DO BUYOUTS STILL HAVE AN OPERATING IMPACT?

AN EVENT STUDY OF SWEDISH POST-GLOBAL FINANCIAL CRISIS LEVERAGED BUYOUTS

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Abstract:

Using a dataset of 55 Swedish leveraged buyouts, we examine the change in operating performance relative to appropriate control groups in the decade following the financial crisis of 2008. Considering the differentia of this decade, the aim of this paper is to evaluate whether the value generating mechanisms of the private equity industry have changed and serve as reference point in the discussion about the societal role of the industry. Controlling for pre-event performances, we find a relative improvement in the return on assets but not in the EBITDA-margin, and that both operating statistics deteriorated for the control groups. We conclude that the leveraged buyouts of this decade still have an operating impact, outweighing a decline in industry operating performance.

Keywords:

Private Equity, Leveraged Buyouts, Abnormal Operating Performance

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1. Introduction

The leverage buyout is an elusive and widely debated economic phenomenon, by some considered an abuse of capitalism and by others the best it has to offer. The financial crisis of 2008 put private equity under the spotlight, raising the contentious question of whether private equity contributes to the economy or simply its fragility.

In this thesis, we examine the operating impact of Swedish leveraged buyouts in the decade following the global financial crisis. With an event study of 55 such transactions, we test whether the operating performances of buyout companies change over the holding period, relative to those of their peers. We complement the analysis of operating impact with an analysis of industry market timing.

The early literature on this subject is close to unanimous in that the buyout private equity sponsors improve the operating performance of target firms while the results of recent studies are more diverse. Conspicuously, this question has, to our knowledge, not been examined since the financial crisis. Without a doubt, this economic upheaval had a major impact on the buyout industry, both at the very time of the crisis and the years that followed. Considering that the decade following the financial crisis has displayed historically unique dovish economic policy, build-up of corporate leverage, and equity market appreciations, it is possible that the value generating mechanisms of buyouts have changed.

There are several reasons for conducting this study on the Swedish market. First, over this decade, Swedish private equity has come to make an important pillar in the Swedish economy. Relative to GDP, the amount of capital raised in Swedish private equity is the second highest in the European Union, surpassed only by the that in Luxembourg, and account for around three percent of all the employees in Sweden (SVCA, 2020). Only once has the value generation of buyouts been studied in Sweden (Bergström et al, 2007).

The importance of analyzing whether the value creation of leveraged buyouts in Sweden persists is evident, and the purpose of this paper is to answer the following research question:

Do private equity sponsors, through leveraged buyouts, have an operating impact on Swedish target firms in the decade following the financial crisis?

Our contribution to the literature is twofold. First, with this study, we shed light on an, with respect to the above stressed societal relevance, disproportionally understudied subject. Second, we devise this event study from the findings of Barber and Lyon (1996), who comprehensively researched the specification and empirical power of event studies on operating performance using accounting-based measures. In doing so, and in detail accounting for considerations intrinsic to an application to the Swedish market, we add to the scarce documentation of accounting-based event studies of small populations.

To isolate the operating impact of the buyout, we benchmark the change in operating performance of the buyout companies against those of respective peer groups

constructed to control for pre-event performances. An abnormal change in performance, is one where difference between these two changes is different from zero, estimating the impact of the buyout. As a measure operating performance, we turn to return on assets and the EBITDA-margin, together providing a comprehensive picture. The analysis of industry market timing is made on a subset of data that the analysis of operating impact uses, namely the absolute change in operating performance of the assigned peer groups. To account for the considerations that go into devising a well-specified model, we add to the main line of analysis of operating impact three complementary lines.

Running non-parametric non-directional tests on the operating impact and market timing, we find both results in line with and contrarian to those of most existing literature. We find support for that the buyout has a positive relative impact on the return on assets of the buyout company, but no support for a positive impact on the EBITDA-margin. Amongst the peer groups, we find support for that both operating statistics deteriorated over the event period. We consider these mixed results a strong indicator of the differentia of the decade following the financial crisis, but conclude, with reference to the relative improvement of ROA, that the buyouts of the period have had an operating impact.

The paper is structured in the following way. In section two we review the related literature. In section three we identify the value generating mechanisms of private equity. In the section four, we develop our hypotheses. In section five we present our empirical methodology. In section six we summarise the data. In section seven, we present the results, and in section eight follows a discussion. Finally, in section nine we conclude the paper.

2. Literature review

Since the 1980s, the leveraged buyout has been a topic of interest for both the financial sector and academia (Wright & Robbie 1998). The most closely related research to our study includes the studies by Kaplan (1989), Muscarella and Vetsuypens (1990), Bergström et al. (2007), Boucley, Sraer and Thesmar (2011), and Barber and Lyon (1996). The first mentioned paper studied U.S. public-to-private management buyouts in the 1980's and found a positive impact on the operating income of buyout companies. Muscarella and Vetsuypens (1990), examined U.S. reverse leverage buyouts of the same decade, concluding on significant improvements in operating profitability which resulted mainly from the sponsors' capabilities of reducing costs. The third line of research, Bergström et al, (2007), found a similar result when studying Swedish buyout companies between 1993 and 2006. Further, Boucley et al. (2011) studied French leveraged buyouts between 1994 and 2004 and found increases in the profitability of the buyout companies but also that value stems from relaxing credit constraints. Lastly, Barber and Lyon (1996) examined the empirical power and specification of accounting-based event studies, from which they formulated an archetypical set of methodological recommendations and considerations. It is upon their findings we construct this analysis, which in turn is an extension of the study of operating impact in Sweden in the two decades leading up to the financial crisis of Bergström et al. (2007).

Our thesis differs from previous work in the following way. First, the study is, to the best of our knowledge, by any geographical application, the first analysis of its kind in the decade following the financial crisis. It is by any measurement a novel landscape in which the private equity buyout fund managers operate. Never in history has liquidity been so strong, equity markets so bullish, the competition for deals so high, and the global financial markets so interconnected. Since the financial crisis, the European economy has become increasingly levered, culminating a corporate debt over EBITDA in 2019 exceeding those in 2008/09 (S&P Global Ratings, 2020). With low interest rates, corporate debt is overall serviceable, but the affordability would rapidly deteriorate should operating performance fall. Against this backdrop, the importance of studying the value generation and operating impact of the buyout – which with abnormal leverage is a driver of this development – is evident. Second, we revisit the findings of Barber and Lyon (1996) and work out a methodology with detailed accounts for considerations that pertain to an event study of operating impact in a small population such as Sweden, adding to a scarcely studied application.

3. Private equity value generation

Buyout proponents, such as Jensen (1989), claim that private equity sponsors raise firms' operating performance and generate economic value. Sceptics, on the other hand, argue that private equity firms do not enhance operating performances and that their returns stem from taking advantage of tax breaks and superior information (Kaplan, 2009). In this section, we briefly identify the different levers of value generation using the framework by Berg and Gottschalg (2003). Breaking down the different levers of value generation discerns the determinants of operating impact. In connection, we expand on the empirical findings in previous literature on both operating performance and market timing.

3.1. Value creation and value capturing

Berg and Gottschalg (2004) break down buyout value generation into two sources: value creation and value capturing. The first, value creation, refers to factors that have a direct effect on the financial performance of the business. Improvements in operating performance and reduced cost of capital are such examples. The second, value capturing, refers to factors that lead to improvements in the valuation of a company over time, but without necessarily changing the underlying financial performance of the business. Examples of such factors are industry multiple expansions and elevated expectations on financial performance.

3.2. Value creation through operating impact

Value creating activities can then be subdivided into primary and secondary levers (Porter 1985, Stabell & Fjaelstad, 1998). Primary levers refer to improvements in operational effectiveness, strategic distinctiveness, as well as financial engineering. These have a direct impact on value generation. The secondary levers are different in that they do not have a direct effect on the financial performance of a company. However, they do enhance the effect of the primary levers. An example of a secondary lever would be an alignment of incentives between the management team of the target company and new shareholders. Even though the increased incentive alignment does not have a direct effect on profits it may have it indirectly by, for example, taking out operational inefficiencies.

Both primary and secondary levers can improve the operating performance of firms. The empirical evidence on the operating impact of leveraged buyouts is strong but not very recent. Kaplan (1986) suggested that increases in operating income, decreases in capital expenditures, and increases in net cash flow stemmed mainly from improved incentives rather than large employment cuts. His study observed U.S. management buyouts of public companies three years after the transaction. In the same decade, Muscarella and Vetsuypens (1990), found that amongst reverse leveraged buyouts, cost reductions made possible by changes to the buyout companies' governance structures was the main source of improvement to their operating performance. More recently, Bergström et al. (2007) found that Swedish buyouts, irrespective of exit type, have a significant positive operating impact. Boucly, Sraer and Thesmar (2011) found that alleviating credit constraints provided growth opportunities for buyouts firms.

Though the majority of the empirical evidence speaks for buyouts having an operating impact, there are exceptions (Kaplan, 2009) such as Guo et al. (2007), who studied U.S. public-to-private transactions between 1990 and 2006. Contrary to the findings from the 1980s, the authors found only modest increases in the operating performance. Still, they found at the portfolio company level, high investor returns. Other authors that show a similar result are Acharya and Kehoe (2008) and Weir, Jones and Wright (2007), studying public-to-private deals in the United Kingdom over roughly the same period. This change in results might suggest that the impact of public to private transactions after the 1980s differ from those prior (Kaplan, 2009). Boucly et al. (2011) raises the same issue in their paper and make the argument that the transactions predating the new millennium may not be fully representative of today's leverage buyouts.

3.3. Value capturing through industry market timing

The other way a private equity sponsor can capture an improvement in operating performance is market timing. That is, identifying an industry or market with an operating performance below steady state. Bergström et al. (2007) are the first to evaluate such a component to the value generation of Swedish pre-financial crisis buyouts. By assuming that industries operate at steady state, they test for changes to industry operating performances, but find no support for private equity sponsors timing the market.

4. Hypothesis development

Between 2005 and 2006, the private equity industry experienced a period of major growth (Lelelux et al., 2015). Often referred as the "Golden Age", the industry saw the number of buyouts rise to new heights and deals struck at record sums. Globally, this amounted to a total of 5,188 buyout transactions at a combined enterprise value of roughly $1.6 trillion (Kaplan, 2009). However, the growth story of private equity would end in 2008. When the financial crisis hit the economy, it suddenly became difficult for private equity firms to obtain funding. Investors became reluctant and banks less eager to lend money. As a result, the deal value of global buyouts fell from $665 billion in 2007 to $71 billion in 2009. Capital raised by private equity sponsors followed, falling from $666 billion in 2008 to $228 billion in 2010 (Bain & Company, 2011).

In the wake of the financial crisis, new regulatory measures that concerned many market participants, private equity included, were introduced. In the U.S, the Dodd-Frank Wall Street Reform and Consumer Protection Act was signed into federal law in 2010, including stricter requirements on disclosure and transparency of the private equity industry (Toyou, 2018). In Europe, a law with similar purpose was passed in July 2011. Unlike the Dodd-Frank act, the AIFMD contained rules of capital requirements, independent valuation providers and depositaries. Further, regulators had the possibility to set certain limits on the leverage levels of private equity funds (Khort, 2014). Many private equity funds were sceptical about these developments. Prior to the financial crisis, the private equity industry had operated largely unregulated. Now, they had to conduct business in line with a new regulatory framework. Despite these changes, there is no evidence, given the high growth of the industry, that these laws have had a negative impact on the aggregated fundraising or investing, as some had feared at first (MJ Hudson, 2020). What is certain though is that the industry is under more scrutiny following the financial crisis and that it is likely to increase going forward as this asset class grows in importance.

Aside regulatory changes, the decade following the GFC has seen some historically low interest rates and dovish economic policy. With an ever-growing stock of liquidity chasing returns, the capital flow toward the buyout private equity industry has accelerated, and its levels of dry powder had accumulated to a global excess of $1.1tn by 2018 (Mergermarkets, 2018). Thereto, the private equity industry has enjoyed an era of cheap debt deal financing, and the prospects for leveraged buyouts have been uniquely ample. Concurrently, the public markets and other competing sources of financing have pushed up valuations, with, for example, the European median EV/EBITDA multiple expanding from 5.4 in 2009 to 8.9 in 2019 (Pitchbook, 2019). Taken together, the competition amongst the buyout private equity sponsors has rapidly increased, in turn increasing the pressure on generating value. While private equity firms used to rely a lot on financial engineering as a lever to create value (Indahl and Zinterhofer, 1998), this decade of cheap external financing, also available to non-financial firms, has put greater

pressure on private equity sponsors to find new ways to add value to their portfolio companies. This manifests itself in a survey of 100 senior-level executives across North America, EMEA, and Asia-Pacific, which found that niching, bringing forth creative deal structures, and geographic expansions are the key characteristics of the late 2010s private equity buyout value generation (Mergermarkets, 2018). Conversely, an increased pressure on novel value creation could also be a result of non-private equity backed firms catching up with the sponsors' practices.

The last decade has seen private equity firms improve their portfolio companies' operating capabilities by expanding on operating partners and developing functional expertise. Thereto, the sponsors have invested heavily into data analytics, geographical reach, sector expertise and local market intelligence (EY, 2020). Possibly, this has improved investment decision makings and operating capabilities.

Amongst non-financial firms, the characteristics of the decade following the financial crisis are manifested differently. Notably, when external funds are easily available, corporate leverage has been found to increase over-investing, overriding its otherwise managerial control mechanism of leverage (López-de-Foronda et al., 2019). All else equal, the high liquidity and escalating corporate debt of the 2010s could increase overinvesting amongst non-financial firms, potentially enhancing the returns to value levers available to private equity sponsors, such as aligning managerial incentives through changes to corporate governance and the firm's financial structure. Such successfully exploited opportunities would primarily result in an increased efficiency of capital, and less in pure income efficiencies.

With basis in the strong support for buyouts having an operating impact in the existing literature and that most of the characteristics of the last decade speak for value creation being essential to generate competitive returns, we hypothesize that the buyout still results in a relative improvement in operating performance of the buyout company. Among the characteristics of the decade following the financial crisis, we consider the following the main drivers. The increased competition amongst private equity sponsors increases the pressure on value creation and in turn relative operating impact on the buyout firm. A telling example of this is the private equity sponsors' investing into improving and widening value levers with data analytics and sector expertise. A mitigating factor to this hypothesized impact is that non-financial firms might have caught up with value creating practices of private equity, as would be predicted by conventional theory on information diffusion and market efficiency.

H_0: *The ROA and the EBITDA-margin, respectively, have not increased relative to the peer group over the holding period.*

H_1: *The ROA and EBITDA-margin, respectively, have increased relative to the peer group over the holding period.*

Market timing with respect to industry is a scarcely studied subject, with Bergström et al. (2007) being the first test for it. We expect to find a similar result as they – private equity funds have no market timing abilities with respect to industry.

H_0: *Private equity funds do not have market timing abilities with respect to industry.*

H_1: *Private equity funds do have market timing abilities with respect to industry.*

5. Methodology

5.1. Operating impact

We devise this event study of operating impact drawing on the findings on specification and empirical power of operating performance event studies by Barber and Lyon (1996). We adapt the following expected performance model, under which the null hypothesis of buyouts not having an operating impact is true, illustrating the assumptions of the analysis.

$$E\left(OPS_{i,t}^{n}\right) = OPS_{i,t-1}^{n} + \Delta OPSPG_{i,t}^{n}$$

where $E(OPS_{i,t}^{n})$ is the expected value of the operating statistic n of buyout company i in period t, $OPS_{i,t-1}^{n}$ is the same operating statistic of the same firm in time $t-1$, $\Delta OPSPG_{i,t}^{n}$ is the difference between the corresponding operating statistic of the peer group to buyout company i in time t and $t-1$.

To determine whether the buyout has an operating impact, we examine whether there is a systematic abnormal change in operating performance amongst the buyout companies over the holding period. Let t denote the time of exit and $t-1$ the time of buyout. The relative change in operating performance[1] of buyout company i is abnormal when:

$$\Delta OPS_{i,t}^{n} - \Delta OPSPG_{i,t}^{n} \neq 0$$

For devising an operating performance event study, Barber and Lyon (1996) outline three main considerations. First, amongst a palette of accounting statistics that describe operating performance, we choose post-tax operating income over book value of assets[2] (ROA) and earnings before interest, taxes, depreciation, and amortization over total revenues (EBITDA-margin). Second, as benchmark to the buyout companies, we construct peer groups considering industry classification and pre-event performance. Third, for the statistical test, we identify the appropriate statistical test as the non-parametric Wilcoxon's signed rank test, found to be uniformly more powerful in this setting.

5.1.1 Operating statistics

We choose ROA and EBITDA-margin as subjects for this analysis, for both fundamental and methodological reasons. An advantage over accounting statistics derived from net income is that these two are unaffected by interest expenses and in turn unaffected by increases in firm leverage, a frequent result of buyouts. Moreover, to allow for cross-firm comparisons, the operating metrics must be scaled, which is why we study two ratios rather than level post-tax operating income and EBITDA. We recognise that specific statistical considerations follow from studying changes in ratios; see section 5.2. for a discussion about this.

ROA is an extensively studied operating statistic in the existing literature and analysing it facilitates making comparisons. This measure of asset productivity better

[1] The difference between the change in operating performance of the buyout company and the change in operating performance of the median of its assigned peer group over the holding period. Here and hereafter referred to as "relative change"

[2] The average of total assets the current and preceding year

accounts for changes to the balance sheet than do pure income statement-ratios. A drawback to ROA is that it approximates the ideal metric of return on operating assets and might understate the true productivity of operating assets. Operating assets are however not reported in the consolidated financial statements we use.

Several variants of asset productivity are used in the literature, and each comes with its own considerations. In Boucly et al. (2011), EBITDA over total assets is analysed and asset write-ups in connection with the buyout and ensuing increased depreciations are identified as potential distortive factors. We find a ROA with EBIT in the numerator, taking depreciation into account, less of a subject to this distortion. On the other hand, EBIT has a lower expected cross-firm comparability when depreciation and amortisation vary idiosyncratically.

We consider the EBITDA-margin, a pure income statement ratio, to together with the ROA, a measure of asset productivity, to provide a comprehensive picture of operating performance. Thereto, an analysis of the EBITDA-margin facilitates making comparisons within the realm of private equity as transaction metrics such as leverage, interest coverage, and enterprise value multiples are most frequently based on EBITDA. In the literature, the EBITDA-margin is less extensively studied, not covered in archetypical papers such as Kaplan (1989), Muscarella and Vetsuypens (1990), Barber and Lyon (1996), but in more recent studies such as Bergström et al. (2007).

Because we analyse the change in operating performance over a holding period, we wish to compare operating statistics that are as close as possible to the buyout and the exit. While transactions occur throughout the year, the data we use is reported annually. From this discrepancy, a trade-off between capturing as much as possible of the event period and including as little as possible of periods before and after arises. We choose to apply an approach inspired by Bergström et. al (2007) where we consider a buyout or exit that took place in the second half of the calendar year to have occurred in the following calendar year, and otherwise in the same calendar year.

We then use the operating statistics of the years prior to the assigned year of buyout and exit. We refer to these two as "ex-buyout" and "ex-exit" operating statistics from here on. With this method, the analysis captures only the impact of years in which the majority of months are part of the event period. We identify that the inevitable imprecision resulting from this is that for buyouts and exits that occurred in the first half of the year, the analysis would omit part of the of impact of the buyout. This is turn is a source of impairment to the power of our test. However, because those omitted months is a small amount relative to the length of most holding periods, we deem this a minor imperfection. For how we adjust for data where fiscal years differ from calendar years, see section 6.

5.1.2 Benchmarking

We assign each buyout company a peer group consisting of five peers considering the two digit SIC-codes (industry), ex-buyout performance, geographic location (Sweden), and a non-private equity ownership during the event period. The change in the peer group operating statistic[3] is then defined as the median of the group. A two-digit SIC criteria generates a seemingly diverse set of companies but Barber and Lyon (1996) shows that a four-, in place of two-, digit SIC criteria, all else equal, provides no improvement in explanatory power (Barber and Lyon, 1996).

[3] $\Delta OPSPG_{i,t}^{n}$

A relatively frequently used alternative to peer matching by pre-event performance, is to match by firm-size. While this methodology too, in general, generates well-specified models, Barber and Lyon (1996) show that for ROA, peer matching without a pre-event performance criterion generates models with large misspecifications for samples with performance-based biases, even when biases are small. By matching on ex-buyout EBITDA-margin and ROA, for the two analyses respectively, we effectively control for mean-reversions of the operating metrics over the ownership period.

While Barber and Lyon (1996) considered a combination of size and performance matching on bandwidths as narrow as 30% and 10%, respectively, the most robust criterion, archetypical recent event studies of operating performance, on populations considerably larger than the Swedish one, use less strict ones. Boucly et. al (2009) apply a 50% bandwidth on ROA and Bernstein et al. (2017) apply bandwidths of 30% on both size and on ROA but note that their results are unaffected by broadening the bandwidth to 50%. Applying a criterion of bandwidths of pre-performance comes with a cost that is especially significant in event studies on small populations. If the number of peers meeting the criterion are fewer than five, the data point must either be excluded, or the other screening criteria loosened when.

With reference to this, Bergström et al. (2007) abandon pre-performance matching altogether and argue that the 20 largest firms in the same industry peers make adequate peer groups, effectively matching by size. We find this an opportunity to add to the subject of event studies using pre-event matching by applying the methodology suggested by Barber and Lyon (1996) on a, scarcely studied, small population. With basis in the above considerations, we choose to devise our analysis using ex-buyout bandwidths of 50%.

For robustness, we also present the equivalent tests on samples from three additional peer group generating methods. Our main line of analysis assumes that the matching buyout companies with peer groups using pre-performance bandwidths of 50% generates a well-specified model. If the model is mis specified, the null-hypothesis rejection rates are misleading. It is possible that the model of our main analysis is mis specified because it imperfectly[4] eliminates observations from the full sample and generates observations with peer groups less alike the buyout companies than does a stricter bandwidth.

We run the same Wilcoxon signed rank tests on (1) the full sample, (2) a sample excluding buyout companies with negative ex-buyout operating statistics, and (3) a sample generated using a 30% bandwidth. Grossly differing results could be an implication of the model being mis specified. Would that be the case, we would reconsider the validity of the analysis. The reason for conducting the analysis on a sample solely excluding buyout companies with negative ex-buyout operating statistics is a result of a caveat to the database we use, outlined in section 6.

5.1.3 Statistical test

To test whether a median abnormal performance exists, the Wilcoxon signed rank test statistic, W follows as:

[4] See section 6 for an account of a caveat to the database causing this.

$$W = \sum_{i=1}^{N_r} \frac{\Delta OPS_{i,t} - \Delta OPSPG_{i,t}}{|\Delta OPS_{i,t} - \Delta OPSPG_{i,t}|} \times R_i$$

Where R_i denotes the rank of the absolute value of relative change in an operating statistic of buyout company i when ordered ascendingly and the other terms are defined as previously.

It is worth noting that each data point has been based relative to the buyout and exit. Interested in examining the effect of the buyout as binary event, we consider it economically meaningful to treat holding periods of different lengths as observations of one type.

While scaled accounting statistics allow for cross-firm comparisons, an analysis of change in ratios carries important considerations that one of level statistics do not. To analyse the change in ROA and EBITDA-margin, there are two options at hand. We either test the relative or absolute change. Testing relative change requires excluding observations yielding illogical comparisons. This includes observations for which the sign of the operating statistic switches or with has an initial value of zero. Naturally, this systematic exclusion could constitute a bias, and our samples contain four such observations each. Testing absolute change does not entail this problem, but it effectively assumes that all absolute changes are equate. Returns to investments in operational performance might be marginally decreasing, which would make absolute changes less economically comparable, a valid objection to the aforementioned assumption. We consider an analysis of absolute change adequate for our purposes, and it allows for wide comparisons as that appears to be most frequently used in the literature.

5.2 Market timing

We complement the analysis of operational impact with a test of market timing, applying the methodology of Bergström et al. (2007). Assuming that the industry operating statistics are at steady-state, equally likely to increase or decrease, we use a sign test to determine whether the private equity sponsors have timed their investments with regards to industry. For this, we use the respective median changes in ROA and EBITDA-margin of the peer groups assigned to the buyout companies. Notably, a macroeconomic development would violate the steady state assumption. In the results section, we report the p-values of the sign test based on the binomial distribution.

To conduct this analysis on the sample of peers implicitly defines the industry that the private equity sponsor has invested in as that of the performance matching subset of the entire industry as classified by the SIC-code.

6. Data description

We construct our test group of buyout companies by screening for buyouts closed between the year start of 2010 and first half of 2020 in Sweden in the Capital IQ database. We choose this end of the sample period because the availability of 2020-data is scarce. For this list of buyout companies, we extract data on the two operating statistics over the fiscal years from 2009 to 2019, transaction close dates, and two-digit SIC codes. Because the operating statistics are generated on a fiscal basis, we adjust the assigned years of buyout and exit where needed by considering them in relation to the fiscal year end. Two of the buyout companies' fiscal years differ from the calendar years. This first round of screening generates 624 transactions, of which a significant portion are irrelevant to the analysis. Of these 624 transactions, 596 are non-buyouts (growth equity and venture capital), do not include necessary data (and cannot be completed using Refinitiv Eikon), have not yet been exited, or was exited in the same year as the buyout. and these are excluded. The full remaining samples consist of 55 observations each. We look up the dates[5] of transaction exits manually in press releases and private equity sponsor websites. After applying the semi-annual cut-off and pre-performance bandwidth of 50%, the two samples of the main analysis of 50 and 47 buyout companies are distributed as in table 1 below.

Table 1. Buyout company samples

The table reports the number of buyouts and exits by year of the two samples on EBITDA-margin and ROA and the distribution of operating statistics from the years preceding the respective buyouts.

	Number of LBOs		Number of exits		EBITDA-margin (%), year preceding LBO					ROA (%), year preceding LBO				
Year	EBITDA-margin	ROA	EBITDA-margin	ROA	Mean	25th pct.	Median	75th pct.	Std dev.	Mean	25th pct.	Median	75th pct.	Std dev.
2009	0	0	0	0	-	-	-	-	-	-	-	-	-	-
2010	4	4	0	0	31.4	11.4	22.7	51.4	27.5	15.9	8.8	14.8	23.0	8.6
2011	15	15	0	0	10.6	6.7	11.0	14.8	4.9	9.6	3.3	7.4	12.6	7.0
2012	12	10	0	0	19.4	9.1	16.6	29.4	13.1	18.8	10.7	19.9	23.1	7.0
2013	7	7	1	2	14.6	11.4	15.7	19.5	5.6	11.9	1.9	12.5	16.7	8.5
2014	2	1	1	1	4.7	4.2	4.7	5.2	0.7	8.8	8.8	8.8	8.8	-
2015	4	4	3	2	11.5	4.5	10.8	18.4	8.1	6.2	5.0	6.6	7.4	1.7
2016	2	2	9	9	20.7	7.1	20.7	34.3	19.3	27.6	16.5	27.6	38.7	15.7
2017	3	3	14	12	6.2	5.3	6.7	6.7	0.9	11.0	1.1	7.9	23.8	11.7
2018	1	1	7	7	9.6	9.6	9.6	9.6	-	3.3	3.3	3.3	3.3	-
2019	0	0	7	6	-	-	-	-	-	-	-	-	-	-
2020	0	0	8	8	-	-	-	-	-	-	-	-	-	-
Total	50	47	50	47	14.9	6.7	12.1	18.8	12.3	12.8	6.3	10.3	19.8	8.8

Note: Buyouts in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. Listed EBITDA-margins and ROAs adhere to the semi-annually cut-off calendar year adjusted for potential fiscal differences. The two samples of buyout companies

[5] For one observation, GPP Perimeter Protection, we find no exact transaction date. Because we have more observations with exit in the first half of the calendar year, we consider it having occurred in the first half.

represent the full samples less the buyout companies with less than five peers within a 50% ex-LBO operating performance bandwidth. LBO: leveraged buyout, buyout.

The sample buyouts are concentrated around the early years of the observed period, to which the fact that the buyouts must have been exited to qualify is likely a significant cause. Within these three years with the largest number of observations, 2011-2013, means and median values differ by little, implying symmetric distributions. Buyouts in 2011 have lower median pre-buyout operating statistics, and the cross-year variability is quite high for both operating statistics. For reference, a corresponding summary of the full samples is found in the appendix, table 8.

For each of the 55 buyout companies of the full sample, we screen for non-private equity backed peers with the same two-digit SIC-codes and operations in Sweden using the S&P Capital IQ database. We consider the automatically generated list of buyout company SIC-codes imperfect, and when screening, we manually assess the fairness of the classifications with regards to which industry classification the buyout company fits. For buyout companies with several autogenerated SIC-codes, we use the intersect of those where we consider it appropriate. The SIC-codes could be an inferior to classification systems such as the NACE 1.1 or possibly the Swedish SNI. The latter two are however not tabulated in the database we use, and we consider the SIC classification adequate for our purposes.

We construct two sets of this data base, one in which we match on pre-buyout EBITDA-margin and one in which we match on pre-buyout ROA. Amongst the buyout companies, the number of industry peers returned prior to applying the bandwidth vary from the low tens to several thousands.

The data from Capital IQ is imperfect, and for both cohorts, we complete missing values for the buyout companies with information from consolidated financial statements from the Refinitiv Eikon database where possible. Thereto, the Capital IQ strictly generates negative margins as not meaningful (NM). For the buyout companies, we simply complete with Refinitiv Eikon data. However, the sets of industry peers contain up to several thousand peers, and we cannot complete all of these. This mainly poses a problem for the screenings on buyout companies with negative ex-ante margins, of which there are 3 EBITDA-margins and 6 ROAs. The outcome for those screenings is that only industry peers with positive margins make it to the matching.

To apply our method of pre-performance matching, we compute each difference between each buyout company's ex-buyout operating statistics and those of their respective industry peers. We then rank and order the industry peers by those differences and select the closest five with data available for the year preceding exit. We aggregate all changes to the operating statistics for the buyout companies and the median of respective peer groups, resulting two main data sets, one for EBITDA-margin and one for ROA.

Then, look up buyout companies with negative ex-buyout operating statistics, remove these and construct the samples without buyout companies with negative ex-buyout operating statistics. In parallel, we compute the bandwidths of 30% and 50% around each buyout company ex-buyout operating statistic, from which we construct the two last samples.

No observation with negative ex-buyout operating statistic remains in the two bandwidth samples. For the EBITDA-margin sample, there are 5 buyout companies without peers within a 50% bandwidth and 7 without peers within a 30% bandwidth. The two corresponding numbers for ROA are 7 and 9 (summarized in table 9 in the appendix).

It follows that the ex-buyout operating statistics of peers to buyout companies with negative ex-buyout operating statistics are skewed in the positive direction. Because improving operating performance might scale (supposedly inversely) to the level of ex-buyout operating performance, this could make up a bias to the selection of peers, magnifying the impact of the buyout. It should be noted however that removing buyout companies with negative ex-buyout operating statistics results in a non-random sample. As a result, the findings of our analysis apply to a (large) subset of all buyouts, that of buyouts with positive ex-buyout operating statistics. Within the sample, the ex-buyout operating statistics of the sample of the main analysis and the full sample compare as shown in table 2 below.

Table 2. Buyout company sample relative to full sample

The table reports the number of buyout companies and the distribution of ex-LBO EBITDA-margin and ROA for the sample of the main analysis and the full sample.

	Number of observations		EBITDA-margin (%), year preceding LBO					LBO ROA (%), year preceding LBO				
	EBITDA-margin	ROA	Mean	25th pct.	Median	75th pct.	Std dev.	Mean	25th pct.	Median	75th pct.	Std dev.
Samples of main analysis	50	47	14.9	6.7	12.1	18.8	12.3	12.8	6.3	10.3	19.8	8.8
Full samples	55	55	14.4	5.9	12.0	18.8	12.8	10.3	3.2	8.8	18.6	10.5

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. "Sample of main analysis" is that of the full samples less the buyout companies with less than five peers within a 50% ex-LBO operating performance bandwidth.

A similar, though much less significant caveat to the data is that operating statistics are generated by fiscal year, and ideally, one should adjust for this relative to the event period of each transaction for all peers before benchmarking and applying the strict bandwidth. Moreover, we try to manually control for that no peer was private equity backed during the event period in question, but it is possible than we fail to account for this. The risk of failing to do so is small however, considering that only a small fraction of firms is private equity backed in a certain period of time.

For the automatically generated ROAs, a transformation is needed. The ROA from Capital IQ is calculated using a static, and irrelevant, tax-rate of 37.5% for the computation of post-tax EBIT. We remove this factor for each observation and then remultiply each ex-buyout and ex-exit ROA with the Swedish corporate tax rate of the year preceding that with the highest number of buyouts in the sample, 26.3%. The ROA should reflect the tax-rate of the actual environment in the firm, which is why we consider appropriate to remove the automatically generated one of 37.5%. In the market timing analysis, we simply use the tax-rate of the ex-buyout year[6].

The changes in the two operating statistics for the buyout companies, the peer groups, and the relative changes between the two groups are summarized in table 3 below.

[6] The level of tax-rate is irrelevant for the purpose of performing a sign test.

Table 3. Absolute changes in EBITDA-margin and ROA over the event period.

The table reports the distributions of absolute changes in operating statistics from LBO to exit for the buyout companies and peer groups, and the relative change between the two groups.

	Min (p.p.)	Max (p.p.)	Mean (p.p.)	Median (p.p.)	Std. Dev. (p.p.)
EBITDA-margin (BOC)	-27.40	13.50	-0.91	0.63	8.61
ROA (BOC)	-20.26	19.34	-0.27	0.20	7.12
EBITDA-margin (PG)	-34.70	3.98	-2.82	-1.91	5.69
ROA (PG)	-16.79	6.34	-3.89	-3.40	5.95
EBITDA-margin (relative)	-27.40	32.70	1.91	1.17	10.33
ROA (relative)	-19.78	28.88	3.61	3.70	9.27
$N_{EBITDA\text{-}margin} = 50$					
$N_{ROA} = 47$					

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. "BOC" is for buyout company, "PG" is for the median of peer group, "relative" is for the difference between BOC and PG.

The most notable takeaways from the summary above are that the variability in changes in operating statistics is high, and the buyout company statistics are asymmetrically distributed while the those of the peer group and the relative are symmetrical, with means and median values approximately coinciding. The dispersion and asymmetry of the buyout company absolute changes could be an indicator of the presence of outliers in our sample. The proper definition of outliers in this study would be observations that divert from the criteria of the population, post financial buyouts in Sweden[7]. Of these, the most salient criterion is that of the transaction being a buyout. As mentioned previously, we remove transactions by non-private equity sponsors in the first round of manual adjustments to the automatically generated sample, but growth equity and venture capital transactions may exist among the remaining. Controlling the sample for such transactions, we do not find any however, and no other fundamental reason for excluding the buyout companies with extreme values[8].

The data for testing market timing, number of positive and negative changes in operating statistics over the event period of the peer group are as follows in table 4 below.

Table 4. Signs of peer group changes in EBITDA-margin and ROA

The table reports the number of negative and positive changes in operating statistics from LBO to exit of the median of the peer groups to the buyout companies.

	Negative	Positive
EBITDA-margin	39	16
ROA	38	17

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. Negative: $OPSI_{i,t} < OPSI_{i,t-1}$; positive $OPSI_{i,t} > OPSI_{i,t-1}$

[7] Our sample includes one Norwegian company (Hansen Protection AS) with main operations in Sweden.

[8] These are CCS Healthcare by Segulah Advisors (EBITDA-margin and ROA), Biolin Scientific Holding by Ratos (EBITDA-margin), Aditro Logistics by Valedo Partners (EBITDA-margin), GPP Perimeter Protection by Procuritas Capital (EBITDA-margin), Car-O-Liner Group by Polaris Management (EBITDA-margin), Bambora by Nordic Capital (EBITDA-margin), Scanacon by Capilon (EBITDA-margin), Bellbox by Fidelio Capital (ROA), Hansen Protection by Montagu Private Equity (ROA).

7. Results

7.1. Buyout operating impact

Table 5. Sample medians and non-directional Wilcoxon signed rank test of buyout operating impact

The table reports the sample medians of the differences in EBITDA-margin and ROA between the year preceding buyout and the year preceding the exit and the test ranks and test statistics of a non-directional Wilcoxon signed rank test performed to determine whether this median difference of buyout companies is statistically different from that of their assigned peer groups.

	Median Δ[d]		Positive ranks[e]			Negative ranks[e]			Test statistics		
	BOC	PG	*n*	Mean rank	Sum of ranks	*n*	Mean rank	Sum of ranks	Ties	*Z*	*p*
EBITDA-margin (p.p.)											
Full sample	0.76	-1.90	33	30.6	1009.50	20	26.4	527.5	2	2.019	**0.0435**
Neg. ex-LBO OPS[a]	0.65	-1.93	31	28.7	890.50	18	26.8	481.5	3	1.863	0.0625
50% bandwidth[b]	0.63	-1.91	30	27.6	827.50	18	24.7	444.5	2	1.849	0.0645
30% bandwidth[c]	0.78	-1.91	29	26.7	773.50	17	23.5	399.5	2	1.918	0.0551
ROA (p.p)											
Full sample	0.54	-2.72	34	31.7	1078	20	23.1	461.0	1	2.585	**0.0097**
Neg. ex-LBO OPS[a]	0.20	-3.03	30	27.8	835	18	21.6	389.0	1	2.218	**0.0265**
50% bandwidth[b]	0.20	-3.39	30	27.0	810	16	19.8	317.0	1	2.609	**0.0091**
30% bandwidth[c]	0.37	-3.21	29	26.6	771	16	19.3	309.0	1	2.524	**0.0116**

Note: Buyouts in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. "BOC" is for buyout company, "PG" is for the median of peer group. The four samples are ordered in descending order of number of observations. The test statistic $W = \sum_{i=1}^{N_r} \frac{\Delta OPS_{i,t} - \Delta OPSPG_{i,t}}{|\Delta OPS_{i,t} - \Delta OPSPG_{i,t}|} \times R_i$ converges to a normal distribution for $n \geq 20$, from which z-scores and p-values are calculated. P-values below 0.05 are in bold.

a) Excluding observations with negative buyout ex-LBO operating statistics
b) Excluding observations with any peers outside a 50% bandwidth
c) Excluding observations with any peers outside a 30% bandwidth
d) For BOC: median value of $\Delta OPS_i = OPS_{i,t} - OPS_{i,t-1}$; PG: median value of $\Delta OPSPG_i = OPSPG_{i,t} - OPSPG_{i,t-1}$
e) Positive: $\Delta OPS_i > \Delta OPSPG_i$; Negative: $\Delta OPS_i < \Delta OPSPG_i$

In our main line of analysis, that of the sample generated with a pre-performance matching bandwidth of 50%, the median buyout company absolute change in ROA (0.2) is notably lower that in EBITDA-margin (0.63), and the median peer group absolute change in ROA (-3.39) is larger than that in the EBITDA-margin (-1.91). Moreover, a Wilcoxon signed rank test did not reveal a significant difference in the median change of EBITDA-margin for the buyout companies and respective peer groups over the holding period[9]. There were two pairs of observations with no difference. The result of the corresponding test for the ROAs was significant, $n = 47$, $Z = 2.609$, $p < 0.05$. There was one pair of observations with no difference.

In the three supplementary lines of analysis, conducted for robustness, the results are mixed. Notably, the median value of buyout company absolute change in ROA drops

[9] Hereafter referred to as "Relative change"

significantly from the full sample to that excluding observations with negative ex-buyout ROAs and is more uniform amongst the other three.

7.2. Market timing

Table 6. Non-directional sign test of market timing

The table reports the number of negative and positive changes of peer groups' EBITDA-margin and ROA over the holding period and the p-values from the binomial distribution of a non-directional sign-test from a sign test. The test was performed to determine whether the difference in the number of positive and negative changes in peer group EBITDA-margin and ROA, respectively, are significantly different from zero.

	Negative	Positive	*p*
EBITDA-margin	39	16	**0.0027**
ROA	38	17	**0.0065**

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. P-values below 0.05 are in bold. Negative: $OPSI_{i,t} < OPSI_{i,t-1}$; positive $OPSI_{i,t} > OPSI_{i,t-1}$

For both the EBITDA-margin and ROA, the sign test reveals that the number of decreases in median peer group operating performance significantly exceeds the number of increases in the median peer group operating performance on a significance, $n = 55$, $p < 0.05$, implying that the operating performance of the industries deteriorated over the holding period.

8. Discussion

For both operating statistics, the results from the Wilcoxon signed rank test are relatively uniform across the three non-full sample groups. The median change in ROA for buyout companies in the full sample differ from the rest. Considering the caveat to the database where industry peers with negative ex-buyout operating statistics do not make it to the peer matching (see section 6), we consider it possible that the full sample yields a mis specified model. No such observations remain in the sample of the main analysis. The findings are therefore only applicable to buyouts where the buyout company had a positive ex-buyout operating statistic. For this subgroup of buyouts, we see no implication for questioning the validity of the analysis. In our full samples, this subgroup of buyouts makes up 52 (EBITDA-margin) and 49 (ROA) out of 55 observations. Likely, the findings of this paper are still widely applicable.

In our main line of analysis, we did not find a significant relative change in EBITDA-margin ($p > 0.05$). This is contrarian to what Bergström et al. (2007) found and does not support our hypothesis of a relative change in the EBITDA-margin. We did find a significant relative change in ROA, which is line with the findings of the aforementioned authors and Boucley, et al. (2011), and supports our hypothesis. Notably, both median absolute changes in the buyout EBITDA-margin and ROA, are small relative to the deterioration of the peer groups' operating statistics, from which the relative change mainly stems from. Nevertheless, the relative improvement is the correct measure to evaluate the operating impact of the buyout by.

A possible explanation to buyouts improving the ROA but not the EBITDA-margin could lie in the combination of the historically unique high liquidity of the 2010s and non-private equity backed firms catching up with the practices of private equity. First, when external financing is easily accessed, the risk of non-financial firms over-investing could increase, something López-de-Foronda et al. (2018) find support for. Over-investing expands the balance sheet disproportionally to profits and would affect the ROA more than it would the EBITDA-margin. It could be so that the expertise of private equity sponsors allows for avoiding a benchmarked over-investing to some degree. Second, just as the value generation from the financial engineering of the 1980s was gradually phased out as firms caught up with these practices and capital markets became more sophisticated, it could be that the room for operating impact is diminishing over time. This study does not provide insight into whether this is the case.

In our analysis of market timing, we found support for that the industry EBITDA-margins and ROAs deteriorated over the holding periods. These results are contrarian to those of Bergström et al. (2007), who observed no significant direction of change in industry operating performance. Moreover, assuming that industry operating performances are at a steady state, our results would indicate that the private equity sponsors did the opposite of timing the industries, investing in those with operating statistics above steady state. Whether this is the case, or the steady state assumption does not hold, we cannot determine from the results obtained. One violation of this assumption is a change in the macroeconomic environment. For the deteriorating industry ROAs, one such overarching change, could also stem from the above-mentioned increased risk of firm overinvestments of the 2010s. Accelerating competition could be another possible explanation to both deteriorations. Following financial crisis, firms around the globe found themselves facing an unprecedented exogenous adverse demand shock in 2008. With a negative real GDP growth in 2009 (World Bank, 2019), it could be that operating

performances in many instances dropped to levels below steady state[10]. However, because there was a significant increase in default rates and the recovery from the financial crisis was swift, largely driven by exogenous monetary and fiscal stimuli, the surviving firms might have found themselves facing competition below the market equilibrium in the years immediately following the financial crisis, enjoying operating performance above steady state. Because operating performance has been shown to mean revert over time, an example being the analysis of returns on equity by Pennman (1991), it could be that the observed deterioration in operating performances is a general downward mean-reversion. This effect would be amplified by the fact that our sample is concentrated around the years immediately following the financial crisis. This study does not provide insight into whether this is the case.

Why we obtain results different from those of Bergström et al. (2007) can, beyond that discussed above, be a result of that we apply a pre-performance peer matching, the method advocated by Barber and Lyon (1996), whereas they construct peer groups consisting of the twenty largest corporations within the same industry, as well as that our findings solely apply to buyouts with positive ex-buyout operating performances. The difference in the method of peer matching affects the analysis of operating impact, in terms of the specificity of the model, and market timing, in terms of the definition of industries.

[10] Precise geographically aggregated data on operating performances over time are scare, but the EBITDA-margin in Europe showed a significant drop from 2008 to 2009, a recovery between 2009 and 2010, a continuous fall from 2010 to 2015, and a continuous increase thereafter (Lazard, 2019). The continuous fall from 2010 to 2015 covers the years in which the majority of the LBOs in the period of this study takes place, to some degree supporting that industry EBITDA-margins deteriorated.

9. Conclusion

In this thesis we analysed whether buyouts in the decade following the financial crisis in Sweden have an operating impact and whether private equity sponsors time their investments with respect to industry. We did this by applying methodologies of Barber and Lyon (1996) and Bergström et al. (2007), with considerations to the event period and population in question.

Our results indicate that buyouts improve the ROA but not the EBITDA-margin relative to non-private equity backed firms and that both operating statistics deteriorated over time for the industries invested in. The first of these four findings is in line with those of Bergström et al. (2007), who studied the operating impact of buyouts and industry market timing in Sweden prior to the financial crisis.

We consider our findings to be valuable considerations to the contemporary discussion of private equity and its societal role. The fact that we did not find support for an improvement in the EBITDA-margin could be a first indicator on non-private equity backed firms catching up with the value creating practices of the private equity industry. With reference to the relative improvement in ROA, we conclude however that the buyouts of this decade do have an operating impact. Thereto, we believe our detailed account of methodological considerations makes a valuable contribution to future event studies of operating performance in Sweden and other small populations.

We identified key characteristics of the decade following the financial crisis such as ample liquidity, lagged post-crisis competition, and increasing competition amongst private equity sponsors, as possible explanations to why our findings differ from those of Bergström et al. (2007). This study does not give insight into the likelihood of those possible explanations causing this result. We consider our study to highlight the importance of two areas of further research.

First, it would be interesting to see the study replicated on additional populations in the under-studied 2010s to strengthen the implication of this decade's characteristics affecting the buyout operating impact and development of industry operating performance. Second, our findings call for further research on contemporary drivers of the operating impact of leveraged buyouts.

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Appendix

Table 7. Buyout company sample

The table reports the name of buyout company, years of LBO and exit, and the private equity sponsor of the transaction for the full sample sorted by year of LBO.

Buyout Company	Year of LBO	Year of Exit	Sponsor
Frosunda Omsorg AB	2010	2018	HgCapital
AcadeMedia AB (publ) (OM:ACAD)	2010	2018	EQT Partners
Solhagagruppen Solhaga by AB	2010	2016	Bridgepoint Development Capital
Swedegas AB	2010	2015	EQT Partners
Scanacon AB	2010	2017	Capilon
ONE Nordic AB	2011	2020	Altor Equity Partners
Jernforsen Energi System AB	2011	2018	Alder
CCS Healthcare AB	2011	2019	Segulah Advisor
Dometic Group AB (publ) (OM:DOM)	2011	2017	EQT Partners
Akademikliniken AB	2011	2016	Valedo Partners
Autotube AB	2011	2014	Accent Equity Partners
Hansen Protection AS	2011	2013	Montagu Private Equity LLP
Biolin Scientific Holding AB	2011	2017	Ratos
Nordic Waterproofing AB	2011	2017	Axcel Management
Bellbox AB	2011	2018	Fidelio Capital
Troax AB	2011	2013	Accent Equity Partners
Grolls AB	2011	2016	Litorina Capital Advisors
SCAN COIN AB	2011	2015	Segulah Advisor
Polarica AB	2011	2020	Hartwall Capital; Intera Partners Oy
Perten Instruments AB	2011	2015	Valedo Partners
Ovako Group AB	2011	2018	Triton
Aleris AB	2011	2020	Investor
Sveba-Dahlen AB	2012	2017	Litorina Capital Advisors
Com Hem AB	2012	2017	BC Partners
Kemetyl AB	2012	2016	Segulah Advisor
GPP Perimeter Protection AB	2012	2015	Procuritas Capital Investors VI Holding
Atos Medical AB	2012	2017	EQT Partners
Coromatic Group AB	2012	2019	EQT Partners
Eton AB	2012	2016	Litorina Capital Advisors
Absortech AB	2012	2017	PEQ
SORTERA Skandinavien AB	2012	2016	Norvestor Equity
Persson Innovation AB	2012	2018	Connecting Capital
Car-O-Liner Group AB	2012	2017	Polaris Management
Fiskarhedenvillan AB	2012	2020	Litorina Capital Advisors
Skånska Byggvaror AB	2012	2016	Polaris Management
SEM AB	2013	2016	Perusa
Actic Sverige AB	2013	2017	IK Investment Partners
Cambio Healthcare Systems AB (publ)	2013	2019	Valedo Partners
Aditro Logistics AB	2013	2020	Valedo Partners
Robust AB	2013	2019	Norvestor Equity
Troax Group AB (publ) (OM:TROAX)	2013	2016	FSN Capital Partners
Netel AB	2013	2016	Axcel Management
Breas Medical AB	2014	2017	PBM Capital Group
Logent AB	2014	2019	Adelis Equity Partners
Textilia Tvätt & Textilservice AB	2015	2017	Accent Equity Partners
Bambora	2015	2018	Nordic Capital
Bygghemma Sverige AB	2015	2017	Nordstjernan
Hector Rail AB	2015	2020	EQT Partners
S:T Eriks AB.	2015	2019	Accent Equity Partners
Piab AB	2016	2018	EQT Partners
Anlaggning & Kabel Entreprenad i Malmö AB	2016	2017	Priveq Investment
Linfre Education AB	2017	2019	Summa Equity
Scandinavian Cosmetics AB	2017	2020	Aurelius Equity
IT Gården i Landskrona AB	2017	2020	Norvestor Equity
KEWAB, Kenneth Wahlström AB	2018	2020	Triton

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics.

Table 8. Full buyout company samples

The table reports the number of LBOs and exits by year of the two samples on EBITDA-margin and ROA and the distribution of operating statistics from the years preceding the respective LBOs.

					EBITDA-margin (%), year preceding LBO					LBO ROA (%), year preceding LBO				
Year	Number of LBOs	%	Number of exits	%	Mean	25th pct.	Median	75th pct.	Std dev.	Mean	25th pct.	Median	75th pct.	Std dev.
2009	0	0	0	0	-	-	-	-	-	-	-	-	-	-
2010	5	9	0	0	24.3	10.6	12.2	33.1	28.6	10.3	7.9	9.8	19.8	14.7
2011	17	31	0	0	11.5	6.7	11.0	14.8	8.7	7.4	3.2	6.8	11.8	9.5
2012	13	24	0	0	17.8	7.0	13.7	25.4	13.8	14.1	8.9	18.6	21.3	10.9
2013	7	13	2	4	14.6	11.4	15.7	19.5	5.6	11.9	1.9	12.5	16.7	8.5
2014	2	4	1	2	4.7	4.2	4.7	5.2	0.7	5.7	2.7	5.7	8.8	4.3
2015	5	9	4	7	12.6	4.9	16.7	17.0	7.5	4.3	3.8	6.1	7.0	4.3
2016	2	4	10	18	20.7	7.1	20.7	34.3	19.3	27.6	16.5	27.6	38.7	15.7
2017	3	5	14	25	6.2	5.3	6.7	6.7	0.9	11.0	1.1	7.9	23.8	11.7
2018	1	2	8	15	9.6	9.6	9.6	9.6	-	3.3	3.3	3.3	3.3	-
2019	0	0	7	13	-	-	-	-	-	-	-	-	-	-
2020	0	0	9	16	-	-	-	-	-	-	-	-	-	-
Total	55	100	55	100	14.42	5.93	12.00	18.80	12.80	10.31	3.20	8.79	18.63	10.54

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics. Listed EBITDA-margins and ROAs adhere to the semi-annually cut-off calendar year adjusted for potential fiscal differences.

Table 9. Effect on sample size of pre-performance matching and caveat to data

The table reports the number of buyout companies in the sample with less than five peers within 30% and 50% bandwidths around its operating statistic, negative operating statistics, and the full sample sizes. Bandwidth of b % is computed as $(1 \pm b) \times OPS_{i,t-1}$ where $OPS_{i,t-1}$ is the operating statistic of the year preceding the LBO.

	Number of buyout companies			
	With less than five peers within a 30% bandwidth	With less than peers within a 50% bandwidth	With negative ex-LBO operating statistic	Full sample
EBITDA-margin	7	5	3	55
ROA	9	8	6	55

Note: LBOs in Sweden with close date between 2010-01-01 and 2020-06-30 having a recorded transaction exit, holding period exceeding one year, and data on operating statistics.