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LONG-TERM VALUE CREATION OF PRIVATE EQUITY FIRMS

A Study of the Aftermarket Performance of Private Equity-backed IPOs in the European Union

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ABSTRACT

The long-term value creation of Private Equity firms has been subject to widespread debate, with sponsors experiencing increased public scrutiny. Using a sample of 967 IPOs, this paper examines the aftermarket performance of PE-backed IPOs in the European Union between 2000 and 2010. Comparing the one-, two- and three-year performance of PE-backed and non-backed IPOs, we aim to examine if the former outperform the latter, possibly indicating potential value creation inherent in PE ownership. Furthermore, we aim to study if certain firm characteristics drive stock performance, and whether these tend to be more prevalent amongst PE-backed firms. The evidence suggest that PE-backed IPOs significantly outperform their non-backed counterparts throughout the three years following flotation, whilst also exhibiting superior initial size, EBITDA-margins and OCF ratios. All these characteristics, finally, are found to be positively correlated to aftermarket performance, partially explaining the superior returns experienced by PE-backed firms.

Keywords: Private Equity, Long-term Value, Aftermarket Performance, Leveraged Buyout

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1. INTRODUCTION

Ever since Jensen (1989) first discussed the advantages of Leveraged Buyouts (a transaction where the buyer, generally referred to as a financial sponsor or Private Equity firm, uses a significant amount of borrowed money to finance the acquisition of the target, henceforth "LBO") as an organizational form, the effects and existence of Private Equity firms (henceforth "PE firms") have been debated.

Not long after Jensen's paper, several other authors analyzed the effects of firms undergoing LBO procedures (Kaplan, 1989; Muscarella & Vetsuypens, 1990). Most authors came to similar conclusions: the operating performance of firms undergoing LBOs significantly improved during the PE ownership, supporting Jensen's theory.

Recent debate has focused on the trade-off between short-term and long-term effects of PE firms on target companies (Sorkin, 2005); more specifically if PE firms focus on short-term results and "quick bucks" at the expense of long-term value creation (Harford & Kolasinski, 2012). In essence, the main focus of the debate has been whether PE firms only engage in restructuring processes that have visible short-term profit-generating effects or if the restructuring is believed to have long-term benefits for the target companies.

Most studies of PE firms' effects on their portfolio companies focus on the performance development between entry and exit dates; thus, not taking into account the trade-off between short-term and long-term value creation. A few studies focus on the long-term aftermarket performance of PE-backed firms, often using older data from Initial Public Offerings (henceforth "IPOs") issued during the 1980s and/or 1990s, whilst also being restricted to the US and the UK. A potential aftermarket outperformance could constitute a proxy for long-term value creation of PE firms, when comparing it to non-backed IPOs.

With aforementioned background in mind, we began raising interest in whether the new wave of buyouts during the first decade of the 21st century is any different from the one during the 1980s, as well as studying whether any outperformance exists in downturns (given the two more severe crises occurring in the last years). Furthermore, given the lack of studies done on Europe as a whole, we have decided for the following first research question:

(1) *Do Private Equity-backed IPOs in the European Union exhibit superior long-term stock performance compared to non-PE-backed IPOs?*

Another question often raised when discussing the effects of PE firms regards the focus of the restructuring process and what they actually improve in the target companies. Nikoskelainen & Wright (2007), for example, find that the level of gearing and size of the buyout are two key drivers for performance development during the buyout period. Interested in which key factors drive value creation by PE firms, and if this possibly has changed over the years, our second research question is:

(2) *Which firm characteristics affect long-term performance of IPOs and is there any sizeable difference in these characteristics between PE-backed and non-backed firms?*

To analyze the long-term performance of PE-backed and non-backed IPOs between 2000 and 2010, we study performance measures for each firm one year, two years and three years after flotation. Our hypothesis relating to the first research question is that PE-backed IPOs will outperform non-backed IPOs. This hypothesis is partially based on the apparent expertise of PE firms to streamline a company's operations and enhance its governance, and partially based on the fact that managers in many non-backed firms are more emotionally attached to the core values of the firm, whilst not focusing on, for example, cash flow management to the same extent as non-biased PE firms.

Our second research question is addressed by studying various firm characteristics that have had explanatory power in previous literature on corporate governance mechanisms (Kaplan & Strömberg, 2008; Levis, 2011). Our hypothesis is that we will find a positive correlation between a firm's sales, EBITDA-margin and OCF ratio at the time of the IPO and long-term stock returns, whilst also finding a higher average EBITDA-margin and OCF ratio amongst PE-backed firms. We believe the EBITDA-margin to have a positive correlation with stock performance because of the nature of the measure: a high EBITDA-margin, in itself, can never negatively affect firm performance. Moreover, the we believe the OCF ratio[1] to be positively correlated to stock performance for two main reasons: first, one of the most widely used approaches to corporate valuation is based on the free cash flows generated by a company (the DCF Model); second, higher firm liquidity reduces the risk for financial distress, which in turn reduces cost of capital. Given the

[1] The operating cash flow ratio, OCF ratio, is defined as Operating Cash Flow divided by Current Liabilities

nature of an LBO, we also expect PE-backed firms to, on average, have higher leverage by time of flotation (even though a fairly large amount of the initial debt taken on for the buyout has been repaid during the ownership period). Furthermore, since optimal buyout targets are mature firms (Kaplan & Strömberg, 2008), we expect PE-backed firms to be, on average, older than non-backed. However, we do not expect to see a positive correlation between these characteristics and long-term stock returns, since the marginal benefit of leverage is diminishing (due to, for example, costs related to financial distress), whilst the effects of firm age depend on several internal factors, making it considerably different between firms. Finally, we do not believe that stock performance positively correlates with the mere fact that firms are PE-backed or not, mainly because we consider the concrete advantages of being PE-backed to be captured by the other independent variables.

In our study, we find solid evidence of PE-backed IPOs outperforming non-backed IPOs when observing Jensen's Alpha, Sharpe ratio and M^2 for all of the three years following the flotation, suggesting that PE firms may indeed create long-term value. The difference in one-year equally-weighted Alpha between PE-backed and non-backed IPOs is 17.23%, whilst the difference for two-year and three-year Alphas are 12.63% and 13.05%, respectively.

Furthermore, when performing regressions on stock performance, we find significant positive correlation between EBITDA-margin[2], OCF ratio and Sales, and stock Alpha for all of the subsequent years studied. There is no significant correlation between Alphas and the dummy variable indicating whether the firms are PE-backed or non-backed, except for on the one-year level. Asset turnover, on the other hand, only shows significant positive correlation with three-year Alphas. Relating to this, we find that the PE-backed firms, on average, exhibit higher EBITDA-margins, OCF ratios, sales, leverage and are generally older at time of flotation. Hence, these results suggest that the target companies may indeed experience a value premium generated by the PE firms.

The paper will proceed as follows: in section 2, we present the theoretical framework and previous literature relating to our study. Section 3 describes the data used in the study, whilst section 4 explains the employed methodology. Our results are presented in section 5, followed by an extensive analysis in section 6. Finally, in section 7, we present our conclusions and discuss further research topics of interest.

[2] The correlation between EBITDA-margin and one-year Alpha is significant only at the 10% level

2. THEORY

The following section will first present the theoretical framework underlying the arguments for a potential value creation from PE ownership and LBOs. We will then proceed to look at some of the related research performed to date.

2.1 THEORETICAL FRAMEWORK

2.1.1 MODIGLIANI-MILLER THEOREM

In 1958, Franco Modigliani and Merton Miller formed the theorem that today is commonly known as the Modigliani-Miller theorem. The essence of the theorem is that the value of a firm is independent of its capital structure. Thus, a higher level of leverage should not create a higher firm value. The first version of the Modigliani-Miller theorem ignores the presence of transaction costs and assumes that investors and corporations can borrow at the same cost, giving us the following relationship:

$$V_L = V_U$$

where:

(i) V_L = the value of the same firm but with a capital structure partially consisting of debt and

(ii) V_U = the value of an unlevered firm

Five years later, in 1963, the same authors published a study correcting their previous theorem. In the revised version, Modigliani and Miller added the effects of a tax deduction of interests payments from debt. Since potential interest payments are tax deductible, they lower the total income that is subject to tax payments which in turn decreases tax expenses, thus creating a tax shield. Since less tax is paid, the cash flows are higher, which in turn leads to a higher valuation of the firm according to the widely used free cash flow approach to valuation. In essence, the tax shield creates firm value. The revised Proposition I of Modigliani-Miller suggests that:

$$V_L = V_U + D \times (1 - t_c)$$

where:

(i) D = debt and

(ii) t_c = the corporate tax rate

2.1.2 JENSEN'S AGENCY PROBLEM THEORY

The grand-father theory of LBOs dates back to the late 1980s when Michael Jensen (1989) first introduced the argument of the advantages of LBO firms as an organizational form. Jensen suggests that the high level of gearing, the concentration of ownership and the supervision from a financial sponsor creates an incentive structure that forces firms to not invest in negative-NPV projects, whilst also resulting in a more efficient decision-making process due to fewer owners. Prior to this study, Jensen (1986) discussed the disadvantages of too much cash held by a firm. According to him, unnecessary surplus of cash enables managers to spend the cash on non-value adding activities, sometimes referred to as empire-building (in short, increasing the size of the corporation rather than its profits, at the expense of efficiency and firm value). If, instead, the firm uses debt as a financing form, continuous interest payments and principal repayments have to be made. This debt servicing limits the unnecessary surplus of cash, leading to less engagement in such negative activities.

2.2 PREVIOUS LITERATURE

2.2.1 LEVERAGE BUYOUTS AND OPERATING EFFICIENCY

Several authors have analyzed firms undergoing an LBO process: Kaplan (1989) studied the development of operating performance of the target firms before and after the buyout, whilst Muscarella and Vetsuypens (1990) did a similar study where they observed 72 firms taking part in reverse LBOs (henceforth "RLBOs", the going-public process of a firm that has previously been subject to an LBO). Both papers conclude that the operating performance of firms undergoing LBOs, when studying gross margin, operating income and several other measures, significantly improves during the holding period, supporting Jensen's arguments. Since then, numerous studies

have observed the operational performance of firms under PE ownership[3,4]. In the aforementioned study by Kaplan (1989), he found that operating measures such as operating income to sales and cash flow to sales of US firms that had been bought out from the public had both increased, with Smith (1990) coming to similar conclusions. These studies also show that PE-backed firms exhibit higher leverage levels and tighter monitoring, which combined with improved operating performance creates value. More recent studies on non-US data observe similar results: Bergström et al. (2007) use a sample of Swedish buyouts between 1998 and 2006 and Boucly et al. (2009) examine operating efficiency on French target companies during the period 1994-2004. Using a sample of 122 public to private transactions between 1998 to 2004 in the UK, Weir et al. (2008) find that the firms experience improved financial health in the form of improved efficiency (lower expenses and higher profit per employee) and increased liquidity. Furthermore, these firms proved to have leverage exceeding the industry average.

2.2.2 Performance of Reverse LBOs and Private Equity-backed IPOs

Another way of studying the effects of LBOs on target companies is by observing stock returns following a going-public process of PE held companies. During the 1990s, two major U.S. studies were done on the subject: DeGeorge & Zeckhauser (1993) study 62 RLBOs between 1983 and 1987, whilst Holthausen & Larcker (1996) use data from 90 RLBOs between 1983 and 1988. Both studies conclude that RLBO stocks outperform peer firms in the years following the flotation. More recently Cao & Lerner (2009), using a sample of 496 global RLBOs between 1980 and 2002, support the previous authors' conclusion by observing superior stock returns over a five-year period compared to other IPOs. However, the study does not find any significant explanatory power of level of gearing to market performance. In 2009, Ritter published a report presenting a three-year average BHR of 7.1% for PE-backed IPOs between 1980 and 2006 in the US, compared to -5.0% for non-backed IPOs. Katz (2009) shows that the long-term performance is superior amongst firms where a majority ownership stake is held by PE firms before IPOs. Furthermore, she shows that reporting amongst PE-backed firms is more conservative (before as well as after the IPO), whilst they also have higher earnings quality in general.

[3] For an extensive paper summarizing the studies on the effects of LBOs, see Cumming et al. (2007)
[4] For an extensive paper summarizing the studies on the PE and LBO market, see Kaplan & Strömberg (2008)

A majority of the studies done to date on the aftermarket performance of PE-backed IPOs are restricted to the US market. However, the few studies done on non-US data are in line with the previously presented results. Bergström et al. (2006) find that PE-backed IPOs in London and Paris outperform non-backed IPOs between 1994 and 2004 using a sample of 1,522 IPOs. Finally, Levis (2011) find that PE-backed IPOs experience higher stock returns in the three following years compared to non-backed IPOs and the market as a whole, using data from 1992 to 2005 on 1,595 transactions in the UK.

2.2.3 IPO PERFORMANCE

Throughout the years, the aftermarket performance of IPOs has been widely discussed with many studies indicating an apparent underperformance compared to the market. Using a sample of 1,526 IPOs between 1975 and 1984 in the US, Ritter (1991) finds that they significantly underperform both comparable companies and market indices three years after flotation. Using a sample three times bigger for the period 1970 to 1990, Loughran and Ritter (1995) find that this underperformance is sustained over a five year period following the issue. One explanation for this underperformance was introduced by Miller (1977). He argues that most investors in an issue are optimistic buyers, resulting in that the offering price is likely to be higher than the "fair" price, and that it will fall with time towards the "fair" price as more information is made available.

3. DATA

The data used in this study has been manually collected by ourselves and is adjusted to optimally answer our research questions. The following section will be split into two parts; the first part describes our initial data set, whilst the second part focuses on adjustments made to the data set.

3.1 DESCRIPTION OF INITIAL DATA SET

The initial data set used in our study consists of cross-sectional data on all firms within the European Union ("EU") that went public between 2000 and 2010, raising net proceeds of €5 million or more.

The main reason we choose to study IPOs after January 1 2000 is to examine whether the nature of the new wave of LBOs during the last decade is similar to the wave during the 1980s, or if they differ in any manner. We use 2010 as our cut-off period to be able to study long-term performance, making three-year returns available for a majority of the transactions. Using 2009 as the final year would eliminate several crucial transactions, whereas using 2011 would hinder the full development of many stock returns.

The geographic scope of this study is limited to IPOs where the company going public is not only registered in an EU country, but also listed on an exchange within the EU. The definition of EU used in the data set is that of the inclusion of the enlargement made in 2004. The reasoning behind this restriction is the rather heterogeneous nature of the non-EU European countries in terms of economic development, where we believe those included up until the 2004 enlargement are more similar.

We use the Zephyr database to collect an initial set of IPOs within the EU during our defined time period, which we control and complete with IPOs from the FactSet database. Furthermore, stock data, company financials and firm characteristics for the firms are collected from FactSet.

Finally, we collect data from FactSet on the development of the MSCI Europe index (henceforth "MSCI EI"). This is done to be able to benchmark the individual returns of the IPOs and retrieve abnormal returns for the stocks. The MSCI EI measures the equity market performance of the developed markets in Europe, including equities from countries largely representing the exchange

locations of our IPO sample. This inclusion, combined with its general recognition, made us choose the MSCI EI as our benchmark.

3.2 ADJUSTMENTS TO INITIAL DATA SET

The intention of the adjustments made to our original data set is to make the data more applicable to our stated research questions. In a few cases, adjustments are made due to precautionary reasons.

As the aim of our study is to compare long-term performance between PE-backed IPOs and other IPOs, we have divided the issues into two groups: PE-backed IPOs and non-backed IPOs. Using Zephyr, we find all Private Equity and Venture Capital-backed IPOs meeting our geographic and time criteria. From this sample we eliminate all transactions where the sponsors are Venture Capital ("VC") firms, leaving us with only PE-backed transactions. One should keep in mind that the distinction between VC firms and PE firms is often vague due to the overlapping nature, imposing a challenge in identifying the appropriate treatment group. We also control for duplicates and ensure that firms are only included in one of the subsample groups.

As previously mentioned, data on stock returns, company financials and firm characteristics are collected for the IPO firms from FactSet. For companies listed later than April 20 2010, we have included the close price as of that date as the third year post-IPO observation. The same approach has been used regarding the MSCI EI. Companies delisted during the period are included in our study, avoiding the issue of survivorship bias. However, companies for which we have not been able to find stock prices for the study period have been excluded from the sample.

For a few observations we were not able to retrieve financial data for the firms at the date of flotation, in which cases we have instead taken the data from six months later. In limited cases we had to expand to three quarters later. By doing this, we decrease the number of drop-outs, thus improving the quality of our analysis. Furthermore, in cases where a beta retrieved for a company exceed four or fall short of minus four, it has been adjusted to four, or minus four, respectively (the changes affected 10 firms, respectively).

As the data is entered manually into the Zephyr and FactSet databases we control a randomly selected sample of companies to validate the data by looking at company reports and press releases.

Our findings suggest no systematic error in the inputs. However, in a few cases the data is obviously incongruous, requiring us to control the data. If possible, we adjust the data manually by looking at company reports, prospectuses and/or press releases. In cases where we cannot find neither confirming nor complementing data ourselves, we choose to exclude the transaction.

In order to be able to conduct industry comparisons we also divide all firms into a number of separate industries, using the widely recognized NACE framework as a reference. The specific NACE codes are retrieved for the companies through Zephyr.

A final, significant adjustment to the data set is that we choose to exclude transactions where the firm going public originates in the financial services sector. This exclusion is based principally on the fact that many IPOs within this sector relate to the flotation of smaller investment vehicles and investment trusts, for which it is troublesome finding financial data, whilst they also tend to be very illiquid on the financial market. Moreover, companies within the financial sector are not widely seen as typical PE targets, supported by our initial data set where few PE-backed IPOs were within the financial services sector. Based on this, we choose to exclude these transactions.

Following the adjustments above made to our initial data set, the final data set comprises 967 IPO transactions over the period 2000-2010. Of these, 226 are PE-backed, whilst the remaining 741 are not. Further information on the distribution of the data set is available in Appendix A, Tables A1-A4.

4. METHODOLOGY

This section will explain how our study is conducted. First, we present the measures used to evaluate the long-term performance of the stocks. Afterwards, we present the model used in our regressions to explain differences in the Alpha observed between the two subsample groups.

4.1 DEFINING AND OBTAINING PERFORMANCE MEASURES

4.1.1 JENSEN'S ALPHA

As a proxy for long-term value creation, we use post-IPO risk-adjusted returns. As a measure for this, we study Jensen's Alpha ("Alpha") on a Buy and Hold basis for our set of IPOs. Developed by Michael C. Jensen in 1967, the Alpha measures a security's or portfolio's excess return over its theoretical expected (or required) return. Jensen's Alpha is defined the following way:

$$JA_t^S = BHR_t^S - E(BHR_t^S)$$

where:

(i) JA_t^S = Jensen's Alpha for stock *S* at time *t*,

(ii) BHR_t^S = Buy and Hold Return for stock *S* at time *t* and

(iii) $E(BHR_t^S)$ = Expected Buy and Hold Return for stock *S* at time *t* according to CAPM

The Capital Asset Pricing Model, CAPM, determines the theoretical expected return of a security, taking into account the systematic risk (in the form of beta), the corresponding market return and the risk-free return. CAPM was developed independently and simultaneously by William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966), based on the previous findings by Harry Markowitz (1952). The following formula determines the abovementioned expected return according to the CAPM:

$$E(BHR_t^S) = r_f + \beta_M^S \times (BHR_t^M - r_f)$$

where:

(i) $E(BHR_t^S)$ is determined as above,

(ii) r_f = The risk-free rate,

(iii) β_M^S = Beta of stock *S* in relation to its local market, *M* , over three years and

(iv) BHR_t^M = The Buy and Hold Return of the market index, *M*, if bought at the IPO date of the corresponding firm

To estimate the risk-free rate, we use the yearly average of the 10-year German government bond. Over the period, the German government bond yield has proved to be one of the lowest in the EU region, and therefore we use it as a proxy for the risk-free rate. If the IPO is issued in 2000, the 2001 yearly average is used for the one-year return, the 2002 yearly average for IPOs issued in 2001 and so forth.

The notion of the Buy and Hold Return is that we buy the stock at the opening of the offering date (thus buying it at the offering price) and hold it until a pre-determined date, which in our study is one year, two years and finally three years after flotation. Therefore, the BHR is calculated the following way:

$$BHR_t^i = \frac{P_t^i - P_0^i}{P_0^i}$$

where:

(i) P_t^i = Price of the stock or index, *i*, at time *t* and

(ii) P_0^i = The offering price of the stock or the opening price of the index at the time of IPO of the corresponding stock, *i*

To be able to retrieve market returns comparable to all stocks, we have to rebase the index. In other words, the initial value of the index is the opening value on the date of the IPO of the corresponding stock.

The Alpha's are analyzed on an equally-weighted and a value-weighted basis. On the equally-weighted level, no adjustments are made and all firms are given the same weights in their respective portfolios (PE-backed and non-backed IPOs and all together). However, on the value-weighted level the stocks are given different weights in their respective portfolios, based on the market capitalization of the companies at the end of the first day of trading. Given issues relating to greater information asymmetries in the flotation of smaller stocks, this method allows us to get a purer reflection of the overall performance of the IPO stocks as less weight is given to smaller issues. Instead, a relatively larger weight is attributed to the performance of larger stocks in their respective groups.

4.2.2 SHARPE RATIO AND M^2

The Sharpe ratio was introduced by William F. Sharpe in 1966, and later revised in 1994. The ratio, sometimes referred to as reward-to-variability, measures the compensation the investor receives in relation to the total risk taken. The compensation is measured as the excess return, or the risk premium per unit of risk, whilst the total risk is measured as the standard deviation of the excess returns, giving us the following formula:

$$SR_t^S = \frac{BHR_t^S - r_f}{\sigma_{BHR_t^S - r_f}}$$

where:

(i) SR_t^S = The Sharpe ratio for any given stock, *S*, at time *t*,

(ii) BHR_t^S = The Buy and Hold Return for the stock, *S,*

(iii) r_f = The risk-free rate and

(iv) $\sigma_{BHR_t^S - r_f}$ = The standard deviation of the Buy and Hold excess returns

However, since the Sharpe ratio is a dimensionless measure and difficult to interpret, we also transform the Sharpe ratio into the Modigliani risk-adjusted performance measure (MRAP), also known as the M^2 measure. It was developed by Franco and Leah Modigliani in 1997 and indicates how well a portfolio or security performs given its risk relative to a benchmark portfolio and the

risk-free rate. Since it is denoted in percentage units, it is more easily interpreted than the Sharpe ratio. The M^2 is defined as following:

$$M^{2S}_t = SR^S_t \times \sigma^M_t + r_f$$

where:

(i) M^{2S}_t = The Modigliani risk-adjusted performance measure for any given stock, *S*, at time *t*,

(ii) SR^S_t = The Sharpe ratio for any given stock, *S*, at time *t*,

(iii) σ^M_t = The standard deviation of the market returns during the corresponding period, *t*, and

(iv) r_f = The risk-free rate

We run a Student's t-test for differences in means between the Alphas, Sharpe ratios and M^2s of our two subsample groups. One of the main assumptions of the Student's T-test is that the variables follow a standard normal distribution under the null hypothesis. However, even if our variables do not strictly follow a standard normal distribution, large samples are approximately normally distributed according to the Central Limit Theorem (Pólya, 1920). Since our sample size is well above the typical threshold limit value, our sample is, by the Central Limit Theorem, approximately normally distributed.

4.2 MODEL SPECIFICATION

To study the relationship between various firm characteristics and aftermarket performance, we obtain the EBITDA-margin (which we use as a proxy for profitability), asset turnover (as a proxy for asset usage efficiency), debt-to-assets (as a proxy for leverage), sales (as a proxy for size), OCF ratio (as a proxy for liquidity) and firm age at the year of flotation for all firms. We choose the IPO year as our reference year since it is the last year where we can fully attribute the financial status of the target firm to the PE firm. Even though we expect the effects of the restructuring to maintain for the following years, we cannot entirely attribute the firm's financial status some years after the IPO to the PE firm since decisions by new owners have been made and implemented.

By running regressions with risk-adjusted returns, Alphas, as dependent variable and firm characteristics as independent variables, we can examine whether any particular firm characteristics affect returns and potentially explain the difference in risk-adjusted returns between our two study groups. The following OLS (Ordinary Least Squares) regression is run on our cross-sectional data[5]:

$$JA_t^S = \propto_0 + \beta_{i,2} \times D + \beta_{i,3} \times EM_i + \beta_{i,4} \times AT_i + \beta_{i,5} \times DA_i + \beta_{i,6} \times S_i + \beta_{i,7} \times OCF_i + \beta_{i,8} \times Age_i + \gamma_{i,1} + \gamma_{i,2} + \gamma_{i,3} + \varepsilon_i$$

where:

(i) JA_t^S = Alphas of the different stocks, *i*, at different times, *t*,

(ii) $\propto_0$ = The intercept,

(iii) D = Dummy variable indicating whether the firm is PE-backed (taking on the value 0) or non-backed (taking on the value 1)

(iv) EM_i = The EBITDA-margin of the firm, *i*,

(v) AT_i = Asset turnover,

(vi) DA_i = The Debt-to-Asset ratio,

(vii) S_i = Sales,

(viii) OCF_i = The OCF ratio,

(ix) Age_i = The age of the target firm at IPO year,

(x) $\gamma_{i,1}$ = Year fixed effects,

(xi) $\gamma_{i,2}$ = Country fixed effects,

(xii) $\gamma_{i,3}$ = Industry fixed effects and

(xiii) ε_i = The error-term of the regression

We include fixed effects to control for the unobserved heterogeneity amongst the independent variables that may exist due to variations between the different flotation years, countries and industries used in our study.

[5] Initially, we include assets as one of our independent variables. However, when controlling for multicollinearity (see Appendix A, Table A5), we decide to drop the assets variable

One of the key assumptions of the OLS regression is that the errors from the regressions are normally distributed. Therefore, we test for normality by plotting a histogram over the error terms and observe that they are indeed normally distributed, letting us perform our OLS regressions (see Appendix A, Graphs A1-A3).

Moreover, we perform Breusch-Pagan tests to test if our variables suffer from heteroscedasticity. We find that our variables in the regression on the one-year Alpha are heteroscedastic, whilst the variables in the other two regression models are homoscedastic. Due to precautionary reasons, we therefore run all our regressions with robust standard errors (see Appendix A, Table A6).

After performing the different regressions, we compare the different firm characteristics between PE-backed and non-backed IPOs to explain the potential differences or similarities in performance between the two groups. More specifically, we study the average values of the aforementioned independent variables used in the regression.

4.3 Robustness Tests

Various robustness tests are carried out to ensure that our results are solid. This is done by running a number of regressions with alterations made to the data set. First, we exclude all firms within the Energy & Basic Materials industry, given their apparent outperformance amongst PE-backed IPOs. Second, we run a regression including only "big" stocks, defined as firms where the sales of the IPO firm at the time of issue is amongst the upper half of the data set. Correspondingly, the third regression is made by including only "smaller" stocks with sales in the lower half. Finally, we use the three-year M^2 instead of the three-year Alpha, to assure that the results are robust when studying also another performance measure.

4.4 PROBLEMATIZATION

There are some concerns with the methodology we have used in our study. One concern regards the vague distinction between PE-backed and Venture Capital-backed firms. Since most databases do not always state vendor name, or state several vendors, it is difficult to determine whether the IPO has been PE-backed or VC-backed, especially in the cases with several vendors. In these cases, we choose to include firms where a majority stake is owned by a PE firm. We conduct a search for the specific vendors of all transactions, to identify the nature of the vendors and eliminate all non-appropriate vendors. However, in many cases, no search results were found, forcing us to trust the database. Moreover, many PE firms engage in VC-type investments. This overlap makes the distinction even more difficult. The reason this complicates, and perhaps even impairs, our study is that many of the VC portfolio companies tend to have low EBITDA-margins, as explained earlier, and thus worsen the regression results. Furthermore, the samples of PE-backed IPOs obtained from both Zephyr and FactSet are most likely affected by the documented underreporting bias of PE transactions, as Strömberg (2008) discusses. Thus, we are fully aware of the possibility that our sample of PE-backed IPOs might not be complete.

When calculating the stock performances, we use the offering price as the initial value. Consequently, as IPO mispricing is an established phenomenon (Barry, Muscarella & Vetsuypen, 1991; Ibbotson et al., 1988), the observed stock performance depends on the amount of mispricing of the stock. By using the first day closing price as the initial value, one could potentially avoid this problem. We used the offering price because of the function of FactSet to directly obtain the offering price. By doing this, we avoid the difficulties of manually finding the date of the first trading day, which sometimes does not correspond with the IPO date available in the database.

Another problem that could potentially affect our regression result is the existence of endogeneity caused by omitted variable bias (OVB). OVB could arise when we drop the asset variable in our regressions. Since asset has a strong correlation with sales (0.9123), it could potentially create an OVB, had its coefficient in the regressions been significantly different from zero. The results from the same regressions including the assets variable are presented in Appendix A, Table A7. We can conclude that no OVB has arisen because of the exclusion of the assets variable, as the correlation coefficient is not significantly different from zero. Naturally, the OVB can still be present in our regression as a result of not including other variables, such as various operating performance

measures or cash flow ratios. However, we believe that including these measures would instead cause severe multicollinearity amongst our variables, thus considerably impairing our regression results.

Finally, endogeneity arises when there is a significant correlation between the dependent variable and the error term – in other words, a loop in causality. We are fairly sure that our regression model suffers from endogeneity, since the purpose of our model is not to study the drivers of stock performance, but rather to examine how PE related characteristics affect stock performance. Thus, our error-terms most likely include factors that may significantly affect stock performance. However, since finding appropriate instrumental variables for our independent variables is extremely difficult, we use the OLS regression approach regardless. The appropriate model, had we been able to identify proper instrumental variables, would have been the 2SLS regression.

5. RESULTS

In this section, we first present the descriptive statistics of the different performance measures we have used to assess the potential outperformance amongst PE-backed IPOs. The results from the student's t-test are presented in the second part. Finally, we present the results from the regression models in the third part.

5.1 AFTERMARKET PERFORMANCE COMPARISON

To assess the potential aftermarket outperformance of PE-backed firms, we primarily use Alpha, Sharpe ratio and M^2. These measures are presented in Tables 1-3 on page 23.

In general, both PE-backed firms and non-backed firms experience negative post-IPO performance over time, which is in line with Ritter's (1991) findings. However, the PE-backed IPOs, on average, display a positive one-year Alpha of 5.24% compared to 1.90% of non-backed IPOs. Despite the long-term negative performance, PE-backed IPOs irrefutably outperform non-backed IPOs. The median Alphas indicate similar results, concluding that the averages are not significantly upward or downward biased.

Regarding risk we find that there are no major differences between the two subsample groups. The standard deviations for one-year Alphas are 67.35% and 62.64%, respectively, whilst increasing to 77.66% and 71.65% after three years. The slight increase in standard deviation over time is to be expected, as the volatility over a larger time horizon is a function of the annualized volatility and time.

When accounting for the total risk, PE-backed IPOs still outperform their counterpart. On average, the Sharpe ratios of the PE-backed firms are higher than those of non-backed firms during all of the three years following flotation. Thus, PE-backed firms have higher returns given the same risk, or in other words, equal returns with lower risk. Since the Sharpe ratio is a dimensionless measure and only describes the internal rankings amongst the stocks, it is difficult to interpret the extent of outperformance of PE-backed IPOs compared to non-backed by solely studying the Sharpe ratio. When studying the quantified version of the Sharpe ratio, the M^2, we find that the average M^2 after one year for the whole data set is -0.08%, whilst the PE-backed firms exhibit an M^2 of 4.96%

compared to -2.59% for non-backed firms. The two-year and three-year M^2s follow the same pattern, with PE-backed IPOs outperforming non-backed IPOs.

In Appendix A, Graphs A4-A6, the stock Alphas are presented on industry level. The most successful industry is Energy & Basic Materials, whilst the least successful is IT services, which also exhibits the largest difference in performance between the two subsample groups. In almost all industries, and for all periods, the PE-backed firms perform better. Given the fairly similar industry distribution amongst the two subsample groups, we do not expect the results from our t-tests to be affected by discrepancies in industry features.

The results from the student's t-tests for differences in means for the aforementioned performance measures (Alpha, Sharpe ratio and M^2) are presented in Tables 4-6 on page 24. Across the whole study period, we find that PE-backed IPOs significantly outperform non-backed IPOs, regardless of the performance measure studied. Since all p-values are lower than our pre-determined alpha (5%), we conclude that all null hypotheses (defined as the difference in mean of PE-backed less the mean of non-backed is smaller than, or equal to, zero) can be rejected.

The three measures together create a robust performance indicator as they take into account systematic risk, total risk and market risk premiums. Since all results are significant and uniform, they answer our first research question and confirm our corresponding hypothesis that PE-backed IPOs have significantly superior aftermarket performance compared to their non-backed counterparts.

TABLE 1-3
AFTERMARKET PERFORMANCE MEASURES

The tables present the aftermarket performances of the firms in the data set as a whole and broken down into the two subsample groups. Table 1 presents the one-year aftermarket performance, table 2 and table 3 present the two-year and three-year aftermarket performance, respectively. PE denotes PE-backed IPOs. NB denotes non-backed IPOs.

1-YEAR PERFORMANCE	ALL	PE	NB
Average Alpha (Equally-weighted)	-8.44%	4.76%	-12.47%
Average Alpha (Value-weighted)	6.54%	9.51%	5.96%
Median Alpha	-17.00%	-8.00%	-19.00%
Std. deviation (Equally-weighted)	64.15%	67.35%	62.64%
Average Sharpe Ratio	-0.2383	0.0471	-0.3253
Average M^2	-0.08%	4.86%	-2.59%

Table 1

2-YEAR PERFORMANCE	ALL	PE	NB
Average Alpha (Equally-weighted)	-19.34%	-9.60%	-22.23%
Average Alpha (Value-weighted)	15.32%	3.41%	17.66%
Median Alpha	-31.00%	-23.00%	-36.00%
Std. deviation (Equally-weighted)	70.83%	71.07%	70.56%
Average Sharpe Ratio	-0.4352	-0.2816	-0.4807
Average M^2	-8.36%	-4.15%	-9.61%

Table 2

3-YEAR PERFORMANCE	ALL	PE	NB
Average Alpha (Equally-weighted)	-21.31%	-11.27%	-24.32%
Average Alpha (Value-weighted)	15.39%	15.81%	13.26%
Median Alpha	-37.00%	-26.00%	-39.50%
Std. deviation (Equally-weighted)	73.25%	77.66%	71.65%
Average Sharpe Ratio	-0.4933	-0.3729	-0.5294
Average M^2	-10.29%	-6.99%	-11.28%

Table 3

TABLE 4-6
AFTERMARKET PERFORMANCE T-TESTS

The tables present the results from the Student's t-tests for differences in mean performed on the aftermarket performance measures. Table 4 presents the results from the t-test on Alphas, whilst 5 and 6 present the results from the t-tests on Sharpe ratio and M^2, respectively. The p-value shows the lowest significance at which the null hypothesis can be rejected. The null hypothesis is defined as the difference in mean of PE-backed less the mean of non-backed is smaller than, or equal to, zero.

		1-YEAR ALPHA	2-YEAR ALPHA	3-YEAR ALPHA
PE-backed IPOs	Mean	4.76%	-9.60%	-11.27%
	Std. Error	(0.04480)	(0.04824)	(0.05334)
Non-backed IPOs	Mean	-12.47%	-22.23%	-24.32%
	Std Error	(0.02301)	(0.02608)	(0.02697)
Observations		(967)	(949)	(918)
P-value		0.0003	0.0109	0.0149

Table 4

		1-YEAR SR	2-YEAR SR	3-YEAR SR
PE-backed IPOs	Mean	0.0471	-0.2816	-0.3729
	Std. Error	(0.07018)	(0.06834)	(0.07171)
Non-backed IPOs	Mean	-0.3253	-0.4807	-0.5294
	Std Error	(0.03552)	(0.03675)	(0.03705)
Observations		(967)	(949)	(918)
P-value		0.0000	0.0053	0.0267

Table 5

		1-YEAR M^2	2-YEAR M^2	3-YEAR M^2
PE-backed IPOs	Mean	4.86%	-4.15%	-6.99%
	Std. Error	(0.01433)	(0.01900)	(0.01977)
Non-backed IPOs	Mean	-2.59%	-9.61%	-11.28%
	Std Error	(0.00720)	(0.01018)	(0.01019)
Observations		(967)	(949)	(918)
P-value		0.0000	0.0058	0.0270

Table 6

5.2 RESULTS FROM REGRESSIONS

The results from the regressions are presented in Table 7 on page 26. In general, we find significant positive correlations to Alphas for the profitability, liquidity and firm size measures (EBITDA-margin, OCF ratio and Sales), whilst no significant correlation is found for firm age, leverage and asset turnover. Lastly, the p-value of the dummy variable shows that no significant correlation exists between whether the firm is PE-backed or not and aftermarket performance.

Our results show that the EBITDA-margin is only significant at the 1% level for three-year Alphas, whilst the correlation with two year-returns is significant at the 5% level. The correlation with one-year Alphas is significant at the 10% level, which is below our predetermined alpha of 95%. The correlation coefficients stretch from 0.0226 for one-year Alphas to 0.0271 for three-year Alphas, meaning that a 10 percentage point increase in EBITDA-margin is expected to increase the one-year Alpha by 0.226 percentage points and the three-year Alpha by 0.271 percentage points.

The firms' amount of sales at time of flotation has a positive correlation with Alphas for all three subsequent years. The result is significant at the 1% level for all three years and an increase of €100m in sales is expected to increase the one-year Alpha by 0.152 percentage points, the two-year Alpha by 0.299 percentage points and finally the three-year Alpha by 0.222 percentage points.

Regarding liquidity, the initial OCF ratio has a significant, positive correlation with returns for two of the three subsequent years. The correlations with one-year and two-year Alphas are significant at the 1% level, whilst the three-year Alpha has no correlation with OCF ratio. A 10 percentage point increase in OCF ratio is thus expected to increase the one-year Alpha by 0.0143 percentage points and the two-year Alpha by 0.0163 percentage points.

For one- and two-year Alphas, no significant correlation with asset turnover is found. However, an increase of 10 percentage points in asset turnover is expected to increase the three-year Alpha by 0.528 percentage points. This result is significant at the 5% level. Moreover, we find no results that would indicate any correlation between stock performance and firm age or leverage[6]. The existence of a financial sponsor in itself (represented by the dummy variable) has no significant correlation with aftermarket performance, either.

[6] However, leverage has a positive correlation with one-year Alpha and two-year Alpha, significant at the 10% level

TABLE 7
REGRESSION RESULTS

*The table shows the results from regressing firm Alphas on the various firm characteristics at time of flotation. The first column indicates the independent variables. The second, third and fourth columns display the correlation coefficients for the regressions on the three different Alphas. Robust standard errors are used for all regressions due to heteroscedasticity. All regressions include year, country and industry fixed effects. The robust standard errors are reported within parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

VARIABLES	1-YEAR ALPHA	2-YEAR ALPHA	3-YEAR ALPHA
Group Dummy	-0.0779	-0.0492	-0.0657
	(0.0605)	(0.0693)	(0.0767)
EBITDA-margin	0.0226*	0.0243**	0.0271***
	(0.0131)	(0.0113)	(0.0103)
Asset Turnover	-0.00407	0.0155	0.0528**
	(0.0197)	(0.0249)	(0.0231)
Debt-to-Assets	0.146	0.193*	0.200*
	(0.0951)	(0.109)	(0.116)
Sales	1.52e-05**	2.99e-05***	2.22e-05**
	(6.01e-06)	(6.26e-06)	(9.25e-06)
OCF Ratio	0.00143***	0.00163***	0.000496
	(0.000341)	(0.000455)	(0.000355)
Age at IPO	-0.000599	0.000553	0.00140*
	(0.000630)	(0.000702)	(0.000756)
Constant	-1.458***	-1.694***	-0.948***
	(0.216)	(0.301)	(0.323)
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	747	732	714
R^2	0.136	0.124	0.102

5.3 ROBUSTNESS TESTS

The results from our robustness tests are presented in Table 8 on page 29. In all robustness tests, we include the same characteristics as in our main model. However, for practical matters we only present three-year Alphas as our dependent variable when performing the robustness checks.

In the first column, the regression is performed on all industries except Energy & Basic Materials, which was the most successful industry and the industry with largest differences in performance between the subsample groups. Interestingly, we find very similar results when only studying the less successful industries. The coefficient of the dummy variable is still negative and not significant. The OCF ratio is still not significant at a three-year level, whereas the EBITDA-margin, asset turnover and sales have a positive coefficient and are all at least significant at the 5% level. Size-wise, the coefficients from this model are very similar to those from the main regression model.

In the second column we only include big firms, defined as sales higher than the median sale, whilst in the third column only small firms are included. The results for big firms differ somewhat from the main results. First, the coefficient for EBITDA-margin is considerably larger (0.438 compared to 0.0271), however the result is no longer significant. The difference in coefficient size is probably a result of eliminating the firms with extremely low sales levels (which directly affects EBITDA-margin). Second, the OCF ratio coefficient is increased from 0.000496 to 0.103. When only including big firms, the OCF ratio is significant at the 5% level. These changes are probably due to the exclusion firms without any operating cash flows as a consequence of low, or no, revenues. Interestingly, the dummy variable is considerably more negative and is significant at the 5% level, when only including big firms.

The results from the regression on only small firms, in column three, are fairly weak, as we find no significant correlations[7]. The lack of significance is most likely due to very low values in sales and information asymmetry that may be more present amongst small firms, which in turn could potentially affect stock performance.

Finally, in our fourth, and last, robustness test we instead use three-year M^2 as the dependent variable. When adjusting for this, the only major differences we find, compared to our main

[7] Except for EBITDA-margin, which is significant at the 10% level

regressions, is that the correlation between Asset Turnover at time of flotation and three-year M^2 is no longer significant, whilst the OCF ratio correlates positively and is significant at the 10% level. This differs from the results from the three-year Alpha, but is in line with the results from the regressions performed on the one-year and two-year Alpha.

Overall, the results of the robustness tests are comparable to those of our main model. In cases where the results differ, there is often a logical explanation related to the inconsistencies in the data set.

TABLE 8
ROBUSTNESS TESTS

*The table presents the results from the robustness test run on the three-year Alpha. The first column indicates the independent variables. The second column presents the results from the regression performed when excluding the Energy & Basic Materials industry. The third and fourth columns present the results from the regressions performed when only including big firms and small firms, respectively. Big firms are defined as having sales above the total sample median sales, whilst small firms are defined as having sales below the total sample median sales. Finally, the fifth column presents the results of the regression when M^2 is used as the dependent variable instead, whilst column six presents the corresponding results from the main model. Robust standard errors are used for all regressions due to heteroscedasticity. All regressions include year, country and industry fixed effects. The robust standard errors are reported within parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

VARIABLES	EXCL. ENERGY 3-YEAR ALPHA	BIG FIRMS 3-YEAR ALPHA	SMALL FIRMS 3-YEAR ALPHA	3-YEAR M^2	MAIN MODEL 3-YEAR ALPHA
Dummy	-0.0620	-0.201**	0.107	-0.0230	-0.0657
	(0.0795)	(0.100)	(0.110)	(0.0278)	(0.0767)
EBITDA-margin	0.0223**	0.438	0.0155*	0.00910**	0.0271***
	(0.00943)	(0.266)	(0.00882)	(0.00388)	(0.0103)
Asset Turnover	0.0572**	0.0468	0.0506	0.0108	0.0528**
	(0.0238)	(0.0284)	(0.0631)	(0.00954)	(0.0231)
Debt-to-Assets	0.192	0.144	0.0384	0.0212	0.200*
	(0.124)	(0.166)	(0.155)	(0.0423)	(0.116)
Sales	3.57e-05**	1.61e-05*	0.00839	8.18e-06**	2.22e-05**
	(1.71e-05)	(8.86e-06)	(0.00520)	(3.85e-06)	(9.25e-06)
OCF Ratio	0.000482	0.103**	0.000245	0.000268**	0.000496
	(0.000357)	(0.0443)	(0.000368)	(0.000127)	(0.000355)
Age at IPO	0.00123	0.00175*	-0.00206	0.000492*	0.00140*
	(0.000771)	(0.000999)	(0.00127)	(0.000298)	(0.000756)
Constant	-0.574*	-0.656	-1.665***	0.113	-0.948***
	(0.304)	(0.567)	(0.226)	(0.127)	(0.323)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	634	389	325	714	714
R^2	0.081	0.155	0.161	0.182	0.102

6. ANALYSIS

6.1 ANALYZING THE DIFFERENCES IN PERFORMANCE

The results from our different performance measures all point in the same direction: for all of the three subsequent years following flotation, the new wave of PE-backed IPOs outperform non-backed IPOs. Previously PE-owned firms outperform their counterparts when taking into account both systematic risk and total risk, much like the PE-backed firms during the buyout bonanza in the 1980s. These results are in line with previous literature: Bergström et al. (2006), Ritter (2009) and Levis (2011) all find that PE-backed IPOs outperform their non-backed counterparts in the years following the flotation.

Our findings from the regression model indicate that sales, EBITDA-margin and OCF ratio[8] explain a portion of the returns. Moreover, asset turnover significantly explains differences only in three-year Alphas. The differences in performance between PE-backed IPOs and non-backed could therefore, potentially, be explained by differences in these firm characteristics.

Table A4, in Appendix A, outlines the medians and means for the various firm characteristics tested for in the regression model. Albeit the EBITDA-margins of non-backed firms are slightly higher than PE-backed firms, the mean is considerably higher for PE-backed firms. The higher EBITDA-margins amongst PE-backed firms indicate that they are more efficient in their operations, which in turn is positively correlated with stock performance. Reminding you that the coefficient for EBITDA-margin is, on average, 0.0247, the difference of approximately 20 percentage points in EBITDA-margin between the two groups is expected to increase the Alpha by approximately 0.494 percentage points.

Regarding the OCF ratio, which also has a significant positive correlation with Alphas, both the median and mean is higher for PE-backed IPOs, indicating superior liquidity. The difference in liquidity can also explain a fraction of the difference in aftermarket performance, as a increase of 1.68 in OCF ratio (which is the mean difference) is expected to increase the one-year Alpha by approximately 0.24 percentage points.

[8] Correlation efficient for the OCF ratio on the three-year Alpha is not significant

Moreover, we find that the previously PE-owned firms are much larger in size in terms of sales, possibly indicating that PE target companies indeed are more mature. The median sales is €82.3 million for PE-backed firms, whilst only being €27.9 million for non-backed making the difference in mean of sales between the two groups approximately €62 million. Thus, an increase of approximately €60m in sales would explain a difference of approximately 0.14 percentage points in three-year Alphas. We expect large firms to suffer less from information asymmetry compared to small firms, since large firms, to a higher extent, are subject to analyst coverage and public interest. Assuming information asymmetry, and sales in general, to be the cause, and stock performance to be the effect, we conclude that investors are positively affected by the lesser extent of information asymmetry affecting large firms and the lesser risk related to already being a well-established and mature firm.

Finally, the lack of significant correlation between leverage and stock performance seems reliable, since a significant correlation coefficient for leverage would suggest that the relationship between debt and firm value (or performance) is linear. Obviously, this is not the case, since debt, at a certain level, has negative marginal effect, with financial distress and debt overhang prevailing if debt levels become too high; whilst having low level of debts would not seed the benefits of tax shields and incentive structures (Kraus & Litzenberger, 1973). Moreover, the lack of significance found for firm age is possibly due the trade-off related to the timing of flotation: on one hand, firms need to perfect their strategies and core operations to attract investors before floating; on the other hand, delaying the flotation due to improvements increases the opportunity costs related to delay of flotation.

6.2 Further Analysis

As the aforementioned analysis shows, the results from our regressions combined with the differences in firm characteristics explain only a portion of the differences in performances. Thus, it is reasonable to assume that the differences in performance are partially due to some less visible characteristics. One of the main tools used by PE firms to improve the business of their portfolio companies is to implement employee stock ownership plans (Kaplan & Strömberg, 2008), in order to reduce the agency problems related to separated ownership and management, which otherwise could create a moral hazard problem. By increasing the incentives for employees and management to always act in the best interest of the firm, the company tends to become more attractive to

outside investors. This effect might be even stronger for big firms, where the agency problem probably is more apparent due to higher ownership dispersion, which could explain why we find significant and strong results for the dummy variable in our robustness test only including big firms.

Moreover, the high levels of debt induced by the PE firms is partially a way to reduce the wasteful use of cash flows by management, as Jensen (1986) presented. The constant requirements of servicing the debt encourages "a state of emergency" in the target firm, forcing management to be cash flow efficient. After the PE ownership period, when most of the debt has been repaid, high levels of debt is hopefully not necessary to encourage cash flow efficiency – rather, this has become the normal state of mind amongst managers. Since wasteful investments are not displayed in OCF ratio, which only takes into account operating cash flows from the main business (thus not including long-term investments), the effect of this new behavior is not included in our regressions. However, this is certainly attractive to outside investors and could potentially explain parts of the difference in performances.

The median EBITDA-margin observed for PE-backed IPOs (11%) and non-backed IPOs (12%) is fairly equal, which initially might seem odd given the previous literature on the superior improvement of operating performance by PE firms in their portfolio companies. However, optimal PE target candidates often do not utilize their full potential, leaving room for improvements. Thus, many of the PE target firms may initially have relatively low EBITDA-margins, but experience a significant improvement over the period of ownership. This does not necessarily mean that they are high in absolute numbers, rather it suggests that their operating efficiency has been enhanced over the holding period. Therefore, we could potentially expect that the EBITDA-margin of the previously PE-owned firms might increase at a higher pace than the non-backed in the years following the IPO, which could potentially explain the difference in aftermarket performance. This potential increase is not included in our study, since we decided to perform our regressions with firm characteristics only at the year of flotation as our independent variables. Also, many of the IPOs are only partial exits by the PE firms, giving them additional time to complete the restructuring process, which would further strengthen our belief that the PE-backed IPOs could experience an increase in EBITDA-margin at a higher pace than the non-backed firms.

Finally, the discussion regarding causality must be raised. All our results only indicate correlation, but does not describe the nature of causality. Nothing in our study suggests that the PE-backed

firms outperform its peers as a consequence of having been under PE ownership. This type of causality is probably the more common one when thinking of PE firms' effect on target companies. However, the reverse causality – that PE firms only target companies which are sound and would outperform its peers regardless of the PE restructuring – may very well be the prevailing causality. Since PE firms are interested in being able to sell the portfolio company with profit, they will most likely not acquire companies not providing enough upside potential. The reasonable conclusion would be that the actual causality is somewhere in between; even though PE firms create short-term and long-term value, the portfolio companies are already initially successful enough to be able to somewhat outperform its peers.

7. Conclusion and Future Research

7.1 Conclusion

This paper aims to study the long-term value creation of Private Equity firms by comparing the three-year aftermarket performance of PE-backed IPOs to that of non-backed IPOs in the European Union between 2000 and 2010. It also aims to examine whether certain PE related firm characteristics tend to drive stock performance and if these tend to be more predominant amongst PE-backed firms. For the first question, Student's t-test for three different performance measures are performed between the two groups, whilst OLS regressions are performed to observe how aftermarket performance and firm characteristics relate.

The Student's t-tests show that PE-backed IPOs significantly outperform non-backed for all of the three subsequent years, when studying Jensen' Alpha, Sharpe ratio and M^2, indicating that there may indeed exist a long-term performance premium to having been under PE ownership. We also find that the two groups are similar in regards of total risk.

Moreover, our results show a positive correlation between initial sales, EBITDA-margin and OCF ratio, and aftermarket performance. In regards to this, we find that these characteristics, on average, are more prevalent amongst PE-backed firms, which could explain a portion of the superior performance exhibited by PE-backed firms.

Additionally, we argue that a part of the outperformance can possibly be explained by less visible factors such as reductions in "Principal-Agent" problems and agency costs of free cash flow. We also discuss the possibility of a reverse causality, implying that PE firms acquire companies that would outperform its peer regardless of the PE ownership.

Our results are in line with previous literature focusing on the performance of PE-backed firms during the 1980s and 90s, concluding that the new wave of buyouts still manage to consistently outperform its non-backed peers. This indicates a consistency in PE firms' ability to create long-term value even in heavy downturns, defying the severe public condemnation.

7.2 FUTURE RESEARCH

Whilst conducting our study, a number of further topics came to our attention. First, a more qualitative research on the effects of employee stock compensation plans as a restructuring tool could prove valuable. The interesting question to raise here is how PE firms use this tool to create value, given its duplicable nature. If stock compensation plans do indeed create more value than its drawbacks, one would expect all firms, regardless of ownership situation, to employ this instrument.

Moreover, another potential study of interest would focus on the impact of crisis-unique characteristics on firm performance and examine whether there are any reasons to believe that PE-backed firms would superiorly endure crises, potentially making PE firms not only operational enhancers, but also better crises managers.

Finally, given the development of the financial markets and the stricter borrowing environment, with more restrictive lending and increased risk aversion, one could assume that the value creation process of PE firms has changed, depending less on the use of leverage. Thus, an interesting field of study would be to look at how the traits of value creation has developed over the years, and if it has become more focused on operational improvements than financial engineering.

REFERENCES

Barry, Christopher B., Chris J. Muscarella, and Michael R. Vetsuypens, 1991, "Underwriter Warrants, Underwriter Compensation, and the Costs of Going Public", *Journal of Financial Economics* 29, 113-135.

Bergström, Clas, Daniel Nilsson, and Marcus Wahlberg, 2006, "Underpricing and Long-Run Performance Patterns of European Private-Equity-Backed and Non-Private-Equity-Backed IPOs", *Journal of Private Equity* 9, 16-47.

Boucly, Quentin, David Thesmar, and David Sraer, 2009, "Leveraged Buyouts – Evidence from French Deals", *The Global Economic Impact of Private Equity Report* 2009, 47-61.

Cao, Jerry, 2009, "Are Buyout Sponsors Market Timers in RLBOs?", working paper, Singapore Management University, August.

Cao, Jerry, and Josh Lerner, 2009, "The Performance of Reverse Leveraged Buyouts," *Journal of Financial Economics* 91*,* 139-157.

Cumming, Douglas, Donald S. Siegel, and Mike Wright, 2007, "Private Equity, Leveraged Buyouts and Governance", *Journal of Corporate Finance* 13, 439-460.

DeGeorge, François, and Richard Zeckhauser, 1993, "The Reverse LBO Decision and Firm Performance: Theory and Evidence", *Journal of Finance* 48, 1323-1348.

Harford, Jarrad, and Adam C. Kolasinski, 2012, "Do Private Equity Sponsors Sacrifice Long-Term Value for Short-Term Profit? Evidence from a Comprehensive Sample of Large Buyouts and Exit Outcomes", working paper, University of Washington, January.

Holthausen, Robert W., and David F. Larcker, 1996, "The Financial Performance of Reverse Leverage Buyouts", *Journal of Financial Economics* 42, 293-332.

Ibbotson, Roger G., Jay R. Ritter, and Jody L. Sindelar (1988), "Initial Public Offerings", *Journal of Applied Corporate Finance* 1, 37-45.

Jensen, Michael C., 1967, "The Performance of Mutual Funds in the Period 1945-1964", *The Journal of Finance* 23, 389-416.

Jensen, Michael C., 1986, "Agency Costs of Free Cash Flow, Corporate Finance and Takeover", *American Economic Review* 76, 323-329.

Jensen, Michael C., 1989, "Eclipse of the Public Corporation", *Harvard Business Review*, September-October, 61-74.

Kaplan, Steven N., 1989, "The Effects of Management Buyouts on Operating Performance and Value", *Journal of Financial Economic*s 24, 217-254.

Kaplan, Steven N., and Per Strömberg, 2008, "Leveraged Buyouts and Private Equity", NBER working Paper No. 14207, July.

Katz, Sharon P., 2009, "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors", *The Accounting Review* 84, 623-658.

Kraus, Alan, and Robert H. Litzenberger, 1973, " A State-Preference Model of Optimal Financial Leverage", *The Journal of Finance* 28, 911-922.

Levis, Mario, 2011, "The Performance of Private Equity-Backed IPOs", *Financial Management* 40, 253-277.

Lintner, John, 1965, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", *Review of Economics and Statistics* 47, 13-37.

Loughran, Tim, and Jay R. Ritter, 1995, "The New Issues Puzzle", *Journal of Finance* 50, 23-51.

Markowitz, Harry, 1952, "Portfolio Selection", *The Journal of Finance* 7, 77-91.

Miller, Edward M., 1977, "Risk, Uncertainty, and Divergence of Opinion", *Journal of Finance* 32, 1151-1168.

Modigliani, Franco, and Merton H. Miller, 1958, "The Cost of Capital, Corporation Finance and the Theory of Investments", *American Economic Review* 48, 261-297.

Modigliani, Franco, and Merton H. Miller, 1963, "Corporate Income Taxes and the Cost of Capital: A Correction", *American Economic Review* 53, 433-443.

Modigliani, Franco, and Leah Modigliani, 1997, "Risk-Adjusted Performance", *Journal of Portfolio Management* 23, 45–54.

Mossin, Jan, 1966, "Equilibrium in a Capital Asset Market", *Econometrica* 34, 768–783.

Muscarella, Chris J., and Michael R. Vetsuypens, 1990, "Efficiency and Organizational Structure: A Study of Reverse LBOs", *Journal of Financial Economics* 45, 1389-1413.

Nikoskelainen, Erkki, and Mike Wright, 2007, "The Impact of Corporate Governance Mechanisms on Value Increase in Leveraged Buyouts", *Journal of Corporate Finance* 13, 511-537.

Pólya, George, 1920, "Über den Zentralen Grenzversatz der Wahrscheinlichkeitsrechnung und das Momentenproblem", *Mathematische Zeitschrift* 8, 171-181.

Ritter, Jay R., 1991, "The Long-Run Performance of Initial Public Offerings", *Journal of Finance* 46, 3-27.

Ritter, Jay R., 2009, "Some Factoids about the 2008 IPO Market". Available at <http://bear.warrington.ufl.edu/ritter/IPOs2008Factoids.pdf>.

Sharpe, William F., 1964, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", *Journal of Finance* 19, 425-442.

Sharpe, William F., 1994, "The Sharpe Ratio", *The Journal of Portfolio Management* 21, 49-58.

Smith, Abbie J., 1990, "Capital Ownership Structure and Performance: the Case of Management Buyouts", *Journal of Financial Economics* 13, 143-165.

Sorkin, Andrew R., 2005, "The Great Global Buyout Bubble", *NYtimes.com* (online). Available at <http://www.nytimes.com/2005/11/13/business/yourmoney/13buyout.html?pagewanted=all&_r=0>.

Strömberg, Per, 2008, "The New Demography of Private Equity", *SIFR Working Paper*. Available at < http://www.sifr.org/PDFs/stromberg(demography2008).pdf>.

Weir, Charlie., Mike Wright, and Louise Scholes, 2008, "Public-to-Private Buy-outs, Distress Costs and Private Equity", *Applied Financial Economics* 18, 801-819.

APPENDIX A - ADDITIONAL TABLES AND GRAPHS

TABLE A1
ANNUAL DISTRIBUTION OF IPO DATA SET

Chronologic distribution of the IPOs in the data set, split across all observations and the two subsample groups. PE denotes Private Equity-backed IPOs, NB denotes non-backed IPOs.

IPO YEAR		ALL	PE	NB
2000	Observations	157	8	149
	% of total	*16%*	*4%*	*20%*
2001	Observations	52	8	44
	% of total	*5%*	*4%*	*6%*
2002	Observations	34	5	29
	% of total	*4%*	*2%*	*4%*
2003	Observations	15	1	14
	% of total	*2%*	*0%*	*5%*
2004	Observations	46	11	35
	% of total	*5%*	*5%*	*25%*
2005	Observations	100	35	65
	% of total	*10%*	*15%*	*9%*
2006	Observations	178	80	98
	% of total	*18%*	*35%*	*13%*
2007	Observations	204	51	153
	% of total	*21%*	*23%*	*21%*
2008	Observations	86	8	78
	% of total	*9%*	*4%*	*11%*
2009	Observations	21	1	20
	% of total	*2%*	*0%*	*3%*
2010	Observations	74	18	56
	% of total	*8%*	*8%*	*8%*
TOTAL		**967**	**226**	**741**

TABLE A2
INDUSTRIAL DISTRIBUTION OF IPO DATA SET

The table presents the distribution across industries in the data set, split across all observations and the two subsample groups. PE denotes Private Equity-backed IPOs, NB denotes non-backed IPOs.

INDUSTRY		ALL	PE	NB
Energy & Basic Materials	Observations	129	13	116
	% of total	*13%*	*6%*	*16%*
Healthcare & Pharmaceuticals	Observations	85	29	56
	% of total	*9%*	*13%*	*8%*
IT Services	Observations	179	29	150
	% of total	*19%*	*13%*	*20%*
Manufacturing	Observations	224	68	156
	% of total	*23%*	*30%*	*21%*
Other Services	Observations	230	47	183
	% of total	*24%*	*21%*	*25%*
Telecommunications	Observations	41	12	29
	% of total	*4%*	*5%*	*4%*
Wholesale & Retail	Observations	79	28	51
	% of total	*8%*	*12%*	*7%*
TOTAL		**967**	**226**	**741**

TABLE A3
GEOGRAPHIC DISTRIBUTION OF IPO DATA SET*

The table presents the geographical distribution in the data set, regarding location of exchange and country of incorporation. The distribution is split across all observations and the two subsample groups. PE denotes Private Equity-backed IPOs, NB denotes non-backed IPOs.

	EXCHANGE			INCORPORATION		
COUNTRY	**ALL**	**PE**	**NB**	**ALL**	**PE**	**NB**
Austria	12 *(1)*	4 *(2)*	8 *(1)*	14 *(1)*	5 *(2)*	9 *(1)*
Belgium	18 *(2)*	4 *(2)*	14 *(2)*	19 *(2)*	4 *(2)*	15 *(2)*
Cyprus	4 *(0)*	0 *(0)*	4 *(1)*	8 *(1)*	1 *(0)*	7 *(1)*
Czech Republic	2 *(0)*	1 *(0)*	1 *(0)*	1 *(0)*	1 *(0)*	0 *(0)*
Denmark	14 *(1)*	4 *(2)*	10 *(1)*	14 *(1)*	4 *(2)*	10 *(1)*
Estonia	7 *(1)*	0 *(0)*	7 *(1)*	7 *(1)*	0 *(0)*	7 *(1)*
Finland	10 *(1)*	3 *(1)*	7 *(1)*	11 *(1)*	4 *(2)*	7 *(1)*
France	127 *(13)*	42 *(19)*	85 *(11)*	126 *(13)*	42 *(19)*	84 *(11)*
Germany	246 *(25)*	47 *(21)*	199 *(27)*	239 *(25)*	47 *(21)*	192 *(26)*
Geece	52 *(5)*	3 *(1)*	49 *(7)*	52 *(5)*	3 *(1)*	49 *(7)*
Hungary	2 *(0)*	0 *(0)*	2 *(0)*	2 *(0)*	0 *(0)*	2 *(0)*
Ireland	2 *(0)*	0 *(0)*	2 *(0)*	7 *(1)*	1 *(0)*	6 *(1)*
Italy	116 *(12)*	28 *(12)*	88 *(12)*	116 *(12)*	28 *(12)*	88 *(12)*
Latvia	2 *(0)*	0 *(0)*	2 *(0)*	2 *(0)*	0 *(0)*	2 *(0)*
Lithuania	2 *(0)*	0 *(0)*	2 *(0)*	2 *(0)*	0 *(0)*	2 *(0)*
Luxembourg	0 *(0)*	0 *(0)*	0 *(0)*	7 *(1)*	1 *(0)*	6 *(1)*
Malta	5 *(1)*	0 *(0)*	5 *(1)*	6 *(1)*	0 *(0)*	6 *(1)*
Netherlands	8 *(1)*	3 *(1)*	5 *(1)*	21 *(2)*	3 *(1)*	18 *(2)*
Poland	118 *(12)*	4 *(2)*	114 *(15)*	111 *(11)*	3 *(1)*	108 *(15)*
Portugal	5 *(1)*	1 *(0)*	4 *(1)*	5 *(1)*	1 *(0)*	4 *(1)*
Spain	19 *(2)*	9 *(4)*	10 *(1)*	20 *(2)*	9 *(4)*	11 *(1)*
Sweden	41 *(4)*	18 *(8)*	23 *(3)*	40 *(4)*	18 *(8)*	22 *(3)*
United Kingdom	155 *(16)*	55 *(24)*	100 *(13)*	137 *(14)*	51 *(23)*	86 *(1)*
TOTAL	**967**	**226**	**741**	**967**	**226**	**741**

* Number in parenthesis represent percentage of total observations in each group

TABLE A4
DESCRIPTIVES OF FIRM CHARACTERISTICS

The table presents the characteristics observed in the data set, split across all observations and the two subsample groups. PE denotes Private Equity-backed IPOs, NB denotes non-backed IPOs.

CHARACTERISTICS		ALL	PE	NB
EBITDA-margin	Median	11.50%	11.00%	12.00%
	Mean	-24.52%	-8.14%	-29.85%
	Observations	(826)	(203)	(623)
OCF-ratio	Median	0.15	0.18	0.15
	Mean	-1.21	0.039	-1.64
	Observations	(817)	(208)	(609)
Asset Turnover	Median	0.90	0.88	0.91
	Mean	1.15	1.15	1.15
	Observations	(877)	(217)	(660)
Beta	Median	0.77	0.79	0.75
	Mean	0.73	0.73	0.73
	Observations	(967)	(226)	(741)
Sales (€m)	Median	34.25	82.30	27.90
	Mean	526.08	572.75	510.76
	Observations	(878)	(217)	(661)
Assets (€m)	Median	41.00	76.20	35.30
	Mean	875.62	634.42	955.17
	Observations	(883)	(219)	(664)
Debt-to-Assets	Median	0.21	0.30	0.17
	Mean	0.27	0.36	0.24
	Observations	(876)	(217)	(659)
Firm Age (years)	Median	13	13	13
	Mean	25	30	23
	Observations	(922)	(225)	(697)

TABLE A5
CORRELATION MATRIX FOR THE INDEPENDENT VARIABLES

The table presents the correlations between the independent variables used in the main regression model, also including the assets *variable. The threshold value for multicollinearity has been set to 0.9.*

	EBITDA-margin	Asset Turnover	Assets	Sales	Debt-to-Assets	OCF Ratio	Age at IPO
EBITDA-margin	1						
Asset Turnover	0.1048	1					
Assets	0.0227	-0.0797	1				
Sales	0.0312	-0.0341	0.9123	1			
Debt-to-Assets	-0.0846	-0.1804	0.0125	0.0311	1		
OCF Ratio	0.0137	0.0005	0.0068	0.0105	-0.0193	1	
Age at IPO	0.0775	0.0451	0.0616	0.1267	0.1248	0.0181	1

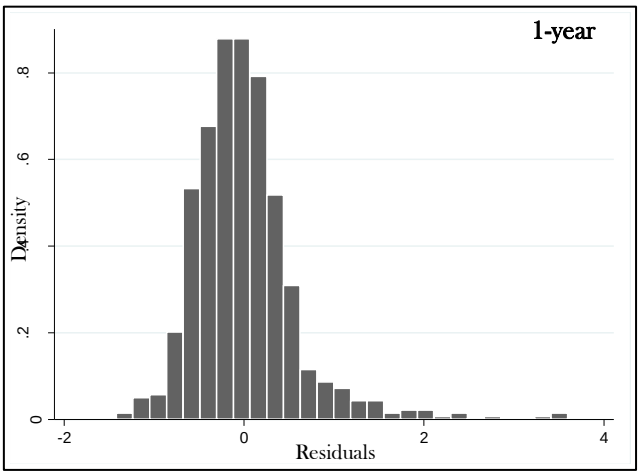
TABLE A6
BREUSCH-PAGAN TEST FOR HETEROSCEDASTICITY

The table presents the results of the Breusch-Pagan test performed on the three dependent variables on which we run our regressions. The first column indicates the dependent variable, whilst the second and third column indicate the Chi-squared and p-values, respectively. The p-values show the lowest level of significance at which the null hypothesis of homoscedasticity can be rejected.

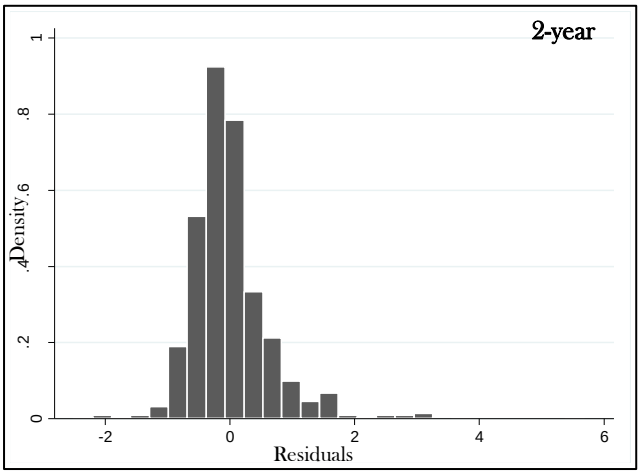
VARIABLES	CHI-SQUARED	P
1-year Alpha	5.45	0.0196
2-year Alpha	0.32	0.5729
3-year Alpha	0.60	0.4387

GRAPH A1-A3
NORMAL DISTRIBUTIONS OF RESIDUALS

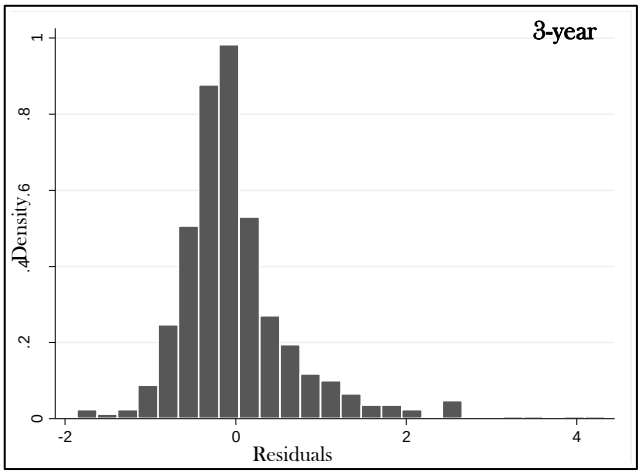
The graphs plot the distribution of the residuals from the three regressions performed on the main model. Graph C1displays the distribution of the residuals from regressing the one-year Alpha. Graph C2 and C3 display the distributions from regressing the two-year and three-year Alphas, respectively.



Graph A1



Graph A2



Graph A3

TABLE A7
REGRESSION RESULTS WHEN INCLUDING ASSETS

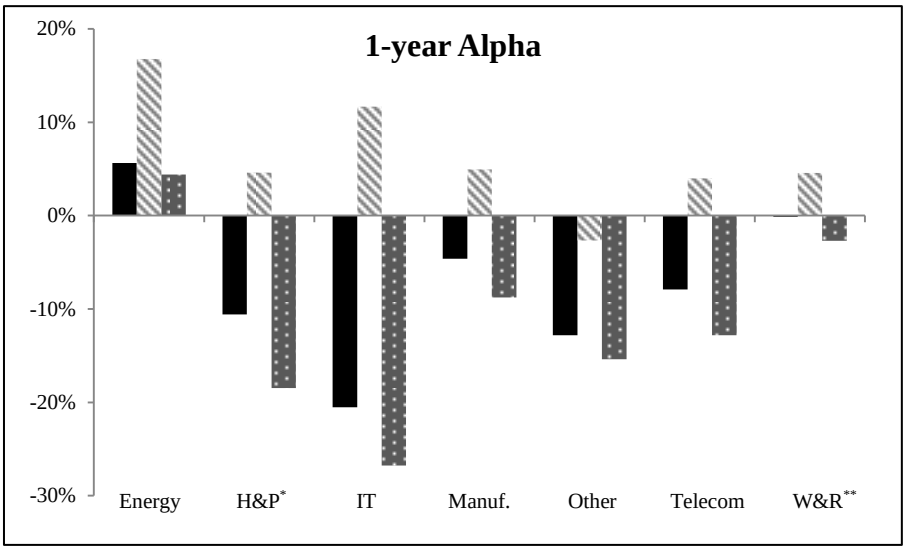
*The table shows the results from regressing firm Alphas on the various firm characteristics at time of flotation. The first column indicates the independent variables. The second, third and fourth columns display the correlation coefficients for the regressions on the three different Alphas. Robust standard errors are used for all regressions due to heteroscedasticity. All regressions include year, country and industry fixed effects. The robust standard errors are reported within parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

VARIABLES	1-YEAR ALPHA	2-YEAR ALPHA	3-YEAR ALPHA
Group Dummy	-0.0752	-0.0496	-0.0638
	(0.0608)	(0.0692)	(0.0767)
EBITDA-margin	0.0225*	0.0243**	0.0270***
	(0.0131)	(0.0113)	(0.0103)
Asset Turnover	-0.00626	0.0158	0.0513**
	(0.0196)	(0.0251)	(0.0230)
Assets	-6.64e-06	1.13e-06	-4.64e-06
	(6.41e-06)	(7.34e-06)	(9.43e-06)
Debt-to-Assets	0.145	0.194*	0.199*
	(0.0952)	(0.109)	(0.116)
Sales	3.14e-05	2.71e-05	3.36e-05
	(1.93e-05)	(2.21e-05)	(2.73e-05)
OCF Ratio	0.00142***	0.00163***	0.000494
	(0.000341)	(0.000456)	(0.000355)
Age at IPO	-0.000655	0.000562	0.00136*
	(0.000621)	(0.000701)	(0.000738)
Constant	-1.455***	-1.695***	-0.948***
	(0.215)	(0.301)	(0.323)
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	747	732	714
R^2	0.137	0.124	0.102

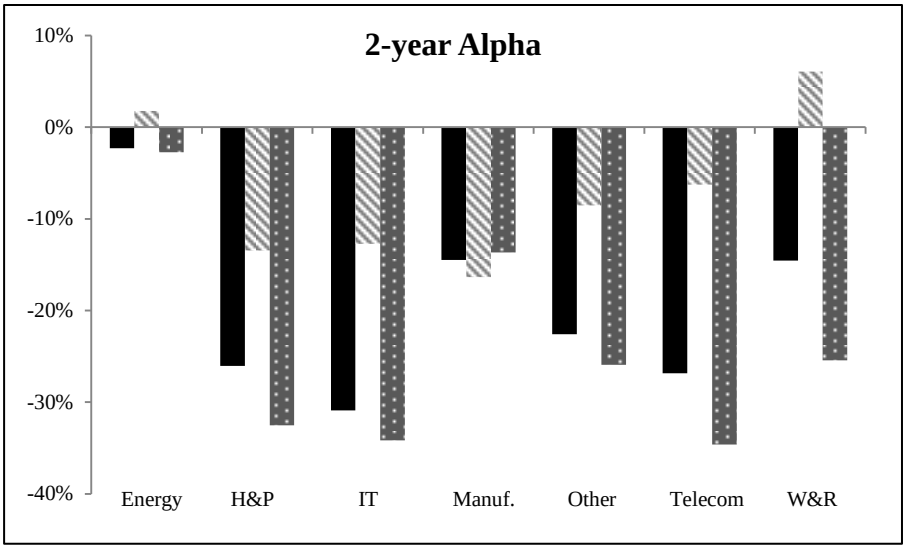
GRAPHS A4-A6
INDUSTRY DISTRIBUTION OF ALPHAS

The Graphs present the aftermarket performance, represented by Alphas, across the seven industries defined. Graph A4 presents the results for 1-year Alphas, whilst Graph A5 and A6 present the results for the 2-year and 3-year Alphas, respectively.

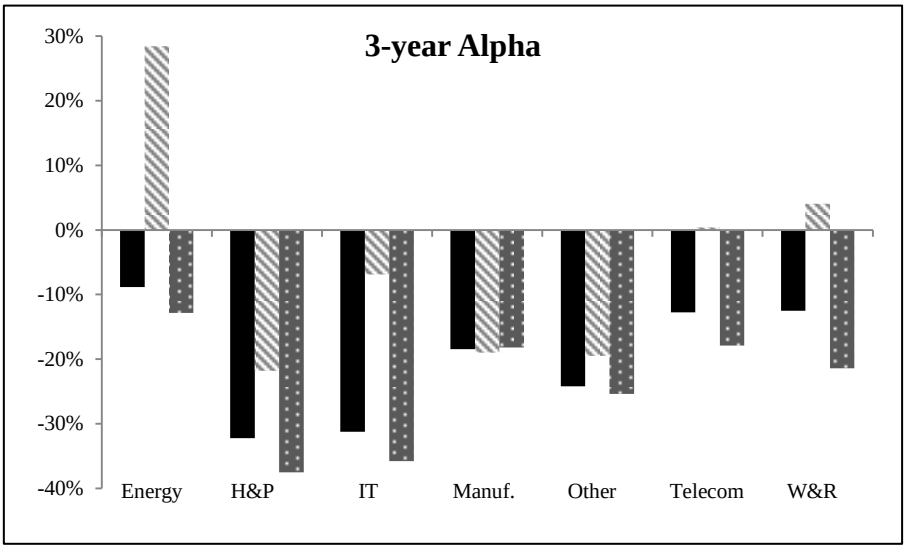
Graph A4



Graph A5



Graph A6



* Healthcare & pharmaceuticals ■ ALL ▧ PE ▩ NB

** Wholesale & retail

TABLE A8-A9
FIRM CHARACTERISTICS T-TESTS

The tables present the results for the student's t-tests for differences in mean of firm characteristics . Table A11 presents the results from the t-test on Sales, EBITDA-margin and OCF Ratio, whilst A12 presents the results from the t-tests on Debt-to-Assets, Asset Turnover and Firm Age. The p-value shows the lowest significance at which the null hypothesis can be rejected. The null hypothesis is defined as the difference in mean of PE-backed less the mean of non-backed is smaller than, or equal to, zero.

		SALES	EBITDA-MARGIN	OCF RATIO
PE-backed IPOs	Mean	572.75	-8.14%	0.04
	Std. Error	(106.40)	(0.10929)	(0.06171)
Non-backed IPOs	Mean	510.76	-29.85%	-1.64
	Std Error	(100.44)	(0.14859)	(0.02697)
Observations		(878)	(826)	(817)
P-value		0.3360	0.1198	0.0582

Table A8

		DEBT-TO-ASSETS	ASSET TURNOVER	FIRM AGE
PE-backed IPOs	Mean	0.36	1.15	29.6
	Std. Error	(0.04124)	(0.07081)	(2.68829)
Non-backed IPOs	Mean	0.24	1.15	22.9
	Std Error	(0.01146)	(0.04638)	(1.10509)
Observations		(876)	(877)	(922)
P-value		0.0024	0.5157	0.0106

Table A9

APPENDIX B – LIST OF PRIVATE EQUITY-BACKED IPOS

COMPANY	IPO YEAR
10tacle studios AG	2006
AB SA	2006
ABC Data SA	2010
Acertec Plc	2006
Acotel Group SpA	2000
Affecto Oyj	2005
AGI Therapeutics Plc	2006
AgroGeneration SA	2010
Alain Afflelou SA	2002
Alfa Laval AB	2002
Alfacam Group	2007
AlphaHelix Molecular Diagnostics AB	2006
Amadeus IT Holding SA	2010
AMG Advanced Metallurgical Group NV	2007
Andritz Ag	2001
ANT Plc	2005
Antichi Pellettieri SpA	2006
ASBISc Enterprises Ltd	2007
asknet AG	2006
Astaldi SpA	2002
Aufeminin.com SA	2000
Aurelian Oil & Gas Plc	2006
AZ Electronic Materials SA	2010
Barracuda Networks Inc.	2007
Bauer AG	2006
BE Group AB	2006
Bene AG	2006
Betfair Group Plc	2010
Biosearch Italia SpA	2000
Bolzoni SpA	2006
Boomerang Plus Plc	2007
Bouty Healthcare SpA	2007
Brenntag AG	2010
Bureau Veritas SA	2007
Byggmax Group AB	2010
Cadogan Petroleum Plc	2008
Cambria Automobiles Plc	2010
Carter & Carter Group Plc	2005
Celoxica Holdings Plc	2005
Chr. Hansen Holding AS	2010
Cineworld Group Plc	2007
Clasquin SA	2006
Clínica Baviera SA	2007

COMPANY	IPO YEAR
co.don AG	2001
Cobra Automotive Technologies SpA	2006
Codere SA	2007
CompuGroup Medical AG	2007
Corporacion Dermoestetica SA	2005
Cozart Plc	2004
Danionics AS	2001
Debenhams Plc	2006
Deinove SA	2010
Delticom AG	2006
Demag Cranes AG	2006
Demos SA	2007
DiaSorin SpA	2007
DIBS Payment Services AB	2007
Digital Pioneers NV	2008
Doppler SA	2008
Duni AB	2007
EAG Ltd	2007
EEMS Italia SpA	2006
Elica SpA	2006
Engineering Ingegneria Informatica SpA	2000
Entersoft SA	2008
Epigenomics AG	2004
ErSol Solar Energy AG	2005
Eurocrystal	2002
Eurogerm SA	2007
Eutelsat Communications SA	2005
Exiqon AS	2007
ExonHit SA	2005
Falkland Oil & Gas Ltd	2004
Fluidra SA	2007
Fountaine Pajot SA	2007
Francotyp-Postalia Holding AG	2006
Freshwater UK Plc	2007
Galapagos NV	2005
Gant Co. AB	2006
Gas Turbine Efficiency Ltd	2005
genOway SA	2007
Gerresheimer AG	2007
Global PVQ SE	2005
GoingPublic Media AG	2006
Gondola Holdings Plc	2005
Greenko Group Plc	2007

COMPANY	IPO YEAR
Grifols SA	2006
Grupo Media Capital SGPS SA	2007
Guala Closures SpA	2005
Halfords Group Plc	2004
Heliocentris Energy Solutions AG	2006
Hemtex AB	2005
Hexagon Human Capital Plc	2007
HMS Networks AB	2007
Hogg Robinson Group Plc	2006
Homag Group AG	2007
Hummingbird Resources Ltd	2010
Hybrigenics SA	2007
Hydrotec Gesellschaft Wassertechnik AG	2001
IC Immobilien Holding AG	2006
Iliad SA	2004
Imaginarium SA	2009
Indutrade AB	2005
Inion Oy	2004
Inmarsat Plc	2005
Intelis AG	2006
Ipsen SA	2005
iSOFT Group Plc	2000
IXEurope Plc	2006
Kabel Deutschland Holding AG	2010
KappAhl AB	2006
Klöckner & Co. SE	2006
Land of Leather Holdings Plc	2005
Lavorwash SpA	2000
Legrand SA	2006
LeGuide.com SA	2006
LHS AG	2006
Lindab International AB	2006
Magix AG	2006
Marazzi Group SpA	2006
Marlborough Stirling Plc	2001
Marr SpA	2005
Mastrad SA	2006
Mediaset Espana Comunicacion SA	2004
Medica SA	2010
Mediterra SA	2008
Meetic SA	2005
Mercor SA	2007
Metris NV	2006
Microlog Logistics NV	2000
ModeLabs Group SA	2006
MQ Holding AB	2010
MTU Aero Engines Holding AG	2005
Muehlhan AG	2006
n.runs AG	2006
Nanogate AG	2006
Nationwide Accident Repair Services Plc	2006
NCC Group Plc	2004
Nederman Holding AB	2007
Negri Bossi SpA	2001
Nessya SA	2008
net mobile AG	2005
Neuf Cegetel SA	2006
NextRadioTV SA	2005
Nice SpA	2006
Norkom Group Plc	2006
Ober SA	2006
OctoPlus NV	2006
Okmetic Oyj	2000
Orexo AB	2005
Outremer Télécom SA	2007
Oxbow SA	2004
Oxford Catalysts Group Plc	2006
Panariagroup Industrie Ceramiche SpA	2004
Pandora AS	2010
Parrot SA	2006
Patientline Plc	2001
Pegas Nonwovens SA	2006
Petrofac Ltd	2005
Petrotec AG	2006
Pfaff Industrie Maschinen AG	2007
Piaggio & C SpA	2006
Piquadro SpA	2007
Poltrona Frau SpA	2006
Polytec Holding AG	2006
Pramac SpA	2007
Press Index SA	2006
Probability Plc	2006
Prodware SA	2006
Promethean World Plc	2010
Prysmian SpA	2007
PV Crystalox Solar Plc	2007

Company	IPO Year
QinetiQ Group Plc	2006
Renovo Group Plc	2006
Rexel SA	2007
RHM Ltd	2005
Rue du Commerce SA	2005
Safestore Holdings Plc	2007
Saft Groupe SA	2005
Salamander Energy Plc	2006
Salcomp Oyj	2006
Sanderson Group Plc	2004
Saras SpA	2006
ScandBook Holding AB	2010
Screen Service Broadcasting Tech. SpA	2007
Screen Technology Group Plc	2005
SeLoger.com SA	2006
Sepura Plc	2007
Seven Principles AG	2005
SFC Energy AG	2006
Sidetrade SA	2005
SKW Stahl-Metallurgie Holding AG	2006
Snacktime Plc	2007
Social Mix Media Group SA	2006
Società Aeroporto Toscano SpA	2007
Southern Cross Healthcare Group Plc	2006
Sporever Group SA	2005
Squeezy Sports Nutrition NV	2007
SThree Plc	2005
Store Electronic Systems SA	2006
Studsvik AB	2001
Styles & Wood Group Plc	2006
Sword Group SE	2002
Symrise AG	2006
TGE Marine AG	2008
Tilgin AB	2006
Tognum AG	2007
TOM TAILOR Holding AG	2010
Transics International NV	2007
Trevisan Cometal SpA	2003
Wacker Neuson SE	2007
Valsoia SpA	2006
Wavin NV	2006
Wellstream Holdings Plc	2007
Versatel AG	2007
Vétoquinol SA	2006
Wilex AG	2006
Windsor AG	2005
Wraith Plc	2005
VTG AG	2007
Vueling Airlines SA	2006
Xchanging Plc	2007
Xiring SA	2006
YOC AG	2006
zooplus AG	2008
Zumtobel AG	2006