

# **The Operating Impact of Buyouts in Sweden**

## **-A Study of Value Creation**

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Master's Thesis in Finance  
Stockholm School of Economics

### **Abstract**

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We analyze the magnitude and determinants of private equity sponsored buyouts' impact on the operating profitability in Swedish buyout companies exited between 1998 and H1 2006. Whereas previous empirical studies have primarily been biased towards reverse LBOs, this paper analyzes buyouts irrespective of exit type. We perform an industry adjusted event study to detect abnormal operating performance and impact on the companies' employees. Our analysis suggests, in line with previous empirical studies, that buyouts have a significant positive impact on the companies' operating performance. We find no support that the increased value, on a company level, is created at the expense of the employees. Further, we find that measurable variables commonly associated with the private equity value creation process, such as wage-level reductions, labor force restructuring, leverage and management ownership, have a low explanatory value for the magnitude of the operating impact.

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**Keywords:** Private Equity, Buyouts, Abnormal Operating Performance

Tutor: Professor Clas Bergström  
Presentation: 27 April 2007, 1:00 PM  
Venue: Room 750  
Discussants: Jih-Farn Chen and Kjell Bennemark

**Acknowledgements:** We would like to thank our tutor Clas Bergström for valuable input during the process of writing this thesis.

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# 1 Introduction

International and domestic private equity sponsors have become a major force in today's Swedish economic landscape. Sweden has the world's third highest private equity investments as a percentage of GDP, surpassed only by the U.K. and the U.S. (EVCA<sup>1</sup> homepage, 24<sup>th</sup> of March 2007). In 2006, assets under management dedicated to the Swedish buyout segment was SEK 210 billion with portfolio companies' revenues amounting to close to 10 percent of the Swedish GDP, a figure that is bound to increase over the next years as less than 50 percent of the committed capital is invested to date (SVCA homepage, 24<sup>th</sup> of March 2007).

Being such a forceful market participant, it is natural that the industry has come under increasing media scrutiny over the last years, which in turn has attracted the attention of trade unions and politicians and other regulators. Both the supporters and the adversaries seem to hold strong opinions of the industry, with ever gloomier or more bullish pictures being painted about the industry's contribution to society (see for example Berggren and Hernmarck, 2007; The Guardian, 2007).

This thesis aims to assess the magnitude and determinants of the operating impact of private equity sponsored buyouts in the Swedish market. Consequently, we believe that this master thesis is contributing valuable inputs, especially in light of the ongoing debate. Whereas earlier, primarily American, studies have been limited primarily to reverse LBOs<sup>2</sup> due to lack of data, our dataset is complete with regards to the type of exit following the buyout and thereby creating an unbiased study, in the sense that it is covering both successful business restructurings as well as less successful ones. The study is also, to the best of our knowledge, the first of its kind to be performed on Swedish data as well as the first to provide a broad-based quantitative study of the determinants of the value creation process. By using a partially novel approach we are providing insights into the potential value creation or destruction attributed to buyouts, and shedding light on who stands to gain from such changes.

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<sup>1</sup> EVCA, The European Private Equity and Venture Capital Association, is a lobby organization for the European private equity sector. SVCA is its Swedish branch.

<sup>2</sup> A reverse LBO is a public equity offering by a company that has previously undergone an LBO.

Leverage is often quoted as an important factor in creating private equity returns. However, leverage cannot directly change the return to the company's combined security holders other than through reduced taxes<sup>3</sup> (Miller and Modigliani, 1958), which, from a societal point of view, can be seen as redistribution rather than true value creation. Other drivers of returns can be the timing of hot and cold capital markets (Nowak et al., 2004) or value redistribution between public bondholders and new sponsor equity (Cook et al., 1992). However, we believe that the only true value creation, i.e. on an aggregated societal basis, is done through improvements in the companies' operating performance, i.e. measures that are not directly affected by the capital structure or other tax considerations. Consequently, we will exclusively focus our study on this aspect of the private equity process. Our study is conducted on a relative<sup>4</sup> basis to isolate private equity sponsors' true operating impact and control for factors such as market timing with respect to industry choice. In addition, we will quantify the impact on the companies' employees as well as try to identify and quantify the determinants of the value creation process. It should be noted that this thesis does not describe the private equity practices as such and, consequently, requires a modest knowledge about the industry. Our study is limited to the buyout<sup>5</sup> segment of the Swedish private equity market where the companies have been exited between 1998 and H1 2006.

Our main findings are in line with previous empirical studies, indicating that the private equity process does create a significant amount of value. On average, we observe a significant abnormal positive impact<sup>6</sup> of a magnitude of 3.07 percentage units when using changes in the EBITDA margin as an indicator of operating profitability. Furthermore, contrary to expectations from theory, we find no evidence that the value created on a company level is transferred from its employees. We also find that it is difficult to single out the key determinants of the value creation as most factors, for example strategic refocusing and parenting advantage effects,<sup>7</sup> are not

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<sup>3</sup> In a less than perfect M&M world, leverage is often thought of to enhance returns by mitigating agency problems. Please see section 2 for a further discussion of the phenomenon.

<sup>4</sup> Henceforth, the term relative refers to performance in relation to the relevant peer group. Please see section 5 for further discussion.

<sup>5</sup> In line with common private equity practice, we have assumed that the buyouts are accompanied by an increase in the management ownership and leverage, thus the terms buyout and LBO are interchangeable.

<sup>6</sup> Abnormal impact refers to development of the operating statistics in excess of the performance of the peer groups.

<sup>7</sup> Please see section 2.1.1 for an explanation of the term.

readily quantifiable. Surprisingly, we cannot show that increased leverage or increased management ownership in the buyout companies has a significant positive impact on the value creation.

The paper proceeds as follows: A theoretical and empirical foundation is presented in section 2 and the hypotheses we formulate based on that foundation in section 3. The methods used are outlined in section 4 and the data and sample collection is described in section 5. In section 6, the results from the tests are described and analyzed, primarily those that are not in line with our ex ante hypotheses. Conclusions are then drawn in section 7, where suggestions for further research are also presented.

## 2 Theoretical and Empirical Foundation

In this section, we will briefly present theories, empirical findings in previous literature and industry participant views<sup>8</sup> about factors that affect value creation by private equity sponsors on the operational level.

### 2.1 Value Generation

Investors can generate value in a company in numerous ways. Financial arbitrage attributed to, for example, private information about the portfolio company and financial engineering such as optimizing the capital structure and reducing the corporate tax are examples of levers of value generation. However, in line with the discussion in section 1, these can be seen as redistribution rather than creation of value, from a societal perspective. We will focus on factors that lead to an improvement in the company's operating performance, which we see as true value creation. Private equity sponsor ownership can imply a parenting advantage and reduced agency costs, both of which can facilitate strategic and operational improvements.

#### 2.1.1 Parenting Advantage

Parenting advantage is related to the impact the particular private equity sponsor has on the value creation in its portfolio firms in terms of the resources it can offer. According to Näs (2007), private equity sponsors differ from other owners in several ways that could be critical when it comes to value generation. One important factor is that private equity has a time horizon that is long enough to implement restructuring measures and short enough for management to have the energy to bring the plans to reality. In other companies,<sup>9</sup> the time horizon is often too short or too long. Buyout companies and companies with other ownership work with the same levers of value generation, with the exception that the private equity sponsors use a wider range of

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<sup>8</sup> We have interviewed participants in different parts of the private equity industry. We have disregarded the information from private equity sponsors, as these might have an interest in portraying the industry in one way or another. Instead, we have focused on an extensive interview with a participant with insight into the value creation processes in private equity sponsored companies as well as other companies, but with a more independent relationship to the business, namely Johan Näs, partner at McKinsey & Company in Stockholm.

<sup>9</sup> Other companies refer to companies not owned by private equity sponsors.

financial levers. However, among buyout specialists,<sup>10</sup> the total value generation is in focus and there is no emotional attachment, which enables evaluation of all levers. In addition, the private equity sponsors can offer an attractive value proposition to the management of the portfolio company that include, for example, less media attention and an advantageous compensation package (Näs, 2007).

Buyout specialists can support the value generation in the post-LBO firm in various ways. Firstly, private equity deal partners have a large freedom to consider the future structure of the industry or actively create a more preferential industry structure. For example, the investors can buy several companies in the same sector and consolidate those (Näs, 2007). Secondly, the buyout specialist may be able to contribute to the management of the portfolio company with management and industry expertise. Thirdly, the private equity sponsor can add value by offering a network of contacts to the buyout company,<sup>11</sup> which may be valuable for everything from headhunting to finding a business partner (Berg and Gottschalg, 2004).

### **2.1.2 Reduction of Agency Costs**

Reduction of agency costs has no direct effect on the operating performance, but it can facilitate strategic and operational improvements (Berg and Gottschalg, 2004). There are several sources of agency cost, briefly explained below. Consequently, the reorganization that is commonly observed in the post-buyout firm tends to involve measures that reduce the agency problem in several ways (Kaplan, 1989).

The level of managerial discretion in decision-making is one determinant of the magnitude of the agency costs in an organization. The increased leverage in the post-buyout firm will decrease management discretion, in the sense that the debt payments will decrease the cash flows at disposal. This will limit waste of free cash flows as well as potential non-value maximizing behavior. High debt levels will also increase the risk of bankruptcy, which is costly for managers. Thus, the management has incentives to work harder to generate cash, restrict their consumption of perquisites and make optimal investment decisions in order to reduce the probability of bankruptcy (Berg and Gottschalg, 2004; Kaplan, 1989). However, it is worth noting

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<sup>10</sup> The terms buyout specialist and private equity sponsor are used interchangeably throughout the thesis.

<sup>11</sup> Throughout the thesis the term buyout company refers to a company bought by a private equity sponsor. The terms buyout company and buyout firm are used interchangeably.

that high leverage also can have the consequence that risk-averse managers favor investment decisions that reduce the risk of the firm assets as a means to avoid bankruptcy (Holthausen and Larcker, 1996).

Misalignment between management incentives and shareholder incentives is another source of agency costs. By, for example, encouraging or requiring management to increase their equity holdings in the company, private equity sponsors work to align these incentives after the acquisition (Berg and Gottschalg, 2004). Post-LBO management equity stake is commonly significantly larger than before the buyout (Muscarella and Vetsuypens, 1990; Easterwood et al., 1989). Consequently, the management's personal costs of inefficiency as well as the personal benefit of value creation are expected to be higher (Smith, 1990; Jensen and Meckling, 1976). Thus, the management will be motivated to make decisions that maximize the value of the firm (Easterwood et al., 1989). Moreover, the large equity stake held by management is potentially a considerable non-diversifiable equity investment. This will further strengthen their incentives to maximize shareholder value (Thompson et al., 1992). However, high management equity stakes may also lead to risk aversion as managers have a large fraction of their wealth tied in the company (Holthausen and Larcker, 1996). Heel and Kehoe (2005) show that the most successful deal partners at private equity sponsors establish substantial performance incentives for the management of the buyout firms, commonly equaling 15-20 percent of the total equity, and require CEOs at target companies to make personal investments in the firm. In addition, after a buyout, motivational systems for employees at various levels in the firm are often developed in order to more closely link pay to performance (Easterwood et al., 1989; Berg and Gottschalg, 2004).

Moreover, the extent to which the owners are able to monitor management and sanction actions that deviate from maximizing shareholder value is a critical factor determining the magnitude of the agency costs (Berg and Gottschalg, 2004). After a buyout, the ownership is typically concentrated to one or a few private equity sponsors. This concentration enables closer monitoring of the management actions and decision-making as well as allows the private equity sponsor(s) to affect the company's strategic decisions (Easterwood et al., 1989). In addition, buyout specialists are professional active investors that have a comparative advantage in monitoring the management of a post-LBO firm (DeAngelo et al., 1984).



The reduction of the agency problem after the buyout creates incentives for the management to take decisions that maximize firm value. These may involve sensitive decisions such as reducing the staff and divesting lines of businesses (Berg and Gottschalg, 2004). Buyouts may facilitate the breach of implicit contracts<sup>12</sup> with stakeholders, which may result in wealth transfers to investors by increasing operating income through, for example, employee lay-offs or wage-level reductions (Schleifer and Summers, 1988).

### **2.1.3 Improvement in Operational Effectiveness and Strategic Focus**

As mentioned above, improvement in operational effectiveness and strategic focus can be facilitated by the parenting advantage and the reduction in agency costs that can be brought about by the private equity sponsor. These enhancements can directly impact the operating performance of the buyout company.

Organizational restructuring commonly take place after a buyout, which provides a mechanism to enable more efficient use of the firm's resources (Muscarella and Vetsuypens, 1990; Wright et al., 2001). Butler (2001) and Anslinger and Copeland (1996) show that most of the value creation in LBOs can be attributed to operational improvements. Enhanced operational effectiveness can be achieved in several areas.

It is common that cost reduction programs are initiated after a buyout (Muscarella and Vetsuypens, 1990). These measures lead to, for example, considerable enhancement in plant productivity (Lichtenberg and Siegel, 1990; Harris et al., 2005; Amess, 2002). Moreover, Kaplan (1989) shows that there is a reduction in capital expenditure of the target company subsequent to an acquisition. Further, decreasing overhead costs is important for improving the overall efficiency. This is achieved by, for example, reducing the size of corporate staff, creating better mechanisms of communication and enabling quicker decision making, leading to less bureaucracy in the target firm (Easterwood et al., 1989).

Moreover, it is common to increase capital productivity and/or reduce capital requirements of the post-LBO company (Berg and Gottschalg, 2004). Easterwood et al. (1989) find significantly lower levels of inventory and receivables compared to

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<sup>12</sup> An implicit contract is a non-contractual agreement that has developed through a long-term relationship between two parties, for example between an employer and a long-time employee.

pre-buyout levels, as a result of tightened management of inventory control as well as working capital and accounts receivable management (Singh, 1990). Consequently, on average, post-LBO firms have considerably less amounts of working capital compared to their industry peers (Holthausen and Larcker, 1996).

Furthermore, poor performance of a firm can be caused by inefficient management teams. Thus, replacement of such management teams can lead to operational improvements which can enhance the performance of the company (Berg and Gottschalg, 2004). Further, for the most successful buyouts, early action from the sponsor deal partners is key. In the top third of deals with respect to performance, the management team is strengthened or changed in 83 percent of the deals, whereas in the worst performing thirds of deals, the corresponding figure is 33 percent (Heel and Kehoe, 2005).

According to Wright et al. (2001), buyouts can facilitate strategic innovation in the presence of entrepreneurial managers. Following a buyout, corporate refocusing often takes place (Seth and Easterwood, 1993) as well as divestment of marginal lines of business, leading to a sharpened strategic focus (Wiersema et al., 1995).

## ***2.2 Market Timing with Respect to Industry***

Several studies investigate the market timing component in the value generation by private equity companies (see for example Nowak et al., 2004). However, none of these discusses market timing with respect to industry, i.e. the ability of the private equity companies to pick companies in industries that have a positive development during the holding period. Näs (2007) stresses that active ownership is considerably more important than sector or market appreciation in terms of value generation. This is supported by Beroutsos et al. (2007), who claim that the most important source of returns for the private equity sponsors is the governance model they apply on their portfolio companies. Moreover, industry betting has a high volatility, whereas active ownership has a relatively low volatility. Consequently, private equity sponsors seeking to maximize the persistence of returns have incentives to focus on active ownership rather than industry betting (Näs, 2007).

### **3 Hypotheses**

Based on the theoretical and empirical foundation provided in the previous section, we have formulated nine hypotheses, outlined below, that we aim to study.

#### **3.1 Operating Performance**

On the basis of the theories and empirical findings presented in section 2 and in particular the studies that have shown that buyouts lead to an improved operating performance (see for example Kaplan 1989, Muscarella and Vetsuypens 1990, Ofek 1994), our first and foremost hypothesis is that we will be able to observe an improved operating performance among the companies in our sample during the holding period, compared to their respective peer companies.

*H<sub>1</sub>: The operating performance of the buyout companies is improved, relative to their respective peer group, during the holding period.*

#### **3.2 Market Timing Ability**

In order to further establish whether changes in operating profitability are primarily due to industry or company specific factors, and to back up our main hypothesis, we also study the performance of the industries in which buyouts have taken place. We expect to find no market timing ability with respect to industry, in line with Näs (2007) and due to the fact that the area has attracted little research attention. In other words, we expect the success of the private equity firm's investment mainly to be dependent on other factors than choice of industry to invest in.

*H<sub>2</sub>: The private equity industry does not have a market timing ability with respect to industry.*

#### **3.3 Factors Affecting Operating Performance**

A buyout is followed by a set of changes in the post-buyout firm (Muscarella and Vetsuypens, 1990), which are factors we expect to influence the operating performance. We aim to identify, describe and quantify the most important of these factors that are measurable and their effect on the operating performance. Many of these factors, such as strategic refocusing and parenting advantage effects, are difficult to measure. However, we have identified a number of factors that we are able

to quantify and formulated a set of hypotheses in order to reach our aim to explain the hypothesized relative improvement in operating performance of the firms held by private equity sponsors.

### **3.3.1 Implicit Contracts**

Schleifer and Summers (1988) claim that buyouts may facilitate breach of implicit contracts with stakeholders that can lead to wage reductions and employee-layoffs. Further, Easterwood et al. (1989) concludes that overall costs can be decreased by a reduction of the size of the corporate staff in the post-buyout firm. Thus, we expect a decrease in wage level and a reduction of the labor force in the post-buyout firm. These measures could potentially generate value for the buyout company if reduced wage levels are not accompanied by a deterioration in the quality of the workforce and employee-layoffs represent shedding of surplus capacity rather than an equally costly capital substitution. Consequently, we also hypothesize that decreases in wage levels and reduction of labor force in the buyout company can explain part of the change in operating performance.

*H<sub>3</sub>: The buyouts have been followed by a decrease in wage levels.*

*H<sub>4</sub>: The buyouts have been followed by a reduction of the labor force.*

*H<sub>5</sub>: Decreasing wage levels leads to improved operating performance.*

*H<sub>6</sub>: Reduction of labor force leads to improved operating performance.*

### **3.3.2 Leverage**

A buyout implies an increased leverage. According to Berg and Gottschalg (2004) and Kaplan (1989) an increased debt level will constrain the managerial discretion due to the decrease in available free cash flows. This will create value by reducing the agency costs of the organization. Thus, we expect the increase in debt levels, as measured by the net interest bearing debt to EBITDA ratio, to lead to an improved operating performance.

*H<sub>7</sub>: The increase in debt level leads to improved operating performance.*

### 3.3.3 Management Ownership

As the post-buyout management equity stake is commonly significantly increased compared to before the buyout, the management and owners' incentives are aligned to a larger extent (Muscarella and Vetsuypens, 1990; Easterwood et al., 1989; Berg and Gottschalg, 2004). Along the lines of Smith (1990), Jensen and Meckling (1976) and Easterwood et al. (1989), who argue that the increased management equity stakes strengthen the motivation to take decisions that maximize the firm value due to increased impact on the management's private economy, we expect the increase in management ownership, created by equity incentive programs and direct investments, to lead to an improved operating performance.

*H<sub>8</sub>: The increase in management ownership leads to improved operating performance.*

### 3.3.4 Type of Buyout

The effect of secondary buyouts<sup>13</sup> is a subject that has drawn increasing attention during the last years, but to date there is limited research conducted. However, as a consequence of the improved operating performance generated by the private equity sponsor (see for example Kaplan 1989, Muscarella and Vetsuypens 1990, Ofek 1994) and in line with Näs' (2007) reasoning about value generation in private equity sponsored companies versus firms with other ownership, we expect that there is less potential for improvement of the operating performance of companies that are acquired from other private equity sponsors. This is due to our expectation that in companies where buyout specialists have already implemented restructuring and incentive programs etc., the impact of further similar measures will have less effect than when these are initially applied. Consequently, we believe that primary buyouts will show a larger operating improvement than secondary buyouts.

*H<sub>9</sub>: Primary buyouts show a larger operating improvement than secondary buyouts.*

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<sup>13</sup> Secondary buyout refers to a buyout where the vendor is another private equity sponsor, whereas primary buyout refers to a buyout where the vendor is not a private equity sponsor or similar.

## 4 Methodology

The aim of our study is to assess and explain the true operating impact of buyouts on companies. Henceforth, the word *true* in this context refers to operating improvements that are in excess of any general improvement of the operating profitability in the company's industry, which can likely be attributed to general macro factors or other factors affecting the entire industry. Such factors are labeled *market timing* as they constitute improvements that are likely to materialize through a buy-and-hold strategy rather than by identifying and executing operating improvements.

To rid the company's performance of market timing factors we assign each company a peer group and compare the development of operating statistics in the buyout company and the peer group.<sup>14</sup> We also specifically look at the ability of private equity sponsors to time the market, i.e. to invest in industries with a positive momentum. Finally we look at factors that can explain any operating impact.

### 4.1 Measuring Operating Impact and Market Timing

We choose to look at three different operating statistics (*OPS*), namely earnings before interest, taxes, depreciation of tangible assets and amortization of intangible assets divided by sales (*EBITDA margin*), return on invested capital<sup>15</sup> (*ROIC*) and compounded annual growth in operating turnover (*growth*). We choose to focus on these three metrics, as we believe that they provide a compound and relevant picture of the operating impacts. The EBITDA margin is highly relevant and focused on in the buyout universe as price and leverage are often quoted in terms of multiples of EBITDA. Further, according to Barber and Lyon (1996), it is preferable to use a measure of operating income rather than earnings in this context. Firstly, operating income does more appropriately than earnings measure the productivity of operating assets. Secondly, after a buyout the capital structure is changed, which will have an

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<sup>14</sup> The performance of the peer group is measured as the median performance in the peer group.

<sup>15</sup> Sales less operating costs (*OC*) and theoretical taxes of the unlevered firm ( $\tau$ ) divided by fixed assets (*FA*) plus non-cash current assets (*CA*) less short term payables (*STP*):

$$ROIC = \frac{(Sales - OC) * (1 - \tau)}{FA + CA - STP}$$

effect on interest expenses and, thus, earnings but not operating income is affected (Barber and Lyon, 1996). Although affected by different accounting practices across industries, ROIC should theoretically give the most neutral cross industry comparison of operating profitability, taking into account both profit margins and capital efficiency. Growth contributes to the value creation process by ultimately expanding EBITDA.

In choosing to examine these three metrics we recognize two distinct problems, accounting for add-on acquisition and goodwill recognition. Due to the widely used practice of adding acquired companies to the additional platform acquisition it can be argued that our post-buyout data can be distorted in comparison with the pre-buyout data when major add-on acquisitions have taken place, as we are effectively not comparing the same company. The effect could potentially be sorted out by subtracting the added sales, margins and balance sheet additions from the original investment. However, we have chosen not to do so for a number of reasons. Firstly, it could be argued that an acquisition of a related company can be seen as a substitute for building the same business in-house. For our purpose, the relevant point to focus on is whether the accounting difference between the two cases will affect the study, e.g. buying new equipment and depreciating it or acquiring the same equipment in a company at a premium over the book value, recognizing goodwill. By focusing on the EBITDA margin as our main indicator of operating profitability, such differences are leveled out, granted that the acquired company has approximately the same cost structure as the platform investment. Secondly, as outlined in section 2, the usage of add-on acquisitions is an important source of value creation in the private equity process.

The second problem, goodwill recognition, arises in the buyout transaction when the company's assets are revalued to the purchase price and causes such recognition. The effect of this recognition is a downward biased estimate of ROIC in the post-buyout period relative to the pre-buyout period. Correcting this bias could be done by excluding goodwill altogether. However, our consolidated accounts are not detailed enough to single out goodwill from other intangible assets. In addition, we believe that such exclusion would create a biased measure of the operating performance both in the buyout companies and in the peer groups. This is due to the fact that goodwill derives from assets that contribute to the operating performance.

#### 4.1.1 Event Statistica

We have structured our testing of hypothesis 1 as an event study. The event we study is the buyout and the data is derived from the OPS that we measure for the buyout companies (*BOC*). We form the event window around the holding period, using the last year prior to the buyout event as the base year ( $\tau_1$ ) and the exit year ( $\tau_2$ ) as the endpoint of our measurement. Since holdings are put into place and exited throughout the year we put a six-month cutoff period during the year. For buyouts taking place during H2, the same year is used as base year and for buyouts in H1 the year immediate prior to the buyout is used. Thereby, we accredit changes to a company only in the years when it has been held by a private equity sponsor for a majority of months. Consequently, for exits we use the same year for exits made in H2 and the prior year for exits in H1. Forming the latter part of the window in this way can be further justified by the use of prognoses in the exit process to determine exit value and since managers only have about six to nine months of credible foresight (Rogers and Stocken, 2005) we believe that a six-month cutoff period is reasonable. For companies with a fiscal year other than a calendar year we have made the corresponding adjustments. In so doing, our model estimates the change in the firms operating performance relative to the change in the operating performance of the peer group (*PG*). Barber and Lyon (1996) supports this method, claiming that change models are always superior to level models (i.e. models that compare the absolute operating performance, but not the change in the measure) in detecting abnormal operating performance.<sup>16</sup>

We use a standard *J1*-statistica (see exhibit 4.1.1.1), proxying for the variance using the sample variance and measuring the true operating impact by measuring each OPS in excess of the change of the peer group in the event window. We believe the *J1*-statistica is superior to the alternative *J2*-statistica as the true operating impact is likely to be higher for companies with a higher standard deviation in their yearly performance (Campbell et al., 1997). The reasons hereto could be operating leverage and the possibility to exit companies within a specific year, i.e. to end on a high note and thereby maximizing exit proceeds, something that should have the most significant impact on more volatile companies. Alternatively, we could have used the

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<sup>16</sup> Abnormal operating performance is defined as the realized performance (of the buyout company) less the expected performance (measured as the median performance of the peer group).



non-parametric Wilcoxon signed-rank test statistic. However, given that we have controlled our sample for extreme values, the power of the t-statistic and the Wilcoxon signed-rank test statistic is similar (Barber and Lyon, 1996).

$$JI = \frac{\overline{\Delta OPS_{BOC} - \Delta OPS_{PG}}(\tau_1, \tau_2)^a}{[\hat{\sigma}^2(\tau_1, \tau_2)]^{1/2}} \sim N(0,1) \quad (4.1.1.1)$$

#### 4.1.2 Assigning Peer Group

In accordance with previous empirical studies (see for example Kaplan 1989 and Amess 2002), we use an official industry classification system in order to select relevant peer groups. The two aforementioned studies use the American Standard Industrial Classification (*SIC*) system. In our study, however, we use the updated Nomenclature Generale des Activites Economiques dans l'Union Europeenne (*NACE 1.1*) system as it is tailored after the industry structure in the European Union.

To select a peer group we look at the four first NACE 1.1-digits of the buyout company. However, as we are measuring the performance of the consolidated group we draw financials from the top holding company, which most often belongs to the group 7415 – *Management Activities of Holding Companies* and in a few instances group 5 – *Wholesale*. As the aim of the peer group is to capture underlying industrial macro trends, these groups are not very suitable, unless the company is principally engaged in the wholesale business. To mitigate this we have looked at the classification of the company's principal operating subsidiary and in a few cases where this has not been possible we have matched the company's activities ourselves with a suitable code.

Each peer group contains the 20 largest, as measured by revenues, Swedish companies with the assigned industry classification.<sup>17</sup> In cases where there have not been 20 such companies within the group, we have progressively subtracted digits from the classification code down to two digits. In cases where two digits still does

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<sup>17</sup> We have tried to control for and exclude other companies owned by private equity sponsors. However, there might still be a small number of private equity-owned companies in the peer groups, but any effect should be small.

not yield a large enough group we have expanded the geographic reach, first to the Nordic countries and then to the rest of Europe.<sup>18</sup>

By using the largest companies within each peer group, rather than companies within a certain size range of the buyout company, we potentially introduce a number of biases. It is reasonable to believe that larger companies, although per definition primarily engaged in the peer group's business, could be more diversified than smaller companies. There is also the possibility that the degree of operating leverage and underlying growth can differ between larger and smaller companies. Ideally, this should be controlled for by examining the cost structure and life cycle of each company. However, most of the buyout companies are within the 20 largest Swedish companies within their industries. Using these companies also allows us to capture the main part of the underlying changes in each industry. It is also more likely that the larger companies have been operative throughout the holding period, operating at least closely to a steady state, on average being affected primarily by changes in underlying macro factors.

It could be argued that it would be appropriate to use a method where the peer group is also selected by taking pre-event performance (i.e. the performance prior to the LBO of the buyout firm) into consideration (see Barber and Lyon, 1996). For example, if a high level of operating performance is observed in a peer firm before an event (the buyout), the tendency for mean reversion could make the firm seemingly perform poorly subsequent to the event (Barber and Lyon, 1996). However, as we (in most cases) have a peer group of 20 companies, this potential effect should not have a significant impact on the peer group performance. Further, if we would have included only companies with a similar pre-event performance, our peer groups would have been considerably reduced, especially given the fact that we also impose geographical constraints to the peer groups. Thus, we believe that the peer groups are more relevant if we include 20 companies based on industry and geographical market, rather than including considerably fewer companies based on pre-event performance, in addition to the mentioned criteria.

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<sup>18</sup> In a small number of cases we have not been able to identify 20 matching companies with the described method. In these cases we have found it more appropriate to use a somewhat smaller peer group, instead of expanding the industrial or geographical reach even further.

There are two types of survivorship biases related to the peer groups that could potentially exist in our study. Firstly, the peer groups might suffer from a survivorship bias in the sense that companies that went bankrupt during the relevant holding period would not be included. However, given that our peer groups consist of the largest companies in the respective sector, we do not find it likely that this bias would be of such magnitude that it would significantly impact our results. Secondly, the peer groups include the 20 largest companies based on the 2005 annual accounts. These 20 companies were not necessarily the largest during the relevant holding period. Due to this, the growth measure of the peer groups might be biased upwards, to the extent the 20 largest companies of 2005 differ from the 20 largest companies during the relevant holding period. This type of bias is likely to be somewhat larger, but it is mitigated by the fact that the vast majority of our peer groups consist of 20 companies and, thus, the impact should not be major. To the extent the bias affects our study, it could make our results regarding growth conservative.

Further, it is worth noting that even though the companies in the peer group are similar to the buyout company in terms of industry and geographic origin, they might have a somewhat different sales split with respect to business and geographic area. This will affect the relevance of the peer group, but it is difficult to control. We believe that selecting the peer companies on the basis of industry, geographic region and size, is a sufficiently good method that will enable us to draw certain conclusions about the true operating impact of the private equity sponsored buyouts.

#### **4.1.3 Testing Market Timing**

To test hypothesis 2, market timing abilities, we use the non-parametric sign test. We are implicitly assuming that a random industry has an equal probability of experiencing a positive development of the operating statistics ( $OPS_+$ ) as a negative ( $OPS_-$ ). This assumption can be questioned, but we believe that, as is often assumed in different studies, if the industry as a whole is operating at close to steady state conditions (see for example Runsten, 1998) any significant change in the OPS should be due to changing underlying macro conditions. We construct the test in the following order:

$H_0$ : *There is no significant difference in the number of  $OPS_+$  and  $OPS_-$ .*

$H_1$ : *There is a significant dominance of either  $OPS_+$  or  $OPS_-$ .*

Since we have 69>30 observations we use the central limit theorem to form the following test statistica:

$$Z = \frac{OPS_+ - OPS_-}{[\hat{\sigma}^2]^{1/2}} \sim N(0,1) \quad (4.1.3.1)$$

For the ROIC and the EBITDA margin we simply define  $OPS_+$  as industries where the level of the respective OPS has increased, as measured by the median company, during the holding period (defined in section 4.1.1). This definition fails to recognize the possibility of a generally changed macroeconomic climate in the economy as a whole, skewing the probability of randomly picking an improving industry away from 0.5, but we believe it is adequate for our purposes. For growth we define  $OPS_+$  as industries where the median growth has been above a certain threshold level. We use a 3 percent threshold level, as this is a level that has approximately characterized the economy as a whole during a majority of the different holding periods (SCB homepage, 31<sup>st</sup> of January 2007).

#### 4.1.4 Testing Robustness of Implicit Contracts

In order to test hypotheses 3 and 4 we deploy the same event study methodology and peer group approach as when testing for hypothesis 1. To test for wage reductions we compute the annual compounded growth rate in the ratio total employee costs ( $TOC$ ) over the total number of employees ( $TNE$ ) at entry and exit:

$$JI = \frac{\left( \frac{TOC_{BOC\tau_2} / TNE_{BOC\tau_2}}{TOC_{BOC\tau_1} / TNE_{BOC\tau_1}} \right)^{\frac{1}{\tau_2 - \tau_1}} - \left( \frac{TOC_{PG\tau_2} / TNE_{PG\tau_2}}{TOC_{PG\tau_1} / TNE_{PG\tau_1}} \right)^{\frac{1}{\tau_2 - \tau_1}}}{[\hat{\sigma}^2(\tau_1, \tau_2)]^{1/2}} \stackrel{a}{\sim} N(0,1) \quad (4.1.4.1)$$

To test for a reduction of the labor force we compute the annual compounded growth rate in total number of employees scaled by total revenues ( $TREV$ ) at entry and exit. By doing so we are effectively measuring the difference in the pace of streamlining of operations in the buyout company and the peer group, causing changing labor intensity.

$$JI = \frac{\left( \frac{TNE_{BOC\tau_2} / TREV_{BOC\tau_2}}{TNE_{BOC\tau_1} / TREV_{BOC\tau_1}} \right)^{\frac{1}{\tau_2 - \tau_1}} - \left( \frac{TNE_{PG\tau_2} / TREV_{PG\tau_2}}{TNE_{PG\tau_1} / TREV_{PG\tau_1}} \right)^{\frac{1}{\tau_2 - \tau_1}} (\tau_1, \tau_2)}{[\hat{\sigma}^2(\tau_1, \tau_2)]^{1/2}} \stackrel{a}{\sim} N(0,1) \quad (4.1.4.2)$$

## 4.2 Explaining Operating Impact

In order to test hypotheses 5-9, the impact from a number of private equity specific parameters, we estimate a regression model (see exhibit 4.2.1 below) explaining the relative change in EBITDA margin ( $\Delta EBITDA_{BOC} - \Delta EBITDA_{PG}$ ) using input on change in wage levels ( $\Delta WAGE$ ), change in labor force ( $\Delta LABOR$ ), management incentives ( $INCENTIVE$ ), leverage ( $LEVERAGE$ ) and type of buyout ( $VENDOR$ ).

For the purpose of explaining operating impact we choose to focus on the EBITDA margin as our primary operating statistic. The EBITDA margin is not affected by goodwill recognition and should, given a relatively similar cost structure in acquired companies, be the least affected by add-on acquisitions. Further, ROIC is likely to be affected by problems in measuring the size of the invested capital of the company (see the discussion about  $LEVERAGE$ , below). Also, growth can be seen as a less appropriate measure of value creation, as it does not necessarily imply improved operating results.

$$(\Delta EBITDA_{BOC} - \Delta EBITDA_{PG})_i = \alpha + \beta_1 \cdot \Delta WAGE_i + \beta_2 \cdot \Delta LABOR_i + \beta_3 \cdot INCENTIVE_i + \beta_4 \cdot LEVERAGE_i + \beta_5 \cdot VENDOR_i + u_i \quad (4.2.1)$$

( $\Delta WAGE$ ) & ( $\Delta LABOR$ ) – The change in wage levels and change in labor force consists of the relative annual compounded percentage growth in wage level and labor intensity, the same input as used for testing the robustness of implicit contracts, as described in section 4.1.4. Although we have not established a significant post-buyout change in any of the parameters at this stage, we deem it relevant to include these

variables. Even if we, on average, cannot conclude any such change, but still find a significant operating impact, we cannot rule out a higher occurrence of wage and labor reductions in successful buyouts. Thus, we include these as independent parameters as they should then have explanatory power.

(INCENTIVE) – Management incentives consist of the percentage ownership of management and key employees of the equity of the buyout company. We calculate the ownership on a fully diluted basis, using direct holdings and any outstanding options, warrants and convertible debentures or any other equity like instruments plus any options issued by an outside party on the equity of the company. There is a degree of uncertainty in these figures, especially on the outside options. This will be discussed in section 5.3. Another, potentially important, factor that this measurement fails to recognize is the occurrence and size of other discretionary and formulaic based incentive programs, giving the management an equity-like interest in the company. However, in cases where we have reliable data on such programs we have concluded that they are small in comparison with the direct equity interest.

(LEVERAGE) – Leverage is defined as the net long- and short-term outstanding interest bearing debt at the end of the holding period's first year divided by the trailing 12-months EBITDA. We use the net debt to EBITDA ratio as it is a commonly quoted indebtedness ratio by practitioners. Although the debt level should be gradually decreased throughout the holding period, we choose to use the initial debt level, rather than an average. In the initial capitalization, the private equity sponsor determines a level of debt that the company is deemed to be capable of supporting. Since a private company can be recapitalized with relative ease, we believe that the initial debt level should be indicative of the potential disciplinary effect on management. However, due to different intra-industry specific needs for working capital and capital expenditures, EBITDA is not an ideal proxy for cash flow available for debt service. Therefore we would ideally like to measure the debt level in relation to the prevailing debt level in the peer group to control for innate factors caused by the operating environment. This has, however, not been possible as most peer groups contain several companies without any debt.<sup>19</sup>

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<sup>19</sup> The lack of apparent debt in several of the peer group companies is due to the fact that several of them are subsidiaries. Consequently they have most of their debt as inter group liabilities, which are not separately disclosed in our database. This also affects the size of the apparent invested capital.

(VENDOR) – The type of vendor is a dummy variable taking the value 1 if the company was acquired in a secondary buyout from another private equity sponsor and 0 if the company was acquired in any other transaction, such as a public-to-private transaction or a divisional buyout. Admittedly, there is a degree of discretion in determining the type of vendor. In distinguishing between divisional and secondary buyouts we have looked at the holding period of the previous owner and if the company has any apparent synergies with other holdings.

As is apparent from section 2, the above factors are not by far the only ones affecting the change in operating performance for buyout companies. We therefore expect a relatively low explanatory power of the model and a degree of misspecification. However, these parameters are the ones that we can readily measure, and by doing so we can get an indication of their significance, although the model will be misspecified.

## 5 Sample and Data

In this section, we will provide a description of the data set and data gathering methods used in our study, and contrast it to data used in previous empirical studies. We will also briefly comment on the distribution of the sample and present descriptive statistics.

### ***5.1 Dataset Used in Previous Empirical Studies***

The fact that previous empirical studies<sup>20</sup> have primarily been performed on American data<sup>21</sup> (see for example Kaplan, 1989; Muscarella and Vetsuypens, 1990 and Sing, 1990) introduces a potential sample bias in these studies. In American data there is a general unavailability of accounting data for non-public companies. Disclosure of accounting data is, except for in a few situations, highly voluntary and is seldom done. Contrary, it could be an advantage for private equity sponsored companies, not being forced to disclose data about sales, margins and other potentially desirable information for competitors and customers. This limits the scope of the aforementioned studies primarily to reverse LBOs. This can potentially create a biased selection since not all buyouts are exited through such public offerings. One mitigant exists in the form of outstanding public debt or offerings of debt instruments or preferred stocks, which also require disclosure of such data. This is much more common in the U.S., than in Europe, due to their common law tradition (Ergungor, 2002). However, these companies still only account for a fraction of the buyout market. As the aforementioned studies, just as our study, include pre-buyout data, the problem is pronounced since a large part of the market consists of divisional buyouts where such data is limited to the segment-reporting requirement of U.S. GAAP. The selection bias can create skewed results if there is a significant and systematic difference between the performance of buyouts exited through public offerings and other types of exits, such as a secondary buyout or a sale to a strategic buyer.

The selection bias and the problem it creates are discussed by Kaplan (1989), but dismissed as small. However, we believe that there is reason to believe that using primarily reversed LBOs can create upwardly biased results. Examining U.S. IPO statistics, it is clear that negative or weak earnings in public equity offerings was

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<sup>20</sup> For a brief overview of previous empirical studies, please see Appendix B.

<sup>21</sup> There are a few exceptions, see for example Amess (2002).



relatively rare during the time periods covered by such studies, especially in industries preferred by private equity sponsors (Ritter, 2006). Consequently, buyout companies that have experienced significant declines in profitability during the holding period are less likely to be exited through a reversed LBO. Thereby, an upwardly biased measure of average operating improvements is created.

Another dimension of bias in the existing studies exists in the selection of peer groups, which are exclusively drawn from the universe of public companies, leaving out subsidiaries and other non-public companies not owned by private equity.

## ***5.2 Our Data Set***

Under Swedish law (see Årsredovisningslag (1995:1554) 8 sec. 3 § and Bokföringslag (1999:1078) 6 sec. 2 §), all joint-stock companies and financial institutions must deliver audited annual accounts to the Swedish Companies Registrations Office, accounts that are made public. This provides for a unique data sample to study, in the sense that it is not limited to public companies. To the best of our knowledge, our study is the first of its kind, studying the operating performance of buyouts during the holding period indiscriminately across exits types, involving Swedish companies.

Our sample contains all private equity sponsored exits with a deal value of over USD 5 million exited in the period 1998 – H1 2006. The sample is further limited to deals where at least one of the private equity sponsors in the investor syndicate belongs to the 300 largest sponsors in the world by capital under management and the buyout company is Swedish. This gives a total of 73 unique exits.<sup>22</sup> The selection is made with respect to exits, rather than current holdings, as this should imply that the restructuring of the company is complete, from the private equity sponsor's perspective. Further, we have chosen to focus on Swedish buyout companies rather than Swedish private equity sponsors as this gives a compound picture of the phenomenon in Sweden. We believe that the chosen time period is desirable because it includes the most recent investments and is long enough to provide enough deals in order to perform our statistical analysis as well as including all phases of the business cycle. The selection of deals with respect to size of investor and investment is made to limit the study to investments within the traditional buyout universe. There is a potential survivorship bias in our sample in the sense that buyout companies that went

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<sup>22</sup> For a list of analyzed investments, see Appendix A.

bankrupt during the holding period would not be included. However, this has rarely happened in the Swedish market and, thus, this is very unlikely to affect our study.

### ***5.3 Data Gathering***

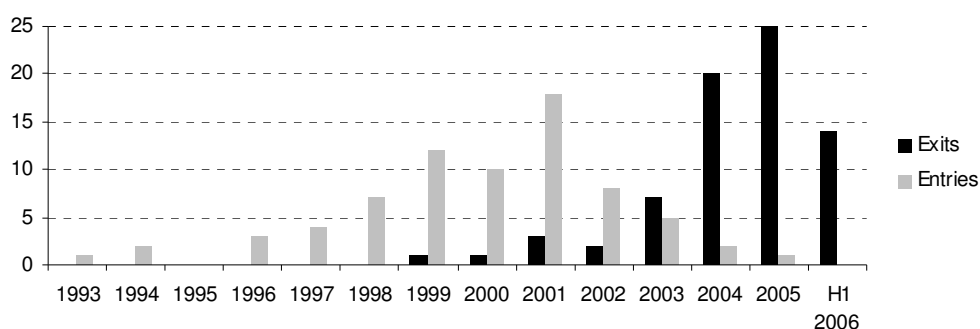
Private equity sponsored exits were identified through the mergers and acquisition database Mergermarket. There is a possibility that not all deals are covered by the database, but we have no reason to believe that there is any systematic exclusion. In a few instances the holding period of the particular investment was disclosed in Mergermarket, but most of the entry years have been obtained by going through press clippings, accessed mainly through the database Factiva, and private equity sponsors' homepages. From here we have also recorded the type of transaction in which the company was acquired. Post- and pre-buyout data on income statements, balance sheets, employees and wages are drawn from the official public accounts, which we have accessed through the databases Orbis and Affärsdata. These databases also contain information on industry classification. In total we have used accounting data from approximately 6,000 annual accounts for the study. Since the figures given in the aforementioned databases are manually typed in by operators we have had to quality check the data by looking for irregularities and comparing the data of a few randomly selected companies with the actual accounts that are downloadable from Affärsdata. Some missing reports have also been ordered directly from the Swedish Companies Registrations Office. Data on management and key employees' shareholdings and other incentive programs have been gathered from actual accounts and press clippings. Management's shareholding, warrants and other convertible instruments issued under incentive programs by the company itself are disclosed in the actual accounts. However, since private equity sponsors sometimes issue options on their own equity in the company directly to the management, not all such programs are covered by the annual accounts. For these instances we have had to rely on secondary information from press clippings, sometimes consisting of relatively crude estimates. This does introduce a degree of uncertainty into the data, but is only valid for a few cases.

## 5.4 Sample Distribution

A large part of our sample is drawn from buyouts that took place in the period 1999 – 2001 and were subsequently exited in 2004 – H1 2006 (see figure 5.4.1). The concentration of activity to these time periods is not surprising, given the rise in general private equity activity and the high liquidity in financial markets during those periods, creating favorable conditions for exit markets.

We also note that the average holding period in the sample is 4.5 years, which seems consistent with the general life span of the private equity sponsors' funds. This period is also long enough not to merely constitute capital market flips.

*Figure 5.4.1 Annual Distribution of Sample Entries and Exits*



## 5.5 Outliers

Firstly, discussing the identification and exclusion of outliers in our sample, it is worth stressing that our study is limited to (a subset of) the private equity industry. However, a few of the private equity sponsors included in our data, such as 3i and CapMan, are not only active within the buyout segment, but also within e.g. the growth equity and venture capital segments.<sup>23</sup> Thus, we need to make sure that the sample we use fulfils our sample criteria, i.e. only includes buyouts. Investments in the growth equity and venture capital segments tend to show more volatile operating statistics than within private equity, due to the nature of the portfolio companies. Thus, deals belonging to these investment categories are likely to show up as outliers

<sup>23</sup> There are variations in how the terminology regarding buyouts, venture capital and growth equity is used. However, the term venture capital is commonly used in the case of financing of start-ups and small businesses with high growth potential. Growth equity straddles between private equity and venture capital, and frequently involves minority investments in established companies needing additional cash to support high growth.

in our sample. Secondly, having large positive or negative residuals,<sup>24</sup> outlying values can distort the test results significantly. Thus, controlling for outliers makes the test results more adequate.

We identify four observations<sup>25</sup> where the EBITDA margin values can be regarded as outliers. These data points represent companies that have had little sales and consequently a highly negative margin and subsequently increased their sales so that the margin has improved considerably in terms of percentage units, although still negative. Buyouts do not typically involve such companies. This type of transactions should rather be classified as growth equity or venture capital. Thus, in addition to these data points being outliers, we can exclude these observations on the ground that they do not fit the sample criteria. The deals have probably been included in our sample as a consequence of several of the buyout shops also doing venture type deals, as mentioned above. Controlling for other cases of growth capital and venture capital we find that these are limited to the four previously mentioned deals. No other outliers were observed in our sample. This leaves us with a studied sample of 69 deals.

## **5.6 Descriptive Statistics**

Table 5.6.1 shows a number of descriptive statistics on data specific to the buyout companies (see section 4.2 for definitions). *Raw* data refers to the measured changes in the operating statistics without respect to the performance of the peer group.

*Industry adjusted* data are the data points that are used for the event study outlined in section 4.1.1.

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<sup>24</sup> Gujarati (2003) suggests that an outlier is a value that deviates from the mean value by at least three or four standard deviations.

<sup>25</sup> Arexis, NeoPharma, Kreatel Communications and Cochlear Bone Anchored Solutions.

Table 5.6.1 Company Specific Descriptive Data

	Min	Max	Median	Mean	Std. Deviaton
EBITDA margin (Raw)	-10.88	33.31	2.66	3.50	7.62
ROIC (Raw)	-75.18	376.55	3.43	17.37	56.46
Growth (Raw)	-16.31	40.20	8.35	11.56	13.65
EBITDA margin (Industry Adjusted)	-12.61	25.01	2.31	3.07	7.51
ROIC (Industry Adjusted)	-63.92	347.56	4.01	17.38	53.41
Growth (Industry Adjusted)	-32.36	53.45	0.71	3.45	15.29
ΔWAGE	-27.95	103.74	-1.15	0.20	15.77
ΔLABOR	-44.79	63.06	0.00	0.46	14.32
INCENTIVE	0.00	0.55	0.05	0.09	0.12
LEVERAGE	0.00	17.71	2.01	3.14	4.03
VENDOR: 14=1					
N = 69					

Looking at the different operating statistics, we see that there are some extreme observations with very high and low values respectively. For EBITDA margin and growth the extreme values are not sizeable enough, or symmetrically distributed, so that the median values do not deviate from the average values to a large extent. However, this is not the case for ROIC,<sup>26</sup> where we observe a very high dispersion. This is expected, due to the construction of the ROIC statistic as a quotient. Consequently, in cases with asset-light businesses, a slight change in margin can have a significant impact on the statistic. It should be noted that the growth statistic is influenced by the add-on acquisitions discussed in section 4.1 as well as strategic divestitures. Examples are, on the high side, Hilding Anders, created through the acquisition of a number of smaller bed manufacturers, and, on the low side, Fastighets AB Torner, which was continuously liquidated throughout the holding period.

Looking at the industry adjusted changes in wage levels and employee layoffs, we again find a few extreme values, with mean and median values around zero. For management ownership and leverage, the sample contains a number of observations with a zero value meaning that the median and mean values are pulled apart. The magnitude of both parameters seems reasonable, though. The sample contains 14 observations where the buyout company was acquired in a secondary buyout.

<sup>26</sup> Due to missing data, we have no ROIC observations for Sab Wabco and GCE Holding. However, as this is not a case of systematic exclusion, this should not have a major impact on our results.

*Table 5.6.2 Industry Specific Descriptive Data*

	<b>OPS<sub>+</sub></b>	<b>OPS<sub>-</sub></b>
EBITDA Margin	37	32
ROIC	34	35
Growth	57	12

Table 5.6.2 shows the number of occurrences where the operating statistic has improved in the peer group over the holding period, OPS<sub>+</sub>, and the number of instances where it has deteriorated, OPS<sub>-</sub>. For EBITDA margin and ROIC the two cases are fairly even, whereas we observe a significant overweight for cases where the annual growth has been above the set threshold level of three percent.

## 6 Results and Analysis

In the following section, we will briefly present and analyze the results<sup>27</sup> of our studies.

### 6.1 Operating Performance

In order to assess whether the operating performance of the buyout companies is improved during the holding period, we present and analyze the results of the tests of the raw data as well as the results of the tests of the event studies, relating the raw data to the performance of the respective peer groups (i.e. the relative changes in the operating statistics of the buyout companies).

Looking at the raw data of the selected operating statistics, i.e. the EBITDA margin, ROIC and sales growth for the buyout companies without respect to their peer groups, we find a significantly positive development for all three operating statistics, presented in table 6.1.1 below. It is important to remember that the holding period varies across the sample, with a mean of 4.5 years.

*Table 6.1.1 T Test of Raw Change in Operating Statistics*

Operating Statistic	Median	Mean	95% Conf. Intervall		P-value
EBITDA Margin	2.66	3.50	1.67	5.33	0.00
ROIC	3.43	17.37	3.60	31.15	0.01
Growth	8.35	11.56	8.13	14.98	0.00

Table 6.1.1 shows that the mean increase of the EBITDA margin during the holding period is 3.50 percentage units, whereas the median increase has a slightly lower value of 2.66 percentage units. The mean increase of the ROIC during the holding period is 17.37 percentage units, which is much higher than the median value of 3.43 percentage units. The mean annualized growth rate in sales during the holding period is 11.56 percentage units, whereas the median value is 8.35 percentage units.

Table 6.1.2 summarizes the results of our event studies, relating the raw operating performance to the development in the respective peer groups.

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<sup>27</sup> For tests of data set properties, see Appendix C.

*Table 6.1.2 Result of Event Studies of Operating Impact*

<b>Operating Statistic</b>	<b>Median</b>	<b>Mean</b>	<b>95% Conf. Intervall</b>		<b>P-value</b>
EBITDA Margin	2.31	3.07	1.27	4.87	0.00
ROIC	4.01	17.38	4.35	30.41	0.01
Growth	0.71	3.45	-0.23	7.12	0.07

From the results displayed in table 6.1.2, we find that on a 5 percent level of significance the mean relative changes in EBITDA margin and ROIC over the holding period are significantly positive. The mean value of the relative change in EBITDA margin of 3.07 percentage units is slightly higher than the corresponding median value of 2.31 percentage units. The mean relative change in ROIC of 17.38 percentage units, however, is remarkably higher than the corresponding median value of 4.01 percentage units. Such high dispersion due to the effect put forward in section 5.6 could imply that the median value is a better indicator. The mean relative annual growth over the holding period is 3.45 percentage units, whereas the median value is 0.71 percentage units. This can be explained by a few cases of very high growth that influences the mean value. However, the growth value is not significantly different from zero on a 5 percent level of significance.

It is clear that we have found an improvement in operating performance for the buyout companies in the Swedish market, with respect to the mean values of the EBITDA margin, the ROIC and the growth in sales. The measured improvement is present in absolute as well as industry adjusted values. We have consequently found support for our main hypothesis; that the organizational changes imposed on the buyout company through the change in ownership lead to true improvements of the operating performance during the holding period. These results are in line with previous empirical studies (see for example Kaplan 1989, Muscarella and Vetsuypens 1990, Ofek 1994).

We observe differences with regards to the various operating statistics. As argued in section 4.2, we regard the EBITDA margin statistic as the best way to measure the impact of the organizational changes. We observe a significant relative improvement of the EBITDA margin of a reasonable magnitude during the holding period, with a mean value of 3.07 percentage units, indicating a significant value creation. It is worth noting that the mean value of the EBITDA margin in the peer groups has not improved notably during the holding period, which is evident from comparing the results using raw and relative data. The observed significant mean value of the



relative improvement in ROIC, 17.38 percentage units, seems to indicate an even greater value creation by significantly improved capital management. However, this result seems a bit too high to be reasonable and is most likely influenced by the possible measurement distortion put forward in section 4.2. The corresponding median value is affected by this measurement distortion to a lesser extent and, thus, it could be more relevant to consider, as mentioned above. The median relative increase in ROIC of 4.01 percentage units also indicates an improvement in the operating performance. It can be noted that a comparison of the results from testing the raw and relative data indicates that the ROIC level in the peer groups has not changed during the holding period.

In terms of growth, the sales have increased during the holding period for the buyout companies as well as for the companies in the peer groups. However, we cannot observe a significant sales growth in the buyout companies relative to the peer groups. This is in also in line with our expectations. Although additional sales could generate cash flows for debt service, due to the incentives of management ownership and debt burden, a company owned by a private equity sponsor should have less scope for wasting free cash flow on projects that generate growth, but not necessarily add to the operating profit. Since these incentives are not present to the same degree in the peer group we could expect that, even if the buyout company is better at finding and implementing positive net present value project, the potential for empire building could make the peer companies grow faster on average. Another effect influencing the growth statistic is the occurrence of acquisitions. However, as we use median values, the impact of major acquisitions in the peer group companies should be limited.

## **6.2 Market Timing Ability**

To test the market timing ability among private equity sponsors, we use the non-parametric sign test discussed in section 4.1.3. The results are displayed in table 6.2.1.

*Table 6.2.1 Result of Sign Test Testing for Market Timing Ability*

<b>Operating Statistic</b>	<b>Sign Test</b>	<b>P-value</b>
EBITDA Margin	0.48	0.63
ROIC	0.96	0.34
Growth	3.37	0.00

According to our results, regarding the EBITDA margin and the ROIC, we cannot reject the null hypothesis of no significant difference in the number of OPS<sub>+</sub> and OPS.

on a 5 percent significance level (see section 4.1.3). Consequently, with respect to these two operating statistics we cannot conclude that the private equity sponsors, on average, have any market timing abilities with respect to industry. This supports our second hypothesis. However, looking at the growth measure, we can reject the same null hypothesis on a 5 percent level of significance, implying that the private equity sponsors have market timing abilities in the sense that they have succeeded to pick companies in industries experiencing high growth. This seems somewhat contradictory, as the effect of operating leverage should increase the profitability of companies in relatively mature industries undergoing periods of high growth. The impact of operating leverage could, however, be netted out by empire building tendencies or by rising input and production assets costs, which can be caused by high growth in a specific sector of the economy (Duggan and Clem, 1985). If it is more feasible to forecast what sectors will experience high growth than to forecast the impact of such growth on the operating profitability, this effect can help to explain our observed values for market timing ability.

It should be noted that we are measuring market timing ex post by looking at closed deals. To measure the private equity sponsors' ability to target industries with positive momentum a more accurate measure would be to look at solicited deals. There is unfortunately no way for us to do this without access to non-public data. If there is a selection effect so that sellers and buyers disagree more often on the price for a specific asset when an abnormal performance is expected, due to for example using different risk premiums for "hockey stick" cases,<sup>28</sup> there would be a bias towards deals carried out in industries with a less extraordinary performance. Therefore private equity sponsors could have a potential positive timing ability, but it would not be observed in our data. However, this bias assumes a widespread market failure with asymmetric information between sellers and buyers.

Alternatively, the observation of market timing ability with regards to growth might be attributable to our choice of threshold level. It could be argued that 3 percent is a modest threshold value. If we would have raised this value, any market timing effect would be less. However, as argued in section 4.1.3, we believe that the growth of the

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<sup>28</sup> "Hockey stick" cases refer to cases with a remarkably high projected growth or profitability after the buyout.

Swedish economy during the holding period of the deals in our sample is the appropriate threshold level.

### **6.3 Robustness of Implicit Contracts**

To test the robustness of implicit contracts discussed in sections 2.1.2 and 4.1.4, we apply the same event study methodology as in section 6.1. The results are displayed in table 6.3.1.

*Table 6.3.1 Result of Event Studies of Robustness of Implicit Contracts*

<b>Operating Statistic</b>	<b>Median</b>	<b>Mean</b>	<b>95% Conf. Intervall</b>		<b>P-value</b>
WAGE	-1.15	0.20	-3.59	3.99	0.92
LABOR	0.00	0.46	-2.99	3.90	0.79

The results displayed in table 6.3.1 show that we cannot find any significant relative impact on wage levels or labor force on any reasonable level of significance during the holding period. The mean value of relative change in wage is 0.20 percentage units, whereas the corresponding median value is -1.15 percentage units. The mean value of relative change in labor force is 0.46 percentage units and the corresponding median value is 0.00.

We do not find support for our hypothesis that the buyouts have been followed by a decrease in wage levels. On an aggregate level there seems to be no redistribution of welfare benefiting the acquirer. Our measure is, however, disregarding any equality components as we are measuring the average wage level without any distinction between management and workers. In theory, higher level officials who partake in profit sharing incentive programs could account for a large part of any increase in the cost of employees, but we find it unlikely that this effect should have any significant impact as the buyout companies are relatively large employers.

Another, potentially influential, effect that is not controlled for is the impact of rising profitability on wage levels. As increased profitability may increase wage levels (Blanchflower et al., 1996) the improved profitability that we observe should lead to higher wage levels in the buyout companies. Our results could therefore suggest that the effects of rising profitability on wage levels could be offset by a breach of long run implicit contracts, calling for profit sharing between the company and its employees. However, the wage effect is primarily existing for long run sector levels

(Blanchflower et al., 1996) and more ambiguous for medium term, company specific, changes.

Further, neither do our findings support the hypothesis that the buyouts have been followed by a significant reduction of the labor force. This suggests that there has been no easily observable and/or adjustable slack labor capacity at the time of the buyout or that the private equity sponsors have had the same inclination as the owners of the peer group companies to restructure its production process with respect to labor force. It should be noted that a majority of the buyouts in the sample are undertaken during periods when the Swedish economy has showed considerable strength and no broad layoffs have taken place. It would be interesting to study the corresponding statistics in an economic downturn. Labor input tends to be sticky and companies usually adjust for lower output through fewer worked hours rather than an overall reduction of the number of workers (Haskel and Kersley, 1997). Since increasing the labor force is not associated with the same hardships, such as regulations and media scrutiny, as layoffs, a better test of the different inclination to vary the labor force would be to measure it in a period with widespread layoffs. Buyout companies could probably avoid at least some of the media scrutiny and could therefore be more flexible with layoffs even if they have the same inclination to hire in an economic upswing.

## 6.4 Operating Impact Regression Model

Estimating the operating impact regression model presented in section 4.2, we obtain the results displayed in table 6.4.1.

*Table 6.4.1 Estimation of Operating Impact Regression Model, EBITDA*<sup>29</sup>

	Expected Sign	Estimated Coefficient	95% Conf. Intervall		P-value
Constant		3.28	0.31	6.25	0.03
$\Delta$ WAGE	-	-0.21	-0.36	-0.07	0.01
$\Delta$ LABOR	-	0.17	-0.03	0.37	0.10
INCENTIVE	+	-1.03	-16.16	14.09	0.89
LEVERAGE	+	0.07	-0.41	0.55	0.78
VENDOR	-	-1.02	-5.66	3.62	0.66
R <sup>2</sup>	0.12				
Adj. R <sup>2</sup>	0.05				

<sup>29</sup> For the corresponding regression model with ROIC and growth as dependent variables, please see Appendix D.

From table 6.4.1 we can see that three out of five explanatory variables have the expected sign,  $\Delta$ WAGE, LEVERAGE and VENDOR. However, only  $\Delta$ WAGE is significant on a 5 percent level of significance. Below, we will discuss each explanatory variable and the explanatory power of the model.

#### **6.4.1 Implicit Contracts**

The results displayed in table 6.4.1 imply that a 1 percentage unit annualized decrease relative to the peer group in wage levels, on average, leads to a 0.21 percentage unit's relative increase in EBITDA margin over the holding period, holding all other factors constant. As mentioned, this result is significant on a 5 percent level. Thus, even though we cannot show that the buyouts, on average, have been followed by a significant decrease in the wage level, we do find support for the hypothesis that wage reductions can explain the true changes in operating performance (measured by EBITDA margin) of the buyout company. Consequently, in the buyout company where we can observe wage reductions this has coincided with true operating improvements. This result is highly expected as it is, all other things like, a matter of mathematical certainty.

We do not find support for the hypothesis that the reduction of labor force leads to improved operating performance on a 5 percent level of significance. There is no indication that, even if there is a reduction in labor force of the buyout company, on average, this has a positive effect on the EBITDA margin of the company. This can be explained by the fact that the relationship between profitability and labor input is less clear cut than the link between profitability and wage reductions. If the labor input is not reduced due to redundancies it is usually substituted for capital investments.<sup>30</sup> Even though the long term objective of such substitution is to achieve a more cost efficient and flexible production, this does not necessarily translate into cost savings in the medium term. Also, due to the operating statistic we have chosen, the accounting treatment of the cost of capital input will affect the profitability. Since depreciations are added back in our statistic, only capital inputs that are not capitalized will affect the operating profitability.

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<sup>30</sup> Such substitution could of course influence the average wage level of employees as well. The marginal productivity of remaining workers should increase and if there is a competitive labor market this should translate into higher wages.

### **6.4.2 Leverage**

Although generating the expected sign, we cannot find any support that increasing leverage has a significant positive impact on the relative operating performance of the buyout company. The results seem to indicate that the debt does not have the expected disciplinary effect on management. This could be a function of the measurement distortion pointed out in section 4.2. Since we do not measure leverage in relation to industry levels due to unspecified liabilities, we cannot control for industry innate factors such as capital intensity and working capital needs. Thus, the measured relative effect of leverage is diluted or enhanced. As the dispersion of the debt levels observed in our sample is larger than what we think reasonably can be explained by difference in inclination to take on leverage or liquidity of debt markets at the time of the buyout, we do believe that this effect is indeed affecting our results.

### **6.4.3 Management Ownership**

Neither can we find any support for the hypothesis that an increased management ownership interest in the buyout companies leads to an improved operating performance. This is highly surprising as we, based on existing theory and previous studies, expected improved corporate governance, induced by better incentives through the alignment of management and shareholder interest and the restraining effect of debt, to be the most important determinant of value creation. The results might be influenced by the measurement problems in determining the actual level of implied management ownership to such an extent that the results are seriously distorted. Another factor that could potentially influence the results is the difference between direct equity participation and derivative instruments. Management incentives are usually a mixture of stock and option holdings. Due to lack of any meaningful data on the characteristics of the equity derivatives and convertible instrument we have used the implied ownership fraction upon conversion of all outstanding securities. However, direct stock holdings and option holdings have somewhat different incentives on management's incentives (Jensen and Meckling, 1976).

The unexpected results could be attributed to the lack of dispersion of the management ownership in our data. There is a fairly high clustering of ownership in the interval 5-10 percent. We also have a few very high values, which are usually

caused by executives having a high ownership percentage before the buyout, often due to being the founder of the company. We have not had enough data for such correction, but ideally we would therefore like to measure the increase in ownership rather than the level in order to capture the improved incentive structure.

Another potential explanation might be that it is the fact that the management has a significant equity stake in the company that is critical, rather than whether this stake is 5 or 15 percent. That is, when management owns a relatively large fraction of the company they may not perceive their incentives as stronger when this fraction increases to an even higher level.

#### **6.4.4 Type of Buyout**

Although yielding the expected sign, we do not find significant support for the hypothesis that primary buyouts show a larger operating improvement than secondary buyouts. This suggests that there could still be operating improvements to be made even after a company has undergone the initial private equity restructuring process. There could be several reasons for the unexpected result. Firstly, since the funds themselves have a limited lifetime there could be other exit considerations with respect to timing than the completion of the restructuring, effectively leaving unrealized potential to the next private equity sponsor.

A second explanation could be that different sponsors bring different resources to the company. As the company progresses through its life cycle, the ideal type of owner may change. For example if a company owned by a regional buyout shop grows significantly and enters new markets it could benefit more from the resources provided by a larger, more international private equity sponsor, bringing knowledge about new markets and having the financial resources for larger strategic changes, such as add-on acquisitions.

It should also be noted that the classification of buyouts into primary and secondary is inherently difficult and we have a relatively small proportion of secondary buyouts in our sample. There have been a number of clear cut secondary buyouts exited in the period after our measurement period, but unfortunately these cannot be included due to the lag in reporting financial results.

### 6.4.5 Explanatory Power

As expected, our Operating Impact Regression Model has a relatively low explanatory power, with an  $R^2$  value of 0.12 and an adjusted  $R^2$  value of 0.05. More so we also have a constant that is significantly different from zero with a mean value of 3.28. This indicates that, to a considerable extent, our model does not capture the factors that lead to a change in the EBITDA margin of the buyout companies. These findings suggest that, by and large, the most important factors explaining the operating improvement of the buyout company during the holding period are factors that are difficult to measure. Such factors could include strategic innovation, such as corporate refocusing and divestment of marginal lines of business, or the parenting advantage the buyout company may benefit from. In addition, even though our methodology corrects for market timing factors with respect to industry, there is no corresponding correction for market timing factors on the company level, i.e. changes that are likely to materialize, not affected by industry or ownership issues.

### 6.5 Summary of Results

In table 6.5.1 below we summarize the results of the tests of our hypotheses. We find that three out of nine hypotheses are in line with what we expected based on our theoretical and empirical foundation.

*Table 6.5.1 Summary of Results of Hypothesis Testing*

Hypothesis	Support?
$H_1$ : <i>The operating performance of the buyout companies is improved, relative to their respective peer group, during the holding period.</i>	Yes
$H_2$ : <i>The private equity industry does not have a market timing ability with respect to industry.</i>	Yes
$H_3$ : <i>The buyouts have been followed by a decrease in wage levels.</i>	No
$H_4$ : <i>The buyouts have been followed by a reduction of the labor force.</i>	No
$H_5$ : <i>Decreasing wage levels leads to improved operating performance.</i>	Yes
$H_6$ : <i>Reduction of labor force leads to improved operating performance.</i>	No
$H_7$ : <i>The increase in debt level leads to improved operating performance.</i>	No
$H_8$ : <i>The increase in management ownership leads to improved operating performance.</i>	No
$H_9$ : <i>Primary buyouts show a larger operating improvement than secondary buyouts.</i>	No



## 7 Conclusion

Private equity sponsored buyouts is a phenomenon that has been present in Sweden for the last two decades. Today, the sector is larger and more active than ever and we believe the phenomenon is here to stay as long as the mechanisms that allow it to create returns for investors and value for society will persist. Previous empirical studies have primarily targeted the U.S. and have almost exclusively dealt with companies involved in a public market transaction. Our study targets a comprehensive Swedish data set and is unbiased in terms of mode of exit.

In this study we have used three different metrics to measure the buyouts' impact on the operating performance on the companies in our sample; EBITDA margin, ROIC and growth. An event study methodology has been applied, using industrial peers, to control for market timing factors. An identical event study has been performed to measure the impact on the companies' employees in terms of wage development and labor force alterations. We have also estimated a regression model, using a number of factors commonly assumed to be part of the private equity value creation process, explaining the magnitude of the operating impact.

Firstly, in line with our initial hypotheses, our main results suggest that the true operating impact on the buyout companies is significantly positive when using the EBITDA margin and ROIC metrics. For growth we do not find a corresponding result, but we regard this metric as a less clear cut measure of value creation. We do not find any evidence that value is created on a firm level by the breach of implicit contracts, facilitated by the buyout. Instead, contrary to theoretical literature and popular allegations, our findings suggest that employment and wage levels in the buyout companies have developed in line with the peer groups.

Secondly, we find that changes in wage and employment levels, leverage, management shareholdings and the type of buyout has a very limited explanatory power on operating impact. This is in line with our ex ante expectations as the value creation process is complex and poorly proxied by a few variables that are relatively easily measured. What is more surprising is that so few explanatory variables come out as significant and with signs in line with our expectations. Most surprising is the insignificance of management ownership, which in several studies has been pointed out as the key determinant of improved corporate governance.

In essence, we believe that our primary results have provided valuable input to the ongoing discussion about the private equity industry. Our results seem to suggest that the phenomenon is highly desirable and that regulators should, for the public good, focus on building a legal infrastructure that can facilitate the industry rather than restrain it. Furthermore, we believe that our problems in quantifying the determinants of operating impact serve as a good illustration of the complexity of the private equity process' value creation. This could be one of the reasons to why the debate can sometimes seem unbalanced, with people focusing in on easily observable data points.

We see three main areas for further research. Firstly, it would be interesting to replicate our study in a few years as there have been a large number exits in the last year, of which several are secondary buyouts, falling outside of our data set. Information input from the market participants themselves, for example regarding management incentive schemes and other data that is hard to obtain, would also vastly increase the quality of the study. Secondly, working out a methodology for controlling for company specific timing factors, possibly by a more detailed study of each of the companies in the sample, would contribute interesting insights. Finally, we believe it would be fruitful to study what lessons can be learned for other companies from the private equity value creation process. This area is bound to have several practical applications as other companies can hardly remain idle, watching private equity sponsored companies outperform them for much longer.

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## Appendix A Buyouts in Sample

*Table A1 Analyzed Buyouts and Sponsors*

<b>Buyout Company</b>	<b>Entry Year</b>	<b>Exit Year</b>	<b>Sponsor</b>
Guldfynd Sverige	1993	2001	Industri Kapital
Cramo	1996	1999	Industri Kapital
VSM Group	1997	2005	Industri Kapital
Intrum Justitia	1998	2005	Industri Kapital
Mölnlycke Healthcare	1997	2005	Accent Equity Partners, Nordic Capital
Arca Systems	1998	2005	Industri Kapital
Dahl International	1998	2003	EQT, Ratos
Flexlink	1997	2005	EQT
Gislaved Folie	1994	2003	Nordic Capital
IVT Industrier	1994	2002	3i
MacGregor	1998	2004	Industri Kapital
Nordisk Renting	1998	2003	3i
Stjaern TV	1998	1999	EQT
Victor Hasselblad	1996	2003	Cinven
Ahlsell	1999	2005	Nordic Capital
Capella Group	1998	2001	Bridgepoint Capital
Carmen Systems	1997	2006	Gilde Investment Managers
Cochlear Bone Anchored Solutions	1999	2005	CapMan
Education & Entertainment	2000	2004	Duke Street Capital, Segulah
Elitfönster	1999	2004	Triton
Elmo Leather	1999	2004	Accent Equity Partners, Nordic Capital
Findus	2000	2006	EQT
Oriflame Cosmetics	1999	2004	Industri Kapital
Stenqvist	1999	2003	EQT
TAC	1998	2003	EQT
Thule	1999	2004	EQT
Acando Consulting	1999	2003	Accent Equity Partners
Alfa Laval	2000	2005	Industri Kapital
Aura Group	2000	2006	Bridgepoint Capital
Cashguard SQS	2002	2004	Accent Equity Partners
Dotcom Solutions	2000	2005	3i
Eldon	2001	2006	EQT
Hilding Anders	2001	2003	Nordic Capital, Ratos
Hörnell International	1996	2004	3i, Accent Equity Partners
Kreatel Communications	2000	2006	ABN Amro
Kronans Droghandel	2001	2002	3i, Ratos
Martinsson Gruppen	2001	2005	Ratos
Multicom Security	2001	2005	Industri Kapital
NeoPharma	1999	2004	3i, Capman
Sweden On Line	2001	2001	3i, Ratos
Sven-Axel Svensson Bijouterier	2000	2004	Accent Equity Partners
Svenska Fönster	2000	2004	Axcel Industriinvestor
Sydsvenska Kemi	2001	2005	Industri Kapital
Total Logistik	1999	2006	Accent Equity Partners
Tradex	2000	2006	EQT
Alignment Systems	2001	2006	3i, Ratos
Anticimex	2001	2005	Nordic Capital
Arexis	2001	2005	3i
Atea	2001	2006	3i

*Table A1 Continued*

<b>Buyout Company</b>	<b>Entry Year</b>	<b>Exit Year</b>	<b>Sponsor</b>
Carpark	2001	2006	Bridgepoint Capital
Dometic	2001	2005	EQT
Envac Centralsug	2001	2005	3i, Ratos
Frigoscandia Distribution	2002	2005	Triton
Gadelius	2001	2004	3i
Guide Konsult	2001	2006	Nordic Capital
Jens S. Transmissioner	2001	2005	3i, Ratos
Norfoods	2000	2004	Segulah
NVS Installation	2002	2006	Segulah
B2 Bredband	1999	2005	The Carlyle Group
Bewater Group	2002	2005	EQT
Clean Chemical Sweden	2002	2004	Segulah
Com Hem	2003	2005	EQT
Plastal Sweden	2001	2004	Gilde Investment Managers
Sab Wabco	2002	2004	Vestar Capital Partners
Tribon Solutions	2002	2004	Accent Equity Partners
Aco Hud	2003	2004	Altor Equity Partners
C More Entertainment	2003	2005	Nordic Capital
Fastighets AB Tornet	2003	2005	Ratos
IVT Industrier	2002	2004	ABN Amro
Semper	2003	2006	Triton
GCE Holding	2004	2005	Triton
Intentia International	2004	2005	Tennenbaum Capital Partners
Nordic Bake-Off	2005	2006	Accent Equity Partners

## **Appendix B Previous Empirical Studies**

A number of empirical studies have been conducted, predominantly on U.S. data, trying to quantify the operating impact of buyouts from a number of different aspects. Below is a brief survey of some of the more influential studies.

Kaplan (1989) examines 48 U.S. public-to-private management buyouts, completed during the period 1980 to 1986. The study finds a positive impact on operating income and net cash flow and a reduction of capital expenditures, relative to a universe of publicly traded industry peers, three years after the completion of the buyout. The results are attributed to improved corporate governance through increased management ownership as no evidence of wage reductions or layoffs can be found.

Muscarella and Vetsuypens (1990) examine 72 firms that underwent a reverse LBO, on a U.S. stock exchange during the period 1983 to 1990, that were previously a division of a publicly traded company. The study finds that the average divisional buyout experiences a significant increase in operating profitability relative to a random sample of 100 S&P 500-companies. Results are attributed to organizational changes, made possible by the buyout, that have enabled the companies to cut costs.

Singh (1990) examines 65 U.S. firms taken private during the period 1980 to 1987 and subsequently undergoing a reverse LBO. The study finds that these companies, in the three years preceding the reverse LBO, show a higher growth as well as a better capital management and higher operating profitability than two random industry peers. The results are attributed to an improved governance structure.

Ofek (1994) examines 120 U.S. firms that underwent an unsuccessful management buyout during the period 1974 to 1989. The study finds that no significant operating improvement can be found, relative to an industry adjusted peer group, two years following the unsuccessful tender offer. The results are consistent with the theory of improved corporate governance and indicate that post-buyout operating improvements are not a result of an opportunistic management using proprietary information to take a company private.

Amess (2002) examines 78 U.K. firms undergoing a management buyout over the period 1986 to 1997. By using an augmented Cobb-Douglas production function the



study shows increased firm-level productivity in the post-buyout organization, attributed to reduced agency costs and increased leverage and monitoring.

## Appendix C Tests of Data Set Properties<sup>31</sup>

In order to be able to identify and remedy potential problems<sup>32</sup> with our data that otherwise may have an impact on our results and the interpretation of them, we perform tests to check for the occurrence of multicollinearity and heteroscedasticity in our data. Further, we check whether the residuals follow a normal distribution. However, as we do not use time series data, we will not have problems with autocorrelation in our data. Below we perform the relevant tests on our operating impact regression with the EBITDA margin as the dependent variable (see exhibit 4.2.1).

### C1 Multicollinearity

Multicollinearity means that two or more of the explanatory variables are linearly correlated, which could make it difficult to isolate the effect each of the variables has on the dependent variable. There are several ways of identifying multicollinearity. Firstly, a sign of multicollinearity could be to observe a high  $R^2$  value, but only have few significant t values. In this case we find a relatively low  $R^2$  value ( $R^2$ : 0.12, adjusted  $R^2$ : 0.05) and we observe one significant t value (two including the constant) (see table 6.4.1). Consequently, this does not indicate that we have multicollinearity in our data.

Secondly, high pair-wise correlations between the explanatory variables could be another sign of multicollinearity. High correlation implies one correlation value above 0.8 or several correlation values exceeding 0.5. As evident from the pair-wise correlations displayed in table C1.1, we do not observe any correlation exceeding 0.8 and we find only one significant correlation value exceeding 0.5. According to our expectations, we observe the highest correlation between wage level and labor force.

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<sup>31</sup> This section is based on Edlund (1997).

<sup>32</sup> Problems due to violations of important OLS assumptions. The appendix does not include tests of all OLS assumptions, instead we are testing a number of important OLS assumptions, based on Edlund (1997).

Table C1.1 Pair-wise correlations between the X variables

	<b>ΔWAGE</b>	<b>ΔLABOR</b>	<b>LEVERAGE</b>	<b>INCENTIVE</b>	<b>VENDOR</b>
<b>ΔWAGE</b>	1.00				
<b>ΔLABOR</b>	0.62	1.00			
<i>p-value</i>	0.00				
<b>LEVERAGE</b>	-0.89	-0.20	1.00		
<i>p-value</i>	0.47	0.10			
<b>INCENTIVE</b>	-0.01	0.11	0.02	1.00	
<i>p-value</i>	0.94	0.38	0.89		
<b>VENDOR</b>	0.07	0.25	-0.20	-0.11	1.00
<i>p-value</i>	0.58	0.04	0.10	0.39	

Thirdly, multicollinearity could occur if we observe high  $R^2$  values in combination with a very high  $R^2$  value. However, we observe a low  $R^2$  value of 0.12 so we cannot observe this sign of multicollinearity in our data. Fourthly, high pair-wise correlations between the estimated coefficients could indicate multicollinearity. As can be seen in table C1.2, we have no correlation value exceeding 0.8. Three values are above 0.5, which implies potential multicollinearity. However, as none of the other tests show any sign of multicollinearity, we conclude that multicollinearity in our data is not a significant problem.

Table C1.2 Pair-wise correlations between the estimated coefficients

	<b>ΔWAGE</b>	<b>ΔLABOR</b>	<b>LEVERAGE</b>	<b>INCENTIVE</b>	<b>VENDOR</b>
<b>ΔWAGE</b>	1.00				
<b>ΔLABOR</b>	-0.62	1.00			
<b>LEVERAGE</b>	-0.03	0.15	1.00		
<b>INCENTIVE</b>	0.11	-0.18	0.02	1.00	
<b>VENDOR</b>	0.12	-0.25	0.15	0.14	1.00

## C2 Heteroscedasticity

Heteroscedasticity refers to the case when the variance of the error term is not constant and not independent on the values of the explanatory variables. If heteroscedasticity occurs in the sample the variance of the estimated coefficients are not minimized. Consequently, the estimated coefficients are not BLUE (best linear unbiased estimator).

To test for heteroscedasticity, we use the Breush-Pagan / Cook-Weisberg test. According to the results presented in table C2.1, we cannot find any signs of heteroscedasticity on a 5 percent significance level.

*Table C2.1 Breusch-Pagan / Cook-Weisberg test for heteroscedasticity*

$H_0$ : Constant variance	
$\chi^2$	2.16
$P > \chi^2$	0.14

### C3 Distribution of Residuals

If the residuals are not normally distributed, it affects e.g. the confidence intervals and the hypothesis testing. In order to check whether the residuals follow a normal distribution, we perform the Skewness / Kurtosis tests for normality. According to the results displayed in table C3.1, we find that we cannot reject the null hypothesis that the residuals follow a normal distribution.

*Table C3.1 Skewness / Kurtosis tests for normality*

Variable	P(Skewness)	P(Kurtosis)	Joint	
			Adj $\chi^2$	$P > \chi^2$
Residuals	0.51	0.98	0.44	0.80

To sum up, having excluded outliers in our data, we find no multicollinearity or heteroscedasticity. In addition, we find that the residuals are normally distributed. Thus, we do not need to make any remedial measures before we perform the regressions.

## Appendix D Supplementary Regressions

Below, we perform two regressions corresponding to the main regression presented in section 4.2, but with the ROIC and the growth respectively as dependent variables.

*Table D1 Estimation of Operating Impact Regression Model, ROIC*

	Expected Sign	Estimated Coefficient	95% Conf. Intervall		P-value
Constant		30.63	8.14	53.12	0.01
$\Delta$ WAGE	-	-0.74	-2.82	1.33	0.48
$\Delta$ LABOR	-	0.39	-1.47	2.26	0.68
INCENTIVE	+	-24.79	-136.27	86.69	0.66
LEVERAGE	+	-3.26	-6.96	0.43	0.08
VENDOR	-	-8.49	-43.10	26.13	0.63
$R^2$	0.07				
Adj. $R^2$	-0.01				

In table D1 we can see that only the coefficient of the constant is significantly different from zero on a 5 percent significance level. On a 10 percent level, also the coefficient of the leverage factor is significantly different from zero. Looking at the signs of the coefficients, we find that the coefficients for wage level and vendor are in line with our expectations. The explanatory power of the model is low, with an  $R^2$  of 0.07 and an adjusted  $R^2$  of -0.01.

*Table D2 Estimation of Operating Impact Regression Model, Growth*

	Expected Sign	Estimated Coefficient	95% Conf. Intervall		P-value
Constant		2.48	-3.25	8.20	0.39
$\Delta$ WAGE	-	0.07	-0.21	0.35	0.63
$\Delta$ LABOR	-	0.41	0.02	0.79	0.04
INCENTIVE	+	26.24	-2.94	55.42	0.08
LEVERAGE	+	-0.41	-1.33	0.52	0.38
VENDOR	-	-0.78	-9.74	8.18	0.86
$R^2$	0.21				
Adj. $R^2$	0.15				

As we can see in table D2, only the coefficient of the relative change in labor force is significant on the 5 percent level. On the 10 percent level, we find that the coefficient of management incentives is also significantly different from zero. The coefficients of the labor force, leverage, management incentives and vendor type are in line with our expectations. With an  $R^2$  of 0.21 and an adjusted  $R^2$  of 0.15, this model has a somewhat higher explanatory power.