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**“The Performance of French LBO firms:  
New data and new results”**

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# The Performance of French LBO Firms: New data and new results

José-Miguel Gaspar\*

## Abstract

This paper investigates the operating performance of French targets of Leveraged Buy-Out (LBO) transactions during the 1995-2005 period. To benchmark the performance of each LBO firm, we use a propensity score methodology to find a suitable non-LBO firm matching pair. The study finds that after the deal, the representative (median) LBO firm exhibits significantly higher operating returns of 2% to 3% relative to its matching control. The improvement in performance seems mostly due to an increase in gross margins (of about 1% of sales), productivity gains (also of about 1% of sales), and an improvement in working capital utilization. These findings are not particular to a certain type of targets and are unchanged if we use the size- and growth-matched industry peers of the LBO firm as a benchmark. Overall our findings are consistent with value creation by LBO firms in the French market.

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## 1. Introduction

The purpose of this paper is to investigate the operating performance of French companies undergoing an LBO. In recent years there has been renewed interest among academics and the public at large on the economic consequences of LBO activity.<sup>1</sup> Private Equity (PE) supporters point out that PE investors create value by improving management incentives and by contributing with financial and operational expertise to their portfolio companies. Critics of the industry argue that the high leverage characteristic of these deals prevents investment and increases the risk of future bankruptcy. It is therefore natural to inquire about the impact on firm performance of LBO activity.

The French Private Equity market (comprising both venture capital and buyouts) is currently the second largest in Europe after the U.K. and ahead of Germany, with about 10 billion Euros of funds invested in 2008.<sup>2</sup> Buyouts constituted the vast majority of PE funds, reaching 74% of investments.<sup>3</sup> AFIC, the French Private Equity association, estimates that nine percent of all employees of the French private sector work in a company held by a PE investor.<sup>4</sup> Activity in the French PE market is therefore economically sizeable, both with respect to the French economy and to the rest of the world, making France an interesting setting to investigate the impact of PE investment.

This study addresses the following two questions: First, how does the operating performance of a firm change as a consequence of the LBO? Second, how does the operating performance of an LBO firm compare with other firms not undergoing an LBO?

To answer these questions, we use standard operating performance metrics such as Return on Invested Capital (ROIC), Earnings Before Interest, Tax, and Depreciation (EBITDA) growth, evolution of EBITDA margins, and revenue growth. We also look at components of the margin

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<sup>1</sup> See for example the report funded by the World Economic Forum at Davos (Gurung and Lerner, 2008), the report made at the attention of the European Parliament (see e.g. Groh and Gottschalg, 2007), and the report published by the French Council for Economic Analysis addressing the French case (Glachant, Lorenzi, and Trainar, 2008). This added interest is undoubtedly correlated with the substantial increase in activity that took place during the 2006-2007 credit bubble.

<sup>2</sup> Source: AFIC (2009), *Activité des acteurs français du Capital Investissement 2008*, mimeo.

<sup>3</sup> Source: AFIC (2009), *Activité des acteurs français du Capital Investissement 2008*, mimeo.

<sup>4</sup> Source: AFIC (2007), *L'impact social des opérations de LBO en France*, mimeo.

(gross margins, labor costs, marketing and general costs) as well as measures of capital efficiency (working capital activity ratios and fixed asset turnover).

Gauging LBO performance is not trivial because LBOs do not occur randomly across the population of firms. LBO targets are selected by investors presumably because of their value creation potential. If an outside observer concludes that the average performance of firms targeted by an LBO increases after the transaction, one cannot rule out the possibility that this finding is due to the fact that LBO investors tend to select *better firms* on average relative to the population.

We address the problem of sample selection bias using a two-pronged approach. First, we benchmark the performance of LBO firms by selecting appropriate matching control firms to each LBO through the use of a propensity score methodology (Rosenbaum and Rubin, 1983; Dehejia and Wahba, 2002). The set of matching control firms is composed of firms that share the same characteristics as the LBO firm prior to the transaction. In other words, we select matching firms that have ex-ante the same probability of being selected by LBO investors. We then measure, for each LBO, its performance relative to the performance of its matching control pair in the years following the deal. Second, we perform panel-data fixed-effects regressions using the two-stage Heckman (1979) methodology to explicitly address the existence of selection bias.

Our sample consists of 158 deals occurring during the 1995-2005 period involving French target firms with more than 2 million Euros in sales. The source for accounting and performance data is Bureau van Dyc's DIANE database, which collects this information directly from the French statistical office. However, data available on DIANE is mostly on an unconsolidated basis. This can be a problem because often buyers use a special acquisition vehicle to acquire LBO targets, and restructure the assets purchased after the acquisition (if only for reporting purposes). We address this issue by performing a series of checks for data reliability, including a case-by-case verification of the consistency between reported accounts, press accounts of the deal, and the company's website. Our results indicate that this process is necessary to obtain reliable data.

The paper finds that the performance of French LBO firms increases after the transaction. The representative (median) LBO firm exhibits statistically significantly higher ROIC, by about 2%

(3%) relative to its matching control, during a horizon of two (four) years after the deal using multivariate (univariate) evidence. This improvement in performance is associated with (i) a more favorable evolution of margins at LBO targets during the post-deal period, and (ii) observed improvements in the management of working capital requirements. LBO firms also exhibit significantly higher growth rates in sales (EBITDA) in the first (first, second, and fourth) year after the deal relative to its matching control.

In terms of margins, we find that EBITDA margins of LBO firms either rise or stay constant, while those of matching control firms decrease by about 120 to 150 basis points in the period after the deal. This finding is consistent with the downward trend in margins for French small-and-medium-sized companies documented by Quignon (2004; 2007) during the sample period. The results indicate that LBO firms seem to better resist this downward pressure.

Looking deeper into the sources of margin over-performance, we find a post-deal increase in gross sales margins of LBO firms of about 1 to 2% relative to matched controls, as well as a decrease in relative labor costs of about 1.2% of sales. This decrease in labor costs seems due to productivity gains rather than cuts in employment, because in complementary analysis we also show that total labor costs and total employment of LBO firms evolve on par with industry trends. We find no evidence of decreases in marketing and general costs ratios for LBOs.

In terms of capital efficiency, we find evidence of an improvement in working capital utilization following the deal, very strongly so in our multivariate analysis. The latter shows that the improvement is due to a strong positive increase in suppliers' payables, but there is also some (weaker) evidence that the amount of inventory in LBOs is reduced compared to matching firms. Finally, we find no evidence of improvements in fixed asset utilization in LBO targets, and also no statistically significant difference in terms of increase in net assets (a proxy for investment), total compensation, or employment between LBO firms and their matched controls.

In robustness checks, we show that our findings are not particular to a certain type of targets, even if larger deals, secondary deals, and deals where the target is not family-owned perform better overall. The paper also presents results using size- and growth-matched industry firms as the performance benchmark. We show that our results are quantitatively similar and statistically stronger using such industry firms as controls, in spite the fact that they seem to be

less comparable to LBO firms than the matched controls obtained from the propensity score procedure.

Our results are consistent with existing theories predicting a positive impact of LBOs on performance, which include reduced agency costs, an increase in expert monitoring of management's actions, and increased incentives through larger management equity stakes.<sup>5</sup> The latter two factors should be very pronounced in the French market, where the majority of targets are either family-owned firms or subsidiaries of large conglomerates.<sup>6</sup> Family firms benefit relatively more from efficiency gains obtained by making the management of such firms more professional, while LBOs might improve significantly the incentives of managers working in divested former divisions. The results are also consistent with the founding literature of LBO operating performance in the U.S. during the 1980s, and recently extended to the 1990s and 2000s.<sup>7</sup> The reported increase in operating performance has been linked to increases in productivity and capital allocation efficiency, and similar results were found for the U.K. market.<sup>8</sup>

Past research on the French LBO market has produced results at variance with this established wisdom. Desbrières and Schatt (2002a, 2002b), working on a sample of deals for the 1988-1994 period, report that French LBO firms perform above the industry average prior to the deal but that their over-performance decreases after the deal. They attribute their findings to the fact that family sellers are a major source of deal flow in France, and that some of the firm value leaves with the founder. Similarly, Le Nadant (1998) also reports an abnormal decrease in LBO margins and operating cash-flow after the deal.

The paper closer to ours is Boucly, Sraer and Thesmar (2009), who investigate employment growth for a large sample of French LBOs from 1994 to 2004. The authors report excess job creation by LBOs, and interpret their results as evidence that investment by PE funds alleviates financial constraints faced by small, mostly-family owned, French firms. As a part of their

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<sup>5</sup> See e.g. Jensen and Meckling (1976), Jensen (1986; 1993), Kaplan (1989a), Baker and Wruck (1990), Fenn and Liang (1998), Cotter and Peck (2001), and Cornelli and Karakas (2008).

<sup>6</sup> Family businesses and corporate groups supply about 65% (50%) in number (value) of LBOs made in France since 2002 (CMBOR, 2006, *European Management Buy-out Review*, Jan-Dec 2006).

<sup>7</sup> See Kaplan (1989a, 1989b), Smith (1990), Muscarella and Vetsuypens (1990), and Guo et al. (2009).

<sup>8</sup> For evidence on productivity, see Lichtenberg and Siegel (1990). For evidence on the U.K. market, see Wright, Thompson and Robbie (1992), and Wright, Wilson and Robbie (1996). See also Cummings, Siegel and Wright (2007) for a useful literature review on the topic.

analysis the authors report positive changes in operating performance, like this paper does, but of a slightly higher magnitude. While similar in spirit, the focus of two papers is different, and complementary. This paper focuses more closely on the evolution of performance and its determinants, and employs a different strategy to deal with the self-selection problem.<sup>9</sup> Our sample and associated cleaning procedure are also different, due to the different data sources employed (in particular, our sample is composed of smaller firms on average). This might explain some of our different results concerning employment.

The remainder of the paper is organized as follows. Sections 2 and 3 describe respectively the construction of the sample and the methodology employed. Section 4 describes our base-line results. Section 5 addresses the issue of robustness. Section 6 presents results on the evolution of net assets and employment-related variables. Section 7 presents regression evidence on performance. A discussion of the results in the light of existing theory and evidence is discussed in section 8. A short conclusion follows.

## 2. Constructing the sample

To obtain the sample of LBOs used in this paper, we identify deals occurring during the 1995-2005 period involving French target firms with more than 2 million Euros in sales using data from four different sources.

Our first data source is Barclays' LBONet, a proprietary database of LBO deal flow on the French market. LBONet contains information about the date of the transaction, names of the target and the acquirer, and information about the deal, including accounting information (sales, enterprise value) whenever available. The second data source is a list of about 150 deals supplied by AFIC, the French Private Equity association, containing year of the deal and the SIRET of the acquired firm (SIRET is a unique identifier attributed to all French firms by the French census bureau). The third data source is the Thomson Financial/SDC Platinum M&A deals database. Relative to other data sources, Platinum covers relatively larger transactions and a higher proportion of publicly-listed targets. Finally, we use Bureau van Dyck's (BvD) Zephyr M&A database. The advantage of this data source is that it ranges a wider spectrum of smaller

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<sup>9</sup> A previous companion to the mentioned paper, Boucly, Sraer and Thesmar (2008), also uses a propensity score methodology like the one we employ here.

transactions relative to SDC Platinum, and contains a direct link, via the SIRET identifier, to the database containing each firm's accounting information. The union of these different databases contains roughly 1,500 deals.

To obtain accounting and performance data for these firms, we use BvD's DIANE databases A and B (i.e. containing accounting data for French companies with more than 350,000 EUR in sales). We remove from DIANE observations with non-positive assets or sales, and winsorize all variables at the 1% and 99.9% level.<sup>10</sup> We are left with about 2.5 million firm-year observations in DIANE.

We then create an algorithm to match the deals in the different databases with DIANE. The following criteria are applied to the data, in order of succession. First, we keep all deals whose reported target sales (whenever available) is within  $\pm 10\%$  of the sales reported in DIANE, for either the year of the deal or the previous year. Second, we require LBO financials to be available in DIANE for at least one year during a horizon period that goes from 3 years before to 4 years after the deal's date. Third, we remove from the data venture capital deals, expansion capital deals, acquisitions by private investors not affiliated with a Private Equity fund, deals with insignificant amount of leverage, minority deals, and build-ups. Fourth, we exclude deals for which DIANE available data is not consistently composed of either consolidated or non-consolidated accounts throughout the horizon period. Fifth, we require the target's financials to be available in the full fiscal (12 month) year immediately preceding the deal as well as in the full fiscal year after the deal. To better identify the fiscal years prior and after the deal, we obtain from DIANE the number of months of the reported financials.<sup>11</sup>

After these 'automatic' criteria, we perform a manual check of each deal using Dow Jones' Factiva, BVD's Zephyr, and the website of the target company (if available). We exclude all deals that have inconsistent information or do not respect the criteria mentioned. These include: deals with target sales substantially understated in DIANE due to non-consolidated accounts or to significant changes in within-group subsidiary size (about 48% of eliminations); deals

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<sup>10</sup> The standard practice of winsorizing at 99% would mean that we would not be able to find suitable benchmarks for some of the large companies in the LBO sample.

<sup>11</sup> In France one of the requirements to achieve group tax integration (that allows for interest costs at the level of the acquisition holding to be offset against taxable profits of the operating company) is that the holding and the operating company have a common 12-month accounting reporting period. For this reason, it is not uncommon that the operating company changes the date of closing of financial statements, resulting in reporting numbers for a period of less than one year.

incorrectly classified as LBOs but where there is no financial investor, or where there is no evidence of debt being used in the transaction (33%); deals with incorrect deal dates or for which it was unclear whether the deal took place (12%); a residual number of deals where no information was available about the company neither in the press nor on any website. Finally, we obtain for each deal a matching control firm (see the Methodology section).

Table 1 provides a summary of the impact of the different requirements on the size of the sample. Careful verification of the data leads to a significant drop in the number of usable observations. The final sample contains 158 deals (181 deals excluding the impact of missing financials for the matching control firms).

– Insert Table 1 around here –

Table 2 summarizes the characteristics of the final sample. The sample is mostly composed of recent deals: 76% of deals take place since 2002 and 45% since 2004. In terms of size, the sample is mostly constituted of relatively small companies: 52% of targets have less than 20 million (M) Euros in sales at the time of the deal, and 87% have less than 75M. Companies with sales above 75M constitute 13% of number but 47% of the value of deals.

– Insert Table 2 around here –

Slightly more than half of the sample is composed of industrial companies (36% in terms of value of the deals), with about a third representing services companies (41% in terms of value of the deals). Slightly less than half of the deals (46%) correspond to sales made by family or individual shareholders, and 30% correspond to sales made by corporate owners (“spin-offs”). The companies in the sample are relatively dispersed across the French territory, as 60% of deals take place outside Île-de-France.<sup>12</sup>

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<sup>12</sup> In unreported work, we investigate whether our final sample shares the same characteristics as the initial population of deals. We compare the distribution of size and industry affiliation of our sample with (i) histograms of the same variables for a sample of 1,400 deals from AFIC’s proprietary database, and (ii) histograms of the same variables for LBONet. In both cases we find that the proportion of small deals is slightly higher in the final sample than in the population (e.g. 87% of firms with pre-LBO sales of less than 75M in our sample vs. 73% in LBONet), and slightly more industrial companies (e.g. 51% in our sample vs 39% in LBONet).

### 3. Methodology

#### 3.1 *Measuring performance*

To measure operating performance we follow previous academic literature (e.g. Kaplan, 1989; Smith, 1990) and focus on the following variables. Our main performance measure is the *Return on Invested Capital (ROIC)* ratio. The latter is defined as  $(\text{EBITDA} \text{ minus Depreciation} \text{ minus Operating Taxes}) / \text{Total Invested Capital}$ , where Total Invested Capital equals long-term operating assets plus operating working capital plus excess marketable securities. The advantage of using ROIC is that it incorporates both margins and capital efficiency effects into a single performance metric.<sup>13</sup> Other performance measures include the *growth in Sales*, the *growth in EBITDA*, and the *change in EBITDA margin*, defined as  $\text{EBITDA} / \text{Sales}$ .

We decompose the margin into the main components of the cost structure, namely: *Gross Margin*, defined as  $(\text{Sales} - \text{Cost of Goods Sold}) / \text{Sales}$ ; *Labor costs ratio*, defined as  $\text{Labor costs} / \text{Sales}$ ; and *Marketing and general costs ratio*, defined as  $\text{selling, general and administrative costs} / \text{sales}$ . To measure efficiency in capital utilization, we define: *Operating Working Capital / Sales*, where operating working capital is defined as operating short-term assets minus operating short-term liabilities; and *Long-term Operating Assets / Sales*, where Long-term Operating Assets are constructed as net fixed assets less financial participations. Finally, activity ratios are calculated as follows: *Days in Receivables* is defined as  $(\text{Receivables} / \text{Sales}) \times 365$ ; *Days of Sales in Stock* is defined as  $(\text{Inventory} / \text{Sales}) \times 365$ ; and *Days of Sales in Payables* is defined as  $(\text{Payables} / \text{Sales}) \times 365$ . The advantage of defining the latter two variables in this way is that Days in Receivables plus Days of Sales in Stock minus Days of Sales in Payables equals Operating Working Capital / Sales. Please see Appendix 1 for the precise variable definitions and their mapping into DIANE nomenclature.

#### 3.2 *Obtaining the matched controls*

From within the DIANE database, we obtain a group of matching controls for each deal by implementing a propensity score matching algorithm (see Appendix 2 for details and references on the propensity score). This procedure involves fitting a regression model that estimates the likelihood of a firm being the object of an LBO bid in a given year, and then using the

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<sup>13</sup> See e.g. Koller, Goedhart, and Wessels (2005).

probability estimate from that model to find a matching control for a firm that indeed was the target of a bid. The main steps of the algorithm are as follows.

First, we perform a stratified random sampling of DIANE to obtain a dataset composed of about 2000 companies. We need to do this because fitting a discrete choice regression model where the number of ‘zeros’ (that is, observations where the firm is not an LBO target in a given year) is very high relative to the number of ‘ones’ (that is, observations where the firm is an LBO target in a given year) results in poor estimates. This is the case since DIANE contains data for about 200,000 companies, and the sample contains 158 LBOs. We therefore divide DIANE into strata and random sample inside each stratum to obtain a manageable number of non-LBO observations. We choose 2000 as a number that seems reasonable because it means that LBOs constitute about 8% of the regression sample.<sup>14</sup>

Second, we run a logit regression that models the likelihood of a firm being the target of an LBO in a particular year. Denote by  $h_k^*$  the latent unobservable variable that represents the net present value of the acquisition of firm  $k$  by a bidder and  $h_{k,t}$  a dummy that takes the value of 1 if the an LBO bid is made in year  $t$ :  $h_{k,t} = 1$  if  $h_{k,t}^* > 0$  or  $h_{k,t} = 0$  if  $h_{k,t}^* < 0$ . The logit regression to be estimated for the probability of  $\Pr(h_{k,t} = 1)$  is

$$h_{k,t}^* = \alpha + W_{k,t} \delta + \upsilon_{k,t} \quad (1)$$

The matrix  $W_{k,t}$  contains firm-specific variables that the literature has identified as determinants of the likelihood that a firm is an LBO target, namely firm size, the debt-equity ratio, the effective tax rate, the firm’s profitability (measured by ROIC), excess cash (proxied by cash divided by assets), as well as time and industry dummy variables.<sup>15</sup>

The predicted value from regression model (1) is called the propensity score. Its interpretation is that it measures the probability, as predicted by the model, that a firm becomes an LBO target in a given year. In other words, firms with similar propensity scores share similar

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<sup>14</sup> We perform different sampling runs and also vary the percentage of LBOs in the regression between 10% and 4%. The results of the paper are not sensitive to this change.

<sup>15</sup> Please see Section 8 for more details and results of a first-stage logit regression similar to the one employed here.

characteristics that lead to being an LBO target. They constitute therefore adequate benchmarks for LBO performance.

Third, we select the matching control in the following way. We group all firms (LBOs and non-LBOs) into blocks according to their propensity score and run tests iteratively inside each block to make sure that all firms within the same block are statistically similar (see Appendix 2). We choose as matching control for a given LBO the non-LBO firm that (i) belongs to the same block as the LBO and that (ii) has the closest propensity score. The matching control firm, is the one used to calculate net (i.e. benchmarked) performance of LBOs.

### 3.3 Hypothesis testing

Let  $y_{k,t+\tau}$  represent a measure of performance for LBO company  $k$  at year  $t + \tau$ , where  $t$  represents the LBO year and  $\tau$  takes the values  $-2, -1, +1, \dots, +4$ . Let  $y_{Control,k,t+\tau}$  represent the same measure of performance for the corresponding matching control firm. The control-adjusted measure of performance measures the net incremental performance of the LBO firm relative to its matched control

$$y_{k,t+\tau}^{Net} = y_{k,t+\tau} - y_{Control,k,t+\tau}$$

Our objective is to understand how the post-deal performance of the LBO firm compares with the pre-deal performance. We therefore calculate the change in gross performance of the LBO from year  $\tau_0$  to year  $\tau_1$  is (setting  $\tau_0 = -1$  and  $\tau_1 = +1, +2, \dots, +4$ ):

$$\Delta y_{k,\tau_0,\tau_1} = y_{k,t+\tau_1} - y_{k,t+\tau_0}$$

The corresponding change in control-adjusted performance is

$$\Delta y_{k,\tau_0,\tau_1}^{Net} = y_{k,t+\tau_1}^{Net} - y_{k,t+\tau_0}^{Net}$$

The statistical significance for the change in performance is ascertained through a signed rank non-parametric test (that can be roughly interpreted as a differences in medians test), under the

null hypothesis of no difference between the two samples. The alternative hypothesis is that the difference is different from zero. Using the notation just defined, this means testing

$$H_0 : \text{median}_k(\Delta y_{k,\tau_0,\tau_1}^{Net}) = 0 \quad (2)$$

$$H_a : \text{median}_k(\Delta y_{k,\tau_0,\tau_1}^{Net}) \neq 0$$

In other words, the null hypothesis means that performance of the representative (median) LBO firms does not change after the LBO. The alternative hypothesis is that performance of the representative (median) firm changes after the LBO.

## 4. Results

### 4.1 Summary statistics

Table 3 presents summary statistics for the performance measures of LBOs and the matching control firms.

– Insert Table 3 around here –

The analysis of Panel A of Table 3 indicates that the distribution in terms of size of LBO firms is asymmetric, as evidenced by the large differences between means and medians. For example, during the year before the deal the average LBO firm has sales (net assets) of 48M (37M) Euros while the median firm has 19M (12M) Euros. The distribution of matched controls shares this characteristic. The median LBO firm has a 10% EBITDA margin and has grown at a rate of 7% the year before the deal. Relative to their matched controls, LBO firms are slightly larger (19 M in median sales vs. 13M), grew at a slightly higher rate the year before the deal (median 7% growth vs. 4.7%), and are less profitable (10% vs. 13.7% in terms of median EBITDA margin and 12.5% vs. 13.4% in terms of median ROIC).

Panel B of Table 3 shows the ratios related to cost structure and capital utilization. The median LBO firm displays a gross margin of 64.8%, while labor costs and marketing and general costs

represent respectively 23% and 24.3% of sales. Control companies have a lighter cost structure and higher margins (e.g. labor costs represent 18.2% of sales and marketing and general costs represent 20.9% of sales).

For comparison purposes, Table 3 also shows statistics for the set of “industry peers” of LBO firms. The latter are defined as the set of companies that (i) operate in the same industry (defined by the French NAF industry code) as the LBO firm and (ii) have values of net assets and sales growth in the same quintile as the LBO firm one year prior to the deal. For each set of peer companies (corresponding to each LBO deal) we take the median of every performance variable as the value representing peer industry performance.<sup>16</sup> The table shows that both LBOs and their matched controls are larger and more profitable than their industry peers, illustrating the need of carrying out the propensity score matching procedure.

#### 4.2 Performance results

Table 4 presents our main results. The table shows the median change in performance (equation (2) above) for different values of  $\tau_0$  and  $\tau_1$ . For example, the cell in the first row, third column (“Sales % growth, From -1 to +1”) shows the percent change in sales occurring between the last full fiscal year before the deal to the first complete fiscal year after the deal for LBO firms.

– Insert Table 4 around here –

The analysis of Table 4 indicates that LBO firms and control firms share similar characteristics before the deal (net performance measures are not statistically different from zero). The only exception is the higher growth in sales two years before the deal for LBOs.

The results show that the control-adjusted ROIC of LBO firms increases by about 5% during the first year (statistically significant at 1% level) and by about 3% during the second to fourth years (statistically significant at 10% level or better). This increase is the result of an increase in (unadjusted) ROIC for LBO firms of about 2% in the first two years after the deal

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<sup>16</sup> If the number of industry peers (for a given LBO firm) defined as above is less than or equal to three, we replace it by the median of the variable for the entire industry.

(statistically significant at 10% level or better), along with a simultaneous decrease in ROIC for controls of about 1.7% (statistically significant in the first and fourth year).<sup>17</sup>

A similar pattern can be observed in terms of margins. The EBITDA margin of LBOs increases by about 1% in the first year after the deal (statistically significant at 10% level) and is statistically undistinguishable from zero in subsequent years. The change in EBITDA margin is negative and significant for the matched controls throughout all the four years, in the range of 120-150 basis points (statistically significant at 5% level).<sup>18</sup> As a result, the net change in EBITDA for LBOs is of 1.8% (significant at the 1% level) on a net basis on the first year following the deal and of 0.77% (significant at the 5% level) in the two years following the deal. This finding is consistent with evidence showing a consistent decline in margins across the board in French small-and-medium sized businesses (Quignon 2004, 2007). We interpret the evidence as a sign that LBO companies have resisted better the downward pressure in margins during this period.

Table 4 also shows that LBO firms also exhibit statistically significant EBITDA growth after the deal, both on a unadjusted (all coefficients are significant at 5% or better) and control-adjusted basis (all coefficients but one are statistically significant). In contrast, EBITDA growth for control firms is not statistically different from zero in the post-deal horizon. Finally, post-deal growth of LBO firms is statistically superior to that of their counterparts in the first year after the deal but statistically similar afterwards. Overall, these results indicate that the representative (median) LBO firm outperforms its matched control firm.

### 4.3 *Decomposing performance*

We complement the previous analysis by decomposing performance in its different components. Table 5 investigates the evolution of the margin and cost structure, as well as the change in measures of efficiency in capital utilization of LBOs compared to their benchmarks.

– Insert Table 5 around here –

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<sup>17</sup> The median is not a linear operator, so (for example) the first year's median difference in ROIC (5.12%) is not exactly the difference of the medians in ROIC ( $2.62\% - (-1.67\%) = 4.29\%$ ).

<sup>18</sup> This finding (of a decrease in margins for the benchmark of control firms) is also patent if we use the LBO's "industry peers" as a benchmark. See section 5.2.

Panel A of Table 5 focuses on the cost structure. The results show that control-adjusted gross margins of LBO firms increase relative to their counterparts for the two years after the deal (1.05% and 2.09%, respectively). This result is due to a negative statistically significant change in the control firms, since the non-adjusted change in gross margins for LBO firms is statistically and economically equal to zero. Table 5 further shows that LBO firms' control-adjusted labor cost ratios decrease in for the first two years after the deal by about 120 to 130 basis points (significant at the 5% level or better), as well as four years out. There is also evidence of a small increase in LBO firms' marketing and general costs, but only in the first year after the deal.<sup>19</sup> We conclude that the increase in EBITDA margins is associated with an increase in relative pricing power of LBOs and the existence of relative productivity gains in labor costs.<sup>20</sup>

Panels B of Table 5 focuses on capital utilization efficiency. Operating working capital ratios of LBO firms decrease on a net basis by 1.87% in the first year after the deal (the change is significant at the 5% level). The same pattern occurs in the operating assets ratio, but on a gross basis only (-0.74%, significant at the 5% level). All other coefficients are not statistically different from zero. Finally, Panel C of Table 5 investigates working capital utilization efficiency by looking at its components. The univariate evidence reported there is mostly inconclusive, as only the days-in-stock variable exhibits negatively statistically significant control-adjusted differences between LBO and their controls, indicating that LBO firms reduce their inventory costs. While for the moment we conclude that there is weak evidence of an improvement in working capital utilization in LBO firms, we shall see in section 8 that the multivariate evidence is different and somewhat statistically stronger.

We can summarize the findings in this section by stating that LBOs display a significant increase in performance after the deal relative to their peers. The increase in performance is linked to an increase in sales margins, productivity gains via a decrease in relative labor costs, and a marginal improvement in working capital requirements.

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<sup>19</sup> The relative increase in marketing and general costs probably explains part of the observed sales increase for LBO firms in the first year after the deal, since a significant part of these costs probably relate to advertising expenditures. Bruining and Wright (2002) find evidence of greater emphasis on marketing and new product development in the strategy of firms involved in a divisional buyout. However we cannot directly test this conjecture since DIANE does not contain separate items related to advertising and marketing expenses.

<sup>20</sup> Section 7 shows that the evolution of total labor costs and number of employees are similar for LBO firms and for control firms. This indicates that the increase in margins comes from productivity gains from increased sales spread over a labor cost base that evolves on par with industry trends.

## 5. Robustness checks

### 5.1 Results across subsamples

We examine how robust are the main results concerning performance by cutting the sample across different dimensions. There are several reasons why our results could be due to a specific subset of firms. First, the majority of accounting data available in DIANE are not consolidated; our results might therefore be driven by inadequate measurement of performance for firms with non-consolidated accounts. Second, our sample is characterized by a predominance of small deals; we should therefore condition the analysis on size of the firm as a robustness check. Third, the over-performance of LBOs might be specific to deals in certain business sectors, or in certain geographical areas. Fourth, results might be due to the exceptional performance of some deals in benign economic conditions, that is, years of high economic growth. Fifth, results could be due to the fact that a substantial number of companies have been involved in secondary or even tertiary LBOs. Finally, we need to check if results hold for firms sold by family shareholders since prior research has shown that these tend to perform worse after the deal (Desbrières and Schatt, 2002a; 2002b).

To investigate these issues, Panels A through G of Table 6 present the results of repeating the analysis for the two main performance measures (ROIC and EBITDA margin) across different sample cuts, namely: (i) deals where consolidated accounting information is available vs. deals with unconsolidated accounting data; (ii) large vs. small deals, where a small company is defined as one with less than 20M Euros in sales; (iii) target companies located in Ile-de-France vs. target companies located outside Ile-de-France; (iv) targets operating in industrial sectors vs. targets operating in services sectors; (v) deals taking place in years in which the French GDP growth is above 2% vs. deals taking place in years in which GDP growth is below 2%; (vi) primary vs. secondary deals; (vii) deals where the seller is a family or an individual shareholder vs. deals from other sources.

– Insert Table 6 around here –

The main conclusions of the analysis of Table 6 are as follows. First, the number of observations across each sample cut is sometimes small, affecting the ability to obtain correct

inferences in the longest horizons. Second, and in spite of this hindrance, our reported findings of post-deal increasing ROIC and increasing EBITDA margin (particularly in the first two years after the deal) are mostly robust across sub-samples. Overall, out of a total of 112 t-test coefficients corresponding to every post-deal horizon, only 2 are negative and significant (both in the industry sub-sample, and in years 3 and 4 of the post-deal horizon), while 63 coefficients are positive and statistically significant at 10% or better. Third, the results are particularly stronger, statistically speaking, for larger deals, for deals in the service sector, and for secondary buyouts. We also find that deals involving family sellers perform relatively worse than deals where targets were held by other shareholders, consistent with the analysis and conjectures in Desbrières and Schatt (2002a; 2002b). We conclude that the evidence is strongly in favor of a performance increase for post-deal LBO firms.

## 5.2 *Results using the industry as a benchmark*

Another issue we have to address is the possibility that the matching controls are an inadequate benchmark for LBO performance, or that the performance of the matching controls is not representative of the performance of the overall economy. To investigate this issue, we repeat the analysis of Table 4 using as benchmarks the median performance of the industry peers for each LBO, as described above. Recall that LBO peers are companies that belong to the same industry as the LBO and that have similar size and growth characteristics.

– Insert Table 7 around here –

Overall results are similar, if statistically stronger, relative to the benchmarking done using the matched-controls. The industry-adjusted ROIC of LBO firms increases by about 2% to 3% over the post-deal horizon (statistically significant at 5% level or better). This increase coincides with a deterioration in industry margins: the EBITDA margin of the industry peers drops by 0.5% to 1% over the period (all coefficients statistically significant at 1%), while that of LBO firms either rises or stays constant. As a result, industry-adjusted margins increase by about 0.4% to 1.3% (all coefficients statistically significant at 10% or better). Furthermore, control-adjusted EBITDA increases by more than 18% after the post-deal horizon (all coefficients statistically significant at 5% or better).

We conclude that the results using the industry peers of the LBO firms as a benchmark are quantitatively and qualitatively similar to the ones obtained using the propensity score matching controls.

## 6. Impact on assets, wages, and employment

The literature on LBOs has also inquired about other aspects of firm behavior such as the impact of LBOs on investment and wages (e.g. Lichtenberg and Siegel, 1990). Some scholars have suggested it could be the case that the increase in profitability of LBO firms is made at the expense of the firm's ability to continue investing or it would be a consequence of a transfer of value from other stakeholders such as employees (e.g. Shleifer and Summers, 1988).

A full-fledged study of investment, productivity and employment in LBO firms is outside the scope of this paper.<sup>21</sup> However, we provide preliminary evidence on the issue by looking at the evolution of investment, worker compensation (total labor costs, including social charges) and employment (number of employees reported) during the horizon window of the LBO.

– Insert Table 8 around here –

Unfortunately the data made available to us does not contain investment, so we use the evolution of the net assets of the LBO firm as a related (albeit very imperfect) proxy. Table 8 shows that the net assets of LBO firms grow at a rate (10.5% in the first year) comparable with the matched controls after the deal (8.1% in the first year). The net growth is not statistically significant, neither in the first year nor at any deal horizon.

Total compensation paid to employees is also increasing in LBO firms at rates comparable to matched controls (8.0% vs. 9.1% in the first year, 9.8% vs. 9.8% over the period of two years after the deal). Again we observe that no coefficient of the control-adjusted change in labor costs is statistically different from zero.

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<sup>21</sup> See Amess and Wright (2007) and Davis et al. (2008) for recent results on Private Equity and employment, and Harris, Siegel and Wright (2005) for recent evidence on productivity. Concerning the French case, see Desbrières and Schatt (2002b) and Boucly, Sraer and Thesmar (2009).

Concerning employment levels, the number of observations available is lower than for the other variables. This makes inferences somewhat less reliable.<sup>22</sup> The change in the number of employees of LBO firms is statistically positive in the first year after the deal, but it remains statistically insignificant afterwards (while the changes in the matched controls are positive and significant after year 2). However, the statistical difference between LBO firms and their matched controls is not different from zero.

Our conclusion is for an absence of significant differences in terms of asset evolution, total compensation, or employment between LBO firms and their matched controls in our sample. The relative decrease in labor costs identified in Section 4 seems therefore mostly due to an increase in productivity coming from increased post-deal sales revenue per employee.<sup>23</sup>

## 7. Regression analysis

To investigate the robustness of the results in the context of a multivariate regression, we estimate the regression model

$$y_{k,t}^{Net} = \alpha + \beta POST_{k,t} + \mathbf{X}_{k,t} \gamma + \varepsilon_{k,t} \quad (3)$$

where  $y_{k,t}^{Net}$  is a measure of control-adjusted performance for the LBO  $k$  at date  $t$ ,  $POST_{k,t}$  is an indicator variable that takes the value 1 for the observations of firm  $k$  in the period after the deal, and takes the value of zero otherwise. The coefficient  $\beta$  measures whether there is a significant difference between the performance of the firm before and after the deal. The testable hypothesis is that performance increases after the LBO deal:

$$H_0 : \beta = 0$$

$$H_a : \beta > 0$$

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<sup>22</sup> This factor, as well as the underlying differences in sample characteristics, might explain why our results are different from those reported by Boucly, Sraer and Thesmar (2009), who find positive changes in employment in LBO firms.

<sup>23</sup> In unreported results, we also find that the control-adjusted change in the ratio EBITDA / Number of employees, a measure of productivity per employee, is positive and statistically significant in the first year after the deal.

The  $X$  matrix contains several control variables, such as firm size (measured by log assets), FirstLBO (a dummy variable equal to 1 if the LBO is a primary deal), ConsolidatedData (a dummy variable equal to 1 if consolidated accounts are available) and GDPChange (the % change in French GDP for that year).

To ascertain the time period in which the performance increase is most significant, we run the alternative regression model

$$y_{k,t}^{Net} = \alpha + \sum_{\tau: \tau \neq -1} \beta_{t+\tau} D_{t+\tau} + \mathbf{X}_{k,t} \gamma + \varepsilon_{k,t} \quad (4)$$

where  $D_{t+\tau}$  is an indicator variable that takes the value 1 for an observation in period  $t + \tau$ . The index  $\tau$  takes all values from  $-3$  to  $+4$ , except  $\tau = -1$ . This means that the coefficients  $\beta_{t+\tau}$  measure the performance change observed in period  $t + \tau$  relative to the performance observed in period  $t - 1$ . The testable hypothesis is that performance increases after the LBO deal, that is

$$\begin{aligned} H_0 : \beta_{t+\tau} &= 0 \\ H_a : \beta_{t+\tau} &> 0 \end{aligned}$$

for  $\tau = +1, \dots, +4$ . To take advantage of the panel nature of the data, we fit the models (3) and (4) using firm fixed-effects.

Even though our hypothesis is being tested on a control-adjusted basis, one possible criticism of our approach is that the sample selection issue raised earlier might still affect our inferences. To address this issue we fit a two-stage Heckman (1979) model that introduces in equation (4) a correction term that adjusts inferences for the fact that LBOs are not observed randomly among the population. Our approach for the first-stage selection equation in the Heckman model follows closely the approach described in section 3.2. We estimate the logit model

$$h_{k,t}^* = \alpha + \mathbf{Z}_{k,t} \theta + v_{k,t} \quad (5)$$

where the dependent variable is a dummy variable that takes the value of one if firm is the target of an LBO in a particular year. The matrix  $Z$  contains variables that the literature predicts to be important in determining that a firm becomes an LBO target (e.g. Opler and Titman,

1993). Our specification includes firm size (log of sales), the debt-equity ratio, the effective tax rate, the firm's profitability (measured by ROIC), cash (cash divided by assets), as well as time and industry dummies.

Panel A of Table 9 presents the results of estimating equations (3) and (4) using ROIC, control-adjusted ROIC, and control-adjusted EBITDA margin as dependent variables. For completeness, Panel B presents the results of the first-pass selection equation regression (5).

– Insert Table 9 around here –

Panel A shows that the coefficient of *POST* is positive and significant in all specifications. The point estimates indicate that ROIC increases by 1.9% after the deal (significant at the 5% level) and control-adjusted ROIC by 2.7% (significant at the 10% level). The control-adjusted EBITDA margin increases also by 1.9% (coefficient significant at the 1% level) after the deal.

The coefficients of the individual horizons indicate that the increase in ROIC is sustained across all the years in the post-deal horizon (all of the  $\beta_{t+1}$  coefficients are statistically significant at 10% or better). That is not the case for control-adjusted ROIC, where only the coefficient of the deal year and the subsequent two years are statistically significant, with point estimates ranging from 2.4% to 4.3% . A similar pattern holds for the EBITDA margin.

For completeness, Panel B of Table 9 shows the result of the first-stage selection regression. The only variables that are statistically significant for predicting LBO status are the log of sales (coefficient of 0.27, significant at the 1% level), and the firm's profitability (coefficient of 0.973, significant at 10% level). Similar findings are reported by Boucly, Sraer and Thesmar (2008).

To better understand these results, we also fit our regression model using as dependent variables the control-adjusted cost structure, capital efficiency, and working capital variables. To save space, we only present the results of estimating equation (4).

– Insert Table 10 around here –

The regression evidence presented in Table 10 shows that, while some of the univariate results hold in a multivariate setting, some other results change. Panel A shows that gross margins of LBOs increase in the first year by 1.7% after the deal relative to the reference year (statistically significant at the 5% level), but that seem to be the case already the year before the deal. The coefficient  $D_{t+1}$  of Labor costs is negative and statistically significant, consistent with the evidence above, but there is no evidence of a sustained decrease in subsequent years. We also find no evidence of change in marketing and general expenses for the period after the deal.

Panel B shows that there is a substantial decrease in working capital utilization after the deal. All post-deal coefficients are negative and three of them are statistically significant at 10% or better. Again there is no evidence of an improvement in fixed asset turnover. The evidence in Panel C shows that the improvement in working capital utilization is due not from lower inventory (as indicated by the univariate analysis), but by an increase in supplier financing. The two pre-deal coefficients are negative and statistically significant at 1%, while all post-deal coefficients are positive and statistically significant at 5% or better. The evidence is then in favor of a particularly marked change in working capital policy for LBO firms.

We conclude that there is evidence of a post-deal an increase in performance for the sample of LBO firms. The decomposition of performance shows that this is due to increased margins, productivity gains, and lower working capital needs via increased supplier financing.

## 8. Discussion

### *8.1 Fit with existing empirical literature on the French market*

Our experience in creating the sample has revealed that a great degree of care should be exercised when linking LBO samples to available accounting data. Most of the accounting data available is unconsolidated, and the use of a special acquisition vehicle is standard in LBO structures. We have found significant discrepancies between the accounting (unconsolidated) numbers reported in DIANE and the economic reality of the operating companies involved in LBO deals. In some cases, the buyer reorganizes the operating assets (by creating different holding layers, for example) in a way that makes the continuous analysis of performance difficult. These discrepancies may be one source of difference in results between our study and the previous literature (Desbrières and Schatt, 2002a, 2002b; Le Nadant, 1998).

Another difference of our study related to its time period. The French market has considerably evolved since the early 90s. Anecdotal evidence indicates that sellers use auctions processes more often, and there is increased competition among buyers, including PE funds.<sup>24</sup> Greater price competition between funds means that returns must increasingly come from improved performance of the portfolio companies rather than from financial leverage (Jin and Wang, 2001). Consistent with this conjecture, Boucly, Sraer and Thesmar (2009) report positive changes in performance for the 1994-2004 that overlaps considerably with our own.

## 8.2 Caveats

One important caveat of our study is that our data focuses on the performance of companies with mostly French assets. We do not observe the performance of deals with unconsolidated data where a significant international expansion took place. This means that the observed performance on a gross basis might be understated relative to true LBO performance. This would not be the case with control-adjusted data since the information available for control firms also suffers from this problem.

Another important caveat is that the sample period does not capture deals made during the 2006-2007 credit bubble. We conjecture that the positive effects on performance uncovered in this paper are the result of correct financial- and incentive-structuring by LBO participants. However, the discipline involved in such structuring might breakdown during periods of euphoric credit markets, as shown by Kaplan and Stein (1993) in the context of the rise of the junk-bond market in the 1980s.<sup>25</sup> Hence it is an open question whether deals done after 2005 would exhibit the same level of over-performance.

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<sup>24</sup> Consistent with this notion, the number of secondary deals has reached 25% of LBO deals in France (CMBOR, *European Management Buyout Review* 2006).

<sup>25</sup> More recently, Ljungqvist et al. (2007) and Axelson et al. (2008) document the importance of credit market conditions on Private Equity investment and LBO pricing.

## 9. Conclusion

This study finds significant over-performance of LBO deals in France. The improvement in performance seems mostly due to a better resistance of LBO firms to generalized falling margins across the French economy, productivity gains, and improvements in working capital utilization.

This result stands in contrast with prior published research showing post-deal under-performance in French LBO firms (Le Nadant, 1998; Desbrières and Schatt, 2002a, 2002b), but is in agreement with more recent papers addressing the issue (Boucly, Sraer, and Thesmar, 2009). Apart from the different sample periods, the experience we gathered working with the data is that extensive checking is necessary to have a reliable sample. The absence of systematic consolidated data concerning French companies, combined with the setup of LBO holding companies in most acquisitions, makes reliable data scarce. Although we cannot rule the possibility that the data suffers from sample selection bias, the use of the propensity score methodology and of the two-stage regression technique should go far in alleviating these concerns. We therefore conclude that the evidence speaks in favor of operating value creation by the Private Equity industry in the French market for the period in question.

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## Appendix 1. Variable definitions

Panel A shows the original DIANE variable names. Panel B maps the constructed variables used in the paper to the DIANE variable names.

Panel A. DIANE variable nomenclature	
Variable code	Variable name
tactif_imm_n	total actif immobilisé : net
mp_approv_n	matières premières et approvisionnement : net
encour_prbien_n	en cours de production de biens : net
encour_prsce_n	en cours de production de services : net
pdts_inter_fini_n	Produits intermédiaires et finis : net
mses_n	marchandises : net
av_ac_cde_n	Avances et acomptes sur commandes : net
clts_cptes_ratt_n	clients et comptes rattaches : net
autr_creance_n	autres créances : net
k_s_a_nonvers_n	capital souscrit et appelé non versé : net
valmob_plac_n	valeurs mob. de placement : net
dispo_n	disponibilités : net
ch_constatdav_n	charges constatées d avance : net
tactif_circ_n	total actif circulant : net
ch_arspe	charges à répartir sur plusieurs exercices
prim_remb_ob	prime de remboursement des obligations
econver_actif	écart de conversion actif
tactif_n	total actif : net
avac_cencour	avance et ac. sur com. En cours
det_fourn	dettes fourn. et cptes ratt.
det_immo	dettes sur immob. & cptes ratt.
autr_det	autres dettes
pdconsav	produits constatés d'avance
ecart_conv_p	écarts de conversion passif
ca	chiffre d'affaires
rap_tch	repr. Sur amort. et prov., tr. de ch.
aachache	autres achats et charges ext.
sal	salaires et traitements
chsle	charges sociales
dexp_imma	dotations d'expl. sur immob.: amort.
dexp_immp	dotations d'expl. sur immob.: prov.
dexp_acirp	dotations d'expl. sur actif circ.: prov.
dexp_rchp	dotations d'expl. pour risques et charges: prov.
rexp	résultat d'expl.
rc_avimp	résultat courant avant impôts
rexc	résultat exceptionnel

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Panel B. Constructed variables

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Variable name	Variable code	Variable definition
Sales		= ca
Net Assets		= tactif_n
Depreciation	depreciation	= dexp_imma + dexp_immp + dexp_acirp + dexp_rchp - rap_tch
EBITDA	ebitda	= rexp + depreciation
Ebitda margin		= ebitda / ca
Gross margin		= (ca - achat_mmp) / ca
Labor costs (amount)	salchs	= sal + chsle
Labor costs / Sales		= salchs / ca
Marketing and other costs / sales		= aachache / ca
Estimated tax rate	tx_is	= impb / (rexc + rc_avimp)
Operating taxes	is_rexp	= tx_is * rexp
Operating cash flow	opcf	= ebitda - is_rexp
Operating short-term assets	opwc_actif	= stock + av_ac_cde_n + clts_cptes_ratt_n + autr_creance_n + k_s_a_nonvers_n + ch_constatdav_n + dispo_n + econver_actif
Operating short-term liabilities	opwc_passif	= avac_cencour + det_fourn + det_immo + pdconsav + ecart_convvp + autr_det
Operating working capital	opwc	= opwc_actif - opwc_passif
Operating long-term assets	opassets	= tactif_imm_n + prim_remb_ob + ch_arspe
Total invested capital	tinvcap	= opwc + opassets + valmob_plac_n
Return On Invested Capital (ROIC)		= (opcf - depreciation) / tinvcap
Capital turnover		= ca / tinvcap
Operating LT assets / sales		= opassets / ca
Operating working capital / sales		= opwc / ca
Days of sales in receivables		= (clts_cptes_ratt_n / ca)*365
Inventory		= mp_approv_n + encour_prbien_n + encour_prsce_n + pds_inter_fini_n + mses_n
Days of sales in inventory		= (stock / ca)*365
Days of sales in payables		= (det_fourn / ca)*365

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## Appendix 2. The propensity score methodology

Let  $y_L$  be the performance of a company undergoing an LBO and  $y_C$  the performance of French a company not undergoing an LBO. We are interested in the difference  $D = y_L - y_C$ , which is the effect of being under an LBO. The problem is that firm  $i$  cannot both under and not under an LBO at the same time, and there might be characteristics that explain both performance and the fact that the firm is a target. That is, the difference  $D = E(y_L | i=L) - E(y_C | i=C)$  is a biased estimator of  $y_L - y_C$ .

Suppose that the treatment effect is random conditional on a set of observable variables  $X$ . Randomization conditional on observables imply that  $D = E(y_C | X, i=L) - E(y_C | X, i=C) = 0 \Leftrightarrow D = E_X \{E(y | X, i=L) - E(y | X, C) | i=L\}$ , that is, the unconditional effect can be estimated as the expectation of the conditional effects over the distribution of the conditioning variables in the treated population.

Exact matching is not practical when  $X$  is continuous or contains many variables. The Dehejia and Wahba (2002) algorithm uses Rosenbaum and Rubin's (1983) propensity score, defined as the probability of assignment to treatment conditional on a vector of independent variables  $X$ ,  $p(X) \equiv \Pr(i=L | X)$ . Now the expectation above can be obtained as

$$D = E_{p(X)} \{E(y | p(X), i=L) - E(y | p(X), i=C) | i=L\}.$$

The algorithm method involves the following steps (Villalonga, 2004):

1. Estimating the propensity using a discrete choice logit model of firm  $i$ 's propensity to become an LBO target;
2. Compute propensity scores for treated and control observations as the predicted values from the model of step 1.
3. Select one propensity score per firm;
4. Separate treatment and control groups and sorting observations within each group from lowest to highest propensity scores;

5. Classify all firms (treated and control) into blocks defined by the quintiles of the propensity score distribution for treated firms.
6. For each variable, as well as for the propensity score, do t-tests of differences in means between the diversified and specialized firms within each block.
  - a. All blocks are well balanced: Stop
  - b. If a block is not well balanced: Divide block into finer blocks and re-evaluate
  - c. If most blocks are not well balanced: Modify logit model and re-evaluate.
7. Steps 5 and 6 ensure that firms are comparable within the blocks defined. The weighted average of the within-block mean differences in value between LBOs and control firms (“the average treatment effect on the treated”) can then be calculated.

**Table 1**  
**LBO data sources and filters**

This table shows the number of deals obtained from each data source that respect the required conditions for sample inclusion (see text for details of origins and characteristics of each database). The column ‘Sample total’ refers to the number of unique deals and it is not the sum of the other columns (due to overlapping deals that exist simultaneously in different sources).

	LBONet	AFIC	Thomson	Zephyr	Sample Total
Initial sample <sup>1</sup>	647	155	243	642	
Matches by sales <sup>2</sup>	183	133	66	642	
Data available for period of deal <sup>3</sup>	131	119	33	570	
LBO deals <sup>4</sup>	107	106	32	302	
Consistent consolidation status <sup>5</sup>	77	50	22	246	
Data available for year t-1 and t+1 <sup>6</sup>	77	50	21	200	300
Manual checks <sup>7</sup>	65	33	17	126	181
Control financials available <sup>8</sup>	56	30	14	111	158
Final sample					158

<sup>1</sup> Deals in 1995-2005 for targets with more than 2 million EUR sales during the year before the deal.

<sup>2</sup> Deals for which the target company has sales (as indicated in each data source) in a neighborhood of +/-10% around the sales stated in DIANE for any of the two years prior to the deal.

<sup>3</sup> Deals with target financials available in DIANE for at least one year during the horizon period.

<sup>4</sup> Excluding all non-LBO deals (venture capital, expansion capital, acquisitions by private investors not affiliated with a Private Equity fund, deals with insignificant amount of leverage, minority deals, and build-ups).

<sup>5</sup> Excluding deals for which DIANE available data is not consistently composed of either consolidated or non-consolidated accounts throughout the period surrounding the deal.

<sup>6</sup> Deals for which the target's financials in the full fiscal year immediately preceding the deal and for the full fiscal year after the deal are both available.

<sup>7</sup> Manual check of the quality of the numbers for each deal. We use three sources of information: searches in Dow Jones' Factiva of articles in *Les Echos* and *Capital Finance* involving the name of the target; BVD's Zephyr deal commentary; the website of the target company (if available). We exclude all deals that have inconsistent information and that were not corrected by the automatic filters. Examples include target sales substantially understated in DIANE, deals misclassified as LBO, incorrect deal dates, etc.

<sup>8</sup> Deals for which the selected benchmark has all financial information available during the horizon period of the deal.

**Table 2****Final Sample Breakdown**

This table shows the number and value of deals in the final sample, conditional on deal characteristics. Value is measured using the sum of sales revenue of companies in each category, in millions of Euros, for the year prior to the deal.

Panel A. Breakdown by year					Panel B. Breakdown by Sector				
	Number	%	Value*	%		Number	%	Value*	%
1995	1	1%	8	0%	Industry	81	51%	2,722	36%
1997	2	1%	26	0%	Distribution	27	17%	1,694	22%
1998	2	1%	14	0%	Services	48	30%	3,083	41%
1999	6	4%	124	2%	Healthcare	1	1%	84	1%
2000	13	8%	586	8%	Other	1	1%	6	0%
2001	16	10%	2,259	30%	Total	158		7,589	
2002	20	13%	616	8%					
2003	28	18%	1,445	19%					
2004	42	27%	1,437	19%					
2005	28	18%	1,074	14%					
Total	158		7,589						

  

Panel C. Breakdown by Geographical Area					Panel D. Breakdown by Type of Seller				
	Number	%	Value*	%		Number	%	Value*	%
Centre/Rhone-Alpes	30	19%	830	11%	Family/individual	72	46%	1,434	19%
Est	14	9%	412	5%	Corporate	48	30%	2,781	37%
Île-de-France	63	40%	3,605	48%	Secondary LBO	29	18%	1,687	22%
Nord	17	11%	846	11%	Public to Private	5	3%	1,472	19%
Ouest	23	15%	1,732	23%	Other	4	3%	215	3%
Sud	11	7%	164	2%	Total	158		7,589	
Total	158		7,589						

  

Panel E. Breakdown by Sales Revenue					Panel F. Breakdown by Data Source				
	Number	%	Value*	%		Number	%	Value*	%
(0;20]	82	52%	849	11%	LBONet	23	15%	713	9%
(20;75]	56	35%	2,071	27%	AFIC	10	6%	663	9%
(75;150]	10	6%	1,093	14%	Thomson	7	4%	304	4%
(150;500]	9	6%	2,675	35%	Zephyr	76	48%	3,438	45%
(>500;max]	1	1%	901	12%	Overlapping	42	27%	2,471	33%
Total	158		7,589		Total	158		7,589	

**Table 3**  
**Summary Statistics**

This table shows the summary statistics for sample deals for the year before the deal. All accounting variables are obtained from DIANE (see Appendix 1 for a detailed description of the construction of the variables). The rows marked ‘LBO companies’ refer to statistics of the sample of LBO firms. The rows marked ‘Control companies’ refer to statistics of the sample of matched controls chosen using a propensity score model (see text and Appendix 2 for details). The rows marked ‘Industry peers’ refer to statistics calculated taking, for each variable, the median of that variable for each LBO’s industry-, size-, and growth-matched set of industry peers. The latter is composed of firms that operate in the same industry (NAF code) of the LBO firm, and have values of net assets and sales growth in the same quintile as LBO firms one year prior to the LBO deal (if the number of such companies is less than or equal to three, we replace it by the median of the variable for the entire industry). The Return On Invested Capital (ROIC) ratio is defined as EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization) minus Operating Taxes over Total Invested Capital. Total Invested Capital equals long-term operating assets plus operating working capital plus excess marketable securities. Long-term operating assets is equal to net fixed assets less financial participations. Operating working capital is defined as operating short-term assets minus operating short-term liabilities. Gross Margin is defined as (Sales – Cost of Goods Sold) / Sales. The Labor costs ratio is labor costs over sales. Marketing and general costs ratio is selling, general and administrative costs over sales. Units are millions of Euros except where mentioned.

		Panel A. Main performance variables					
		N	Mean	Std. Dev.	Q2	Median	Q3
LBO companies	Sales	158	48.01	100.23	9.71	18.89	40.88
	Growth in sales	138	10.6%	19.5%	1.6%	7.0%	14.3%
	Net assets	158	36.59	80.27	5.81	12.12	25.53
	Ebitda	158	4.18	7.39	0.76	1.91	4.84
	Ebitda / Sales	158	11.7%	10.3%	5.1%	10.1%	16.4%
	ROIC	158	10.0%	28.6%	6.1%	12.5%	19.9%
Control companies	Sales	158	20.91	24.43	6.99	12.92	28.82
	Growth in sales	132	8.9%	23.1%	-1.5%	4.7%	13.8%
	Net assets	158	21.83	63.63	4.44	6.92	21.67
	Ebitda	158	3.12	4.48	0.67	1.62	3.59
	Ebitda / Sales	158	16.8%	14.1%	5.3%	13.7%	25.5%
	ROIC	158	14.9%	10.0%	7.7%	13.4%	19.8%
Industry peers	Sales	158	7.23	6.91	2.65	5.14	8.98
	Growth in sales	158	6.9%	11.1%	1.7%	6.3%	10.8%
	Net assets	158	5.06	4.54	1.89	3.73	6.68
	Ebitda	158	0.53	0.57	0.19	0.38	0.66
	Ebitda / Sales	158	8.1%	5.5%	5.3%	6.9%	8.8%
	ROIC	158	8.4%	3.7%	6.1%	8.7%	10.7%

**Table 3**  
**Summary Statistics (cont.)**

		Panel B. Other performance data					
		N	Mean	Std. Dev.	Q2	Median	Q3
LBO companies	Gross margin	158	66.3%	23.7%	48.8%	64.8%	84.0%
	Labor costs ratio	158	24.6%	14.0%	14.3%	23.0%	31.1%
	Mktg. and general costs ratio	158	28.8%	18.7%	16.6%	24.3%	37.0%
	Op. Working Capital / Sales	158	22.7%	14.0%	13.9%	23.0%	32.3%
	Operating LT Assets / Sales	158	24.8%	59.2%	6.0%	11.2%	23.1%
Control companies	Gross margin	158	65.9%	29.0%	41.9%	72.6%	94.4%
	Labor costs ratio	158	20.5%	12.9%	9.5%	18.2%	30.8%
	Mktg. and general costs ratio	158	26.1%	19.6%	12.1%	20.9%	33.7%
	Op. Working Capital / Sales	158	30.8%	39.6%	13.3%	23.1%	37.1%
	Operating LT Assets / Sales	158	36.4%	102.7%	6.4%	14.0%	34.8%
Industry peers	Gross margin	158	67.7%	24.0%	50.8%	64.1%	95.8%
	Labor costs ratio	158	26.4%	12.4%	17.2%	23.9%	32.9%
	Mktg. and general costs ratio	158	27.1%	15.1%	18.0%	23.3%	32.5%
	Op. Working Capital / Sales	158	24.8%	14.9%	17.9%	23.5%	28.0%
	Operating LT Assets / Sales	158	41.8%	129.5%	6.7%	9.6%	17.7%

**Table 4**

**Evolution of Performance of French LBO companies**

Each cell presents the median value of changes in sales, ROIC, EBITDA/sales, and EBITDA for LBO firms over a time window around the deal (see caption of Table 3 and Appendix 1 for a detailed description of the construction of the variables). Years -3,..., +4 represent full fiscal years defined relative to the year of the LBO (date 0). For Euro variables (Sales and EBITDA), changes are measured using percentage growth rates, while for margin variables, changes are measured using variation in the percent margin. Control-adjusted change is the median change in the difference between the value of the variable for an LBO firm and the contemporaneous median change for its matched control. The symbols \*\*\*,\*\*,\* denote statistical significance at respectively the 1%, 5% and 10% levels.

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
<b>ROIC</b>						
Change	1.52%	0.56%	2.62% ***	1.93% *	1.15%	-0.04%
Control change	1.61% **	0.62%	-1.67% **	-1.67%	-1.76%	-1.99% **
Control-adjusted change	-0.10%	-0.66%	5.12% ***	2.96% *	3.35% *	2.82% **
<i>% of Control adjusted change &gt;0</i>	44%	47%	67%	56%	55%	65%
<b>Ebitda / Sales</b>						
Change	0.42%	0.27%	0.92% *	0.15%	0.20%	4.10%
Control change	0.57%	-0.16%	-1.18% **	-1.43% ***	-1.52% **	-2.70% **
Control-adjusted change	-0.28%	0.21%	1.84% ***	0.77% **	0.83%	3.04% **
<i>% of Control adjusted change &gt;0</i>	49%	53%	63%	57%	54%	63%
<b>Ebitda</b>						
% Growth	27.78% ***	10.89% ***	24.13% ***	25.69% ***	21.45% **	36.48% ***
Control % growth	23.05% ***	8.44% ***	-6.29%	-6.04%	4.64% *	-13.43%
Control-adjusted % growth	16.15%	2.74%	22.27% ***	19.78% **	1.21%	34.80% *
<i>% of Control adjusted change &gt;0</i>	58%	55%	64%	57%	51%	63%
<b>Sales</b>						
% Growth	15.33% ***	7.04% ***	13.91% ***	17.13% ***	25.74% ***	25.42%
Control % growth	11.12% ***	4.66% ***	6.04% ***	12.97% ***	20.97% ***	15.25%
Control-adjusted % growth	7.99% **	0.10%	5.97% ***	5.99%	7.44%	10.53%
N	103	132	158	107	68	49

**Table 5**

**Analysis of Performance Components of French LBO companies**

Each cell presents the median value of changes in performance accounting ratios for LBO firms over a time window around the deal. Years  $-3, \dots, +4$  represent full fiscal years defined relative to the year of the LBO (date 0). For unit variables (working capital periods, capital turnover), changes are measured using percentage growth rates, while for margin variables, changes are measured using variation in the percent margin. Control-adjusted change is the median change in the difference between the value of the variable for an LBO firm and the contemporaneous median change for its matched control. Panel A contains results for measures related to margins. Gross Margin is defined as  $(\text{Sales} - \text{Cost of Goods Sold}) / \text{Sales}$ . The Labor costs ratio is labor costs over sales. Marketing and general costs ratio is selling, general and administrative costs over sales. Panel B contains results for measures related to capital utilization efficiency. Long-term operating assets is equal to net fixed assets less financial participations. Operating working capital is defined as operating short-term assets minus operating short-term liabilities. Panel C contains results for measures related to working capital management. Days in Receivables is defined as  $\text{Receivables} / \text{Sales} \times 365$ . Days of Sales in Stock is defined as  $\text{Inventory} / \text{Sales} \times 365$ . Days of Sales in Payables is defined as  $\text{Payables} / \text{Sales} \times 365$ . The symbols \*\*\*, \*\*, \* denote statistical significance at respectively the 1%, 5% and 10% levels.

**Table 5**  
**Analysis of Performance Components of French LBO companies (cont.)**

Panel A. Margins						
Years relative to LBO date						
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
Gross margin						
% Change	1.58% ***	0.01%	0.20%	0.01%	0.03%	1.33%
Control % change	-0.34%	0.02%	-0.23% **	-0.72% **	0.34%	0.10%
Control-adjusted % change	1.49% **	0.01%	1.50% **	2.09% **	0.10%	4.19% **
Labor costs ratio						
Change	0.01%	-0.10%	-0.28% **	-0.80% *	-0.80%	-0.68%
Control change	-0.15%	0.07%	0.22% **	0.04%	0.68%	2.46% **
Control-adjusted change	0.01%	-0.18%	-1.20% ***	-1.35% **	-1.06%	-2.64% *
Marketing and general costs ratio						
Change	0.01%	-0.12%	0.91% *	0.53% *	0.93%	0.30%
Control change	-0.23%	0.02%	0.53%	0.18%	0.17%	0.13%
Control-adjusted change	0.63%	-0.15%	0.90% *	1.25%	0.79%	1.13%
N	103	132	158	107	68	49

**Table 5**  
**Analysis of Performance Components of French LBO companies (cont.)**

Panel B. Capital Utilization Efficiency							
Years relative to LBO date							
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4	
Operating Working Capital / Sales							
Change	0.76%	1.14%	0.03%	0.62%	-0.35%	-0.43%	
Control change	-1.85% **	-0.12%	0.99% **	0.77%	1.36% *	-1.43%	
Control-adjusted change	2.78% **	0.94%	-1.87% **	0.03%	-3.51%	-0.39%	
Operating Assets / Sales							
Change	-0.65% ***	-0.30% **	-0.75% **	-0.22%	-0.19%	0.55%	
Control change	0.43%	-0.60% ***	-0.77%	-0.69%	0.23%	-1.03%	
Control-adjusted change	-1.78% ***	0.22%	-0.05%	0.38%	-0.77%	2.05%	
N	103	132	158	107	68	49	

**Table 5**  
**Analysis of Performance Components of French LBO companies (cont.)**

Panel C. Working Capital Management						
Years relative to LBO date						
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
Days in Receivables						
Change	0.30%	0.81%	1.05% *	6.60% **	3.92%	-0.58%
Control change	-1.30%	-3.58%	-0.05%	-0.19%	0.67%	-0.43%
Control-adjusted change	4.03%	7.81% *	3.64%	10.46%	7.20%	4.29%
Days of Sales in Stock						
Change	-2.39%	1.18%	-1.88%	4.40%	-4.55%	-11.63%
Control change	-2.71%	0.13%	-0.01%	-1.53%	17.05% **	22.06% **
Control-adjusted change	0.36%	2.21%	-5.19%	6.13%	-15.30% *	-36.89% ***
Days of Sales in Payables						
Change	-8.84%	-2.62%	-4.94% *	-2.23%	-5.58%	-9.64%
Control change	-4.83%	-4.44% **	-0.48%	-0.89%	-10.92%	-8.84%
Control-adjusted change	-7.10%	3.06%	-2.16%	0.16%	8.83%	5.52%
N	103	132	158	107	68	49

**Table 6**  
**Results across subsamples**

Each cell presents the median value of changes in ROIC and EBITDA/Sales for LBO firms over a time window around the deal (see caption of Table 3 and Appendix 1 for a detailed description of the construction of the variables). Years -3,..., +4 represent full fiscal years defined relative to the year of the LBO (date 0). Changes are measured using variation in the percent margin. Control-adjusted change is the median change in the difference between the value of the variable for an LBO firm and the contemporaneous median change for its matched control. Panels A through G show results for different sample cuts, as follows. Panel A shows deals where consolidated accounting information is available vs. deals with unconsolidated accounting data. Panel B shows large vs. small deals, where a small company is defined as one with less than 20M Euros in sales. Panel C shows target companies located in Ile-de-France vs. target companies located outside Ile-de-France. Panel D shows targets operating in industrial sectors vs. targets operating in services sectors. Panel E shows deals taking place in years in which the French GDP growth is above 2% vs. deals taking place in years in which GDP growth is below 2%. Panel F shows primary vs. secondary deals. Panel G shows deals where the seller is a family or an individual shareholder vs. deals from other sources. The symbols \*\*\*, \*\*, \* denote statistical significance at respectively the 1%, 5% and 10% levels.

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
Panel A. Consolidated vs. non-consolidated accounts						
Firms with consolidated accounts						
Control-adjusted ROIC	-5.37%	-1.79%	5.66% **	3.91% *	-4.93%	0.69%
<i>% of control-adjusted change &gt;0</i>	18%	33%	68%	67%	33%	50%
Control-adjusted Ebitda / Sales	0.28%	1.22%	3.48% **	0.24%	-0.20%	5.64%
<i>% of control-adjusted change &gt;0</i>	54%	60%	64%	54%	43%	83%
N	11	15	22	12	6	6
Firms without consolidated accounts						
Control-adjusted ROIC	-0.36%	-0.24%	5.05% ***	1.66% *	6.00% *	4.59% **
<i>% of control-adjusted change &gt;0</i>	47%	49%	67%	55%	58%	67%
Control-adjusted Ebitda / Sales	-0.45%	0.18%	1.69% ***	0.93% **	0.83%	2.48% *
<i>% of control-adjusted change &gt;0</i>	48%	52%	62%	59%	54%	60%
N	92	116	136	95	62	43

**Table 6**  
**Results across subsamples (cont.)**

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
Panel B. Smaller deals (companies with less than 20M EUR of sales)						
Smaller deals						
Control-adjusted ROIC	-0.63%	-0.74%	5.15% ***	-0.09%	-0.70%	0.79%
<i>% of control-adjusted change &gt;0</i>	49%	46%	66%	49%	49%	57%
Control-adjusted Ebitda / Sales	-0.53%	0.21%	1.64% **	1.30% *	-0.52%	-0.25%
<i>% of control-adjusted change &gt;0</i>	45%	52%	58%	55%	45%	47%
N	57	71	82	61	35	23
Excluding smaller deals						
Control-adjusted ROIC	-2.30%	-0.24%	5.05% ***	4.33% **	7.21% **	4.20% ***
<i>% of control-adjusted change &gt;0</i>	51%	52%	64%	61%	60%	77%
Control-adjusted Ebitda / Sales	0.53%	0.48%	2.39% ***	0.76% *	1.92% **	6.24% ***
<i>% of control-adjusted change &gt;0</i>	53%	54%	67%	58%	63%	77%
N	47	61	76	46	33	26
Panel C. Geographical area						
Ile-de-France						
Control-adjusted ROIC	-0.70%	-0.53%	7.18% ***	3.97% *	1.34%	5.61% *
<i>% of control-adjusted change &gt;0</i>	45%	48%	67%	56%	56%	70%
Control-adjusted Ebitda / Sales	0.79%	0.00%	2.27% ***	2.46% ***	0.93%	4.70%
<i>% of control-adjusted change &gt;0</i>	55%	50%	68%	67%	53%	80%
N	40	52	63	43	32	20
Outside Ile-de-France						
Control-adjusted ROIC	-1.29%	-0.66%	4.35% ***	1.57%	6.76%	2.75% *
<i>% of control-adjusted change &gt;0</i>	44%	47%	67%	56%	56%	62%
Control-adjusted Ebitda / Sales	-0.61%	0.51%	1.40% ***	0.00%	0.83%	2.48%
<i>% of control-adjusted change &gt;0</i>	45%	54%	59%	50%	55%	51%
N	64	79	95	64	36	29

**Table 6**  
**Results across subsamples (cont.)**

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
<b>Panel D. Deal sectors</b>						
Deals in Industry sectors						
Control-adjusted ROIC	0.34%	-0.74%	3.47% ***	0.35%	-0.04%	1.71%
<i>% of control-adjusted change &gt;0</i>	52%	46%	63%	53%	50%	62%
Control-adjusted Ebitda / Sales	-0.61%	0.21%	1.20%	0.18%	-0.21% *	-0.65% *
<i>% of control-adjusted change &gt;0</i>	48%	55%	54%	51%	47%	46%
N	56	67	82	57	36	26
Deals in Services sectors						
Control-adjusted ROIC	-3.43%	-0.43%	6.02% **	4.67% *	4.12% *	6.53% *
<i>% of control-adjusted change &gt;0</i>	32%	48%	70%	59%	65%	64%
Control-adjusted Ebitda / Sales	-0.55%	0.38%	2.30% ***	3.92% ***	2.47% *	4.46% **
<i>% of control-adjusted change &gt;0</i>	47%	54%	73%	72%	55%	100%
N	31	40	50	32	20	14
<b>Panel E. Macroeconomic conditions</b>						
Deals with year +1 in a low economic growth year						
Control-adjusted ROIC	-0.71%	0.23%	5.71% ***	4.21% **	6.02%	2.88% *
<i>% of control-adjusted change &gt;0</i>	46%	51%	66%	63%	59%	71%
Control-adjusted Ebitda / Sales	0.40%	-0.03%	1.59% **	0.56%	0.14%	2.27%
<i>% of control-adjusted change &gt;0</i>	52%	49%	61%	55%	50%	57%
N	56	73	89	60	54	28
Deals with year +1 in a high economic growth year						
Control-adjusted ROIC	-1.29%	-0.76%	4.41% ***	-0.43%	-2.34%	1.54%
<i>% of control-adjusted change &gt;0</i>	42%	43%	68%	47%	43%	57%
Control-adjusted Ebitda / Sales	-1.01%	0.79%	2.53% ***	1.78% **	2.33%	3.18%
<i>% of control-adjusted change &gt;0</i>	45%	58%	65%	71%	58%	67%
N	48	58	69	47	14	21

**Table 6**  
**Results across subsamples (cont.)**

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
<b>Panel F. Primary vs. Secondary deals</b>						
<b>Primary LBOs</b>						
Control-adjusted ROIC	-2.35%	-0.76%	4.91% ***	0.80%	-0.08%	2.09% *
<i>% of control-adjusted change &gt;0</i>	39%	47%	65%	52%	50%	62%
Control-adjusted Ebitda / Sales	-0.51%	0.00%	1.50% **	0.24%	1.40%	2.66%
<i>% of control-adjusted change &gt;0</i>	47%	50%	60%	52%	50%	62%
N	85	106	130	88	56	42
<b>Secondary LBOs</b>						
Control-adjusted ROIC	3.37%	-0.07%	7.28% ***	10.20% ***	10.02% ***	12.05%
<i>% of control-adjusted change &gt;0</i>	68%	48%	79%	74%	83%	86%
Control-adjusted Ebitda / Sales	0.97%	0.87%	4.51% ***	4.57% **	8.07% **	6.78% *
<i>% of control-adjusted change &gt;0</i>	45%	58%	65%	71%	58%	67%
N	19	25	28	19	12	7
<b>Panel G. Family/Individual Sellers vs. Non-Family Sellers</b>						
<b>Family/Individual Sellers</b>						
Control-adjusted ROIC	-1.54%	-0.70%	3.76% *	-0.62%	-3.84%	-1.25%
<i>% of control-adjusted change &gt;0</i>	44%	48%	61%	44%	40%	38%
Control-adjusted Ebitda / Sales	-0.28%	-0.21%	0.50%	-0.58%	0.46%	0.74%
<i>% of control-adjusted change &gt;0</i>	48%	48%	54%	46%	53%	52%
N	50	60	72	50	30	21
<b>Non-Family Sellers</b>						
Control-adjusted ROIC	-1.20%	-0.47%	6.24% ***	5.11% ***	7.40% ***	9.98% ***
<i>% of control-adjusted change &gt;0</i>	44%	46%	72%	67%	68%	86%
Control-adjusted Ebitda / Sales	0.09%	0.86%	3.31% ***	2.46% ***	1.38%	6.52% ***
<i>% of control-adjusted change &gt;0</i>	50%	57%	69%	66%	55%	71%
N	54	71	86	57	38	28

**Table 7**

**Evolution of Performance using industry peers as benchmarks**

Each cell presents the median value of changes in sales, ROIC, EBITDA/sales, and EBITDA for LBO firms over a time window around the deal (see caption of Table 3 and Appendix 1 for a detailed description of the construction of the variables). Years  $-3, \dots, +4$  represent full fiscal years defined relative to the year of the LBO (date 0). For Euro variables (Sales and EBITDA), changes are measured using percentage growth rates, while for margin variables, changes are measured using variation in the percent margin. Industry-adjusted change is the median change in the difference between the value of the variable for an LBO company and the contemporaneous median change for the median of a set of companies operating in the same industry (NAF code) and with values of net assets and sales growth in the same quintile as sample companies one year prior to the deal. The symbols \*\*\*, \*\*, \* denote statistical significance at respectively the 1%, 5% and 10% levels.

**Table 7**  
**Evolution of Performance using industry peers as benchmarks (cont.)**

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
<b>ROIC</b>						
Change	0.86% **	0.61%	2.62% ***	1.46%	1.24%	0.79%
Industry change	-0.32% *	-0.26% **	-0.40% ***	-0.70% **	-1.16% ***	-1.58% ***
Industry-adjusted change	1.40%	0.85% *	2.97% ***	2.02% **	2.39% **	3.25% **
<i>% of Industry adjusted change &gt;0</i>	61%	59%	62%	60%	52%	70%
<b>Ebitda / Sales</b>						
Change	0.36%	0.37%	0.92% *	0.24%	0.11%	0.37%
Industry change	0.05%	-0.05%	-0.47% ***	-0.57% ***	-0.93% ***	-1.07% ***
Industry-adjusted change	0.52%	-0.09%	1.34% ***	0.68% *	0.36% *	2.44% *
<i>% of Industry adjusted change &gt;0</i>	58%	49%	59%	58%	56%	61%
<b>Ebitda</b>						
% Growth	26.85% ***	10.94% ***	24.13% ***	25.75% ***	25.22% **	42.38% ***
Industry % growth	15.43% ***	7.27% ***	5.14% ***	5.26% ***	-2.84%	-1.18%
Industry-adjusted % growth	-2.04%	0.45%	23.08% ***	17.94% ***	21.15% ***	42.13% **
<i>% of Industry adjusted change &gt;0</i>	49%	51%	63%	60%	62%	65%
<b>Sales</b>						
% Growth	14.66% ***	6.98% ***	13.91% ***	16.66% ***	21.18% ***	25.54% ***
Industry % growth	14.29% ***	6.01% ***	10.44% ***	14.38% ***	17.00% ***	22.67% ***
Industry-adjusted % growth	1.24% *	0.76% **	3.49% **	1.10%	1.95%	4.62%
N	116	138	158	130	87	60

**Table 8****Evolution of assets, wages, and employment of French LBO firms**

Each cell presents the median value of changes in Net Assets, Labor Costs, and Number of Employees for LBO firms over a time window around the deal. Years -3,..., +4 represent full fiscal years defined relative to the year of the LBO (date 0). Changes are measured using percentage growth rates. Control-adjusted change is the median change in the difference between the value of the variable for an LBO firm and the contemporaneous median change for its matched control. The symbols \*\*\*, \*\*, \* denote statistical significance at respectively the 1%, 5% and 10% levels.

	Years relative to LBO date					
	From -3 to -1	From -2 to -1	From -1 to +1	From -1 to +2	From -1 to +3	From -1 to +4
<b>Net Assets</b>						
% Growth	16.25% ***	6.93% ***	10.57% ***	17.62% ***	22.27% ***	18.13% **
Control % growth	15.14% ***	0.89% **	8.15% ***	11.62% ***	20.45% ***	29.35% **
Control-adjusted % growth	1.46%	3.43% **	4.87%	0.86%	0.87%	0.89%
N	104	132	158	107	68	49
<i>% of Control adjusted change &gt;0</i>	50%	62%	57%	51%	50%	51%
<b>Labor Costs (amount)</b>						
% Growth	14.88% ***	5.80% ***	8.02% ***	9.85% ***	13.19% ***	15.04% ***
Control % growth	10.78% ***	5.83% ***	9.10% ***	9.84% ***	18.76% ***	20.35% ***
Control-adjusted % growth	5.83% **	-1.49%	-1.94%	0.08%	-1.54%	-5.27%
N	101	129	154	106	68	48
<i>% of Control adjusted change &gt;0</i>	57%	46%	45%	50%	48%	48%
<b>Number of Employees</b>						
Change	3.44%	2.38%	6.91% **	2.79%	5.26%	4.97%
Control change	3.70%	2.62%	2.13%	6.67% *	8.82% **	7.65% **
Control-adjusted change	-0.27%	0.44%	5.71%	-0.47%	3.91%	-9.62%
N	57	70	73	49	35	26
<i>% of Control adjusted change &gt;0</i>	46%	51%	59%	47%	51%	43%

**Table 9**

**Regression analysis of performance of French LBO companies**

This table presents fixed-effects regression estimates of the relation between LBO performance measures and dummy variables representing the time periods (years) around the date of the LBO. The left-hand side variables are ROIC, control-adjusted ROIC, and control-adjusted EBITDA margin (see caption of Table 3 and Appendix 1 for a detailed description of the construction of the variables). The right-hand side variables are defined as follows. The variables Year – 3, Year –2, etc. up to Year +4 represent indicator variables that take the value 1 if an observation respects to the period of 3 years before the LBO date, 2 years before the LBO date, etc. up to 4 years after the LBO date, and zero otherwise. The year before the delisting (year –1) is used as the reference point and does not appear in the regression. Log Sales is the natural logarithm of company sales in the year before the deal. GDP change is the percentage change in French GDP in the year before the deal. Time dummy is an indicator variable indicating deals made on or after 2004. Estimates in Panel A are produced using Heckman’s sample-selection correction technique (Heckman, 1979). The statistical significance of Heckman’s Lambda can be seen as a test for the null hypothesis that self-selection is irrelevant in the sample. For completeness, Panel B presents results for the first-stage (selection) logit regression, where the left-hand side variable is an indicator variable of whether a firm is target of an LBO transaction in a given year. The right-hand side variables of the logit regression are defined as follows. Log Sales is the natural logarithm of company sales. Debt-equity ratio is total financial debt divided by shareholders’ equity. Effective tax rate is the ratio between tax paid and pre-tax income. ROIC is calculated as in the definition presented in Table 3. Excess Cash is the amount of marketable securities divided by assets. GDP change is the percentage change in French GDP in the year). The logit specification also contains time and industry (NAF code) dummies. T-statistics are calculated using robust clustered standard errors. The symbols \*\*\*, \*\*, \* denote significance levels of 1%, 5% and 10%, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

**Table 9**  
**Regression analysis of performance of French LBO companies (cont.)**

Panel A. Second-stage regression

Dependent variable:	ROIC			Control-adjusted ROIC				Control-adjusted EBITDA Margin										
	(1)		**	(2)		(3)		(4)		(5)		***	(6)					
	Coeff.	t-stat.		Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.							
Post	0.019	2.20	**			0.027	1.99	*				0.019	3.57	***				
Year t-3				-0.005	-1.26				0.015	1.62				0.004	0.54			
Year t-2				0.004	0.73				0.011	1.16				-0.006	-0.90			
Year t				0.016	1.90	*			0.026	2.18	*			0.009	1.14			
Year t+1				0.025	2.58	**			0.043	2.70	**			0.024	3.73	***		
Year t+2				0.032	1.83	*			0.024	1.69	*			0.025	1.68	*		
Year t+3				0.036	2.66	**			0.041	1.39				-0.010	-1.00			
Year t+4				0.041	2.12	*			0.039	1.30				0.000	-0.03			
Log Sales	-0.294	-14.25	***	-0.297	-14.13	***	-0.295	-15.17	***	-0.294	-14.54	***	-0.085	-5.80	***	-0.084	-6.10	***
GDP Change	0.039	12.71	***	0.038	14.19	***	0.035	6.03	***	0.034	5.68	***	0.010	2.25	**	0.009	2.02	*
Time dummy	-0.005	-1.06		-0.016	-1.52		-0.013	-1.04		-0.013	-0.62		-0.001	-0.07		0.000	0.02	
Heckman's lambda	-1.093	-18.70	***	-1.096	-18.57	***	-1.071	-20.72	***	-1.070	-21.01	***	-0.249	-4.63	***	-0.245	-4.53	***
Constant	9.128	17.32	***	9.182	17.12	***	8.872	18.70	***	8.849	18.42	***	2.182	5.05	***	2.147	5.05	***
Observations	665			665			643			643			643			643		
Adj. R <sup>2</sup>	0.02			0.03			0.03			0.03			0.02			0.02		

**Table 9****Regression analysis of performance of French LBO companies (cont.)**

Panel B. First-stage regression			
Dependent variable:	Likelihood of being an LBO target		
	(1)		
	Coeff.	t-stat.	
Log Sales	0.270	3.51	***
Debt/Equity	-0.008	-0.5	
Effective tax rate	0.043	0.38	
Excess Cash	-0.083	-0.15	
GDP Change	-0.037	-0.55	
ROIC	0.973	1.93	*
Constant	-13.821	-8.18	***
Time dummies	Yes		
Industry dummies	Yes		
Observations	12293		
Pseudo R <sup>2</sup>	0.08		

## Table 10

### Regression analysis of components of performance of French LBO companies

This table presents fixed-effects regression estimates of the relation between LBO performance measures and dummy variables representing the time periods (years) around the date of the LBO. The left-hand side variables are control-adjusted accounting performance measures (see caption of Table 5 and Appendix 1 for a detailed description of the construction of the variables). The right-hand side variables are defined as follows. The variables Year – 3, Year –2, etc. up to Year +4 represent indicator variables that take the value 1 if an observation respects to the period of 3 years before the LBO date, 2 years before the LBO date, etc. up to 4 years after the LBO date, and zero otherwise. The year before the delisting (year –1) is used as the reference point and does not appear in the regression. Log Sales is the natural logarithm of company sales in the year before the deal. GDP change is the percentage change in French GDP in the year before the deal. Time dummy is an indicator variable indicating deals made on or after 2004. Estimates in Panel A are produced using Heckman’s sample-selection correction technique (Heckman, 1979). The statistical significance of Heckman’s Lambda can be seen as a test for the null hypothesis that self-selection is irrelevant in the sample. The symbols \*\*\*, \*\*, \* denote significance levels of 1%, 5% and 10%, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

**Table 10****Regression analysis of components of performance of French LBO companies (cont.)**

Panel A. Margins									
Dependent variable:	Control-adjusted Gross Margin			Control-adjusted Labor costs ratio			Control-adjusted Marketing and general costs ratio		
	(1)		***	(2)		**	(3)		***
	Coeff.	t-stat.		Coeff.	t-stat.		Coeff.	t-stat.	
Year t-3	-0.00167	-0.0936		0.00178	0.441		0.0537	1.991	*
Year t-2	0.0294	2.745	**	0.00328	0.723		0.059	4.62	***
Year t	0.0272	2.685	**	-0.00764	-1.268		0.00725	0.39	
Year t+1	0.0171	2.559	**	-0.0165	-2.211	**	-0.0224	-1.361	
Year t+2	0.0175	1.421		-0.0081	-0.848		-0.0359	-1.116	
Year t+3	0.00851	0.672		0.0065	0.701		-0.0321	-1.481	
Year t+4	0.024	1.243		-0.00613	-0.839		-0.0365	-0.935	
Log Sales	0.0383	2.006	*	0.0321	2.376	**	0.326	5.184	***
GDP Change	-0.00603	-1.297		-0.00222	-0.769		-0.0014	-0.155	
Time dummy	-0.00594	-0.583		-0.00196	-0.26		0.0242	1.505	
Heckman's lambda	-0.0478	-1.259		0.0529	1.454		-0.0377	-0.321	
Constant	-0.0888	-0.23		-0.564	-1.937	*	-2.987	-3.054	**
Observations	633			643			645		
Adj. R <sup>2</sup>	0.01			0.07			0.04		

**Table 10****Regression analysis of components of performance of French LBO companies (cont.)**

Panel B. Capital Utilization Efficiency					
Dependent variable:	Control-adjusted Operating Working Capital / Sales			Control-adjusted Operating Assets / Sales	
	(1)			(2)	
	Coeff.	t-stat.		Coeff.	t-stat.
Year t-3	0.149	3.512	***	-0.00443	-0.0925
Year t-2	0.127	2.122	*	-0.00112	-0.0318
Year t	-0.0319	-0.775		0.0562	1.546
Year t+1	-0.144	-2.195	**	-0.013	-0.414
Year t+2	-0.254	-1.954	*	-0.0273	-0.387
Year t+3	-0.239	-3.012	**	-0.239	-1.281
Year t+4	-0.16	-1.528		0.0404	0.532
Log Sales	1.1	3.815	***	-0.0934	-0.743
GDP Change	-0.0374	-1.223		-0.0185	-0.846
Time dummy	0.0556	1.092		-0.0175	-0.31
Heckman's lambda	0.988	1.065		0.383	1.042
Constant	-16.41	-2.103	*	-1.346	-0.409
Observations	643			643	
Adj. R <sup>2</sup>	0.02			0.01	

**Table 10****Regression analysis of components of performance of French LBO companies (cont.)**

Panel C. Working Capital Management								
Dependent variable:	Control-adjusted Days in receivables			Control-adjusted Days of sales in stock		Control-adjusted Days of sales in payables		
	(1)			(2)		(3)		
	Coeff.	t-stat.		Coeff.	t-stat.	Coeff.	t-stat.	
Year t-3	-7.26	-1.716		-1.026	-0.309	-56.42	-4.421	***
Year t-2	-5.303	-2.041	*	-0.973	-0.366	-30.17	-4.544	***
Year t	2.208	0.644		2.045	0.699	17.45	1.789	*
Year t+1	-1.347	-0.301		-1.83	-0.348	33.44	3.165	***
Year t+2	8.071	1.046		-2.79	-0.71	43.34	3.103	***
Year t+3	1.983	0.226		-0.0534	-0.0177	53.98	2.952	**
Year t+4	-15.66	-2.109	*	-4.29	-0.968	54.4	3.852	***
Log Sales	-5.476	-0.558		-1.328	-0.267	-222.5	-6.281	***
GDP Change	4.171	2.583	**	-1.115	-0.568	-5.088	-1.197	
Time dummy	2.139	0.69		-0.21	-0.0424	-21.98	-1.81	*
Heckman's lambda	12.66	0.5		-1.129	-0.066	110.8	1.984	*
Constant	-22.66	-0.0956		16.95	0.121	1572	3.73	***
Observations	645			643		642		
Adj. R <sup>2</sup>	0.03			0.01		0.05		

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