

**Private Equity Target Selection: Performance and Risk
Measurement based on Propensity Score Matching**

by

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Abstract

We use a dataset of 94 private equity (PE) buyouts initiated in Western Europe from 1996 to 2005 to identify PE target selection patterns. In contrast to the literature, our sample covers all types of PE deals, and not just the large public-to-private deals. We find that PE funds buy stable companies within a profitability corridor far above zero. Moreover, we use the identified selection pattern to measure the performance and operational risk of PE investments in comparison to propensity score matched peers. PE portfolio companies generate un-levered returns of 6.1% and improve profitability by 2.2% above the propensity score matched peers. Compared to overall sector benchmarking, peer matching lowers the financial outperformance of PE deals and increases their operational outperformance by roughly a third. Peer benchmarking, therefore, solves the puzzle in the existing literature of huge financial outperformance of PE deals with only moderate or no operational outperformance. In addition, we also find that PE owned companies show significantly lower operational volatility than the median sector volatility. Also, the debt coverage ratio of PE investments does not drop below sector levels, despite the high debt-to-equity ratios during PE ownership.

JEL: G31, G32, G34, G38, G23, G24, G18

Keywords: leveraged buyouts (LBO), management buyouts (MBO),

Executive Summary

We study whether using matched peers instead of broad sector benchmarking has an influence on Private Equity performance measurements. We are able to show with deal-level data that Private Equity follows a specific pattern in their selection of target companies and that using peer instead of sector benchmarking, lowers the financial outperformance and increases the operating outperformance by roughly a third. Peer benchmarking, therefore, solves the puzzle in the literature of huge financial outperformance with only moderate operational outperformance.

We use a dataset of 94 PE buyouts initiated in Western Europe from 1996 to 2005, which is representative in terms of performance of large and mature PE funds, to identify PE target selection patterns. In contrast to the literature, our sample covers all types of PE deals, instead of rare, large public-to-private deals only.

We identify Private Equity peer via propensity score matching. We first capture the selection pattern with a multivariate logit regression and then use the estimated model to find the 10 nearest neighbors for each deal.

Our results in detail are:

- Peers show statistically significantly higher levered and unlevered returns, lower profitability (EBITDA margin) improvements, lower sales growth and higher multiple improvements than the broad sector.
- PE portfolio companies generate un-levered returns of 3.5% and improve profitability by 2.3% above the propensity score matched peers. Accordingly, peer instead of sector benchmarking, lowers the financial and increases the operational outperformance by roughly more than a third. Peer benchmarking, therefore solves the puzzle in the literature of huge financial with only moderate operational outperformance.

- We are also able to reveal that PE owned companies show a 29-36% lower operational volatility than the median sector volatility; and that the debt coverage ratio of PE investments does not drop below sector levels, despite the high debt-to-equity ratios during PE ownership.

1. Introduction

Among regulators, governments, and unions there is concern that during periods of economic distress, PE (Private Equity) owned companies face more difficult times due to the additional debt taken on during the acquisition. Moreover, it is unclear if PE caused any operational improvements in the acquired companies (deals) in the wave of buyouts in the last decade.¹ We are able to show, with a proprietary deal-level data set for 94 European deals initiated by large and mature PE houses, that both concerns are overstated when comparing PE owned companies with propensity score matched peers.

Using matched peers instead of all sector companies as a benchmark is crucial for the valuation of PE activity, given the clearly non-random PE target selection. One can see the non-random selection in most summary tables in the literature and also in the data set used here. The acquired companies are, on average, not equal to the industry. The non-random company selection becomes manifest in the lengthy deal generation and due diligence phase. PE firms and financing banks, for example, only acquire companies that promise an upside potential but still show a sufficient profitability to service the debt. So analyzing the changes in the sector is not appropriate to control for "what would have happened if PE had not acquired the company." Fortunately, there is a solid knowledge in microeconometrics of how to identify an adequate benchmark (or in other words counterfactual) via propensity score matching. We will build on this technique heavily in the following sections.

The first half of the paper quantifies how PE funds select deals and makes the following contributions to the literature:

(1) In contrast to the existing literature, the analyses also cover carve-out deals, where only part of a company is acquired, as well as private-to-private deals, where a non-listed

¹ Guo, Hotchkiss and Song (2009) show that operating performance gains for US buyouts between 1990 and 2006 do not **exceed** (or only slightly exceed) those observed for benchmark firms. For a comprehensive review of the literature on the buyouts of the 1980s see Cumming et al. (2007).

business is acquired. Carve-out and private-to-private deals are mostly smaller in size and different in profitability (EBITDA margin) from public-to-private deals. Moreover, carve-out and private-to-private transactions comprise 39% and 36% of PE deals in the last decade and 44% and 32% of the deals in our sample. Additionally, this paper is based on a consistent dataset for the pre-acquisition phase as well as during the PE ownership phase, which is critical to match the deals on pre-acquisition characteristics and identify operational outperformance.² (2) We provide evidence that PE firms target companies with stable operating performances pre-acquisition. Companies acquired by PE firms do not systematically display an upward or downward trend pre-acquisition, which PE firms can build upon (momentum trading) or help to recover (reversal trading). (3) We show that the selection pattern is non-linear in profitability (EBITDA margin); target companies are neither too profitable nor unprofitable at acquisition. Furthermore we show in the Appendix that the selection on profitability seems to be a general pattern, since we find qualitatively the same results when we use data of all PE buyouts in Western Europe.

The second half of this paper builds on the findings on the target selection pattern to match for each deal a comparable set of sector peers (via propensity score matching). We then use the peer benchmark to re-calibrate the findings on various PE outperformance and risk measurements and get the following outcome:

(1) Previous results in literature concerning PE financial outperformance seem to be prone to an upward bias of roughly one-third when using sector returns as a performance benchmark. This is because PE focuses on a segment of companies that already generate higher levered returns than the sector. Also, on an un-levered basis, the bias stays statistically significant. Despite the higher debt-equity ratio of the peers in comparison to the sector, the

² Probably the only data source with no structural inconsistency is the data PE houses collect themselves in the due diligence process and through monitoring efforts during their ownership, which is the data we use in the present paper. We tried to replicate the data set we collected from PE houses via a public source (Amadeus) and got very different and not comparable data for the pre-acquisition and during the PE ownership period.

un-levered returns for peers are still above the sector un-levered returns. Nevertheless, even after taking the upward bias into account, the PE funds in our sample still generate alpha (return above the peer return) of 6.1%. (2) While deals and sector show profitability (EBITDA margin without exceptional items) gains, we find that comparable peers do not improve their profitability during PE holding period. Assuming that the performance of the peers represents the counterfactual of the portfolio companies during holding, we interpreted the statistically significant improvement difference of 2.2% between deals and peers as an impact attributable to PE ownership. The lower financial outperformance together with the higher profitability improvements, when using peer benchmarking, reduce the "puzzling" divergence in the literature of "large positive returns on average with only modest cash flow gains".³ On the other hand, we find no clear pattern in outperformance in sales growth or EBITDA multiple improvements, when comparing deals, peers, and sectors. (3) We find that the deals show or maintain a high operational stability during PE ownership, since they show a statistically significant lower volatility than their sectors and similar peers. (4) Finally, we are able to provide evidence that the debt service coverage ratio (EBITDA/debt service requirements) of the deals in our sample does not exceed the sector average, even though the the deals have a statistically significant lower ratio than their peers. Our interpretation is that PE firms select companies in a segment with relatively high EBITDA levels and the high EBITDA compensates for the increase in leverage during PE ownership.

Overall, the matching exercise unveils additional positive findings from a risk perspective: At acquisition, PE portfolio companies show a high profitability and have a debt service coverage ratio that is in line with the sector. In addition, deals show a lower volatility in the operational performance before and during ownership than their comparable peer companies and also improve their operational performance during PE ownership.

³ Guo, Hotchkiss and Song (2009), p. 2

2. Literature review

There are two strands of PE literature:

The first strand of literature focuses on financial and operational outperformance of PE owned companies, but devotes less attention to the way in which PE funds select their target companies. Accordingly, these papers benchmark financial or operating performance of PE owned companies against the sector performance and find mixed results.⁴

The second strand looks in more detail at the target selection pattern of PE and describes the selection as clearly non-random. Opler and Titman (1993) analyze 180 US companies, which undertook an IPO between 1980 -1984 and 1985-1990. They argue that PE systematically avoids companies with high costs of financial distress – because PE acquisitions are synonymous with higher leverage – and instead favors companies with entrenched management. Consistent with this view, they find for both periods that the probability of an LBO (Leveraged Buy Out) increases for a company with 1) a low cost of financial distress and 2) high cash flows and 3) low market-to-book-value-ratios.

Aslan and Kumar (2007) compare 157 PE deals with private and public companies in the UK and Ireland from 1996 to 2006, based on pre-acquisition financial and accounting data from FAME (a source providing accounting measures for all registered companies in the UK). The authors find that PE firms select companies that are large and have growing assets, higher return on assets, higher profit margin and higher liquidity, but lower market-to-book and leverage ratios. However, the finding that PE selects large companies might be biased. First, data for individual divisions of companies, necessary to estimate the selection patterns of the frequent "carve-out" deals, is not available from FAME. We suspect that the only viable data for carve-out deals is collected by the PE firms themselves during due diligence. Second,

⁴ For a comprehensive review see Cumming et al. (2007).

since market-to-book ratios are only available for public companies, the findings cover only public-to-private transactions and do not show the PE selection pattern for potentially smaller companies that were not previously listed.

Mehran and Peristiani (2008) investigate a subset of 150 companies out of the 852 US public companies that went private through LBOs between 1990 and 2007. They find that a major reason for abandoning the public listing is inadequate analyst coverage/financial visibility due to a lack of investor interest, vis-à-vis other public companies. According to their view, without financial visibility, access to debt and equity markets becomes more costly (less liquid) and companies therefore opt out of the public market. Accordingly their results show that a decline in analyst coverage, number of institutional investors, and stock turnover leads to a higher probability of becoming an LBO target. Interestingly, public companies with a lower market-to-book-ratio, a higher debt-to-equity ratio, a higher free-cash-flow and lower stock volatility are more likely to become private. However, the sample again does not include carve-out deals or private-to-private transactions. Furthermore, Mehran and Peristianis' correlation might be spurious. As we argue in this paper, LBO financing banks require that target companies have stable and sufficient profitable operational figures, which may be negatively correlated with the change of analyst coverage. In other words, analysts lose interest in public companies without "hot" (volatile) stories. Hence, the results shown might be spurious, since the authors are not able to control for the stability or profitability of companies operating performance, and instead control only for the return on assets. Also Bharath and Dittmar (2007) examine public to private transactions in the US between 1980 and 2004. In line with Mehran and Peristiani (2008), they find the probability of a company being taken private is high if it has: low analyst coverage, low stock turnover, but high liquidity and FCFs (only in the early sample period).

Axelsson et al. (2007) and Ljunqvist et al. (2007) the following general economic factors drive LBO volumes: Low interest rates, loose credit conditions and syndication of loans.

In conclusion, the literature suggests that, in selecting targets, PE firms systematically look for companies with higher profitability, higher cash flows, and lower valuations than their sector peers. The current literature does not cover 1) carve-outs and private companies, which make up the largest proportion of deals, 2) performance trends pre-acquisition and 3) non-linear selection patterns (in particular, inverted u-shaped patterns). In addition, we go one step further and use the identified selection pattern to benchmark PE on various performance and risk measurements.

3. Data

3.1 Data on PE deals and sample selection

The analysis is based on a proprietary data set from 14 large and mature PE houses collected by McKinsey & Company, Inc. The data set covers 110 Western European PE leveraged buyouts (deals) with an enterprise value above EUR ~50 million. We have reduced the sample in this paper to 94 (69 respectively) deals, since the analysis requires 1 (2) years of pre-acquisition operational data.⁵ We also excluded deals from the financial sector.

Table 1, Panel A shows that most of the deals in the sample were initiated between 1998 and 2004, with a dip in 2000 and 2001, due to the global recession and credit tightening. Table 1, Panel B, provides additional summary statistics, e.g., PE deals have on average a

⁵ UK (55 deals); the remaining deals are from Germany (15), France (10), Scandinavia (8), Benelux (5) and Spain (1).

holding length of 4 years. This explains why deals in our sample are sold after the year 2000. The sample also includes 4 bankruptcies and 7 deals, which PE funds did not sell until 2008.⁶

Coming to the sample-selection issue, Table 2, Panel A-D provides several relevant comparisons between our sample and the PE universe. Overall, our sample seems to be representative in terms of performance of large PE houses, covers mostly large deals, but most importantly includes all different vendor types, e.g., also the very frequent private-to-private deals.

First, Table 2, Panel A presents the comparison of deal performance in terms of IRR to the PE funds in our sample and shows that PE funds did not seem to cherry-pick the deals, according to their fund IRR reported. In fact, the difference between the fund IRR and the average IRR of our deals per fund is not statistically significant ($t=0.52$). This illustrates that in terms of performance, we have a good representation of deals within the funds we sampled.

For the comparison we first need to convert our gross deal-level IRRs (before fees are charged by PE houses to fund investors) to net IRRs (after fees, or in other words, IRRs from the point of view of fund investors). This is because the data we have on the overall universe is primarily in the form of net IRRs. To this end, we have constructed an artificial fund of our sample deals and calculate its IRR. The pseudo-fund starts in year 1996 and lasts for 12 years until the year 2007; investments or cash inflows take place in years 1-9 (with small investments in years 10 and 11 as well); the bulk of the investments occur in years 3-9; cash payouts start in year 5, and in the last 3 years, the fund only has cash payouts. Using this pattern of cash inflows and outflows, we calculated the gross IRR of the pseudo-fund. Next, we deduct a 2% annual fee from the gross IRR and 20% carry for IRR above (the typical)

⁶ For those 7 deals we do not have all cash flows, because there is no final cash flow from exit nor can it be deemed to be zero as in the case of bankruptcies. Therefore, the end enterprise-value cash flow was simulated using the EV / EBITDA multiple at the start of the deal and applying that to the 2006 year-end EBITDA.

benchmark (the market return of 8%).⁷ This pooled net IRR for our deals is 23.9%, which is close to the average net deal IRR of 26.2%. If we focus on the returns of the 32 specific funds (based on Prequin figures), we get a simple average of net fund IRRs of 24.1% and a median of 26.4%, which is close to the performance of the deals in our sample.

Second, Table 2, Panel B shows that the sampled funds are, in terms of performance, a good representation of similar-sized funds, once we take into account the fact that we are focusing on funds whose sizes are above €500 million. All 229 funds in Western Europe with the same vintage year (1993-2003) as our sample have a simple average net IRR of 16.3% (based on Thomson Financial Venture Expert figures), which is lower than the net IRR of our funds ($t=-2.29$). Yet large funds have higher returns. Specifically, the 53 funds with a size above €500 million as the participating funds in our sample show a net IRR of 22.0%, which again does not differ in a statistically significantly from the 24.1% net IRR average of our 32 participating funds ($t=-0.50$). In row (0), we also report the net IRR of the previous funds to show that the higher performance of our funds is persistent and not a flash in the pan.

Third, Panel C shows that on the one hand, the number of deals in our sample is significantly smaller than that of all Western European deals over the sample period. Our sample only represents 110 out of 5,384 deals for which data was available. However, in value terms we cover 13.7 % of large and very large deals – €100 to €500 million and greater than €500 million. Ultimately, because we are studying the performance of large, mature PE houses, we have a sample with a large bias. However, most of the literature also has an implicit large bias. The reasons are that the literature exclusively focuses a) only on public-to-

⁷ More specifically, if a) $\text{Gross IRR} \leq 10\%$, then LPs keep all return except 2% fees, so that $\text{Net IRR} = \text{Gross IRR} - 2\%$ fees; b) $10\% < \text{Gross IRR} < 12.5\%$, then LPs keep all return up to 10% except for 2% fees and GPs keep all return from 10% to 12.5%, so that $\text{Net IRR} = \text{Gross IRR} - 2\%$ fees – $(\text{Gross IRR} - 10\%) = 8\%$; and c) $\text{Gross IRR} \geq 12.5\%$, then LPs and GPs share in 80:20 ratio the return exceeding 12.5%, so that $\text{Net IRR} = \text{Gross IRR} - 2\%$ fees - $2.5\% - 20\% * (\text{Gross IRR} - 12.5\%)$.

private deals, which are mostly large deals or b) on deals with public debt financing, which are also typically larger.⁸

Finally, Panel D shows the biggest advantage of our data set. As previously mentioned, our sample includes all types of deals. For instance, the sample also consists of carve-out deals where only part of a company is acquired, or private-to-private deals where PE acquires a non-listed business. Moreover, our data also includes deals, which were previously owned already by PE and former state-owned companies. We think that covering all vendor types is an important novelty, in contrast to the literature, which mostly analyzes public-to-private deals only. First, public-to-private transactions represent by volume (by value) only 4% (17%) of the total buyout activity. In contrast, the majority of deals are carve-out and private-to-private. For example in Western Europe, they comprise 74% (58%) of all PE deals between 1995 and 2005. Second we find strong operational improvements during PE ownership, in contrast to Guo, Hotchkiss and Weihong (2007), for example. Moreover, the differences could be caused by a particular strong PE impact in carve-out deals or on former private companies, since we find that carve-out and private-to-private deals are already different pre-acquisition. They are smaller in size and different in profitability (EBITDA margin) from public-to-private deals in the Western European universe, as shown in Table 2, Panel D.⁹

In addition to describing the characteristics of a deal (e.g., deal timing, size and vendor type), the PE firms also reported basic accounting figures for the acquired companies, which include:

⁸ It should be also noted though that the large-size bias makes our sample more comparable to the benchmark group we employ, which consists of publicly quoted companies. The size of public quoted companies is generally larger than a typical private equity deal in the entire universe of such deals.

⁹ However, due to our small sample size, we are not able to identify differences in financial performance or operational improvements by vendor type. We have only 14 public-to-private deals in our data.

EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization), equal to Operating revenues – COGS (cost of goods sold) – SG&A (selling, general and administrative expenses) – Other (e.g., R&D) = Operating income [+ Non-operating income].

Academics and practitioners widely use EBITDA since it shows a company's fundamental operational earnings potential. EBITDA is, in contrast to 'Net Income', not distorted by (1) expenses outside a company's business (interest and taxes), and (2) non-cash charges due to allocation of historical cost of an asset (depreciation and amortization). Also EBITDA, in contrast to 'Operating Cash Flow', does not include changes in working capital and capital expenditure, which are altered by changes in liquidity or capital investment decisions. However, EBITDA is not a defined measure according to Generally Accepted Accounting Principles (GAAP) or IFRS/IAS. In this paper we define EBITDA as EBITDA excluding "Non operating income".¹⁰ Often this measure is more precisely referred to as EBITDAE (Earnings Before Interest, Taxes, Depreciation, Amortization and Exceptionals).

Sales, in this context, are operating revenues earned by a company when it sells its products, in the course of ordinary operating activities.

For all deals, the PE firms provided figures for enterprise value, equity, and debt at the point of acquisition. In general, if the fiscal year end for a given company is less than 6 months after the acquisition date, then we treat 'first year' figures as belonging to the pre-acquisition period.

3.2 Sector data

¹⁰ The reason for the exclusion of 'Non-operating income' is that this measure contains income derived from a source other than a company's regular activities and is by definition nonrecurring. For example, a company may record as non-operating income the profit gained from the sale of an asset other than inventory (which can be large in relation to the operating income). From a practitioner's perspective, for example, a EBITDA multiple including 'Non-operating income', would not be a helpful measure to understand the price paid in relation to the current performance capability. From our perspective, the operational performance indicator EBITDA would then be subject to a measurement error.

For the sector data, we use data from Datastream for all listed companies in Western Europe in the same sectors and time periods as covered by the PE data and with data on margins available, which sums up to $n=7,602$ in the acquisition year.¹¹ To identify the sector companies, we use the sector code the PE firms reported at a level 3 ICB (Industry Classification Benchmark) for each portfolio company, which segments companies into one of approximately 40 sectors; the ICB system is a global industry classification standard, based on FTSE and DOW JONES systems. Our sample covers only 23 industry codes.

To calculate EBITDA without exceptional items, we use the data field operating income (WC01250) and add depreciation plus depletion & amortization (WC01151). Sector enterprise value¹² is defined as Datastream's equity plus net debt.¹³ The sector returns are calculated using annual data on the total return to shareholders, which represents the change in capital plus dividends, expressed as a percentage of the opening value.

4. Non-random PE target selection

The intensive deal selection process undertaken by PE firms and the financing banks indicates that the target selection is non-random. Before a deal is closed, PE firms go through a lengthy and costly target generation (“origination”) and due diligence phase. During this phase, PE firms collect and process quantitative and qualitative information to determine whether the investment offers a positive NPV (Net Present Value): a so called “investment upside.” The information on a potential investment upside covers complex topics, such as low-quality current management, potential synergies with other companies, or benchmarking efforts to other companies.

¹¹ Countries included are Germany, UK, Italy, France, Spain, Benelux, Scandinavia, Switzerland, Portugal and Austria

¹² Market Capitalization at fiscal year end date+ Preferred Stock + Minority Interest + Total Debt minus cash. Cash represents Cash & Due from Banks for Banks, Cash for Insurance Companies and Cash & Short Term Investments for all other industries.

¹³ Net debt is total debt minus cash. Cash represents Cash & Due from Banks for Banks, Cash for Insurance Companies and Cash & Short Term Investments for all other industries.

Since the PE business model requires a significantly higher leverage than the typical public company, acquisitions are almost always financed with additional bank debt,¹⁴ which gives the financing banks a large role in the acquisition. However, banks have their own target selection criteria. In contrast to the PE firms, which aim to maximize NPV, banks are interested in minimizing the downside risk of an investment, due to the nature of the payoff structure of the debt.

Overall, we should observe a selection of companies, which a) have room for improvement in their performance, in order to generate an upside for the PE house, and b) are still profitable and therefore have a low downside, so that banks are willing to finance the acquisition. These criteria significantly reduce the number of potential target companies. As we later show, they explain a large proportion of the acquisition decision. Although we must acknowledge that, due to the complexity of the information used in the acquisition and the limits of our data set at hand, we are only able to identify necessary and not sufficient criteria to become a PE target. Large parts of information gathered in the acquisition phase are unobservable and the decision pattern is too complex to be fully captured.

However, in our later performance benchmarking effort, these (time-varying) unobservable factors do not inevitably create a bias. Even though the unobservable factors might have an influence on the target selection decision, we still can assume that these factors are constant, or, if they are time-varying, do not matter for the later counterfactual performance of the matched peers. In other words, the unobservable factors might be important for the performance of a PE owned company and therefore for the selection, but not for the performance change of a company.

4.1 Target selection based on profitability and company size

¹⁴ Axelson, Stromberg and Weisbach (2007) provide a theoretical explanation of why this is the case.

PE acquires companies inside profitability (EBITDA margin) and size corridor (log sales), due to the upside-but-low-downside criteria.

Before we identify the target selection pattern in a multi-variate logit regression in the next chapter, we compare bi-variate each deal with its corresponding sector. We start with summary statistics for EBITDA margin and log sales for deals and sector and subsequently illustrate the comparison with two different types of plots. The first type of plot is a kernel density for the sector and deal distribution. The second type is a polynomial smooth, which displays the values from a polynomial regression of the acquisition status (1 for deals, 0 for sector companies) on each variable. The vertical dimension captures the probability of acquisition by PE. The grey shaded area illustrates the 95% confidence bands of the local coefficient estimates.

Profitability (EBITDA margin): First, in Table 3, the deal average margin for the deals in our sample is 16.17%, which is statistically significantly higher than the sector with an average margin of 11.64 %. We test for the difference between deal and sector margins with a t-test ($t=3.57$) and a non-parametrical test ($z=7.04$), given the outliers in the sector data and the non-normal distributions.¹⁵ As a non-parametrical test we use the standard Wilcoxon-test (also known as the Mann-Whitney two-sample statistic or rank sum test). In contrast to the t-test, the Wilcoxon-test uses solely the order in which the observations from the two distributions fall and therefore is less sensitive to outliers. Second, PE firms do not only select companies with a high margin on average, they also avoid companies with a negative margin. On the lower end, no deal has a margin of zero, and only 2 out of 94 deals have a negative margin. The proportion of public companies with either nominal or negative margins is far higher by comparison; 20% of the sector companies have a negative or zero margin. Interestingly, in this bi-variate setting PE does not seem clearly to avoid companies with a

¹⁵ The sector distribution has a negative skew, the deal distribution a slight positive skew, and both are clearly leptokurtic.

particularly high margin. For example 2 out of 94 deals have a margin above 40%, which is roughly in line with 3% of sector companies with a margin above 40%. However, in the latter multi-variate regression, we find that PE avoids companies with very high margins too.

Figure 1 (left column, first row) illustrates the findings revealed by the t- and non-parametric test. Both distributions of EBITDA margin show a similar shape, but the distribution for the deals is shifted to the right (i.e. PE in our sample targets companies with higher margins than the sector). In addition, PE avoids companies with low margins as indicated in the local polynomial regression in Figure 1 (right column, first row). The probability of being acquired becomes lower with a low margin. These findings bolster the upside-with-low-downside-hypothesis. A non negative margin allows better access to debt finance and therefore increases the probability of acquisition and a not too high margin leaves potential for operational improvement.

Figure A1 in the Appendix, shows the same plots for the EU universe based on data from Private Equity Insight for the same time period. We get the similar findings on the selection on profitability; PE in general avoids companies with very high or very low profitability.

Size (log sales): First, a t-test ($t=5.44$) and a Wilcoxon-test ($z=5.72$) in Table 3 show that PE deals in our sample are on average larger than the sector. The median (average) sales size for deals is EUR 366.19 (564.23) million. In comparison, the median (average) sales for the sector is EUR 109.33 (1,562.25) million.

Second, PE targets companies inside a size corridor as indicated by the inverted U-shaped curve in the local polynomial smooth plot in Figure 1 (right column, second row). 23% of the sector companies have lower annual sales than the deal with the smallest sales in our sample (EUR 19.50 Mio). At the higher end, we see another cut-off: 9% of the sector companies have higher annual sales than the largest deal by sales (EUR 3,072.12 Mio). At the

lower end, this might be an artifact of the bias toward large buyouts in our PE sample. Only large and mature PE funds participated in the data collection. At the higher end, this pattern is not due to selection bias in our sample: there is no upper limit on the deal size included in our sample, and the moderate deal sizes observed, relative to the large public sector companies, are a general feature of LBOs. The largest European buyout to-date is KKR's 2007 acquisition of Alliance Boots in the UK, with a deal enterprise value of EUR 16.3 bn, but this is less than 5% of the enterprise value of the largest company in our sector data (EUR 369.2 bn). We interpret this finding in line with our argument that banks play a major role in the acquisition decision. PE houses are not able to acquire very large companies due to the reluctance of banks to finance larger deals.

4.2 Target selection based on company performance trends

PE neither acquires companies with declining performance i.e. those with falling sales or a drop in profitability pre-acquisition (reversal trading), nor does PE instead aim for companies that are already growing above the sector, in order to participate in future gains (momentum trading).

Change in Profitability (EBITDA margin_t - EBITDA margin_{t-1}): First, deals do not seem to follow a specific performance trend pre-acquisition. The average change in the deal profitability in Table 4 is rather low (0.08%) and not statistically different from zero ($t=0.17$). The change of the deal profitability also does not differ significantly from the sector ($t=0.34$, $z=0.87$). We use for the changes in the sector medians, given the outliers and the fact that we mostly less than 100 companies in each sector. Figure 2 (left column, first row), shows that PE does not systematically follow a turnaround business model, nor does PE particularly select companies which are growing in profitability. Second, we find evidence that PE focuses on companies without extreme profitability fluctuations. Also in Figure 2 (right column, first row), the probability of getting acquired diminishes with a lower or higher change in the EBITDA margin, i.e. PE targets stable companies. However, the evidence is

weak, given the wide confidence interval band and the local increase on the left side of the graph.

Sales growth ($\log \text{sales}_t - \log \text{sales}_{t-1}$): First, deals and sectors in Table 4 show a robust sales growth in the year pre-acquisition. The average annual change in deal sales is 5.87% and the median sector sales growth is 6.54%. Both growth rates are statistically significantly different from zero ($t=3.29$, $t=6.71$). The deal sales growth does not differ from the sector ($t=0.65$ and Wilcoxon-test shows $z=0.34$). Second, in Figure 2 (right column, second row) we find weak evidence that PE does not select companies, which either drop or jump massively in sales pre-acquisition. However, the evidence is again weak, as illustrated by the local increase on the left and right side of the graph and the broad confidence interval bands.

4.3. Logit on pre-acquisition performance and performance changes

In this section, we show that the observed upside-but-low-downside pattern also holds in a multivariate setting. For example, the unveiled target selection based on profitability is not a result of the fact that PE selects smaller companies, for which profitability is often higher than for larger companies. In Table 5, we analyze the PE acquisition pattern ('PE treatment') with Logit or Probit regressions. The dependent variable is binary: in the pre-acquisition year it takes on 0 for all sector companies, and 1 for all deals. The independent variables are the same as discussed before. We do not add dummies for sector and deal entry time periods since: a) to get time specific selection patterns one has to interact the operational variables with time and sector, but we only have 94 (69) treated observations; b) we match latter the deals with companies in the same sector and year; and c) adding dummies without interactions would only change the intercept. We also do not include out-of-sample variables, e.g., market interest rate movements, because we are interested in finding comparable peers rather than explaining the level of PE activity.

The upside-but-low-downside selection hypothesis implies a non-linear selection pattern. Therefore, we use a specification with the quadratic terms, assuming a u-shaped relationship between the later acquisition and the operational variable. Throughout regression (1) to (6), the squared terms for log sales and margin are statistically significant and have negative signs, which indicate an *inverted* u-shaped selection pattern: If a variable is either large or small, the probability of PE acquisition becomes low.

In regression (4) to (6) in Table 5, we include the pre-acquisition performance trends in the Logit regressions. Overall, adding performance trends has a trade-off. On one hand, it lowers the deal sample by roughly a third, since we have only 69 deals with 2 years of operational data pre-acquisition.¹⁶ On the other hand, including the pre-acquisition operational performance changes increases the prediction power. The Pseudo R-squared and log likelihood rise slightly by adding the performance trends.

In regression (6), we do the same specification, only with a Probit regression, but get a lower pseudo R-squared and log likelihood. Therefore, we use the logit regression model for the Propensity Score Matching in the following sections.

The pseudo R-squared in regression (3) - (6) indicate that we are able to describe roughly 15-16% of the acquisition, or PE-treatment decision. We interpret this as high, given that we are only able to control for necessary but not sufficient acquisition criteria with the data at hand.

In Table A1, in the Appendix, we do the same type of regressions for the EU universe and get similar results. The fact that PE avoids companies with very low or very high profitability is a general pattern of PE.

5. Identifying peers

¹⁶ Moreover, other variables already incorporate part of the information on the pre-acquisition performance trends. For example, the distribution pattern of the margin itself already reflects the fact that the margin does not fall or jump in an extreme way pre-acquisition.

In the previous chapters we show in part how PE selects companies. In this section we will use the unveiled pattern in order to get a more adequate benchmark group. Based on the regression results of the previous chapter, we pick companies for each deal out of the sector via Propensity Score Matching and call them "peers."¹⁷ The goal is to find a set of companies that were similar to the deals and therefore also potential targets, but were not acquired by PE. Technically, we select a set of companies that do not differ on average to the deals in our sample in the target selection relevant criteria.

First, we use the estimated coefficients from Table 5, regression (5) and predict for each sector company (in the same sector and year as the deal) and for each of the 69 PE deals an acquisition probability (propensity score). For the 25 deals for which we only have one year of pre-acquisition data, we use from Table 5, regression (3). Second, we calculate the absolute distance in propensity score between each deal and sector company.¹⁸ Third, we mark the 10 companies that are closest to the deals in the propensity score as peers.

Figure 3 provides the propensity score for the deals and the sector companies, which we flag as peers. Panel A shows the 10 nearest sector companies by propensity score (10 nearest neighbor), Panel B shows the 5 nearest neighbors. In the following sections, we use the 10 instead of the 5 nearest neighbors. Using 5 instead of 10 does not increase the average propensity score by much, and using 10 neighbors increases the amount of peer data we can use.¹⁹ The propensity scores in Figure 3 are rather small. However, this is not necessarily problematic, as discussed in the section before.²⁰

¹⁷ For more background on the methodology of propensity score matching see Rosenbaum and Rubin (1983) or Heckmann et al. (1998).

¹⁸ We only use sector companies as peers, if their propensity score is at least a larger as the lowest propensity score of all deals (common support criteria).

¹⁹ Our results are robust to using 5 nearest neighbors.

²⁰ Basically, we have to assume that we have captured all factors that matter for the counterfactual performance. In other words, we assume that the unexplained part of the model is not important (or orthogonal to) for the latter performance of a company.

Table 6 provides evidence that the propensity score matching based on the 10 nearest neighbors is able to eliminate, on average, all pre-acquisition differences in the operational measures. We find on average no significant differences between deals and peers pre-acquisition, neither in profitability (EBITDA margin) nor in sales ($t=0.73$ and $t=0.78$).

6. Performance measurement using matched peers

In the previous chapters, we systematically identify peers, which on average do not differ from the deals in our sample pre-acquisition. In this section, we provide evidence that these peers have statistically significant higher returns than other sector companies. Hence, using sector returns as a benchmark instead of matched peer returns when measuring PE outperformance is prone to an upward bias. The upward bias stays statistically significant on an un-levered basis. The un-levered bias is only slightly less pronounced, given that the debt-to-equity ratios are higher for peers than for the sector, which reduces their return advantage on an un-levered basis. However, in despite of the higher peer returns, the deals in our sample still produce significant un-levered returns (alpha) above peers.

We measure the financial outperformance using the same methodology as in Acharya et al. (2009). Our findings are robust to alternative performance measurements. When we use a "Public Market Equivalent" or PME, in the spirit of Kaplan and Schoar (2008) we also find that peer instead of sector performance benchmarking lowers the outperformance of PE. (This finding does not surprise us, given the high correlation between abnormal performance and PME.)

6.1. Levered returns: peers vs. sector averages

Peers outperform the sector during the time period of PE ownership. For the sector companies and peers we used exactly the same time periods of the 94 different deals and calculate 94 median IRRs, either for the peers or all the sector companies.

First, as Table 7 shows, the median levered return for the peers is 12.92% and statistically significantly higher than the 9.97% sector return ($t=4.17$). We prefer medians instead of averages given the outliers in the data and since we only have 10 peer or 100 sector observations for each deal.

6.2. Un-levered returns: peers vs. sector averages

The debt-equity-ratios are higher for peers than for the sector. This is in line with the upside-but-low-downside selection criterion. Peers, which are in the middle of the distribution by operational measures, have better access to debt finance and therefore a higher debt-equity-ratio. The higher debt-equity-ratios for the peers in the denominator of the standard unlevering formula lower the returns more in comparison to the sector.²¹ But, the higher debt-equity-ratios do not outbalance the levered performance advantage of peers above sectors.

First, Table 7 shows that the difference in the debt-equity ratios is statistically and economically significant. Peers have a median debt-equity ratio of 0.21 and the sector of 0.16. The difference of the ratios is significant ($t=3.39$) and implies a relative debt-equity ratio increase of more than 30% between the median peer and sector.

Second, Table 7 reports that peers generate a statistically significant return above the sector of 3.46% ($t=4.20$), given that peers generate a median un-levered returns of 11.96 %, sector companies of 8.5%.

6.3. Adjusted abnormal performance

Matching peers to the deals, instead of using a broad sector benchmark, reduced the identified outperformance by nearly 40% and highlights the importance of getting the alternative benchmark as precise as possible for PE outperformance measurement.

²¹ $R_{U,i} = (R_{L,i} + R_{D,i}(D/E_i)) / (1 + (D/E_i))$. The un-levered IRR, $R_{U,i}$, is the return generated at company level. The levered IRR, $R_{L,i}$, the return generated for the PE house. Since the cost of debt $R_{D,i}$ is not available, we assume that $R_{D,i} = 5\%$. However, the results are robust to alternative assumptions. The debt-equity-ratio for the sector companies and peers is calculated based on a three year simple average after the PE entry date.

First, we compute an un-levered return of 16.66% on average for the deals in our sample, as shown in Table 7. We use the same methodology for the peers as we do for the sector and for each of the 94 deals. We calculate an IRR (levered return) using the entire time pattern of quarterly cash inflows and outflows. Afterwards, we un-levered the deal returns with the same standard un-levering formula and an average debt-equity ratio between entry and exit date. Un-levering the PE investments is important, given the statistically significant higher debt-equity ratio of 1.43 of the deals in comparison to 0.21 median of the peers. Second, we subtract from the peer (sector) median un-levered of return 11.96% (8.5%) from the deal return to derive a measure of outperformance, so-called abnormal performance. Accordingly, the deals in our sample generate a 8.16% return above sector (alpha), but only 3.46% return above comparable peers (adjusted alpha).

6.4. Operational performance

Peers improve their profitability (EBITDA margin) and grow their sales less than the sector, but improve the multiple more than the sector. These differences make the peer benchmarking instead of sector benchmarking important in the operational performance measurement.

While deals show profitability (EBITDA margin) gains, we find that comparable peers and sector do not improve their profitability during the PE holding period. Assuming that the performance of the peers represents the counterfactual of the portfolio companies during holding, we interpreted the statistically significant improvement difference between deals and peers as an impact attributable to PE ownership ($t=2.69$). On the other hand, we find no clear pattern in sales growth or EBITDA multiple improvements when we compare deals, peers and sectors.

First, in Table 8, deals improve the profitability (EBITDA margin) from entry (t) to exit year (T) by 1.96%, with $t=2.69$.²² In contrast, the median profitability changes for the peers does not indicate an improvement in the profitability in the same time period ($t=-1.56$). The median changes of the sector are positive with 0.17%. Second, we find a significant difference between peers and sector ($t=2.52$). This bolsters again the importance of defining the benchmark in the right way. Overall, assuming that the performance of the peers represents the counterfactual of the portfolio companies during holding, we interpret this outperformance as a causal PE impact on the company.

PE does not grow companies. We find no clear pattern in sales growth when comparing deals, peers, and sectors. According to the second part of Table 8, Panel A, deals, peers, and sector companies increase their nominal sales during PE ownership; but we find no performance differences in growth. However, we again find that peers and sector show a different performance. The sales growth of peer companies is significantly lower ($t=3.42$).

Moving on to the PE impact on EBITDA multiple changes, we do not find any outperformance in the absolute or relative changes in the EBITDA multiple above sector or peers. However, we again find differences in the performance change of peers and sector companies.

7. Risk measurement using matched peers

In this section, we draw on the set of peers to further understand the operational risk of PE deals. In the first part, we find that the volatility of PE owned companies is lower than the peers and sector. In the second part, we are able to show that the debt service coverage ratio of the highly levered PE deals is higher than for peers but still in line with the sector.

7.1 Operational volatility

²² For the operational outperformance measurement we use only deals that the PE houses exited by 2008

From the data, we find that PE-backed companies show or maintain a high operational stability during PE ownership. Deals show a lower volatility, measured in standard deviation, than their sector and even than similar peers.²³ In contrast to previous chapters, we combine pre-acquisition and during PE ownership data – we simply do not have enough data points to analyze volatility for the pre-acquisition or during acquisition phase separately. Instead, we assume that the volatility of a company does not change fundamentally during PE ownership.²⁴

First, the volatility is on average lower for deals than for sector companies. Deals (sector medians) show in Table 9 on average a standard deviation in the EBITDA margin of 2.46% (3.87%) and in log sales of 19.26% (27.54%). Furthermore, these deals show no extreme volatility values in comparison to the sector. This provides evidence for the upside-with-low-downside-hypothesis. PE selects not only companies that are reasonably profitable, but also more than the sector. Second, the fact that in Table 9 peers still show a slight difference in volatility from the deals allows two alternative interpretations. 1) Either our matching is not precise enough and we included companies in the peer group which are still slightly different in the volatility than the deals pre-acquisition or 2) PE was able to lower the volatility during PE ownership. However, the borderline significance in EBITDA margin ($t=1.77$) shows that we were able to identify companies very close to the deals in stability criteria or that the increase of stability during PE ownership is not very distinctive.

7.2 Debt service coverage ratio

First, peers have a higher debt-equity ratio than the sector, but a higher debt service coverage ($\text{EBITDA} / (\text{net debt} * \text{interest rate})$) than the sector. The reason for this is peers are profitable companies, which have relatively high EBITDA levels in comparison to the sector.

²³ Our findings are robust to other volatility measures like min-max

²⁴ Sector data is only included for the same time period as the deals, to rule out time-based variations in volatility between the two data sets.

Second, PE deals have a much higher debt-equity ratio than the sector, yet its debt-coverage ratio is no different from the sector. Our interpretation is a leverage arbitrage: 1) PE focuses on stable, profitable companies; 2) stable, profitable companies already have a higher debt-equity ratio, but their debt service is still low in relation to their high profits; 3) at acquisition, PE firms increase the leverage so that debt service coverage reaches the average sector level. We compare EBITDA with annual debt service, assuming a 5.0% annual interest payment on the net debt. Our findings are robust to using alternative assumptions of 7.5 or 10.0%. For the deals we are applying the debt level used in the buyout.

First, in Table 10, the deals have a coverage ratio of 4.81, which means roughly 5 times more annual profit than debt service payments. In contrast, peers are more conservatively leveraged (peers show a median coverage ratio of 8.03). Since the data on the coverage ratio is prone to outliers, for example, and the maximum coverage ratio for peers is 5,448.70, we prefer to use the t-test on the medians and in addition to use Wilcoxon-tests for analyzing the differences between the two distributions. Both tests demonstrate that the coverage is higher for the peers than for the sector at a 1% level ($t=2.69$, $z=3.68$). Figure 4 (first row) provides a visual comparison for the two distribution. The distribution of the peers is clearly shifted to the right.

Second, in Table 10, we also add the coverage ratio for the sector companies. The median coverage ratio is 4.91 and not much different from the 4.81 for the deals. Neither the t-test nor the Wilcoxon test rejects the null hypothesis that PE deal and sector coverage ratio are equal ($t=0.14$ and $z=-0.69$). According to our interpretation, PE selects companies with a high coverage ratio and reduces the coverage to the sector level by adjusting the debt levels to the relatively high EBITDA level. Figure 4 (second row) visualizes our findings. The distribution of the deal debt coverage ratio is centered more in the middle, but it is not shifted to the left or right in comparison to the sector distribution. Interestingly, the coverage ratio of the PE deals also does not seem to be below a certain level.

8. Concluding remarks

We use a dataset of 94 PE buyouts initiated in Western Europe during 1996 until 2005, which is representative in terms of performance of large and mature PE funds, to identify PE target selection patterns. In the second part of the paper, we employ the identified selection pattern to measure PE outperformance and the underlying risk of PE investments based on propensity score matched peers.

The wider coverage of deal types (e.g., private-to-private deals) in our sample outbalances the drawback that only large and mature PE funds participated in the data collection. The literature, in contrast, uses data sets with public-to-private deals only. Public-to-private deals are less frequent (4% by volume) and very large and therefore potentially initiated by large and mature PE houses as well. Public-to-private deals have an average (median) deal size of EUR 441 (167) million in comparison to all PE deals with an average (median) deal size of EUR 112 (22) million.

Coming to our main findings, PE funds systematically buy companies with stable profitability. In our sample of 94 large buyouts, we find non-parametrically and also with Logit regressions that PE favors companies with a profitability corridor far above zero. We get the same findings when using the PE universe in Western Europe. We also discover that PE avoids companies with a large change in the operational figures pre-acquisition. Our interpretation is that PE acquires companies that promise an upside potential but still show a sufficient profitability to service the debt.

Second, PE funds financially outperform comparable peers (propensity score matched) by 6.1% and improve the profitability by 2.2% above peers. Furthermore, propensity-score-based peer benchmarking is important in the PE performance measurement. It lowers the financial outperformance and increases the operational outperformance by roughly a third. Therefore, peer benchmarking solves the puzzle in the literature of huge financials with only a moderate operational outperformance.

We are also able to reveal that PE owned companies show a lower operational volatility. In addition, the debt coverage ratio of PE investments does not drop below sector levels, despite the high debt-to-equity ratios during PE ownership. Overall, PE seems to pick systematically stable companies with a high profitability, which enables PE to increase leverage ratios of those companies significantly without exceeding sector debt coverage levels. Why don't companies with a stable profitability increase the leverage on their own? We have two interpretations, which are not mutually exclusive. First, PE helps to overcome supply frictions for corporate capital structure decisions. Leary (2009) finds that, in addition to demand side effects, credit supply and debt market segmentation has an influence on the capital structure choice. We find that PE acquires companies that are larger than average but not very large. One explanation could be that the companies acquired by PE are not large enough to have access to public debt markets, as well as not small enough to increase their leverage via their house bank lending channel. PE engages in capital structure arbitrage by increasing debt levels for mid-size companies via organizing bank consortia and debt syndication. Our second interpretation is that PE selects companies with entrenched management, since those companies promise the highest improvement potential and entrenched managers prefer a low leverage.

Future research is needed in several areas. First, we show that large and mature PE funds generate financial returns and operational improvement above comparable peers. However, it is not clear if this applies to PE activity in general. We doubt that, given that large and mature PE funds show a higher performance than all PE funds (22.4% large PE funds, 16.3% all PE funds, Table 1, Panel A). The performance difference is roughly the financial outperformance of 6.0% we have identified in this paper. Second, the fact that large and mature PE house show outperformance even when we use comparable peers as a benchmark and un-lever returns indicates that fixed effects on a fund level exist, e.g., the ability of General Managers (GPs) in large and mature PE funds. We have no clear understanding of

what these fixed effects are. Third, we are curious if the identified selection patterns we observe for the period from 1996 to 2005 will apply to a world with tight credit and/or low sector returns. Finally, in the future, companies with a lower profitability might also fall into the selection criteria. LPs are starting to think about only paying GPs for un-levered outperformance by tying the hurdle rate to a comparable un-levered index rather than keeping it fixed. So GPs may lose the incentive to lever up to the same extent as before and therefore might select companies with a low profitability in the future also.

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Table 1 – Panel A: Distribution of deals by entry and exit years

The table shows the years in which the PE houses bought (entry) or sold (exit) the portfolio companies (deals) in our sample.

Years	1996	97	98	99	2000	01	02	03	04	05	06	07	Sum
Entry	2	7	11	12	9	9	15	16	11	2	n/a	n/a	94
Exit	n/a	n/a	n/a	2	5	5	9	19	16	16	16	22 ¹	94

¹ Including seven deals for which exit is simulated

Table 1 – Panel B: Summary statistics

The table shows various financial measures for the deals in our sample.

The first part reports the financial performance and the duration. We calculate the deal IRRs (internal rate of return) using the entire time pattern of cash inflows and outflows for each deal (portfolio company), as experienced by the PE house (before fees). The cash in/cash out multiple measures the absolute value of all positive cash flows divided by all negative cash flows minus 1. The duration captures the length of the deals in years, using the entry and exit months and years as reported by the PE house.

The second part of the table compares the enterprise value (deal size) and several financial ratios at entry date.

Variable	n	mean	median	std. dev.	Min	max
Deal IRR %	94	38.2	36.3	41.0	-87.8	122.8
Cash in/cash out multiple		2.9	2.7	1.9	0.0	10.3
Duration (years) ¹	87	3.8	3.6	1.4	1.4	7.3
Entry deal size		665.0	447.5	695.3	42.7	3,154.9
Entry debt/equity	94	2.0	1.8	1.1	0.1	8.7
Entry deal size/EBITDA		8.6	7.8	6.3	-13.7	38.7
Entry debt/EBITDA		5.4	4.9	4.1	-5.5	32.4

Note: In Mio, EUR; significance level * p<0.1, ** p<0.05, *** p<0.01

¹ Only exited deals

Table 2 – Panel A: Benchmarking of our deals vs. our funds by net IRR comparison

This table compares the deals with the funds in our sample by Net IRRs. Row (1) provides the Net IRR for 32 out of 36 funds that participated in our sample and for which Prequin reports the NET IRRs by end of 2007. ⁶ We weight the 32 fund returns by the number of participating deals per fund. In row (2) we show the simple average NET IRRs for all deals in our sample for which we have fund return data (for 93 out of 110 deals). In row (3) we pool these deals artificially in one pseudo fund. Since the publicly available data on the European universe is primarily in the form of net IRRs, we convert our gross deal-level IRRs (before fees charged by PE houses to fund investors) to net IRRs (after fees, or in other words, IRRs from the viewpoint of fund investors). In the last column we test if the PE houses cherry-picked the deals out of their funds in terms of performance.

	n	Net IRR ¹		t-stat of diff. to our funds
		mean	median	
(1) Our funds ⁴	32	24.1 ⁵	26.4	
(2) Our deals	93	26.2 ²	25.0	0.52 ⁷
(3) Our deals pooled in 1 pseudo fund ³	1	23.9		

Note: All values in percent or Mio EUR, vintage year 1993-2003, significance level * p<0.1, ** p<0.05, *** p<0.01

1 NET IRR, estimated for our deals in the following way: If a) Gross IRR≤10%, then LPs keep all return except 2% fees, so that Net IRR = Gross IRR - 2% fees; b) 10%<Gross IRR<12.5%, then LPs keep all return up to 10% except for 2% fees and GPs keep all return from 10% to 12.5%, so that Net IRR = Gross IRR - 2% fees - (Gross IRR - 10)% = 8%; and c) Gross IRR≥12.5%, then LPs and GPs share in 80:20 ratio the return exceeding 12.5%, so that Net IRR = Gross IRR - 2% fees - 2.5% - 20%*(Gross IRR - 12.5%).

2 Simple averages

3 Pooled by calendar period using quarterly cash flows

4 As reported in Prequin.

5 Weighted averages by number of participating deals per fund

6 In 5 cases, more than one fund of a PE house is involved; in these cases, we take the simple average of the funds involved and treat the funds as one fund.

7 We use Welch's t-test of difference between (1) and (2) assuming unequal variance for (1) and (2).

Table 2 – Panel B: Benchmarking of our funds vs. PE universe by net IRR comparison

This table compares the returns of the funds in our sample with fund returns of the EU universe. First, row (1) provides the Net IRR for 32 out of 36 funds that participated in our sample and for which Prequin reports the NET IRRs. ³ Second, row (2) provides the Net IRRs for all funds in Western Europe and (3) for very large funds only, as reported in Thomson Financial Venture Expert.

In addition, in row (0) we added the performance of previous funds, e.g., of fund "Europe I" for fund "Europe II" in our sample. However, we only calculate Net IRRs for 25 funds (out of the 32 funds), since 5 funds do not had a previous fund in Western Europe and for two previous funds there is no Net IRR available. In the last column we test if the PE funds in our sample are different in terms of Net IRR from a) the Western European universe, b) the universe with the same fund size and c) the previous funds.

	n	Net IRR		fund size	t-stat of diff. to our funds
		mean	median		
(0) Previous funds of our funds ¹	25	24.2 ⁴	22.1	500-5000	0.03 ⁵
(1) Our funds ¹	32	24.1 ⁴	26.4	500-5000	
(2) All funds in Western Europe ²	229	16.3	9.8	0-1000+	-2.29*** ⁶
(3) All large funds in Western Europe ²	53	22.0	18.9	500-1000+	-0.50 ⁷

Note: All values in percent or Mio EUR , vintage year 1993-2003, significance level * p<0.1, ** p<0.05, *** p<0.01

1 As reported in Prequin

2 According to Thomson Financial Venture Expert

3 In 5 cases, more than one fund of a PE house is involved; in these cases we take the simple average of the funds involved and treat the funds as one fund.

4 Weighted averages by number of participating deals per fund

5 We test for the difference between (0) and (1) assuming equal variance for (0) and (1) and use for (1) only the 25 funds, for which previous fund Net IRR was available (Net IRR 24.18%).

6 We test for the difference between (2) and (1) assuming equal variance for (2) and (1)

7 We test for the difference between (3) and (1) assuming equal variance for (3) and (1). Unequal variance assumption leads to t= -0.58

Table 2 – Panel C: Benchmarking of sample by distribution of deal size

The table classifies the deals by the price paid for the acquired company (deal size). The first part of the table shows the distribution by size for the deals in our sample and the second part for the European universe. The last column shows the share of our sample on all large and very large buyouts

	Deal size (in Mio EUR)				total	Sample coverage of large & very large deals
	Small (0-50)	Medium (50-100)	Large (100-500)	Very large (>500)		
Our deals per #	2.1%	6.4%	43.6%	47.9%	94	
Our deals per value	0.1%	0.7%	14.9%	84.3%	62507	
EU universe per #	67.3%	11.9%	15.2%	5.5%	5,384	7.7%
EU universe per value	9.4%	7.1%	26.9%	56.5%	636,604 ¹	11.7%

Note: In Mio, EUR **Source:** EU universe data from Private Equity Insight, covering all deals acquired from 1995 to 2005 in Western Europe for which information on deal value or deal size category was available

¹ For 22.8% of all deals in EU universe only deal size category was available. Deal value estimated with the mean deal value per category. Mean deal value per category calculated with 77.2% of all deals for which exact deal value was available (sum deal value = mean deal value per category * number of deals)

Table 2 – Panel D: Benchmarking of sample by vendor type

The table classifies the deals by vendor types into five different categories. Category (1) shows public-to-private deals, in which PE acquired a whole public company and (2) carve-out deals, in which PE acquired only a part of a company. Category (3) reports PE acquisitions of former family or private companies, (4) of companies, which were owned by institutional investors, e.g., other PE funds, and (5) of former state or government owned companies. The first part of the table reports the categories for the deals in our sample, the lower part for the PE universe in Western Europe. In addition, the table reports the mean (median) size (enterprise value) and profitability (EBITDA margin) of the company at the acquisition date. In the last column we test for differences in profitability by vendor type.

vendor type (previous owner)	N	split in %		enterprise value ¹		EBITDA margin	
		by n	by value	mean (median)	test of diff. ²	mean (median)	test of diff. ²
Our sample							
(1) Public-to-Private	9	9.6%	10.1%	703.8 (425.7)	0.17	15.3 (14.3)	-0.25
(2) Carve-out	41	43.6%	43.9%	668.8 (501.6)	0.04	16.5 (16)	0.28
(3) Family/Private	30	31.9%	26.4%	550.6 (382.4)	-1.06	13.5 (12.4)	-1.71*
(4) Instit. Investor	13	13.8%	18.4%	884.3 (469.3)	1.22	22.3 (21.9)	2.15**
(5) State	1	1.1%	1.2%	738.9 (738.9)		10.9 (10.9)	-
Total	94	100.0%	100.0%	665 (447.5)		16.2 (14.4)	
EU universe							
(1) Public-to-Private	249	4.6%	17.3%	442.7 (170.7)	16.67***	10.3 (8.1)	-2.66***
(2) Carve-out	2,066	38.4%	44.7%	137.6 (31.3)	6.09***	9.8 (8.9)	-3.52***
(3) Family/Private	1,937	36.0%	13.2%	43.4 (14.1)	-18.50***	13.5 (10.4)	2.85***
(4) Instit. Investor	749	13.9%	19.3%	163.7 (55.7)	13.01***	14.3 (11.1)	3.71***
(5) State	74	1.4%	2.6%	226.5 (36.9)	1.45	12.3 (8.4)	0.72
(6) Not Disclosed ³	309	5.7%	2.9%	59.5 (9.5)	-9.70***	10.8 (9.8)	0.44
Total	5,384	100.0%	100.0%	118.2 (25.0)		11.8 (10.0)	

Note: In Mio EUR, significance level * p<0.1, ** p<0.05, *** p<0.01

Source: Private Equity Insight, all deals acquired from 1995 to 2005 in Western Europe with deal size or size category available

¹ We estimated the mean for 22.8% of the deals in the EU universe, for which only information on the deal size category was available. We estimate the mean with the mean of the deal size category.

2 We test for differences with a Wilcoxon tests and compare each vendor type with all other deals. Test on margins for the EU universe (n=1,524) and for deals in our sample (n=94) for which data on margin was available.

3 Including "In Receivership"

Table 3 – Operational measures pre-acquisition deal vs. sector

The table reports EBITDA margin and sales in the last year PRE PE ($t=0$) for 94 deals for which we have operational data. To determine precisely if PE ownership was not already in place and therefore had an influence on a company's performance, we only count the last PRE PE-ownership year if the PE acquisition month is less than 6 months before the end of the fiscal year. We also report the variables for all sector companies in the deal's corresponding years and sector. In addition, for each deal, we calculate i median sector figure. In the last column we test for differences between deal and sector. In the last column we also show a Wilcoxon tests, given the outliers in the sector data and non-normal distributions.

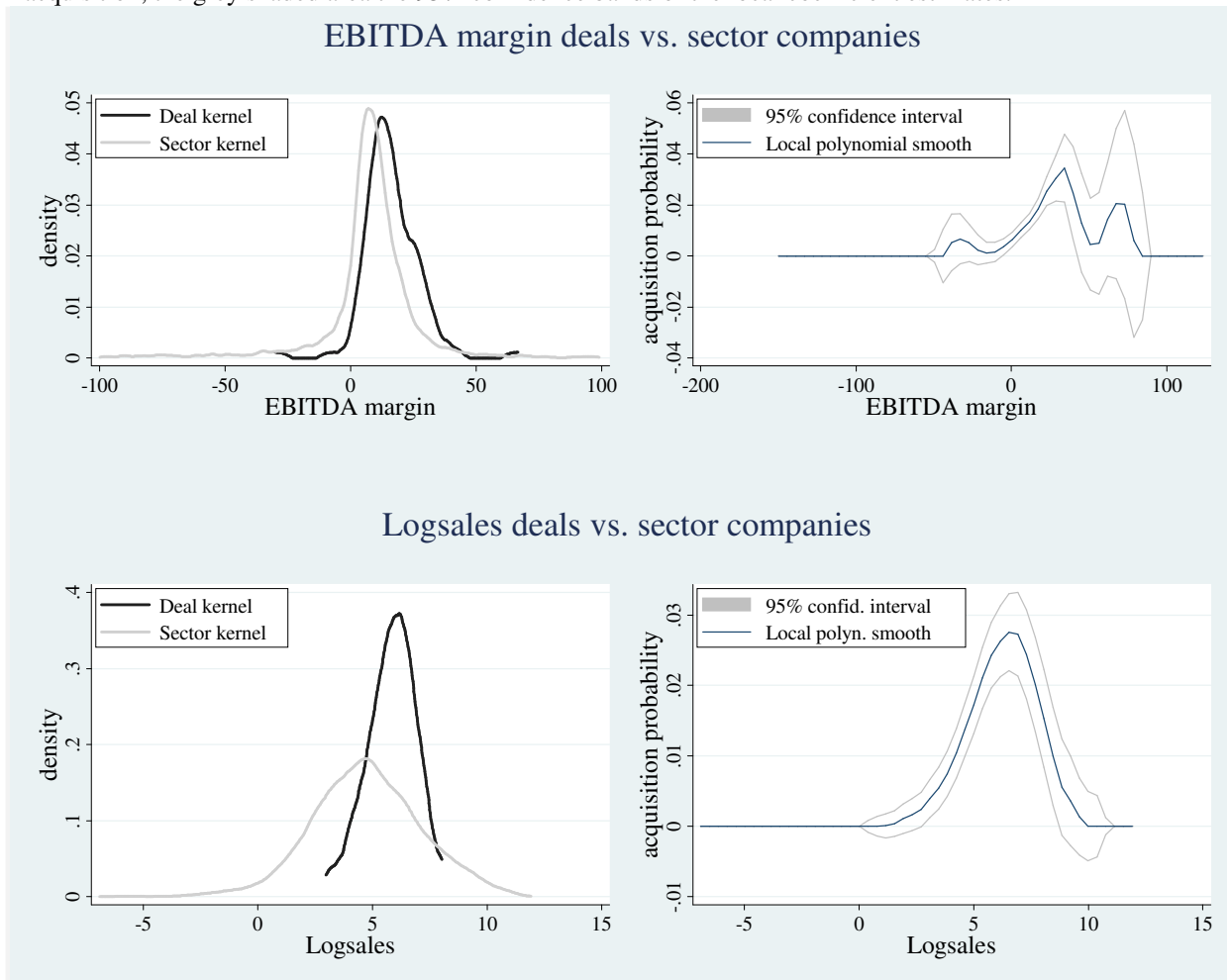
Variable _{t=0}	N	mean	median	std. dev.	min	max	difference to deal	
							t-test	rank test
EBITDA margin deal	94	16.17	14.43	11.15	-30.19	66.72		
EBITDA margin sector	7,602	-36.45	8.21	864.37	-51,300	3,545		-7.04***
EBITDA margin sector avg. ¹	94	11.64	10.46	5.74	4.81	45.96	-3.57***	
EBITDA margin sector median	94	9.01	9.26	2.51	2.24	15.23	-6.02***	
Log sales deal	94	5.84	5.90	1.06	2.97	8.03		
Log sales sector	7,602	4.75	4.71	2.39	-6.91	11.92		-5.71***
Log sales average	94	5.05	5.06	0.91	3.55	10.38	-5.44***	
Log sales sector median	94	4.70	4.68	0.83	2.92	6.90	-8.53***	

Note: in percent or EUR millions, significance level * p<0.1, ** p<0.05, *** p<0.01

¹ Weighted average (total sector EBITDA divided by total sector sales) for each deal in corresponding years and sectors

Figure 1 – Operational measures pre-acquisition deal vs. sector

The plots on the left are kernel densities for the sector and deal distribution. On the right we show polynomial smooth, which displays the values from a local polynomial regression of the acquisition status (1 for deals, 0 for sector companies) on the variable. The vertical captures the probability of PE acquisition; the grey shaded area the 95% confidence bands of the local coefficient estimates.



Note: In percent or EUR millions

Table 4 – Change in operational measures pre-acquisition deal vs. sector

The table provides performance trends in the last year of PRE PE ownership ($t=0$) for 69 deals in our sample, for which we have at least two years of PRE PE ownership data: change in EBITDA margin ($ebitda\ margin_t - ebitda\ margin_{t-1}$) in percentage points and the sales growth ($logsales_t - logsales_{t-1}$) in percent for the deals. We also report the variables for all sector companies in the deal's corresponding years and sector. In addition, for each deal we calculate i median sector figure. In the last column we also show Wilcoxon tests, given the outliers in the sector data and non-normal distributions.

Change in... ²	N	mean	medi an	std. dev.	min	max	diff. to 0 t-test	diff. to deal t-test	rank test
deal margin	69	0.08	0.60	3.66	-19.97	10.94	0.17		
sector margin	7,380	73.44	0.07	4,517	-20,375	367,487	0.17		-0.87
median sector margin ¹	69	0.23	0.17	1.11	-1.56	8.11	1.72*	-0.34	
deal log sales	69	5.87	7.18	14.79	-59.03	58.11	3.29***		
sector log sales	7,411	9.04	6.36	47.15	-816.01	722.05	3.79***		0.34
median sector log sales ¹	69	6.54	5.52	8.08	-8.81	23.02	6.71***	0.65	

Note: in percent, significance level * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

1 Median changes per sector (and not changes of the median)

2 For EBITDA margin change in percentage points ($FD\ ebitda\ margin_t = (ebitda\ margin_t - ebitda\ margin_{t-1}) * 100$) for sales change in percent ($FD\ logsales_t = (logsales_t - logsales_{t-1}) * 100$)

Figure 2 – Change in operational measures pre-acquisition deal vs. sector

The plots on the left are kernel densities for the sector and deal distribution. On the right we show polynomial smooth, which displays the values from a local polynomial regression of the acquisition status (1 for deals, 0 for sector companies) on the variable. The vertical captures the probability of PE acquisition; the grey shaded area the 95% confidence bands of the local coefficient estimates.

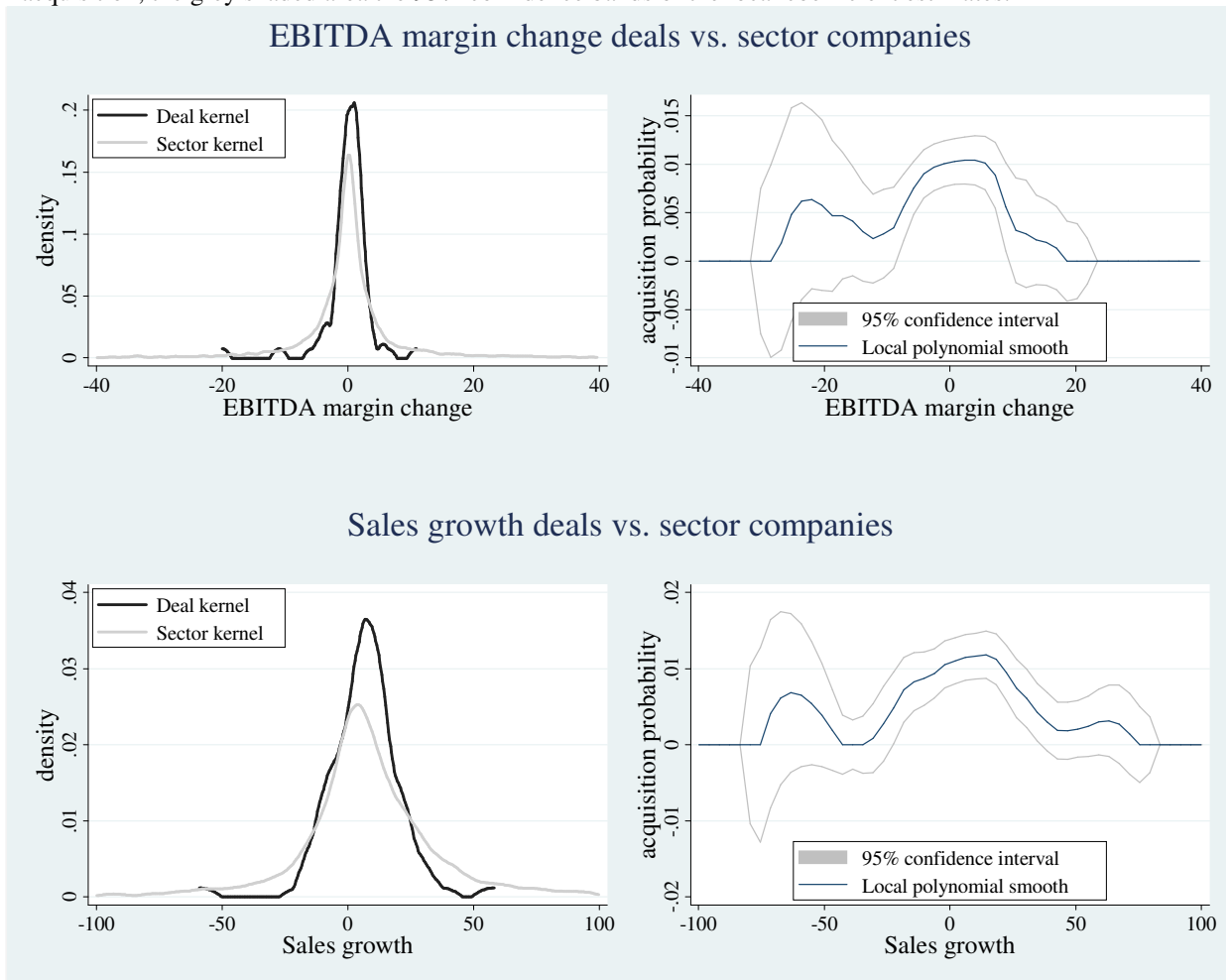


Table 5 – PE treatment on company criteria pre acquisition

Table 5 shows multivariate Logit or Probit regressions of the treatment status (PE acquisition) on operational measures pre-acquisition. We therefore pool our deal sample with all publicly listed companies in Western Europe as provided by Datastream.

The binary dependent variable takes on 1 for all deals and 0 for all sector companies. The independent variables are levels in operational measures in the last year pre-acquisition. We do not add dummies for sector and deal entry time periods since we do not have enough observations to identify time-specific selection patterns. We also do not include out-of-sample variables, e.g., market interest rates, because we are interested in finding comparable peers and not explaining the level of PE activity.

We use a non-linear specification with the quadratic terms, assuming a u-shaped relationship between the later acquisition and the operational variable. In regression (4) to (6), we include in addition to levels also pre-acquisition operational performance changes as independent variables.

Independent variables	Dependent variable treatment (1 for deals, 0 for sector companies)					
	Logit (1)	Logit (2)	Logit (3)	Logit (4)	Logit (5)	Probit (6)
Margin _t	14.51*** (3.53)		14.70*** (3.31)	15.54*** (3.47)	14.63*** (3.32)	6.20*** (4.04)
Margin _t ²	-22.25* (-2.20)		-21.77* (-2.08)	-22.92* (-2.14)	-20.80* (-2.01)	-8.61* (-2.46)
Log sales _t		4.77*** (4.33)	4.62*** (4.27)	4.66*** (4.25)	4.52*** (4.07)	1.73*** (4.58)
Log sales _t ²		-0.39*** (-4.35)	-0.38*** (-4.32)	-0.38*** (-4.29)	-0.37*** (-4.12)	-0.14*** (-4.56)
Margin _t - Margin _{t-1}				-2.65 (-1.49)	-2.31 (-0.57)	-1.58 (-1.18)
(Margin _t - Margin _{t-1}) ²					-7.70 (-0.25)	-1.71 (-0.23)
Log sales _t - log sales _{t-1}				-0.86* (-2.24)	-0.54 (-0.49)	-0.23 (-0.57)
(Log sales _t - log sales _{t-1}) ²					-3.80 (-0.98)	-1.26 (-1.07)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	5,241	5,240	5,240	5,110	5,107	5,110
No. of deals	94	94	94	69	69	69
Pseudo R ²	0.06	0.10	0.15	0.15	0.16	0.16
Log likelihood	-343.48	-329.12	-312.33	-309.94	-297.76	-308.03

Note: t-stat in parenthesis with robust standard errors, significance level * p<0.1, ** p<0.01, *** p<0.001

Figure 3 – Panel A: Propensity score deals vs. peers (10 nearest neighbors)

Figure 3 provides on the left the propensity score for the sector companies, which we use as peers, and on the right the propensity score for the deals in our sample. We calculate the score using the model we have estimated in the previous table in regression (5) for the 69 deals with two years of data pre-acquisition. For 25 deals with only one year of data we use regression (3) in the previous table instead. Panel A, shows the propensity scores for the 10 companies that have the lowest absolute distance to each deal by propensity score (10 nearest neighbors). Panel B, reports the same for the 5 nearest neighbors.

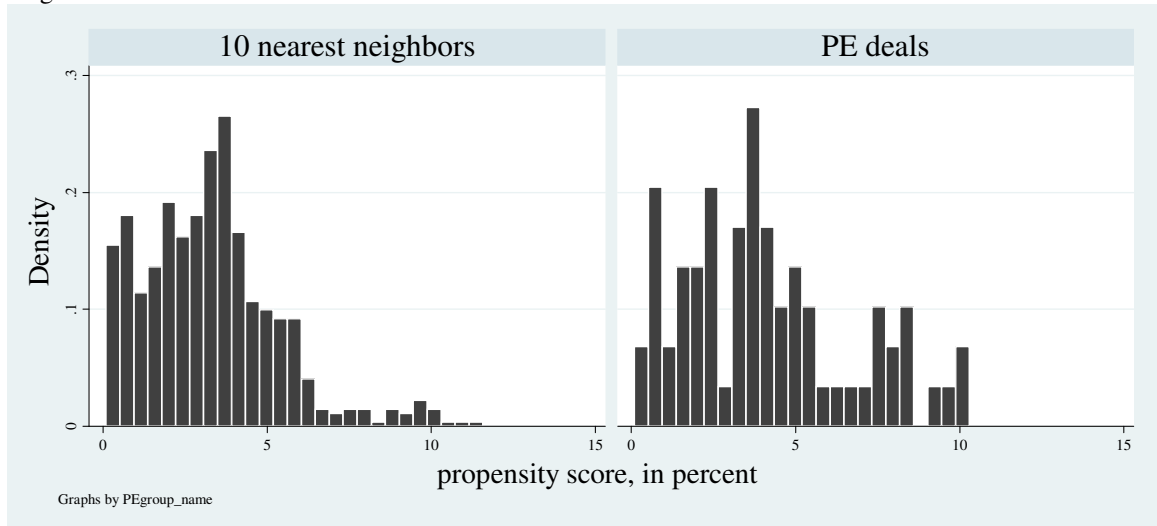


Figure 3 – Panel B: Propensity score deals vs. peers (5 nearest neighbors)

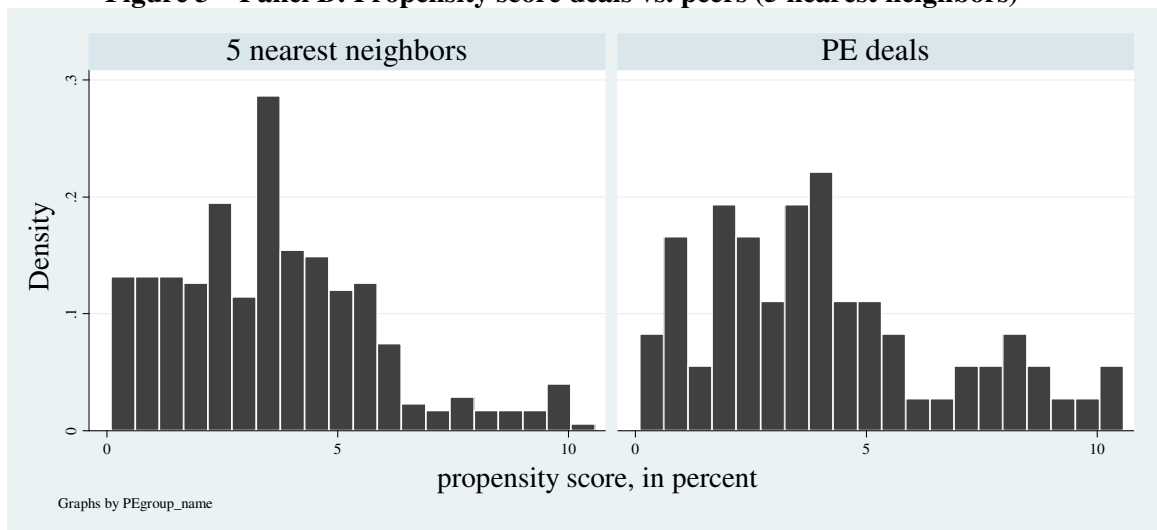


Table 6: Difference between deal and peers pre-acquisition

Table 6 includes deals and matched peers only, in order to show that there is no difference in operational measures between deals and matched peers pre-acquisition. We compare our deal sample with the 10 nearest neighbors.

	N	mean	median	st. dev.	min	max	diff. with deal t-test
EBITDA margin							
Deal	94	16.17	14.43	11.15	-30.19	66.72	
Peers average ²	94	15.24	14.23	6.93	2.06	32.08	-0.73
Log sales							
Deal	94	5.84	5.90	1.06	2.97	8.03	
Peers average	94	5.76	5.81	0.48	3.54	6.59	-0.78
EBITDA margin change⁴							
Deal	69	0.08	0.60	3.66	-19.97	10.94	
Peers average ²	69	0.10	0.08	1.18	-3.69	3.07	0.05
Log sales change⁵							
Deal	69	5.87	7.18	14.79	-59.03	58.11	
Peers average ³	69	6.75	5.67	8.78	-9.95	28.71	0.48

Note: In percent, significance level * p<0.1, ** p<0.05, *** p<0.01

1 10 nearest neighbors; deals in the last year pre-acquisition; sector companies in the deal corresponding years and sectors

2 Weighted average (total sector EBITDA divided by total sales) for each deal in corresponding years and sectors

3 Weighted average change in logsales (weighted by logsales)

4 Margin change in percentage points (FD ebitda margin_t = ebitda margin_t - ebitda margin_{t-1}, with t= entry year)

5 Sales change in percentage (FD logsales_t = logsales_t - logsales_{t-1}, with t= entry year)

Table 7: Financial performance deals vs. different benchmarks ¹

	N	mean	median	std. dev.	min	max	t-test of diff. with	
							deal	sector
Levered returns ²								
deals	94	38.22	36.3	40.99	-87.78	122.76		
Median peer	94	12.92	11.43	14.98	-17.21	51.23	-6.25***	4.17***
Median sector	94	8.97	8.18	12.24	-17.21	52.02	-6.98***	
D/E ratio ⁴								
deals	94	1.43	1.27	0.92	0.09	6.63		
Median peer	94	0.21	0.16	0.23	-0.19	0.9	-12.65***	3.39***
Median sector	94	0.16	0.11	0.14	-0.12	0.47	-13.43***	
Un-levered returns								
Deals	94	16.66	15.98	19.44	-60.29	67.23		
Median peer	94	11.96	10.65	12.87	-12.69	46.93	2.16**	4.20***
Median sector	94	8.5	7.51	10.62	-15.27	48.21	3.78***	
Adjusted Alpha ⁵								
Deals - sector	94	8.16	10.49	20.93	-86.14	73.36		
Peers –sector	94	3.46	2.45	7.98	-13.89	34.18		
Deals - peers	94	4.7	3.79	21.06	-93.16	73.36		
Public Market Equivalent (PME), Kaplan and Schoar 2005								
Median peer	94	1.46	0.87	4.12	-1	37.01		-2.96***
Median sector	94	1.68	1.14	4.06	-1	37.01		

Note: In percent, significance level * p<0.1, ** p<0.05, *** p<0.01

¹ Peers (10 nearest neighbors) and sector companies in the deal corresponding years and sectors

² Based on quarterly TRS

⁴ Based on a three-year average of net debt / market equity for each company

⁵ Assuming 5% cost of debt and using median D/E ratios and median returns

Table 8: Operational improvements deals vs. benchmarks ¹

The table reports for various operating measures x the cross-sectional difference $\Delta x_i = x_{iT} - x_{it}$ from the last pre-acquisition year ($t=0$) to last PE-ownership year (T) for all deals. We also report the changes in the deal corresponding sector companies $\Delta x_s = x_{sT} - x_{st}$ and for deal comparable peers $\Delta x_p = x_{pT} - x_{pt}$. We divide the difference for log sales between t and T by the number of PE ownership years ($T-t$) to get annual changes. We use median sector and peer changes, given that there are mostly less than 100 companies in each three digit sector and only 10 matched peers. In the last column we test if the changes are different from zero and also for differences between deal and median sector or peer changes. In the second part of the table we report the same statistics without including changes in years with M&A or divestment events. Since the numbers might get artificially inflated or deflated in the presence of acquisition or divestment activity.

	N (exited deals only)	mean	media n	std. dev.	min	max	t-test of differences		
							with 0	with deal	with sector
Margin $T - \text{margin}_t$									
deals	92	1.96	0.83	7.19	-10.31	38.61	2.69**		
peer median	94	-0.36	-0.12	2.25	-5.26	11.83	-1.56	3.24***	-2.52**
sector median	94	0.17	0.13	1.25	-2.79	4.56	1.33	2.40**	
(Logsales $T - \text{logsales}_t$) / (T-t)									
deals	92	5.4	4.23	11.71	-44.08	41.95	4.42***		
peer median	94	5.9	5.78	6	-12.6	31.05	9.53***	0.49	-3.42***
sector median	94	7.49	6.21	5.9	-7.46	30.06	12.31***	1.81*	
Multiple $T - \text{multiple}_t$									
deals	75	1.36	1.35	12.18	-60.58	50.25	0.96		
peers median	75	0.46	0.51	0.96	-1.7	2.61	4.16***	0.64	2.77***
sector median	75	0.23	0.33	0.59	-1.17	1.36	3.44***	0.79	
Log multiple $T - \text{log multiple}_t$ ⁶									
Deals	72	14.1	16.45	57.47	-153.55	223.24	2.08**		
peer median	75	6.47	8.97	12.12	-20.02	34.65	4.61***	1.18	2.94***
sector median	75	3	4.53	8.55	-18.82	22	3.03***	1.65	

Note: In percent, significance level * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

¹ From entry year (t) to exit year (T); peers (10 nearest neighbors) and sector companies in the deal corresponding years and sectors

Table 9: Operational volatility deals vs. benchmarks¹

	N	mean	median	std. dev.	min	max	t-test of differences	
							with deal	with sector
Std. dev. EBITDA margin								
deals	66	2.46	1.72	2.47	0.28	12.87		
peer median	66	3.01	2.71	1.27	0.88	8.02	1.77*	
sector median	66	3.87	3.16	1.59	0.80	6.75	4.28***	
Std. dev. Log sales								
deals	66	19.26	12.54	16.35	2.71	81.60		
peers median	66	24.40	23.92	9.08	7.47	44.71	2.70***	
sector median	66	27.54	26.94	7.57	6.33	48.64	4.13***	

Note: In percent, significance level * p<0.1, ** p<0.05, *** p<0.01

¹ Includes deals only with data for at least 1 year pre-acquisition and 2 years after acquisition

² Weighted average (total sector EBITDA divided by total sector sales) for each deal in corresponding years and sectors

³ Sector median vs. peers median or sector average vs. peers average

Table 10 – Debt service coverage at acquisition peers vs. sector vs. deals^{1 2}

	N	Mean	Median	St. Dev.	Min	Max	Diff. to deal
Deal	69	4.81	3.90	4.03	0.62	33.23	
Peers average ²	69	18.81	13.70	35.02	-145.27	198.50	3.27***
Peer median	69	8.03	8.11	7.87	-14.63	28.52	2.69***
Peers	638	-31.57	7.75	824.88	-17,063.91	5,448.70	3.68*** ³
Sector average ²	69	10.93	11.10	66.68	-444.83	217.64	0.83
Sector median	69	4.91	4.75	3.40	-6.55	11.48	0.14
Sector	4,534	-172.31	3.80	29,171.11	-831,272.81	1,550,116.25	-0.69 ³

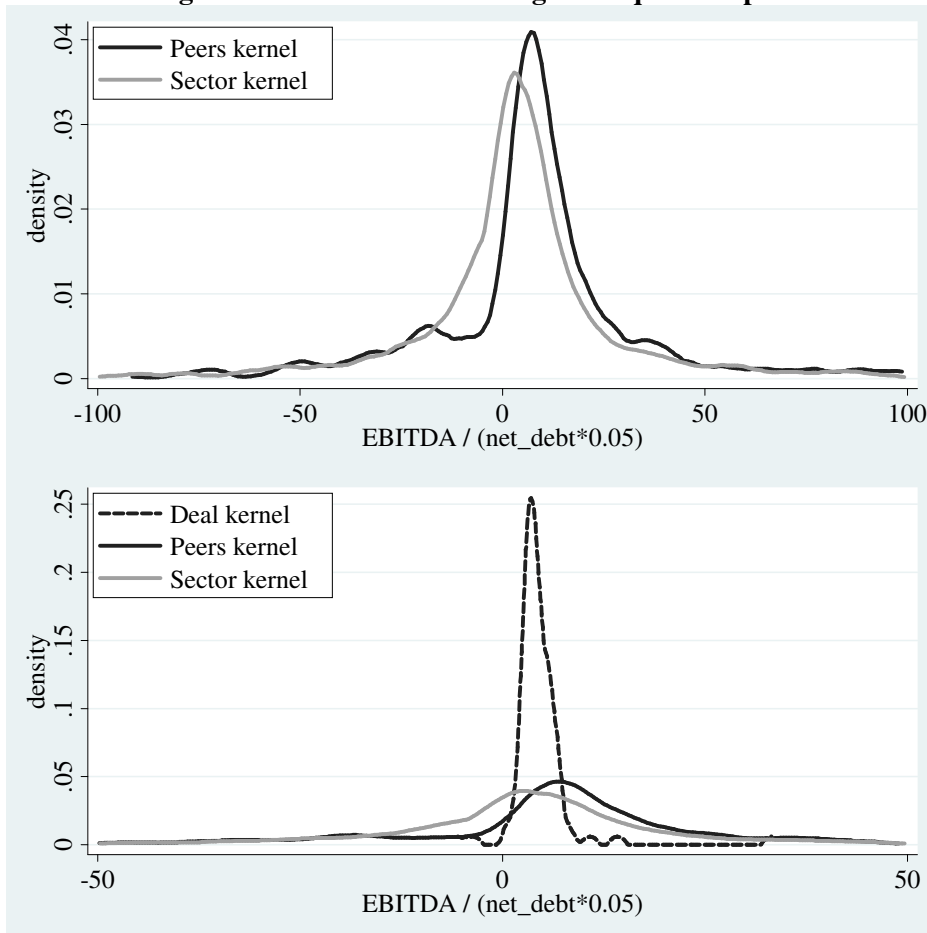
Note: significance level * p<0.1, ** p<0.05, *** p<0.01

1 Peers are the 10 nearest neighbors; coverage based on 5% cost of debt; EBITDA coverage ratio = EBITDA / (net debt * .05)

2 Weighted average (total sector EBITDA divided by (total net debt*0.05)) for each deal in corresponding years and sectors

3 Wilcoxon Test

Figure 4 – Debt service coverage at acquisition peers vs. sector vs. deals



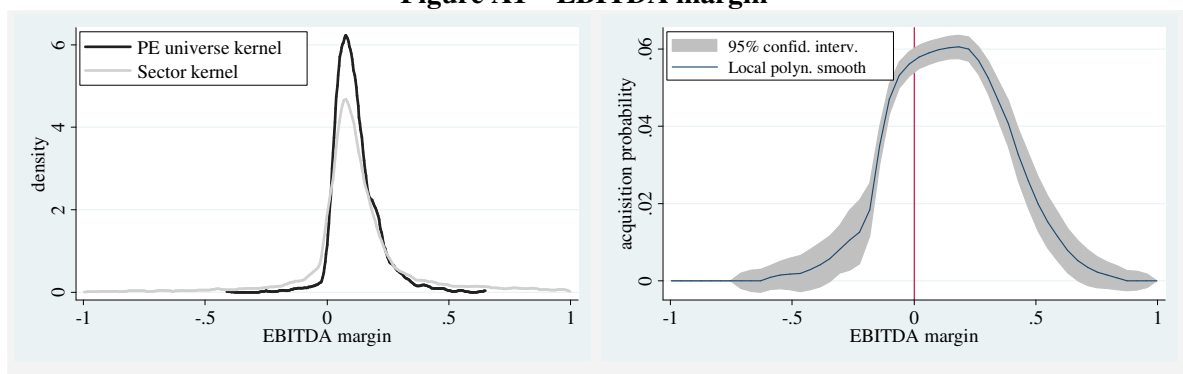
Note: Sector companies n=6,430; peers= 674, deals n=100

1 Using 5% cost of debt, EBITDA/(net debt 0.05)

2 10 nearest neighbor

Appendix: European PE universe vs. public listed sector companies

Figure A1 – EBITDA margin^{1 2}



Note: In EUR Mio or percent; for EBITDA margin PE deals n=1,528 and sector companies n= 31,086

Table A1 - Probit: PE treatment and company criteria pre acquisition (PE universe)^{1 2}

Independent variables	Dependent variable treatment (1 for all European PE deals, 0 for all public sector companies)						
	All entry years and deals	All deals by entry period				All entry periods by deals source	
		1994-1997	1998-2000	2001-2002	2003-2005	Private-to-Private	Public-to-Private ³
	(1)	(5)	(6)	(7)	(8)	(9)	(10)
Margin _t	0.40** (2.33)	3.11** (2.52)	0.23 (1.13)	-0.34 (-0.58)	3.85** (2.45)	0.32*** (3.93)	5.97*** (4.72)
Margin _t ²	-0.20*** (-3.55)	-9.68*** (-4.40)	-0.13*** (-2.90)	-2.59*** (-3.53)	-10.84*** (-3.49)	-0.26*** (-2.88)	-20.50*** (-5.14)
Log sales _t	-0.19 (-0.72)	-0.79 (-1.50)	0.02 (0.07)	0.00 (0.00)	-0.19 (-0.40)	-0.00 (-0.01)	-0.56 (-1.01)
Log sales _t ²	-0.05** (-2.08)	-0.03 (-0.63)	-0.07** (-2.24)	-0.08* (-1.88)	-0.05 (-1.22)	-0.09*** (-2.83)	-0.01 (-0.29)
EBITDA _t	1.04* (1.68)	-0.00*** (-2.58)	0.00* (1.93)	0.00 (1.09)	-0.00** (-2.15)	-0.00*** (-5.67)	-0.00 (-1.47)
EBITDA _t ²	-0.00*** (-4.20)	0.00** (2.51)	-0.00*** (-3.12)	-0.00 (-1.34)	-0.00 (-0.91)	-0.00*** (-5.48)	-0.00 (-0.85)
Constant	2.87*** (4.00)	5.57*** (3.51)	2.65*** (2.92)	3.16** (2.37)	3.03** (2.35)	2.76*** (3.02)	3.17** (2.01)
No. of obs.	32,573	5524	9257	6227	11,565	32,432	31,186
No. of PE deals	1,528	378	603	217	330	1,387	141
Pseudo R ²	0.88	0.94	0.91	0.89	0.84	0.87	0.73
Log likelihood	-761.85	-82.74	-205.43	-100.87	-235.80	-741.41	-241.65

Note: t-stat in parenthesis with cluster robust standard errors, significance level * p<0.1, ** p<0.05, *** p<0.01

1 All deals acquired from 1994 to 2005 in Western Europe according to Private Equity Insight with operational data; PE deals in the last year pre-acquisition;

2 Only in the Appendix does EBITDA include also exceptional items

3 Vendor type classification "Going Private" according to Private Equity Insight