Performance of private equity-owned firms post-IPO

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Abstract

Title: Performance of private equity-owned firms post-IPO

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This paper examines the effect of private equity involvement in initial public offerings. Two regression models were applied to assess the data ranging from 2006 and 2017 with IPOs on Nasdaq Stockholm. The dataset includes 126 firms out of which 33 were private equity-sponsored.

The first regression model predicts next year's return on assets with financials from the year prior to, and the year of the IPO. The second regression is using cumulative abnormal returns as dependent variable. Cumulative abnormal returns are computed for four different time windows following the event of the IPO, in order to measure the effect private equity firms have on companies they are backing in the event of an IPO.

t can be concluded that private equity firms have a positive impact through their involvement, both in terms of return on assets and cumulative abnormal returns. However, the positive effect on cumulative abnormal returns can only be validated for the three-month period following the initial public offering.

Keywords: Nasdaq Stockholm, private equity, initial public offering, private equity-backed IPOs, cumulative abnormal returns, operating performance.

Abstract

Título: Desempenho de IPOs financiados com capital privado

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Este artigo examina o efeito do envolvimento de capital privado em ofertas públicas iniciais. Dois modelos de regressão foram aplicados para avaliar os dados que variam de 2006 e 2017 com IPOs na Nasdaq Estocolmo. O conjunto de dados inclui 126 empresas, das quais 33 foram patrocinadas por capital privado.

O primeiro modelo de regressão prevê o retorno do ano que vem sobre ativos com informações financeiras do ano anterior ao ano do IPO. A segunda regressão está usando retornos anormais cumulativos como variável dependente. Os retornos anormais acumulados são calculados por quatro janelas de tempo diferentes após o evento do IPO, a fim de medir o efeito que as empresas de private equity têm nas empresas que estão apoiando no caso de um IPO.

Pode-se concluir que as empresas de private equity têm um impacto positivo por meio de seu envolvimento, tanto em termos de retorno sobre ativos quanto em retornos anormais cumulativos. No entanto, o efeito positivo nos retornos anormais cumulativos só pode ser validado pelo período de três meses após a oferta pública inicial.

Palavras-chave: Nasdaq Stockholm, capital privado, private equity, oferta pública inicial, IPOs financiados com capital privado, cumulative abnormal returns, desempenho operacional.

Term sheet

AMEX	American Stock Exchange
BHARs	Buy-and-Hold Abnormal Returns
CAARs	Cumulative Abnormal Returns
Capex	Capital Expenditure
CAPM	Capital Asset Pricing Model
D/E	Debt-to-Equity
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EV	Enterprise Value
GDP	Gross Domestic Product
IPO	Initial Public Offering
LBO	Leveraged Buyout
M&A	Mergers and Acquisitions
NYSE	New York Stock Exchange
OMX30S	OMX 30 Stockholm
P/B	Price-to-Book Value
P/E	Price/Earnings Ratio
P&L	Profit and Loss Statement
PE	Private Equity
PPE	Property, Plant and Equipment
RLBO	Reversed Leveraged Buyout
ROA	Return on Assets
ROE	Return on Equity
SEO	Seasoned Equity Offerings
SMEs	Small and Medium-sized Enterprises
VC	Venture Capital
WC	Working Capital

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1. Introduction

Through a continuous development of technology and increased globalization, the world and the financial markets get increasingly intertwined. This enables investments in both new and previously not as easily accessible investment opportunities in numerous asset classes. Today, information is much more easily available and more people invest in the stock market. Therefore, it is natural that investment strategies are developed around a vast amount of potential investment opportunities, since it is of investors' best interest. In addition, researchers conduct studies around all different markets, financial instruments and events that sparks the interest.

With regards to the reasons earlier mentioned, it comes as no surprise that initial public offerings are a much studied subject. There are several studies that address the IPO underpricing and poor performance, in terms of stock returns, of companies post IPO. The general notion from previous research seems to be that firms which display positive returns during their first day going public, to show underperformance from thereon, in the long run going forward.

Private equity (PE) funds usually acquire companies through leveraged buyouts, which is described as majority stake investments in private companies with a considerable portion of debt, where the firm later is enhanced through active ownership and capital injections via efficient financing. Since the inception in the United States during the 1980s, the overall attractiveness of private equity as an asset class has altered during business cycles. Today, it seems more popular than ever.

A much pursued strategy for selling (exiting) investments made in portfolio companies by private equity funds, is by listing it on an exchange through an initial public offering (IPO), and divesting the shares to the public. Private equity funds are known for creating large returns on investments, and some believe they are not creating any real value.

Therefore, the performance of IPOs where a PE fund is backing the target subject of going public has received attention in media, especially in the United States and in the United Kingdom. These two markets are at the forefront for the asset class of private equity investments, and are considered as developed. Sweden, in spite of not being as large with regards to the size of the economy, is also surprisingly established and has many actors active in both traditional private equity- and venture capital investments. Reasons for this is believed

to be the robust legal system, a high degree of education through free access, and the history of entrepreneurial spirit which has created several multinational corporations.

However, the Swedish debate regarding these type of funds is more on a political scale where the most left-wing party want to prohibit PE funds to have ownership stake in businesses operating within the welfare sector. This serves as proof of the topic's immediacy outside the realm of academia.

1.1 Problem statement

Several studies have been conducted around both performance of initial public offerings, and initial public offerings where the company being listed is wholly or partially owned by PE funds. However, this research is more extensive for larger economies.

For Swedish companies going through the process of an IPO, the amount of research is fairly scarce. Therefore, this study strives to fill a gap in the existing literature by contributing with observations from the Swedish financial market, more specifically Nasdaq Stockholm.

In order to address the topic this study will focus on;

I. What are the difference between private equity-sponsored and non-sponsored firms that went through an IPO, in terms of return on assets?
II. How do the stock price returns deviate between these two groups of firms during the period following the initial public offering, in terms of cumulative abnormal returns?

For the models chosen this translates to that there should be evidence of differences between the two different groups of IPOs.

2. Literature review

Funds specialized in acquiring companies with small amounts of equity and substantially larger part of external debt in leveraged buyouts (LBOs) are commonly referred to as private equity (PE) firms, as described by Kaplan & Stromberg (2009). In a traditional LBO transaction, the private equity fund acquires a majority stake in mature, private companies with seasoned management teams and stable cash flows. These firms are enhanced through active ownership and effective financing during the fund's lifecycle, with ownership that usually lasts five to seven years. The phenomenon of LBOs and private equity firms first appeared in United States during the 80's, and has since then increased in attractiveness as an asset class. For instance, when looking at the Global PE capital raised (in $1,000 billions), the amount totaled to $105 in year 2003. This figure grew each year until the 2008's financial crisis, where it dipped significantly. In 2015 it surpassed the previous record levels of 2008, and peaked in 2017 with $855. Buyout funds constitute the lion's share of the global PE capital raised between 2003 and 2018, Bain & Company (2019).

In spite of Sweden not being a large economy, the private equity market is remarkably developed. Private equity helps small and medium-sized enterprises (SMEs) to reach their full potential and can provide better access to capital markets. Moreover, empirical studies show that companies backed by Swedish private equity firms display a relatively higher profitability and productivity post-acquisition, than similar firms without PE-backing. Between 2007 and 2017, the funding provided by PE-funds added up to fifteen billion euros, which roughly is equivalent to the amount IPO capital issued by Nasdaq Stockholm in the same time period. These companies were responsible for 270,000 job opportunities and 5.5% of the Swedish gross domestic product (GDP), SVCA (2017).

IPOs are a sought way to exit investments made by PE firms. The rational for exiting a firm through an IPO is simply due to the returns being abnormal when compared to other options, Das, Jagannathan & Sarin (2002). High valuations have further fueled the interest of IPOs in general, and PE-backed IPOs in particular. This is interesting from a larger perspective outside the academic sphere, because of the debate in Sweden around performance of IPOs, and whether or not PE-firms should be able operate in industries which otherwise rely on governmental funding, such as elderly care, healthcare and education. This paper could highlight the reality on company fundamentals and financial performance for different companies that go public, while there is evidence that PE-firms contribute to stimulating the economy and the creation of jobs.

There is a handful of existing literature that investigates IPO pricing and the aftermarket performance of companies after being listed. Jain & Kini (1994) study the operating performance of IPO firms, measured by operating return on assets and operating cash flows scaled by the firm's assets, in comparison to the levels seen before the IPO. The authors show that firms that go public, in general, demonstrate a reduction in operating performance, after the event of an IPO. The trade-off for lower operating performance, is an increase in sales and capex in the post-IPO period, relative to firms in the same industry, which are public. Another finding, is that the firms where a higher ownership stake is kept by the entrepreneur post-IPO, tend to perform better in comparison to other issuing firms, in general. The authors do not find any connection between the initial returns of the initial public offering and post-IPO operating performance. Moreover, the authors believe it is contradictory how firms that go public usually are priced at high price/earnings (P/E) ratios. This translates to a belief among investors that there will be an increased future growth of the company. Moreover, the authors find empirical evidence that profit margins before the IPO, which serves as the foundation for the future expectations, are not upheld. To explain why IPO firms' operational performance decline post-issue, one could point to increased agency costs when going public. This would be a result of reduced ownership from the initial owners post-IPO, as the conflict of interest increases with a higher amount of shareholders.

Another explanation for the reduced operating performance could be "altering" the financial numbers prior to the IPO to the point where those levels could be kept later on. This would be done in order to achieve a successful IPO, by increasing the money raised from the operation. As a result, the performance post-IPO will, of course not, live up to the initially set of expectations. Lastly, there could be a timing aspect, in which entrepreneurs would time their IPO to certain periods with particularly strong financials. The common denominator for all these possible reasons are information asymmetry and conflict of interest.

Brav & Gompers (1997) study long-term performance of IPOs between 1972 and 1992. The sample contains both venture-backed and non-venture-backed firms that went public. The authors examine the performance of these newly listed firms on a five-year period, post-IPO. They find that firms who are backed by VC-companies outperforms their non-VC-backed counterparts, when looking at equally weighted returns. The authors test the performance of IPO firms with several different benchmarks, market indexes (S&P 500, Nasdaq composite, NYSE/AMEX value-weighted, NYSE/AMEX equal-weighted), industry portfolios, Fama-French three factor model and portfolios matched by book-to-market and size. Measuring the

performance of IPO firms, the results show that what drives poor performance among the non-VC-backed issuers is its small size, in terms of market capitalization. Moreover, when looking at the value weighted returns the poor performance is reduced in comparison to the benchmark indexes. Lastly, there is evidence of correlation in underperformance and time of the year, regardless of which year the firm goes public. To conclude, the found underperformance does not solely seem to be a result of the IPO, as firms do not underperform when matched in terms of size, book-to-market ratio and companies that have issued equity in recent time are excluded. One possible justification for the phenomenon of underperformance could be that investors tend to methodically overestimate the possible future growth prospects of the IPO firm. Also asymmetric information may have an effect due to institutional investors being more informed than small shareholders, and more actively monitoring their portfolio holdings.

Ritter (1991) investigates underpricing of IPOs that took place between 1975 and 1984, and their aftermarket performance for a three-year period. When looking at the returns of the first trading day (opening price compared to closing price of the initial day of trading) the author refers to a previous work of by Ibbotson, Sindelar & Ritter (1988) which studied a sample of 8,668 IPOs that were listed between 1960 and 1987 in the United States. These firms display an average return of 16.4%. Moreover, there are certain periods where the returns of the first trading day are even more notable. However, the aftermarket long-term (three-year) performance is not as promising, as the IPO firms performed substantially worse than a group of comparable firms, matched by industry and size. IPOs are of interest for several reasons. First, to investigate the performance of IPOs is the investor's best interest: identifying different patterns an investor can be able to develop strategies for trading and generate abnormal returns. Secondly, aftermarket performance of IPOs can provide evidence of different hypotheses, e.g. Shiller (1990), who states that equity markets with specific emphasis on the market for IPOs are sensitive to current trends which can affect market prices to a certain extent.

Ritter (2018) measures the performance for different IPO groups. The sample contains IPOs between 1980 and 2016. The first day returns for IPOs of VC-backed firms were on average 26.8%, while their non-VC and non-buyout counterparts yielded an average return of 13.5%. Moreover, when comparing the groups using a three-year buy-and-hold strategy, the VC-backed IPOs had a return of 24.7%, while the non-financially sponsored group showed a return of 16.6%. When doing the same exercise with the distinction of making the returns market-adjusted, both groups instead showed returns of -10.9% and -29.7%, respectively.

Levis (2011) conducted a study, that examined initial returns as well as the aftermarket performance for private equity- and VC-sponsored IPOs. The underlying data used is quite recent in comparison to many other studies, ranging from 1992-2005. However, the study examines issues on the London Stock Exchange. Since there is evidence of superior performance of PE-backed IPOs during recent years, the interest has increased. For instance, Cao & Lerner (2009) study reversed leveraged buyouts (RLBO) i.e. firms that previously were acquired by a private equity fund and later exited through an IPO. The paper contains 526 RLBOs from 1986 until 2003. Through cross-sectional analysis, the authors find that RLBOs continuously beats "regular" IPOs and the overall market. The typical RLBO is larger in size, and both more profitable and more heavily levered. However, the superior performance and number of RLBOs seems to be shrinking towards the end of the sample period. Another interesting conclusion from the authors is the existence of a weak correlation between high leverage post-IPO and poor performance.

Levis discusses the two works of Jensen (1986, 1989), and argues that the recipe for successful PE investments includes the improvements in operational efficiencies, increased leverage, managerial proficiency and close monitoring. Moreover, it is reasonable to assume that these value drivers are also in place when the firm is no longer in the PE fund's possession. The PE player is accountable for structuring the terms of the IPO, and does not leave the company entirely when the firm goes public, as a result of regulation for lock-up period. Those could be reasons for IPOs being a suitable method for measuring the "PE-effect" on firm's performance. In other literature the PE-effect is also referred to achieving goals by spurring management incentive programs, and if several individuals are heavily rewarded for achieving financial goals, it often happens.

Furthermore, Levis (2011) aims to identify the central differences, in terms of firm characteristics, between PE-, VC- and non-backed initial public offerings. The author finds that there are notable differences among the different IPO groups. The differences are evident for the firms' assets, market capitalization, debt levels, operational efficiency measures, and profitability, where all of these parameters are higher for the PE-group of IPOs. Meanwhile, the underpricing for the PE-group is lower at the point where the company is offered to the public, in comparison to the others. This is consistent with the fact that PE-funds target larger firms, which are in a mature stage, and as a result it would lower the overall risk with PE-IPOs at floatation.

To evaluate the performance in the aftermarket, Levis (2011) utilizes a three-year buy-and-hold strategy. For the PE-backed IPOs, the returns are statistically significant and positive during the sample period. Returns are measured as buy-and-hold abnormal returns (BHARs) compared to four different indexes; Financial Times All-Share Index, Size-Adjusted Index, FTSE10 Group Industry Classification and a size and book-to-market-adjusted benchmark. Meanwhile, the control groups VC- and non-sponsored IPOs perform worse or present negative returns.

When looking at the returns from the first trading day post-IPO, the results are concordant with the theory that investors who commit to an IPO are the ones who are most hopeful for the firm's future. VC- and non-sponsored IPOs displayed high initial returns during the first day of trading, and poor performance in the aftermarket. Loughran & Ritter (1995) studied IPOs from 1970 until 1990 and found that both seasoned equity offerings (SEOs) and IPOs have been deprived investments for investors, since it only yielded annual average returns between seven and five percent for SEOs and IPOs, respectively. Miller (1977) addresses investor behavior in terms different opinions regarding uncertainty and risk. The capital asset pricing model (CAPM) assumes that all investors have the same distribution of the probability for all returns, as well as the same expected returns for all securities. However, the reality is a bit different. Investors' opinions can diverge by some of them adding premiums for uncertainty when evaluating potential investment opportunities. Demand for different projects or investments comes from those with the most optimistic expectations.

In conclusion, Levis (2011) made some additional findings. For instance, IPOs that were PE-sponsored tend to focus around certain industries; typically, consumer goods and services. Moreover, these IPOs are noticeably more "accurately" priced, with less underpricing. Lastly, the PE-backed firms that went public in IPOs were not as sensitive for periods of "hot markets" when looking at the first-day returns.

The long-run price development of the stocks that went public with PE-backing showed statistically significant and positive cumulative abnormal returns (CAARs), which would mean that these firms beat the benchmark performance measurement. In comparison, the other two groups of IPOs (VC and non-sponsored), appear to be performing poorly in the following three years in the aftermarket, after going public. How venture capital differs from more traditional private equity with leveraged buyouts, is the fact that private equity funds are typically larger than VC funds, in terms of capital. Private equity funds invest in a much later stage, where the target company is more mature and generates profit, and invests in fewer companies than VC funds. VC funds typically invests in startups.

Rosen (2006) conducts a study where the market's reaction to an announced merger is examined. In order to determine whether the reaction of a bidding firm's stock price is a result of the recent merger history, both in the overall market and for the bidding firm, an event study is used. To measure the effect of the announced merger, Rosen uses cumulative abnormal returns in the event window of five days surrounding the first announcement. Therefore, the two days prior to the merger announcement, the day of the announcement, and the two days post-announcement is used to create the event window. To compute the CAARs, Rosen adds the return of the stock for the bidding firm less the return of the index for each of the five days in the event window. In Rosen's case, he uses a value-weighted index as benchmark for the "normal state" of the returns. However, Rosen stresses the importance of using an index with high correlation to the returns of the bidding firm, in the case that the firm had not announced a merger.

To support this, Rosen (2006) refers to Mitchell and Mulherin (1996), who study patterns across more than 50 industries during the eighties. The authors show that "merger waves", which is described as certain periods with peculiarly high M&A activity, is a result of shocks occurring in the different industries subsequent takeovers and restructuring. Stock price reactions following these shocks tend to have a spillover influence on the entire industry during merger waves. The authors are assuming these industry shocks and takeover activity to be linked, where the industries are structured by number of firms, as well as their size – which is determined by the technological development, governmental policies and supply and demand dynamics. Any factor that alters these fundamentals will cause a shift in the industry structure.

Therefore, using an industry specific index as benchmark for the normal state of returns seems as the most superior choice. As a result, the factors affecting a certain industry will be captured more distinctively when looking at a specific firm's performance in comparison to their peers.

Rostami, Rostami & Kohansal (2016) study corporate governance effects on firms' ROA and stock returns for companies listed on Tehran Stock Exchange. Close to 470 firm years are gathered over a span of seven years to test the hypothesis. Mechanisms to measure corporate governance are, inter alia, concentration of ownership, involvement of institutional investors and independence of the board. The presented findings suggest that there is evidence of a positive effect on ROA from ownership concentration and independence of the board. Whereas institutional owner involvement on ROA. Meanwhile, institutional ownership affects stock returns positively. Moreover, the authors present previous similar work from other authors who

also uses different variations of return on assets as a measure of operating performance. Examples of this are Andreou, Louca & Panayides (2014) as well as Giroud & Mueller (2011).

3. Data

3.1 Data collection

In order to be able to perform the statistical analysis regarding the performance of the different types of IPOs, a large exercise of data collection was done. First, all completed IPOs between 2006-01-01 and 2017-12-31 on Nasdaq Stockholm, were gathered manually. The justification behind only taking the firms that were listed on Nasdaq Stockholm was the fact that it is the biggest and most prominent list, and the requirements on regulatory policies are higher, and therefore the data should be more complete. The reason for excluding all IPOs after the last day of 2017 was a result of the need for a complete fiscal year after the year of the IPO, and there is usually a delay before the complete financials of 2019 are presented. Data was required for three years in total, the year of the initial public offering as well as the two adjacent years. This was the case since one of the regressions uses a one-year lag on return on assets when predicting next year's ROA based on the firm's financials one year in advance. It is very uncommon for firms to be directly listed on Nasdaq Stockholm. Instead, they listed on a smaller exchange and later relisted when fulfilling the requirements of Nasdaq Stockholm, which is the most established list. Therefore, the selected firms had most of the data available for the required years around the event of the IPO.

Second, Reuters Instrument Codes (RIC) were taken from Thomson Reuters Eikon. These codes serve as a type of ticker to identify stocks in Thomson Reuters Datastream. All stocks that were dual-listed were removed since it caused trouble when trying to retrieve the financial data. Moreover, a few companies that displayed error codes or completely missing data, were removed.

Third, information about each IPO was collected, in order to find evidence of private equity firm involvement in the listing. This was expressed as a dummy variable taking the value 1 for PE-involvement (Private Equity involvement), and 0 for a "non-sponsored" IPOs. Private Equity involvement means that one or more Private Equity firms owned more than 50 of the firm subject for an initial public offering.

Only the IPOs were private equity firms had majority interest were selected for the data sample. Three exceptions were made, were evidence of PE-involvement were found, but the exact ownership stake was not specified, or just is below controlling interest. However, there was strong reason to believe that the ownership of one or several PE firms had a strong impact on how the firm was developing up to the point of the IPO. One example could be where a VC

fund had over 40 percent ownership stake in the company, but it had been reduced over time through additional rounds of funding, and hence experiencing a dilutive effect. In addition to this, the date of the IPO, as in the first trading day were noted in order to be able to check the first day returns.

For each firm, the following data items were retrieved on a yearly basis (see exceptions stated below);

Net sales or revenues – Worldscope (WC01001)
Total assets – Worldscope (WC02999)
Long term debt – Worldscope (WC03251)
Short term debt & current portion of long term debt – Worldscope (WC03051)
Common equity – Worldscope (WC03501)
Earnings before interest, taxes & depreciation – Worldscope (WC18198)
Cash – Worldscope (WC02003)
Net income after preferred dividends (Basic EPS) – Worldscope (WC01706)
Common shares outstanding – Datastream (WC05301)
Enterprise value – Worldscope (WC18100)
Price (Adjusted – Default) – Datastream (P) (Daily values)
Price – Opening – Datastream (PO) (Daily values)
Price to book value – Datastream (PTBV)
Current assets total – Worldscope (WC02201)
Current liabilities total – Worldscope (WC03101)
Capital expenditures (Additions to fixed assets) – Worldscope (WC04601)
Property, plant and equipment net – Worldscope (WC02501)
Return on assets – *(Net income after preferred dividends / Total assets)*
Return on equity – *(Net income after preferred dividends / Common equity)*
Working capital – *(Current assets total – Current liabilities total)*
Debt-to-equity ratio – *((Long term debt + Short term debt) / Common equity))*

In order to be able to compute the cumulative abnormal returns, benchmark indexes for each industry had to be retrieved. As previously discussed in the literature review, it is of great importance to choose a benchmark index with high correlation, in terms of market movements, to the changes in stock price of the firm active in the particular industry.

Since the data retrieved for the companies did not come with any system to identify in which industry the companies operated in, a number system based on two digits were created. Industry specific price indexes were taken from OMX Nasdaq Nordic. The table below presents the price index which was used as benchmark for the normal state of the returns within a certain industry, as well as which SIC code that corresponds to that industry;

Table 1: Sector specific indexes used per industry

Industry specific index	Industry	SIC
Personal goods PI	Beauty/Health	11
Basic resources PI	Commodities	12
Software computer services PI	Data/IT	13
OMX Stockholm PI	Education	14
Alternative energy PI	Energy	15
Retail PI	Fashion/Clothing	16
Financial services PI	Finance	17
Food and beverage PI	Food	18
Industrials PI	Industrial	19
Healthcare PI	Medical	20
Real estate PI	Real estate	21
Retail PI	Retail	22
Consumer services PI	Services	23
Telecom PI	Telecom	24
Travel and leisure PI	Travel	25

Note: The SIC codes are only made up in order to keep track of the industries while performing all the calculations. The SIC codes does not have any connection to any real industry identifying codes. In the table one can see the chosen benchmark index per industry used to compute the cumulative abnormal returns.

3.2 Sample

The final sample included a total of 126 companies that were listed on Nasdaq Stockholm between 2006-01-01 and 2017-12-31. Out of these 126 firms, 33 had PE involvement at the time of its IPO. In total the sample consisted of 378 firm-year observations; composed with data from the year of the IPO, as well as the year before and the year after. Out of the 33 IPOs with PE-involvement, only three could be classified as venture capital focused. The rest had a more traditional buyout focus. Because of the small number of VC-backed firms, no distinction between PE and VC will be made in this study.

3.3 Data limitations

Limitations in the data made it impossible to use firms' quarterly data and therefore instead yearly data was used. Even though Thomson Reuters Datastream supports the extraction of quarterly financial data for Swedish firms, all the values used correspond to the end of a given year.

Moreover, firms that went public in 2018 could not be included in the sample. The reason was that I required two years around of the event of the IPO to be able to run the regression models. At the time of this study no data was yet available for the year of 2019.

The price indexes selected as benchmarks for each industry are not perfect, due to lack of some industry specific indexes. For instance, in the case of "Education" the OMX Stockholm PI (OMXSPI) which is an "all-share index" was used, and it is constituted of all stocks listed on the Stockholm stock exchange. However, the vast majority of the sector indexes are a good fit for the industry they are representing in this study. Correlation between the returns of the firm and their corresponding benchmark index should be high. Further suggestions for research, partly as an effect of data limitations, will be discussed in a later section.

4. Methodology

4.1 Regression models

This paper serves two purposes. The models shown below will be applied to two different groups of IPO firms, in order to investigate the research questions. The first model will be used to assess the differences in terms of ROA between the two IPO groups. I will assess next year's ROA based on sales, D/E ratio, ebitda and ppe. The second mode will test the effect firm characteristics such as sales, cash, capex and the operational efficiency measure ROE have on first-day, three-months, six-months and twelve-months abnormal returns in the two IPO groups. The following models will be applied:

$$Return\ on\ assets_{t+1\ Year} = f(sales, debt\text{-}to\text{-}equity\ ratio, ebitda, ppe, pe\text{-}sponsor\ dummy)$$

$$CAARs_{t+n\ months} = f(sales, cash, capex, return\ on\ equity, pe\text{-}sponsor\ dummy)$$

In order to run the regressions, the computer software Stata will be used. In this paper the panel data is weakly balanced, which means that there are not observations for each firm for all the years throughout the time period. This has to do with the nature of this exhibit which more resembles an event study, as it focuses on the effects resulting from a particular event. When performing these regressions, it is of importance to make sure the time-, and industry fixed effects are taken into consideration. By including the industry of time fixed effects, all average differences within the panel data groups, both unobservable and observable are being controlled for.

When performing the second regression where cumulative abnormal returns is the dependent variable, it is not panel data, since each firm only have got one observations from one year, which is the year of the IPO. I will check the impact of being PE-sponsored in terms of cumulative abnormal returns post-IPO for four different time windows; first-day, three-months, six-months and twelve months CAARs.

4.2 Dependent variable

For the models, two different dependent variables will be used. The model which is trying to predicts next year's return on assets aims at capturing the changes from the fiscal year before the IPO until the year of the IPO. This model serves to explain how firms are preparing themselves for an IPO, as well as to pinpoint differences between the two IPO groups. The first model with ROA as dependent variable, will highlight which financial items that have the most impact on ROA one year in advance, around the event of an IPO. This will give answers to

whether or not firms that are backed by a PE-fund and goes through an IPO are performing better or not, than their non-backed counterparts in terms of return on assets.

Return on assets was chosen as the dependent variable since it is a substantial financial ratio. It presents the firm's profitability. ROA seemed like the best way to predict how well a company was performing, if you only were to choose one dependent variable. In accordance with the work of Rostami, Rostamy & Kohansal (2016) and in union with the referencing these authors made to similar work, return on assets is widely accepted as a measurement of operating performance. For this regression, ROA has a lag of one year forward in time, in order to see if ROA can be predicted one year in advance based on previous year's financial items and ratios.

For the second regression, it is instead the cumulative abnormal returns that will be predicted. This will unravel which IPOs that, in theory, are favorable for investors to subscribe to in terms of returns during a specified window in excess of the return of the market, as in comparable benchmark index, for the same given period. This is relevant due to the vast amount of literature that discusses IPO underpricing and initial returns of IPO firms.

Daily values of the benchmark indexes presented in the data chapter were extracted. Then the returns for each trading day were calculated, together with the returns for every trading day for each of the firms in the sample.

$$Return\ for\ trading\ day\ of\ firm = \frac{Closing\ price}{Opening\ price} - 1$$

$$Return\ index\ of\ day = \frac{Closing\ price}{Opening\ price} - 1$$

The returns of the benchmark index are considered as the normal state of the returns. Since the industry specific indexes are comprised of firms active in the same sector, general trends in each industry should be captured to the largest extent possible

As a first step, the initial returns were linearized. The linearized returns are defined as follows:

$$Return^{e} = ln(1 + Return)$$

The linearized cumulative abnormal returns for a period was calculated the following way, by adding up the CAAR for each day during a specified time window:

$$CAARs_{Period\ n} = \sum (Returns\ firm - Returns\ index)$$

As shown in the formula above, to compute the CAARs for a specific period, the returns for the index are summed and then subtracted from the summed returns of the firm for the same period. This exercise was done for four time periods; the first trading day of the IPO, as well as the three-, six- and twelve months post-IPO. Following the work of several authors, for instance Rosen (2006) who also uses CAARs to measure stock market reactions to certain events, the rationale for using this measure as dependent variable seems self-evident.

4.3 Independent variables

The set of independent variables were chosen in order to measure how much of the variation in the dependent variable that can be measured from the independent ones.

The financials were scaled by assets. This means that for sales, long-term debt, ebitda and so forth were divided by the firm's assets according to the example below:

$$Sales\ scaled\ by\ assets_{Year\ n} = \frac{Sales_{Year\ n}}{Total\ assets_{Year\ n}}$$

This was done for each of the years for every firm in the dataset's financials. Furthermore, for some financial items that were not suitable to scale by assets (for instance assets itself) the natural logarithm was applied instead to reduce the size of the numbers. Another example of this would be enterprise value Enterprise value takes the firm's market capitalization (market value of equity) into account, as well as the net debt and is relatively close connected to assets. Hence, the natural logarithm was also applied to enterprise value.

For the metrics price-to-book ratio, return on assets, debt-to-equity ratio and return on equity nothing was done as they already are expressed as a ratio.

The main reason for selecting the chosen independent variables, was because they were believed to have an impact on ROA, without having too high correlation. Usually, this is described as multicollinearity, and occurs when the variables chosen as predictors have a strong correlation to the dependent variable. In the case of the regression where ROA serves as dependent variable, for example net income and total assets would have high correlation.

When choosing independent variables, the number of observations for the data point must be taken into account since some metrics are not available before the point of the IPO. Moreover, some variables are closely related to each other and both of them should not be included in the regression model. Cash is a current asset and hence often included when computing the working capital, therefore only one of cash and NWC should be used. Capex is investments and

maintenance of fixed assets or tangible assets, such as property, plant and equipment. As a result, both of them should not be used in the models since there is usually a strong correlation between the amount of fixed assets a firm possesses and how much capital expenditure that is required to maintain these.

5. Descriptive statistics

In total, the sample consists of 126 IPOs between 2006 and 2017 on Nasdaq Stockholm. For the studied sample, most IPOs were registered in 2017, where the general trend is a significant increase in IPOs from 2014 and onwards.

Table 2: Summary of IPOs per year and by sector (PE-sponsored IPOs in parentheses)

IPOs per year			**IPOs per sector**		
2006	3		Commodities	5	(0)
2007	3	(1)	Data/IT	23	(4)
2008	8		Industrial	25	(10)
2009	6		Real Estate	10	(0)
2010	10	(2)	Medical	20	(1)
2011	10	(2)	Retail	7	(3)
2012	3		Services	19	(10)
2013	4		Food	2	(1)
2014	15	(4)	Telecom	1	(0)
2015	23	(10)	Fashion/Clothing	1	(0)
2016	17	(6)	Finance	9	(2)
2017	24	(8)	Energy	1	(0)
			Travel	1	(0)
			Education	1	(1)
			Beauty/Health	1	(1)

Note: The sample contains data from IPOs on Nasdaq Stockholm from 2006-2017. In total there were 126 IPOs out of which 33 had PE involvement. (PE-sponsored IPOs in parentheses)

When looking at the specific industries, industrial companies dominated with 25 IPOs during the studied time period. The industrials sector recorded the most IPOs accounting for 25 out of the 126 IPOs. The industrial sector was closely followed by the data and information technology industry where 23 IPOs were registered.

Out of the total 126 IPOs in the sample, 33 had PE involvement. Among the PE-backed IPOs there were two dominating sectors; “industrial” and “services”, which both accounted for ten PE-backed IPOs each.

Table 3: Summary statistics for Non-backed firms

	IPO -1 year				Year of IPO				IPO +1 year			
	Obs	Mean	Median	St. Dev.	Obs	Mean	Median	St. Dev.	Obs	Mean	Median	St. Dev.
sales/assets	91	1.0434	0.9734	0.8383	93	0.9978	0.9208	0.8117	93	1.0198	0.9069	0.8336
ln(total assets)	92	13.5528	13.4996	1.7206	93	13.8404	13.9226	1.6506	93	14.0004	14.0542	1.6074
long-term debt/assets	91	0.1550	0.0656	0.2077	93	0.1351	0.0523	0.1735	92	0.1267	0.0477	0.1638
ebitda/assets	87	0.0610	0.0988	0.3271	90	0.0765	0.1078	0.2092	93	0.0752	0.1022	0.2113
cash/assets	67	0.1618	0.0800	0.2154	73	0.2027	0.1158	0.2302	77	0.1938	0.1026	0.2204
ln(enterprise value)	45	13.5634	13.4913	1.2585	86	14.1367	13.8441	1.5942	91	14.2875	14.3910	1.6042
price-to-book	48	2.9156	2.1450	2.9795	52	3.4496	2.1250	3.9971	93	2.9708	1.9300	3.0708
working capital/assets	90	0.1850	0.1766	0.2654	91	0.2314	0.1976	0.2486	91	0.2028	0.1522	0.2663
ppe/assets	92	0.1784	0.0451	0.2637	93	0.1723	0.0471	0.2544	93	0.1760	0.0523	0.2592
capex/assets	91	0.0530	0.0193	0.1106	92	0.0448	0.0195	0.0749	93	0.0393	0.0154	0.0565
return on assets	91	0.0074	0.0338	0.3128	93	0.0273	0.0466	0.1852	93	0.0169	0.0584	0.2025
debt-to-equity	88	1.5048	0.4418	4.5453	92	0.7036	0.2621	1.6155	89	0.5902	0.2648	0.8595
return on equity	91	-0.2806	0.1144	4.9298	93	0.0848	0.1316	0.2632	93	0.0437	0.1243	0.4895

Table 4: Summary statistics for PE-backed firms

	IPO -1 year				Year of IPO				IPO +1 year			
	Obs	Mean	Median	St. Dev.	Obs	Mean	Median	St. Dev.	Obs	Mean	Median	St. Dev.
sales/assets	32	0.9507	0.9771	0.4868	33	1.0170	1.0592	0.4855	33	1.0351	1.0304	0.4975
ln(total assets)	32	14.8948	15.0337	1.4761	33	15.0278	15.0068	1.2372	33	15.1083	14.9905	1.2122
long-term debt/assets	32	0.3378	0.3578	0.1904	33	0.2364	0.2375	0.1160	33	0.2210	0.2366	0.1230
ebitda/assets	32	0.0271	0.0901	0.3830	33	0.0854	0.0926	0.1190	33	0.0784	0.1034	0.1917
cash/assets	32	0.1084	0.0586	0.1429	33	0.1021	0.0504	0.1596	32	0.0997	0.0650	0.1591
ln(enterprise value)	1	12.7513	12.7513	0.0000	31	15.3159	15.2735	0.9974	33	15.2956	15.5008	1.0531
price-to-book	2	0.0000	0.0000	0.0000	3	1.6433	0.0000	2.8463	33	2.5194	2.2300	1.9379
working capital/assets	32	0.0804	0.0308	0.1679	33	0.1041	0.0678	0.2177	33	0.0993	0.0606	0.2014
ppe/assets	32	0.0806	0.0630	0.0750	33	0.0868	0.0766	0.0745	33	0.0872	0.0747	0.0780
capex/assets	31	0.0173	0.0139	0.0136	33	0.0260	0.0149	0.0259	33	0.0200	0.0158	0.0176
return on assets	32	-0.0341	0.0204	0.3715	33	0.0286	0.0399	0.1047	33	0.0277	0.0574	0.1797
debt-to-equity	32	2.2685	1.3144	4.1175	33	0.6617	0.6403	0.3550	33	0.6436	0.6841	0.3620
return on equity	32	-0.0419	0.0979	0.7963	33	0.0796	0.0914	0.1396	33	0.0806	0.1345	0.2691

Note: In this table, each financial item or ratio corresponds to the year stated in the header, and no lag for ROA was used.

When looking at the mean and medians for the two different IPO groups for each of the three years used to form the dataset, some conclusions can be made for these companies during the

studied years. The table above shows whether PE- or non-backed firms had the highest mean and median for the respective financial item or ratio. By looking at the table above, it should give a general idea of the distribution of the data between the two different groups, during the specific time period and for this particular sample.

When looking at the mean for the year prior to the IPO, the non-backed firms had higher sales to assets, on average. However, while moving forward to the year of the IPO and one year post-IPO the PE-backed firms showed higher sales in relation to assets which was consistent with the medians of the sample as well.

Both the means and medians, when looking at the logarithmized assets, where higher for the PE-backed firms. The same holds for the long-term debt/assets.

For ebitda to assets, the pattern follows the one of sales, where the non-backed firms showed a higher ebitda in relation to assets prior to the IPO. Later, the PE-backed firms surpassed the non-backed firms for the year of the IPO and post-IPO.

In terms of cash, the non-backed firms showed higher cash/assets consistently through the sample.

Enterprise value had few observations for the year prior to the IPO. Especially when looking at the PE-backed firms. Considering the year post-IPO, the PE-backed firms had higher enterprise values, on average. This implies that the PE-backed firms are larger, which goes in line with PE-firms having more assets as well.

Regarding price-to-book ratio, there were only a full set of observations for the year post-IPO. Hence, the only conclusion to be made is that for these firms, non-backed firms had a higher price-to-book ratio on average. If a stock is trading at a P/B value below 1, it might imply that the stock is undervalued. In this case, both of the means for the two different groups are above 2.5.

Working capital and cash are somewhat related due to the fact that cash is considered a quick current asset. As in the case with cash, the non-backed firms showed the higher working capital to assets ratio for all the periods.

In a similar way capex and PPE are related due to the fact that capex is investments and maintenance of a firm's fixed assets. By looking at the means, one can tell that this relationship holds for the given sample, as the non-backed firms display both higher capex- and PPE in

relation to assets for all the periods. However, the mean and median for PPE differs quite a bit since the PE-backed firms have higher medians.

Return on assets is, on average, higher for the non-backed firms the year before the IPO. However, this changes for the year of the IPO and the year post-IPO, where the PE group shows higher ROA on average.

The PE-group on average had a higher debt-to-equity ratio both prior to, and post-IPO. Return on assets follows the same pattern, which seems reasonable since higher leverage could be utilized in order to achieve higher profit.

Table 5: PE-backed and Non-backed CAARs for different time windows post-IPO

Non-backed CAARs

Variable	Obs	Mean	Median	St. Dev.	Max	Min
first trading day	93	-0.0054	-0.0061	0.0364	0.1091	-0.1309
three months	92	-0.0665	-0.0617	0.1972	0.6739	-0.5217
six months	92	-0.0758	-0.0543	0.3304	0.8168	-0.8622
twelve months	92	-0.0878	-0.0706	0.5407	1.5057	-2.2178

PE-backed CAARs

Variable	Obs	Mean	Median	St. Dev.	Max	Min
first trading day	33	-0.0067	-0.0078	0.0271	0.0449	-0.0944
three months	33	0.0448	0.0433	0.1134	0.3365	-0.2467
six months	33	0.0543	0.0477	0.1884	0.5043	-0.2697
twelve months	33	0.0676	0.0481	0.2792	0.6492	-0.3777

The means and medians of the CAARs inside of the two different IPO groups are relatively close to each other for the four different time periods. The first trading day's CAARs are negative for both of the groups, with the PE-backed showing a larger decline in stock prices the first day following the IPO.

The three months' cumulative abnormal returns are negative for the non-backed, and positive for the PE-backed group, on average. The six month's CAARs is on average higher than the three month's for the PE-backed group, but the same relationship does not hold for the non-backed fims, where the CAARs are even more negative for the six-month period.

Twelve months CAARs are positive for the PE-backed group, where non-backed firms displayed the largest negative returns for the twelve-month period.

6. Results

The regression below predicts next year's return on assets based on sales, debt-to-equity ratio, ebitda and property, plant and equipment scaled by assets, while controlling for PE-sponsor backing. Three different versions of the regression are presented. The year fixed effects regression was the one which showed most explanatory power. Hence, it will be the focus of the analysis in the results section for the regression using ROA as dependent variable.

Table 6: Regression using ROA as dependent variable

Variables	Return on assets$_{+1\ year}$	Year fixed effects Return on assets$_{+1\ year}$	Industry fixed effects Return on assets$_{+1\ year}$
sales/assets	0.0569***	0.0476***	0.0586**
	(0.0150)	(0.0169)	(0.0280)
debt-to-equity ratio	-0.0008	-0.0011	-0.0005
	(0.0031)	(0.0025)	(0.0038)
ebitda/assets	0.2954***	0.2988**	0.2465
	(0.0389)	(0.1437)	(0.2201)
ppe/assets	0.0800	0.0782*	0.0290
	(0.0512)	(0.0470)	(0.0704)
pe-sponsor dummy	0.0201	0.0230*	-0.0021
	(0.0232)	(0.0120)	(0.0344)
Constant	-0.0715***	-0.0624**	-0.0570
	(0.0223)	(0.0289)	(0.0402)
Observations	238	238	238
R-squared	0.3069	0.3329	0.3491

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Due to the relatively small sample, a bootstrap regression with 1,000 repetitions was run for the regression with year fixed effects and industry fixed effects.

Looking at sales/assets, it is significant on the one percent level. Sales is the highest line item on a profit and loss statement (P&L), from which costs are subtracted to finally reach net income as bottom line. Since return on assets is defined as net income/total assets, it is natural that an increase in sales would have a positive impact on return on assets. A one percentage point increase in sales (scaled by assets) would, on average, increase the return on next year's ROA by 0.0476 percentage points, all else held constant.

The debt-to-equity ratio shows a small negative relationship to ROA for all three regressions in the table above. One interpretation could be that high leverage leads to more cost for interest payments which reduces the net income. On the other hand, higher leverage could mean that the company has borrowed cash for investments opportunities, which are supposed to generate

profits which would increase net income. Either way, the coefficient is not statistically significant on any level and hence no certain conclusions can be made.

EBITDA/assets is significant at the five percent level with a positive coefficient. By removing taxes, interest payments, depreciation and amortization you arrive at the net income. Therefore, companies with a higher EBITDA, which often serves as a proxy for free cash flow, in general should have a higher net income. However, it depends on a lot of other factors as well. Keeping in mind that EBITDA is scaled by assets, a company that have higher EBITDA in relation to its assets, probably have higher free cash flow as well. This gives more financial flexibility with opportunities to use the free cash to further increase returns. On average, if EBITDA scaled by assets increases by one percentage point, ROA would increase by 0.2988 percentage points as well if all else is held constant.

When looking at sales and EBITDA on a scaled by assets basis, the difference is that high sales in relation to assets not necessarily would mean better return on assets. It all depends on the margins of the specific firm. This is evident when looking at the coefficients, where ebitda/assets has a much larger impact on ROA than sales/assets.

Property, plant and equipment (PPE) displays a positive coefficient significant at the ten percent level. PPE are the company's fixed assets, and the amount of PPE usually has a strong relationship to how much capex a company spends in order to invest, or maintain the fixed assets. The sector a company operates in usually have impact on how much fixed assets that are needed. For instance, a consulting firm or software company does not need as much fixed assets as a producing industrial firm. Here PPE represents the amount of PPE in relation to total assets. The interpretation from the regression output could be that a firm with high amount of PPE could be used to further increase ROA. Comparing two identical firms except one having higher PPE would probably mean that the firm has newer, more or better means for production and therefore higher capacity. For the other regressions, no statistical significance was found for the PPE/total assets variable. But on average a one percentage point increase in PPE scaled by assets increases ROA by 0.0782 percentage points. Moreover, PPE are depreciated over the course of several years, and capex might not be needed yearly to maintain these assets. Therefore, a firm might enjoy the benefits of having a lot of PPE while the future need for capex to maintain it is not reflected in the ROA at the time.

The PE-sponsor dummy variable takes on the value 1 for PE-backed firms that went through an IPO, and 0 for the non-backed. This is probably the most interesting coefficient to study in

the regression output. It is significant at the ten percent level, with a positive coefficient of 0.0230. This translates to that next year's ROA is on average 2.3 percentage points higher than non-backed firms, all else held constant. The PE-sponsor dummy variable was only significant for the regression taking the time fixed effects into consideration.

As seen in the regression table with next year's return on assets as dependent variable, the coefficients almost entirely take on the same signs in spite of not always showing significance. This is possibly a result of de number of observations not being that many. Because of the data sample not being that large, a bootstrap regression was run with 1,000 repetitions, for the year fixed effects model and the industry fixed model, as explained in Table 6.

Next, the effect on cumulative abnormal returns will be assessed due to the effect of private equity-backing. Four different time windows have been studied. The different time windows corresponding to each CAAR is measured from the point of a firm going public in Table 7.

Table 7: Regression using CAAR as dependent variable, year fixed effects

Year fixed effects Variables	CAAR First day	CAAR Three months	CAAR Six months	CAAR Twelve months
sales/assets	-0.0005	0.0641**	0.0111	0.0569
	(0.0059)	(0.0267)	(0.0446)	(0.0706)
cash/assets	-0.0019	0.0712	0.1640	0.6727***
	(0.0189)	(0.0862)	(0.1438)	(0.2277)
capex/assets	-0.0770	-0.5398**	-0.6927	-0.0081
	(0.0590)	(0.2698)	(0.4500)	(0.7126)
roe	0.0047	0.1847**	0.5169***	0.6915***
	(0.0170)	(0.0778)	(0.1297)	(0.2054)
pe-sponsor dummy	-0.0004	0.1012***	0.0807	0.1242
	(0.0082)	(0.0377)	(0.0629)	(0.0996)
Constant	-0.0026	-0.1256***	-0.0865	-0.2670**
	(0.0092)	(0.0421)	(0.0701)	(0.1111)
Observations	105	104	104	104
R-squared	0.1383	0.3344	0.3273	0.3020

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The time period for each CAAR corresponds to time from the IPO.

For the regressions using CAAR as the dependent variable with time fixed effects, the three-month period is the only one where the effect of private equity firm involvement is validated with statistical significance being shown for the PE-sponsor dummy variable. This period is the one were conclusions can be made regarding the private equity effect. Therefore, the three-

month CAARs will be the main subject of analysis for this regression. For the three-month period post-IPO, the results show statistical significance for all variables but one. Sales is significant at the five percent level with a positive coefficient. Higher sales in relation to the firm's asset increases the firm's performance in a three-month window after the firm going public. It seems natural that firms with higher sales (scaled by assets) should be appreciated by investors. Larger firms, in terms of sales, should have better bargaining power and better reach. If a firm experienced a one percentage point increase in sales scaled by assets, an average increase of 0.0641 percentage points would be seen in ROA, all else held constant.

Cash/assets shows a positive coefficient for all periods except the first day CAARs. The fact that cash has a positive coefficient is not surprising, since firms with higher liquidity can act faster to both unforeseen events and allocate resources where it is needed to achieve the sought after results. However, the coefficient is not statistically significant and no certain conclusions can be drawn.

Capex/assets is statistically significant at the five percent level. Firms having a lot of capital expenditure are likely to experience less cumulative abnormal returns the following three months of an initial public offering. It is not surprising since investments in fixed assets are not likely to yield results instantly. Those are the conclusions from the negative coefficient that capex shows. Private equity funds prefer firms with little requirements on capital expenditure in order to operate, since it reduces the free cash flow which often is required to service interest payments due to a high portion of debt financing. Moreover, the cash flows are to a high degree used in order to pay down the debt in order to increase the amount of returns at the point of exit. A one percentage point increase in capex/total assets, on average, results in a -0.5398 percentage point reduction of ROA keeping everything else constant. Capex/assets shows a constant which have a particularly large, and negative, impact on ROA. Since stock prices, which is one of the two components to compute CAARs, reflects all available information about a company one could argue that it is natural investors put weight into high capex. As previously said, capex reduces the free cash flow, and reduces the amount of earnings that could be paid out to shareholders as dividends and correspondingly would give a lower output when valuing the firm.

Return on equity is a financial performance measure and says something about how efficiently the firm utilizes part of its assets to create profit, since total assets less total liabilities equals shareholders' equity. The coefficient is positive and statistically significant at the five percent level. Return on equity is defined as net income divided by shareholders' equity. A higher return

on equity is highly appreciated, as it is a financial metric to look at in order to assess the financial soundness of a given firm. Moreover, it means that there is a greater likelihood to be any earnings left for the equity holders, after debt payments have been made. The relationship between ROE and CAARs for the three months' period is that a one percentage increase in ROE, would lead to an average increase of 0.1847 percentage points in CAARs for the three-month period, when keeping everything else constant.

While looking at the PE-sponsor dummy, the coefficient is positive. On average, the PE-backed firms that went through an IPO had three month CAARs of 10.12 percentage points higher than non-backed firms, all else kept equal. For the studied years and the selected sample, this is statistically significant at the one percent level.

Table 8: Regression using CAAR as dependent variable, industry fixed effects

Industry fixed effects Variables	CAAR First day	CAAR Three months	CAAR Six months	CAAR Twelve months
sales/assets	0.0010	0.0660*	0.0062	0.0544
	(0.0076)	(0.0352)	(0.0595)	(0.0958)
cash/assets	0.0056	0.1098	0.2913*	0.7847***
	(0.0209)	(0.0969)	(0.1639)	(0.2639)
capex/assets	-0.0734	-0.4878*	-0.7431	0.1746
	(0.0628)	(0.2913)	(0.4926)	(0.7930)
roe	0.0008	0.1575*	0.4486***	0.7338***
	(0.0186)	(0.0861)	(0.1456)	(0.2344)
pe-sponsor dummy	-0.0028	0.0971**	0.0831	0.1578
	(0.0092)	(0.0427)	(0.0723)	(0.1163)
Constant	-0.0045	-0.1328**	-0.0974	-0.3046**
	(0.0113)	(0.0523)	(0.0885)	(0.1424)
Observations	105	104	104	104
R-squared	0.1327	0.2995	0.2722	0.2196

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The time period for each CAAR corresponds to time from the IPO.

As seen in the table above, the results when taking the industry fixed effects into consideration, are much similar to the ones while using year fixed effects. One notable difference is that cash/assets have the largest impact on CAARs for the twelve months' period. The takeaway would be that cash can be used to achieve greater CAARs in the longer-run, since the results from the possible investments that a pool of cash enables, are not seen immediately.

The fact that the results were more complete, in terms of more variables showing statistical significance while using time fixed effects regressions is reasonable. To begin with, the financial items are scaled by each firm's assets and ratios are firm specific by default, which makes all firms more comparable, regardless of industry. Moreover, for the CAARs, industry specific indexes were used which makes the excess returns more comparable across industries. In other words, the sector specific gains and losses are smoothened out. However, the time fixed effects are not being taken into account any other way. Therefore, the time fixed effects regressions were the main subject for discussion in this analysis.

Just as in the regression using next year's return on assets as dependent variable, the coefficients while regressing CAARs are quite aligned in terms of signs, with regards to the variables for three months, six months and twelve months CAARs. It is mostly the first day cumulative abnormal returns that show deviant values. Since the goal was to study the effect of PE-sponsored IPOs in the short-term with regards to cumulative abnormal returns, the first day CAARs are not that representative. This has to do with the IPO underpricing phenomenon, and the first day returns not being representable for the performance for several months following the IPO.

For the three months, six months and twelve months CAARs, the PE-sponsor dummy variable all have positive signs, in spite of only being significant for the three-month period. This could however be a result of IPO signaling, where Private Equity firms who possesses significant know-how on how to take firms public, purposely underprice their IPOs in order to achieve a successful IPO in terms of initial returns. In the future, investors are then more likely see the PE-backed IPOs as firms of higher quality. This could be classified as a problem of asymmetrical information.

A regression while using CAAR as dependent variable without controlling for industry- or year fixed effects can be found in Appendix Table 1, where the results are very similar to the ones of Table 7 and Table 8.

7. Conclusion

This study investigates the effect private equity firms have on companies that go through an initial public offering, both in terms of return on assets and cumulative abnormal returns. The paper aims to answer whether or not private equity-backed firms are performing better in the short-term after going through the event of an initial public offering.

Jensen (1986, 1989), claims that the formula for successful private equity investments includes the increased operational efficiencies, increased leverage, managerial proficiency and close monitoring. Managerial proficiency and monitoring was not studied in this paper. However, it is not uncommon for private equity firms to put new management into place when acquiring a company. Of course the management is selected so that the PE-owner can have a close dialogue with management and implement their strategies. The findings of this paper is more in line with the findings of Cao & Lerner (2009), who found that there is a weak correlation between correlation between high leverage and performance post-IPO, as the effect of debt-to-equity ratio on ROA was not statistically significant. However, PE-backed firms that went through an IPO displayed both higher return on assets, and higher CAARs for the three-month period post-IPO during the studied period. It seems natural that the results for ROA and CAARs are aligned, since higher ROA should imply better overall performance which should be reflected in stock prices as well.

Ritter (1991) discusses the work of Ibbotson, Sindelar & Ritter (1988) which studies the first-day returns and found that the initial return was estimated to 16.4%. His notion is that investors periodically are over optimistic about firms' growth prospects. In contrast to these authors, the descriptive statistics for the selected sample shows negative first-day returns for both non-backed and PE-backed IPOs. However, the regression output first day CAARs could not be confirmed as statistically significant.

For the second regression using CAARs as the dependent variable, it could be concluded that PE-backed firms on average experienced higher CAARs of 10.12 percentage points than non-backed firms, all else held constant, during the three-month period following the initial public offering. This seems in line while comparing the regression result to the descriptive statistics of CAARs in Table 5, where the private equity-backed firms on average displayed CAARs of 4.48 percent, in comparison to the non-backed of -6.65 percent for the three-months period, as the difference is roughly 11 percent. One could argue that is expected, since private equity funds have a more direct incentive to seek higher increases in stock prices in the short-term post-IPO.

This is a result of the stock price being directly linked to how high the internal rate of return will be for a private equity fund in the case of exit through an IPO, and because of lock-up periods prohibiting the owners to sell all of their stock immediately. Therefore, private equity owners should be very focused on stock price development in the year following the IPO, since they are close to the point of exit and can aim to drive up returns, whereas a company without any financial sponsor is much more long-term focused. This is also reflected while looking at the twelve-months CAARs in the descriptive statistics, Table 5, where PE-backed firms showed the largest values and, non-backed the largest negative values.

Like the results of Levis (2011), there seems evident that PE funds active in the Nordics who listed companies on Nasdaq Stockholm, were primarily focused on certain industries. These were companies in the "Services" sectors like Levis also concluded in his work. For this study, "Industrial" companies also stand out as one of the most common sectors for PE-backed IPOs on Nasdaq Stockholm between 2006 and 2017.

Regarding the regression using next year's return on assets as dependent variable, we can conclude the private equity-backed firms on average experience a 2.3 percentage points higher ROA for next year, than non-backed firms.

If one were to accept IPOs as being a suitable method for measuring the "PE-effect" on firm's performance, this study concludes that PE-sponsored IPOs are performing better in terms of next year's ROA. Moreover, PE-backed firms outperform non-backed counterparts with regards to cumulative abnormal returns during the three months following the IPO. No findings can be concluded for the other time windows of the CAARs due to lack of statistical significance. PE-sponsors seems to be capable of achieving their goals by spurring management through close monitoring and incentive programs. Furthermore, as previously stated, if several individuals are heavily rewarded personally for achieving financial goals, it often happens.

7.1 Further research

In future research, it would be interesting to correct the shortcoming of this paper with the relatively small data sample. To solve this issue, one could include additional firms from smaller lists than Nasdaq Stockholm. In addition to this, it would be interesting to conduct the same analysis on other markets, and perhaps comparing Nordic countries to each other.

Moreover, quarterly data can be studied instead of yearly, in order to get better understanding of how the state of the firms developed around the event of the IPO with higher precision.

Furthermore, instead of using available benchmark indexes to compute CAARs, synthetic indexes could be created. With more resources, firms could be manually selected with the best matching characteristics to each firm in the sample. The industry specific indexes are generally a good fit, but it can be further improved.

The time windows for the cumulative abnormal returns can be expanded in future research, to assess the effects private equity funds have on their sponsored IPOs in the long-run, as in over one year.

Lastly, the results bring some thought to reflections about IPO underpricing. A future study could continue on the topic of underpricing, and look at the stock prices closer to the event of the IPO to assess how good private equity firms are at pricing their IPOs.

8. References

Andreou, P. C., Louca, C. & Panayides, P. M. (2014). “Corporate governance, financial management decisions and firm performance: Evidence from the maritime industry”. *Transportation Research Part E: Logistics and Transportation Review*, 2014, vol. 63, issue C, 59-78.

Bain & Company (2019), *Global Private Equity Report*.

Brav, A. & Gompers, P. A. (1997). “Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-Backed Companies”. *The Journal of Finance*, 52: 1791-1821.

Cao, Jerry & Lerner, Josh, (2009). "The performance of reverse leveraged buyouts". *Journal of Financial Economics*, Elsevier, vol. 91(2), pages 139-157, February.

Das, S., Jagannathan, M. & Sarin, A. (2002)” The Private Equity Discount: An Empirical Examination of the Exit of Venture Backed Companies”. *Journal of Investment Management*, 1. 10.2139/ssrn.298083.

Giroud, X. & Mueller, H. M. (2011). “Corporate Governance, Product Market Competition, and Equity Prices”. *The Journal of Finance*, Volume 66, Issue 2.

Jain, B., & Kini, O. (1994). “The Post-Issue Operating Performance of IPO Firms”. *The Journal of Finance*, 49(5), 1699-1726.

Jensen, M.C. (1986), “Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers”. *American Economic Review*, 76, 323-329.

Jensen, M.C. (1989). “Eclipse of the Public Corporation”. *Harvard Business Review*, 67, 61-74

Kaplan, Steven N., & Per Stromberg. (2009). "Leveraged Buyouts and Private Equity". *Journal of Economic Perspectives*, 23 (1): 121-46.

Levis, M. (2011). “The Performance of Private Equity-Backed IPOs”. *Financial Management*, 40: 253-277.

Loughran, T. & Ritter, J. (1995). “The New Issues Puzzle”. *Journal of Finance* 50, 23-51.

Miller, E. M. (1977). “Risk, uncertainty, and divergence of opinion”. *The Journal of Finance*, 32(4), 1151-1168.

Mitchell, M. & Mulherin, H. (1996). “The Impact of Industry Shocks on Takeover and Restructuring Activity”. *Journal of Financial Economics*, 1996, vol. 41, issue 2, 193-229.

Ritter, J. R. (1991). “The Long-Run Performance of initial Public Offerings”. *The Journal of Finance*, 46: 3-27.

Ritter, J. R. (2018). “Initial Public Offerings: Updated Statistics on Long-run Performance”.

Rosen, R. (2006). “Merger Momentum and Investor Sentiment: The Stock Market Reaction to Merger Announcements”. *The Jourrnal of Business*, 2006, vol. 79, issue 2, 987-1017.

Rostami, S., Rostami, Z. & Kohansal, S. (2016). ”The Effect of Corporate Governance Components on Return on Assets and Stock Return of Companies Listed in Tehran Stock Exchange”. *Procedia Economics and Finance*, Volume 36, 2016, pages 137-146.

Shiller, Robert J. (1990). "Speculative Prices and Popular Models". *Journal of Economic Perspectives*, 4 (2): 55-65.

Swedish Private Equity & Venture Capital Association (2017). *Swedish Private Equity Market*.

Appendix

Appendix 1: Regression using CAAR as dependent variable

Variables	CAAR First day	CAAR Three months	CAAR Six months	CAAR Twelve months
sales/assets	-0.0023	0.0526**	0.0022	0.0430
	(0.0057)	(0.0263)	(0.0441)	(0.0698)
cash/assets	-0.0059	0.0558	0.1913	0.6792***
	(0.0185)	(0.0854)	(0.1434)	(0.2269)
capex/assets	-0.0572	-0.4571*	-0.8082*	-0.1523
	(0.0567)	(0.2626)	(0.4408)	(0.6974)
roe	-0.0021	0.1824**	0.5231***	0.7231***
	(0.0165)	(0.0763)	(0.1280)	(0.2026)
pe-sponsor dummy	-0.0024	0.0959***	0.0950	0.1653*
	(0.0079)	(0.0364)	(0.0611)	(0.0967)
Constant	0.0002	-0.1130***	-0.0831	-0.2643**
	(0.0090)	(0.0416)	(0.0699)	(0.1106)
Observations	105	104	104	104
R-squared	0.0117	0.2168	0.1986	0.1698

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The time period for each CAAR corresponds to time from the IPO.