost per employee worked as a partial mediator through which LBOs impacted the operational performance metric EBITDA. We did however very importantly note, for reasons explained in *Section 4.4* that this does not necessarily represent a causal relationship.

We started off this paper by noting that the positive impact LBOs have on firm performance is both well documented and widely accepted among researchers. We could not in this paper conclude that these improvements are the result of operational changes implemented by the PE firm in search of increased efficiency. As such, the possibilities for further research on this topic in order to better understand how PE firms bring about operational improvements in their target firms, are almost endless. Below we list some suggestions for such extensions.

5.2 Further research

Using a methodology not having been applied in mainstream research since Kaplan (1989a, 1989b), exclusively including LBO firms in our analysis, we may have opened a window of research which has been shut for some 30 plus years. The same methodology can be used to examine other potential mechanisms through which PE firms affect target firm performance. We looked exclusively at the operations, but financial engineering is another possible topic. One could examine whether changing leverage is a way in which PE firms usually impact performance, both in the direct effects leverage has on cash flows, but also the indirect effects on things like agency costs.

As discussed in the paper, secondary buyouts may have resulted in an underestimation of our results as initial buyouts may have a larger effect on the operational performance than in cases where other PE firms already have had controlling interest in the LBO firm. A topic of further research could be to examine possible discrepancies in effects of different types of buyouts, including both initial and secondary buyouts. Other types of buyouts could also be included in the analysis, for example buyouts taking listed companies private, or management buyouts.

Applying a qualitative rather than a quantitative methodology would also be interesting, analyzing the LBOs effect on non-monetary and non-accounting metrics, such as the company's business culture, the education levels of employees, and company strategies. Changes in internal processes, changes in decision-making, supply chain optimization and talent acquisition are all other potential ways through which PE firms could seek to enhance performance, all being well suited for a qualitative analysis. In conclusion, the possibilities to extend upon this research topic are vast, and only the imagination set the limits.

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Appendix

Table A - List of PE firms

Rank	PE firm	Value (EUR m)	Number of deals
1	EQT Partners AB	22 232	68
2	Accent Equity Partners AB	1 879	65
3	CapMan Plc	2 588	62
4	Nordic Capital	11 969	61
5	3i Group Plc	8 322	60
6	Ratos AB	10 813	58
7	Segulah Advisor AB	1 517	57
8	Litorina Capital Advisors AB	570	50
9	Priveq Investment	1 134	41
10	Procuritas AB	489	40
11	IK Investment Partners Limited	6 140	31
12	Triton Partners	5 747	31
13	FSN Capital Partners AS	262	31
14	Altor Equity Partners AB	2 531	26
15	Polaris Private Equity	558	25
16	Valedo Partners	297	25
17	Verdane Capital Advisors AS	431	20
18	Nordstjernan AB	255	17
19	Nalka Invest AB	171	17
20	Bridgepoint Advisers Limited	2 387	16

Note: The 20 largest PE firms based on volume of Swedish firm buyouts between the years 1998-2015.

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Table B - List of LBO firms

LBO firm	Investment Year	Seller at entry	PE firm	Buy type	Exit Year	Buyer at exit
AB Annas Pepparkakor	2005	Private investors	Accent Equity Partners AB	IBO	2008	Lotus Bakeries NV
Actic Group AB	2007	Founders	FSN Capital Partners AS	IBO	2012	IK Investment Partners Limited
AddPro AB	2005	Founders	Polaris Private Equity	IBO	2014	Perusa Partners II L.P.
Akerstroems Bjoerbo AB	2008	BrainHeart Capital	Verdane Capital Advisors AS	IBO	2015	Allgon AB
Alimak Group AB	2006	3i Group	Triton Partners	SBO	2015	IPO Investors
Almondy Group Holding AB	2008	Smedvig Capital & private investor	Segulah Advisor AB	IBO	2015	Givesco Bakery A/S
Alo AB	2002	Balticgruppen	3i Group Plc	IBO	2011	Altor Fund III Limited
Ambea AB	2005	Private investors	3i Group Plc	SBO	2010	Triton Partners
Anticimex AB	2005	Nordic Capital	Ratos AB	SBO	2012	EQT Partners AB
Apotek Hjärtat AB	2009	Apoteket	Altor Equity Partners AB	IBO	2014	ICA Gruppen AB
Aspen AB	2007	Founders	Valedo Partners	IBO	2010	CapMan Buyout IX Fund
Atos Medical AB	2005	Fisher Scientific	Nordic Capital	IBO	2011	EQT VI Fund
Attendo AB	2006	Bridgepoint Advisers	IK Investment Partners Limited	SBO	2015	IPO Investors
Autotube AB	2011	Specma Hydraulic	Accent Equity Partners AB	IBO	2014	AKWEL
Balco Group AB	2003	Founders	3i Group Plc	IBO	2010	Segulah IV, L.P.
Bravida Holding AB	2006	Telenor	Triton Partners	IBO	2012	Bain Capital, L.P.
Bulten AB	2004	Private investors	Nordic Capital	IBO	2011	IPO Investors
BYGGmax AB	2005	Private investors	Altor Equity Partners AB	IBO	2013	Undisclosed bidder
Cederroth International AB	2008	Alberto-Culver	CapMan Plc	IBO	2015	Orkla ASA
Dustin Group AB	2006	Private investors	Altor Equity Partners AB	IBO	2015	IPO Investors
Eltel AB	2007	Telia	3i Group Plc	SBO	2015	IPO Investors
Emotron AB	2007	Siem Capital	Polaris Private Equity	IBO	2011	CG Power and Industrial Solutions Limited
EPiServer AB	2010	Amameus Capital Partners	IK Investment Partners Limited	SBO	2014	Accel-KKR LLC
Eton Fashion AB	2012	Founders	Litorina Capital Advisors AB	IBO	2015	EQT VII Fund
Etraveli AB	2010	Norvestor Equity	Segulah Advisor AB	SBO	2015	ProSiebenSat.1 Media SE
Exotic Snacks AB	2007	Founders	Segulah Advisor AB	IBO	2011	Credelity Capital AB
Fiskarhedenvillan AB	2007	Private investors	Polaris Private Equity	IBO	2012	Litorina IV L.P.
Fristads Kansas Group	2005	Axcel	IK Investment Partners Limited	SBO	2015	Christian Dyvig (Private Investor); Michael Hauge Sorensen (Private Investor)
Frosunda Omsorg AB	2007	Praktikertjänst	Polaris Private Equity	IBO	2010	Hg
Grycksbo Paper AB	2006	Stora Enso	Accent Equity Partners AB	IBO	2009	Arctic Paper SA
Hooks Håstport AB	2011	Founders	Accent Equity Partners AB	IBO	2014	Alipes AB
Inflight Service Europe AB	2005	Founders	CapMan Plc	IBO	2009	Triton Partners
INR Nordic AB	2007	Founders	Accent Equity Partners AB	IBO	2010	CapMan Buyout IX Fund
Inwido AB	2004	Triton	Ratos AB	SBO	2014	IPO Investors
Isaberg Rapid AB	2006	Industrivärlden	Segulah Advisor AB	IBO	2009	Esselte AB
Joy Shop AB	2006	Founders	Segulah Advisor AB	IBO	2009	Joy Shop (MBO vehicle)
KGH Customs Services AB	2007	Private investors	Procuritas AB	IBO	2013	Bridgepoint Development Capital Limited
Lundhags Skomakarna AB	2007	Five seasons	EQT Partners AB	IBO	2012	Swix Sport AS
Max Matthiessen AB	2009	Government of Sweden	Altor Equity Partners AB	IBO	2014	Willis Towers Watson Public Limited Company
Menigo Foodservice AB	2006	ICA Gruppen	Nordic Capital	IBO	2010	Brakes Group
Metallfabriken Ljunghall AB	2003	Private investors	CapMan Plc	IBO	2014	Gnutti Carlo SpA
NEA Gruppen AB	2006	Investment Latour	Segulah Advisor AB	IBO	2010	Royal Imtech N.V.
Nefab AB	2007	Nordgren/Phil family	Nordic Capital	IBO	2014	Nordgren/Phil family
Nils Hansson Logistics AB	2005	Private investors	Nordstjernan AB	IBO	2011	PostNord AB
OneMed AB	2006	Tamro	CapMan Plc	IBO	2010	3i Group Plc
Osby Glas AB	2012	Private investors	Procuritas AB	IBO	2015	Beijerinvest AB
PAX Electro Products AB	2005	Private investors	Litorina Capital Advisors AB	IBO	2013	Volvation Group Plc
Permobil AB	2005	Stiftelsen för Teknisk Hjälp åt Handikappade	Nordic Capital	IBO	2013	Investor AB
Piab AB	2006	Tell family	Altor Equity Partners AB	IBO	2015	EQT Partners AB
Proxima AB Nacka Narsjukhus	2007	Praktikertjänst & Nacka Läkarkonsortium	CapMan Plc	IBO	2011	Aleris AB
San Sac AB	2008	Founder	Priveq Investment	IBO	2014	Accent Equity 2012 L.P.
Scan Coin AB	2010	Ovin family	Segulah Advisor AB	IBO	2015	Suzo-Happ Group, Inc.
Skanska Byggarvaror AB	2012	Founder	Polaris Private Equity	IBO	2015	BYGGmax AB
Swedegas AB	2009	Fortum, Equinor, E.ON & Orsted	EQT Partners AB	IBO	2015	Enagas S.A.; Fluxys SA
Tactel AB	2009	Private investors	FSN Capital Partners AS	IBO	2015	Panasonic Avionics Corporation
Trox Group AB	2010	Gunnebo Group	Accent Equity Partners AB	IBO	2013	FSN Capital Partners AS

Note: List of LBO firms that have had an exit from above PE firms between the years 2008-2015 and meet the criteria described in Section 3.1.