Reverse LBO Performance in Sweden

An Empirical Study

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Abstract

This focuses on the question of whether or not private equity firms create value in their portfolio firms that remain after the private equity funds exit. In order to do this the study investigates post-IPO performance in terms of stock returns for a set of 176 IPOs between 2005 and 2016, of which 60 were private equity owned prior to the IPO, and 116 were not. The IPO approach is used in order to reduce the heterogeneity between owners after the private equity funds exit, and the studied time period is the first year after the IPOs. The econometric model used is a year fixed effects model with robust standard errors to control for heteroskedasticity within the sample. The results indicate that there is a statistically significant negative relationship between private equity ownership prior to an IPO and first year excess returns. The discussed reasons for this include less operational and structural benefits for private equity-backed firms than others as well as private equity firms being better at getting higher prices for their companies in the IPO.

Keywords: Private Equity, IPO, Reverse LBO, Fixed Effects Regression, Public Markets

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1 Introduction

1.1 Introduction and purpose

While private equity (PE) firms have been around since the second half of the 20th century, they have once again become a hot topic in Sweden; in the finance industry, in politics and in popular culture. The question whether or not PE firms actually add any value to the companies they invest in and whether or not too much of the value created is collected directly by the firms was publicly scrutinized in Neurath and Almgren's (2015) book about venture capitalists and their compensation structures. Additionally, before that there was already, and still is, a fierce debate in the political landscape about PE ownership in the Swedish welfare system and in private schools. While many have opinions on what PE does right or wrong, the firms keep sticking around and keep flourishing financially.

What is known is that PE funds generally manage to outperform other types of owners when it comes to both operating performance (Kaplan and Strömberg, 2009) and returns to investors and owners (Guo et al., 2007; Weir et al., 2007). So it is clear that PE firms are good at generating value in the short term, making themselves, portfolio company managers and their investors rich. However, what is not completely clear is how much long-term value the PE funds generate in their portfolio companies. Is the value creation structure PE firms work with good for the portfolio firms even after the PE funds exit, or is all the value exerted from the companies once the PE funds leave?

The main question is whether or not PE funds manage to create tangible value in portfolio firms that last after the exits of the funds, which could technically be achieved in a multitude of ways including investigating growth after PE exits, earnings quality, return on the investment by strategic or financial buyers once PE firms exit, or by looking at post-IPO returns.

The chosen approach for this paper is to look at performance of PE-backed firms after they undergo an IPO and are listed on public stock exchanges, which can be seen as measuring returns of one specific tranche of post-PE investors. The advantages of focusing on IPOs is that the majority of the firms' ownership base usually becomes quite diverse with most individual owners having relatively little influence over the firms' operations and decisions. In contrast to using e.g. growth or performance for firms after PE exits, where the type of owners and influence vary a lot between different types of investors and forms, the IPO approach levels the playing field. Additionally, when measuring returns on the public market it is

possible to use actual benchmarks such as index returns instead of expected returns etc. for private firms.

Furthermore, the IPO market in Sweden is a good place to study this since there has been a clear surge in IPO activity both in Sweden and the rest of the Nordics. The IPO levels have returned to and by far surpassed the levels before the financial crisis of 2008 and with low interest rates investors are eager to find better returns. Hence, IPOs in recent years have been an attractive way for both entrepreneurs, financial owners and other business owners to cash out. PE firms have also in recent years successfully exited a record number of firms via IPOs (see Figure 3 in Section 3.2). The trend has more than recovered since before the financial crisis, and only some smaller studies have been made in Sweden on the topic of how these PE-backed firms actually perform once they go public.

Worldwide though, several studies have been made on the performance of PE-backed IPOs, also called reverse LBOs (Katz, 2009; Levis, 2011; Chen and Liang, 2016). The fact is that the results are quite diverse with some arguing for a positive effect of PE-backing before the IPO (Chou et al., 2006) while others find negative effects (Alavi et al., 2008). What most agree on, however, is that PE-backing is indeed an important factor when measuring post-IPO performance. In the varying results, there seems to be quite strong country specific effects, which is why a study on Sweden is an important contribution to understanding the effect of PE-backing specifically in Sweden.

So the purpose of this paper is to investigate in a more comprehensive way how firms that pre-IPO were owned by a PE firm perform once they go public compared to other firms that go public. Looking at post-IPO performance is a way of evaluating if PE firms actually manage to create lasting value in their portfolio companies, or if the value creation is only during the holding period and all the value created is returned to the PE fund and their investors. The empirical focus of this study will be on answering the question whether PE-backed firms generate better excess returns the year after their IPOs compared to non-PE-backed firms, used as a means to try to answer the question of lasting value creation in PE-owned firms.

This may, in addition to trying to explain the value creation question, also serve as investment guidance for investors on the public stock market, since it also answers the question of whether or not it is a good investment strategy to purchase shares in reverse LBOs, compared to investing in non-PE-backed IPOs. The study also tries to conclude why a potential effect could be there.

1.2 Background

1.2.1 About Private Equity

Private equity is important to define, and while many definitions exist, one well recognizes is "equity capital to enterprises not quoted on a stock market", as it is defined by the European Private Equity and Venture Capital Association (EVCA) (Söderblom, 2011). While public equity is equity available for the public to invest in and generally listed on a stock exchange, private equity is equity in firms not listed on any exchange and are not traded as standardized instruments.

Private equity firms are companies whose business model is to purchase private equity, either in the form of whole companies or as majority or minority shares of companies. Acquisitions can be made from private shareholder or from the public market, then generally with the intention of taking the company off the market in order to make it private. Once a company is acquired by a PE firm, the PE firm's main task is to improve the value of the company in one or some ways, including but not limited to using the added capital for add-on acquisitions, development of new products or technologies, or to increase the financial performance or structure of the company (Söderblom, 2011).

Private equity is generally divided into two sub-categories: buyout (BO) capital and venture capital (VC). The major differences between the two approaches to private equity is that BO firms generally take majority shares in mature firms, backed by varying but substantial amounts of debt in so called leveraged buyouts (LBO), while VC firms focus on smaller shares in startups or high-growth companies, alternatively fairly mature firms entering an expansion phase. On the other hand, the similarities are many. Both BO and VC firms invest primarily third-party capital and are active owners in the sense that they in addition to capital also bring expertise, network and other both soft and hard types of assets to their portfolio companies. They both also have professional structures for how to make investments and how to subsequently work with them (Söderblom, 2011).

Private equity firms are generally organized as a partnership or a limited liability corporation. In the structure of private equity investments, this is called the general partner (GP), who then raise capital in private equity funds where they invest together with third-party limited partners (LP). LPs are usually institutional investors such as pension funds or endowment funds. The fund technically has a limited and fixed lifetime, usually 10 years for BO firms, and during that time it is the GPs job to invest the committed capital and generate a return. During the lifetime of the fund, the LPs have little say on how the capital is invested as long as

it follows the agreed upon covenants or restrictions (e.g. maximum amount that can be invested in one firm, debt to equity ratios, types of securities invested in) (Kaplan and Strömberg, 2009).

The compensation scheme for the GP is generally divided into two main parts: a management fee and a carry fee. The management fee is one the GP charges the LPs that is a percentage of committed capital (usually around 2% per year) which in the exit period of a fund changes to a percentage of employed capital. The second part is a percentage of the return of the fund called the carry fee (usually 20%), which is only realized if the fund generates a positive return or surpasses an agreed upon minimum return. The compensation schemes vary a bit more in VC firms but the general structure with a management fee and a carry fee is often the same (Kaplan and Strömberg, 2009; Söderblom, 2011).

One last characteristic for private equity firms worth mentioning is that the investors, both GPs and LPs, cannot realize the returns on their investments until the fund is closed. Portfolio firms can be exited earlier, after which typically the management fee on employed capital (rather than on committed capital) is charged to LPs. There are multiple ways private equity firms to exit their investments including selling the portfolio company to a strategic or financial buyer, to another private equity firm, to management, or through an IPO (Kaplan and Strömberg, 2009; Söderblom, 2011).

1.2.2 Value creation in portfolio companies

Since PE funds' main objective is to increase the value of their portfolio firms, it is important to explore how this is achieved. Kaplan and Strömberg (2009) describe two different areas within which PE firms generally work: financial engineering and governance, and operational engineering. There are different ways to do this, but PE firms generally follow some standard patterns.

PE funds generally let the management teams in the portfolio firms buy in on a large part of the equity in those firms. Kaplan and Strömberg (2009) mention that around 15% of the equity generally go to management teams, with around 3% going directly to the CEO. This is done in order to align incentives between managers and owners – since the PE funds' main objective is to increase the value of their portfolio firms, this should also be the main objective of managers leading those firms.

Leverage is another means of both financial and governance engineering. While leverage enables the PE funds to purchase companies using less equity, it is also a way to keep managers in check. By leveraging their portfolio firms, PE funds create

an environment where managers seldom have any excess cash to waste or spend on non-value adding activities. Jensen (1986) describes what he calls the "free cash flow problem", which occurs when non-growth companies have excess cash. The problem that can be seen in many of those cases is that managers tend to spend that cash inefficiently instead of returning it to investors. With fairly high levels of leverage, excess cash goes to pay interest and is thus returned to investors (Kaplan and Strömberg, 2009).

PE firms also maintain closer governance schemes in their portfolio firms than comparable public firms. This includes stricter reporting requirements, smaller boards of directors, more frequent board meetings as well as a smaller aversion towards replacing management (Kaplan and Strömberg, 2009).

The second area Kaplan and Strömberg (2009) mention is operational engineering, i.e. increasing the actual operating performance of portfolio firms. In the 1980s, increases between 10% and 20% were reported in operating margin and around a 40% increase in cash flow to sales was reported both in absolute numbers and relative to industry, as well as lower levels of capital expenditures in relation to revenue. Later studies in the 2000s contradict these large performance increases, instead reporting modest operating performance increases while still reporting increasing returns to investors in portfolio firms (Guo et al., 2007; Weir et al., 2007). Grubb and Jonsson (2007) suggest that specifically Swedish firms experience a positive impact on operating performance after a buyout by a PE fund, in line with several other studies cited by Kaplan and Strömberg (2009). The increase in operational performance is not necessarily detached from the financial and governance improvements, but can also be an effect of such. For example, one of the main ideas behind PE deals (and a reason PE funds generally want current management teams to stay on) is that managers, with the right incentives, will deliver better results – and use their current expertise and knowledge of the business to do so.

To conclude, PE firms employ several methods to increase the value in their portfolio companies, within the categories financial, governance and operational engineering. These include leverage, closer and tougher governance and reporting requirements, alignment of financial incentives as well as increasing operational performance.

1.2.3 IPO theory

From a private firm's perspective, it is a very important decision whether or not to go public. In most western countries, Sweden included, listing on a public stock exchange through an IPO process is the one main way to get access to public funding (van Heerden and Alagidede, 2012). There are several reasons why a firm would choose to go public. Previous literature points to three main reasons: (1) to increase the value of the firm, (2) so that previous owners can exit, and (3) for strategic or financial reasons connected to M&A.

First, going public is a way to increase the value of the firm. Public firms tend to be able to lower their cost of capital due to the higher level of liquidity in their shares. Lower cost of capital in turn leads to a higher total value of a firm (Modigliani and Miller, 1963; Scott, 1976). Another factor that increases the value of the firm through an IPO, albeit short term, is the finding that analysts tend to be generally more positive regarding firms after IPOs (Bradley, Jordan and Ritter, 2003). However, there is a potential downside when it comes to maximizing value by going public which is that a firm's value becomes increasingly vulnerable to the effect on external factors such as the public opinion and media. Myers (1984) mentions asymmetric information as an issue that makes firms reluctant to go public, from a valuation standpoint, despite the positive effects from decreased cost of capital.

Second, going public provides previous owners such as PE firms or management with an opportunity to cash out (Pagano et al., 1998). Black and Gilson (1998) argues that IPOs is a very attractive method for VC firms (also includes BO firms) to exit a portfolio company, while Mello and Parsons (2000) claim that management's desire to cash out too is indeed an important motivation for firms to go public. It has also been proven that insiders such as equity holding managers tend to sell shares in the event of an IPO (Ang and Brau, 2003).

Finally, Brau and Fawcett (2006) found that CFOs perceived the most common reason to go public to be in order to create public shares which can then be used as currency in future acquisitions of other companies. Zingales (1995) points out that going public can be beneficial for the opposite side in an M&A process, that goes hand in hand with the lower cost of capital argument; by going public the firm's value is inflated, enabling existing owners to ask for a higher price in the case of a takeover.

Once a firm decides to go public, it has been proven that IPO timing is an important factor in the process. The fact that IPO markets tend to be cyclical, ranging from so called cold periods to booming hot periods, suggests that market timing is an important factor in the IPO decision (Brau and Fawcett, 2006; Yung et al., 2008).

Firms tend to time the IPO in order to get the best offering prices at the date of issue (Ritter, 1991; Loughran and Ritter, 1995). Brau and Fawcett (2006) found that according to CFOs, the overall state of the stock market was the most important indicator for when the timing was right for an IPO, but this is not that easy to measure or define. Several suggestions of how to measure a bull market have been presented, spanning current, predicted (Lucas and McDonald, 1990) and historical market conditions (Ritter and Welch, 2002). Another important indicator for when to start the IPO process, especially for smaller firms, is when other reputable firms go public, which should create a momentum in the IPO market (Choe et al., 1993).

2 Theoretical framework

2.1 Previous literature

2.1.1 Exiting of PE investors

One inaccurate assumption often made with regards to IPOs is that it means that the whole company is listed or that all existing shareholders sell their shares during the IPO process. Klamer (2017) studies the exit behavior of PE investors in the Nordics and finds that on average less than 55% of PE held shares are sold during the IPO, while selling generally accelerates once the standard lock-up period of six months expire. Only after two years are 85% of the PE-held shares sold. These findings are interesting since it may imply that one by measuring PE-backed companies' performance in the public market could potentially evaluate PE firms' performance as owners. Chen and Liang (2016) discuss this briefly and confirms that their results, showing that VC backed IPOs, underperform regardless whether or not the VC firm stays on after the IPO or not.

2.1.2 Performance of Reverse LBOs

Previous studies have found varying results when it comes to the effect of PE-backing in IPOs (or so called reverse LBOs), ranging from clear over-performance by the PE-backed firms compared to their peers (Levis, 2011), to more careful conclusions about over-performance based both on the size of the PE-sponsoring and the time horizons (Katz, 2009), to clear signs of under-performance from day one (Chen and Liang, 2016).

Katz (2009) performed an extensive study on the effect on PE-sponsoring before and during IPO events. Her study focused on three major areas and how they were affected by PE ownership, compared to firms that were owned by their management teams: earnings management, conservatism and post-IPO performance. The study was done in the US, where reporting regulations for private firms are much laxer than in Sweden, which may lead to a climate where e.g. earnings management practices could vary more between different types of ownership (Katz, 2009). This could in turn lead to that IPOs to a larger extent affect both internal practices but also such issues as earnings management and conservatism.

The fact that previous owners, and especially PE firms, tend to work hard on the phenomenon called "dressing the bride" prior to IPOs (Jansson and Enström, 2017) could also underline a difference between US and Swedish reporting regulations. This theory would lead to that US firms generally should be better at dressing the bride than those in Sweden, because of the more transparent accounting regulations in Sweden. However, when comparing firms within the US, Katz (2009) shows clearly

that PE owned firms resort less to earnings management than management owned. As she points out, this is due to stricter regulations and more continuous reporting demands on the firms due to PE firms' desire and need to continuously keep track of their portfolio firms' performance.

Katz (2009) further obtains various results on the topic of post-IPO stock performance among her sample firms. She finds that PE-backed firms that are majority owned by PE firms tend to outperform those that were management owned prior to the IPO, while those where PE firms only had a minority stake underperform. The horizon the author studies is long-term, in her paper defined as a 5-year period. She claims that the reason for the majority PE owned firms' over-performance is mainly due to the tighter monitoring practices employed by such firms due to the majority ownership of PE firms. Katz (2009) also finds that there is a significant relationship between the post-IPO stock performance of PE-backed firms and the reputation of the PE-sponsor, where assets under management is used as a proxy.

Several other studies confirm the main point of Katz's (2009) results on post-IPO performance for PE-backed firms compared to non-sponsored firms. Levis (2011) confirm that PE-backed firms generally outperformed non-PE-backed firms in the UK during the period 1992-2005, while also experiencing lower first day returns. This could be due to several factors including lower levels of underpricing. Chou et al. (2006) also support these results with a study made in the US that finds that sponsored firms have better earnings quality, which would then in turn lead to higher stock returns. Bruton et al. (2010) also confirm these results with a study in the UK and France.

However, there are several papers outlining potential reasons why PE-backed firms would underperform non-PE-backed firms after an IPO. Alavi et al. (2008) is one of them where the authors point to the fact that "large pre-IPO non-managerial shareholders" are extra concerned with exiting a pre-IPO investment. The authors identify this as a major cause that drives up both the size of the issue and the direct costs. Another paper finds that VC firms (included in the definition of PE in this paper) underperform their peers once they go public is Chen and Liang (2016) where the authors rather point to the high cash retention rate cash among VC owned firms as the problem. They argue that once these firms go public and the VC owners exit, these firms indulge in excess spending and wasteful investment, which, contrary to the argument of Alavi et al. (2008), would not drive up the IPO price, but rather drive down prices in the post-IPO period. A third paper follows Alavi et al. (2008) and indicates that the price of PE-backed IPOs is driven up due to less underpricing (Landare, F., and Rydén, J., 2015). This could result from e.g. that PE owners are

more professional and familiar with the financial landscape and the IPO process, and thus are better at getting a fairer price for the public issue.

2.2 Contribution

This study aims to focus on the question whether or not, and how, PE-backing in an IPO process affects the return on stocks in the short/medium term. While the driver behind this question is based in whether or not PE funds create lasting value in their portfolio companies, the empirical analysis will focus on the performance of reverse LBO companies compared to non-PE-backed IPO companies, in the medium term. The previous literature points mainly towards the effect on PE-backing being positively correlated with returns (Katz, 2009; Levis, 2011; Chou et al., 2006), especially in the very short term, i.e. days and months after the IPOs. However, some indications exist that there could be a negative relationship between returns and PE-backing (Alavi et al., 2008; Chen and Liang, 2016), while other studies simply do not obtain any statistically significant relationship (Scheer and Undén, 2015). Furthermore, VC- and PE-backing has only been studied to a certain extent on the Swedish market, and only very limited explicitly for IPOs during the 21st century.

The hypothesis this paper is testing is whether or not PE-backing has an effect on the return of a firm one year after an IPO:

H_0: Return on stocks for PE-backed firms do not differ from those of non-PE-backed
H_1: Return on stocks for PE-backed firms do differ from those of non-PE-backed

If the null hypothesis is rejected, the paper will aim to find whether the difference is positive (PE-backed firms perform better) or negative (PE-backed firms perform poorer). As stated above, previous literature points towards a positive effect, even if some negatives have been reported (Chen and Liang, 2016). Regardless of the found effect, it will be tested for robustness and then analyzed in the sense as to why this specific effect is found.

3 Data and Methodology

3.1 Data collection

3.1.1 Scope

The sample used in this study consists of Nordic firms that underwent an IPO between 2005 and 2016. The sample consists of 2 subgroups: PE-backed and non-PE-backed. The definition of a PE-backed firm has been discussed earlier in this paper, and in this study both buyout (BO) firms and venture capital (VC) firms are considered PE firms.

The geographical scope of this study is limited to Sweden in the sense that only Swedish firms that underwent an IPO and became listed on one of the Swedish stock exchanges during the time frame are included. Thus, Swedish firms listed on foreign exchanges are excluded, as well as foreign companies listed on any of the Swedish exchanges. The exchanges included in the study are OMX Stockholm, First North Sweden, AktieTorget, Nordic OTC and Nordic Growth Market (NGM) (see Table 1 in Section 3.2 for distribution).

The time frame of this study is set from 2005 to 2016, meaning that only firms going public during that period is included. The lower bound, 2005, is chosen for several reasons: to not risk potential after-effects from the Dotcom bubble (as suggested by Levis (2011)), to assure that the firms in the sample has sufficient and reliable electronic data, and also in order to make sure that the information and the results generated from it are relevant. The upper bound at 2016 is set as recent as possible to the time of writing, under the constraint that all firms should have at least one full year of data available since the IPO date. Including the years during the 2008 financial crisis should not pose a problem since the main analysis is done using excess returns over index.

3.1.2 IPO firms

The firm selection process in this study is largely based on data availability. First, a list of 291 firms that underwent an IPO sometime between 2005 and 2016 were recovered from FactSet. Second, another list was retrieved from FactSet, identical to the first one with the exception that only firms that were PE-backed before the IPO were included. By looking for duplicates in the two sets and assigning a PE dummy equal to 1 to the PE-backed firms in the first set, and a 0 for those that are not duplicates, the first sample of firms is compiled. The first sample consists of 97 PE-backed IPOs and 205 non-PE-backed IPOs. The total number of IPOs and the distribution between PE-backed and non-PE-backed firms during the years the study

takes place are presented in Figure 2 and Figure 3, respectively, in the Descriptive statistics section (Section 3.2).

3.1.3 Post-IPO performance

Performance data regarding the stock performance of the sample firms has been collected from the FinBas database. FinBas is a database containing stock data for public firms in Scandinavia and Finland. Data includes stock price data (e.g. bid, ask, close), trading data (e.g. number of shares turnover, value turnover) as well as dividend and other stock related data, on yearly, quarterly, monthly and daily level. The database consists of data from as far back as 1979 for Sweden (the country for which the oldest data is available) and from 1993 for Denmark (the country most recently added to the dataset). The data is collected from several sources that complement each other, both on a data type basis as well as on a geographical basis. FinBas was originally developed by Stockholm School of Economics (SSE) in the 1970s, and has after several commercial owners been donated back to SSE. (SHoF, 2018)

Annual reports data, such as revenue, profit, book value of equity, etc. has been extracted from the database Serrano. The Serrano database contains extensive data on Swedish firms on the company level. The database consists of primarily three datasets: annual reports data, key ratio data, and company information data. This data is based on annual reports data from the Swedish Companies Registration Office (Bolagsverket), with additional data being collected from Statistics Sweden (SCB) and Bisnodes group register. The database includes data on different types of firms, both on subsidiary and group level, when applicable. In contrast to the FinBas database, Serrano only includes data on a yearly basis, as of December 31 every year. (SHoF, 2018)

From FinBas, a query based on instruments consisting of the sample firms' public market tickers was prepared, through which a dataset containing data on share performance and stock turnover on a monthly basis was retrieved. From Serrano, annual reports data consisting of total revenue and EBIT was extracted.

3.1.4 Index performance

The index data was recovered from the website of Nasdaq OMX Nordic. Nasdaq, Inc. is one of the largest stock exchange companies in the world, with over 3900 companies listed on their exchanges worldwide. Nasdaq Nordic is the subsidiary working in the Nordics and the Baltics. Nasdaq Nordic is the company that run the largest stock exchange in Sweden, Nasdaq OMX Stockholm, and the growth company

exchange First North Sweden (Nasdaq, 2018). These two exchanges are where a majority of the sample firms used in this study are listed.

Nasdaq provides all historical data, both on prices and turnover, from their indices on their website on a daily basis. After downloading a file with price data during the study's time interval, it can be merged with the firm specific data from FinBas and Serrano.

3.1.5 Data cleaning and regression sample generation

The original sample consists of 302 firms that did an IPO during the time frame of this study, between 2005 and 2016. However, some firms had to be discarded for various reasons, such as that they had too short of a period on the public market or that no reliable data was available. These details are shown in Table 1. From the initial sample of 302 firms that were listed on the Swedish stock exchanges, 11 of them were not Swedish firms, but rather other Scandinavian or Nordic firms being listed in Sweden. Additionally, 57 of the firms in the original sample were either missing all relevant data, or were missing completely from one or both of the datasets. These 11 foreign firms and the 57 firms for which data could not be found were discarded. After that process the "cleaned sample" was obtained.

However, when merging of two datasets, in this case Serrano and FinBas, there is bound to be some imperfectness. In the merging process, it was found that not all data overlapped completely, leaving some firms with data only from FinBas and some with data only from Serrano. Another issue that arose was that some firms lacked one or two data points, or observations, in variables necessary for the regression, which then can not be used. A total of 56 firms were discarded from the sample due to lack of individual data points necessary for the regression analysis. Furthermore, 2 firms lacked sufficient data to perform the regression due to the fact that they were not public long enough. After removing the 56 firms with incomplete data and the 2 that were not public long enough, the "regression sample" consists of 176 firms. The distribution between PE-backed and non-PE-backed firms in the regression sample is such that 53 firms were PE-backed and 123 firms were not PE-backed. The data cleaning process is illustrated in Appendix 1.

It can be argued that this sample size is fairly small. However, both the geographical scope and the time frame was selected despite this potential shortcoming, as discussed above. Furthermore, the original sample includes all IPOs made during the selected interval and the data cleaning process led to the removal of firms mainly due to lack of data, rather than limited scope; only 11 firms were removed due to the narrow scope.

3.2 Descriptive statistics

The compiled dataset contains data on several different levels, from general data regarding stock exchange listings to firm specific key ratios. Despite the fact that some firms from the original sample are excluded from the actual regression due to lack of data, the cleaned sample still provides some insights into the data and the Swedish IPO market between 2005 and 2016. When analyzing the sample of 234 firms, it is worth noticing that a selection is made and that the sample does not comprise e.g. all IPOs conducted during the time period studied.

As can be seen in Figure 1, the distribution of IPOs on the different exchanges is very skewed. Although Nasdaq OMX Stockholm is the largest exchange in Sweden, the majority of IPOs between 2005 and 2016 were made on AktieTorget. As much as 100 (43%) of the listings were made on AktieTorget. Nasdaq OMX Stockholm is the exchange with the second most listings during the time period, 67 (29%) of the IPOs, and third was First North Sweden with 59 (25%) of the listings. Nordic OTC and NGM had very few listings included in the sample, which could be a result of e.g. looser requirements for reporting.

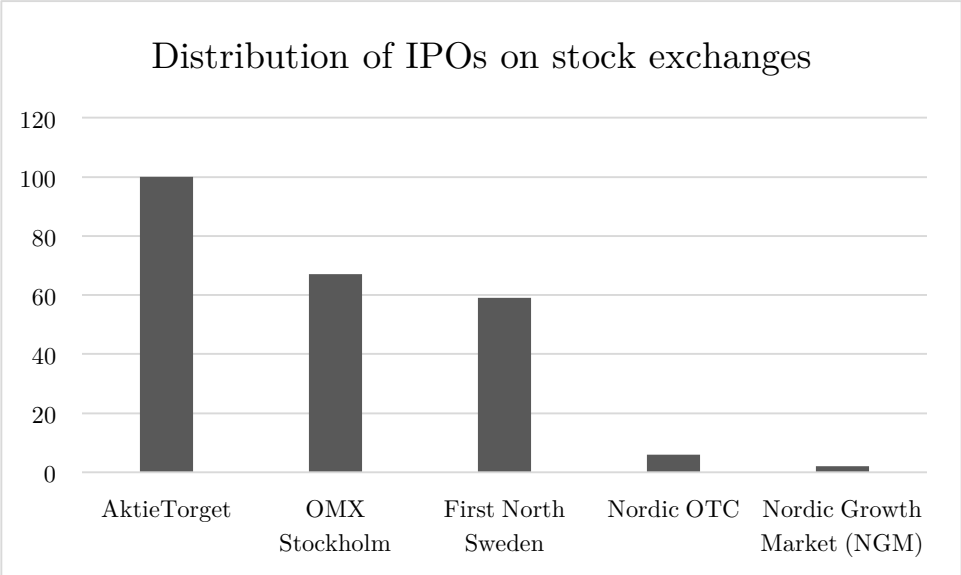

Figure 1: IPO activity in Sweden - Exchanges. Measured in IPOs per stock exchange in Sweden based on the cleaned sample of 234 firms and the five exchanges represented therein. Of these firms 60 were PE-backed at the time of the IPO and 174 were non-PE-backed. Based on Appendix 2.

As far as IPO activity goes in Sweden between 2005 and 2016, some cyclicality can be seen. That IPO trends are cyclical in general has been confirmed by studies of the US IPO market (Yung et al., 2008). However, Banerjee et al. (2016) also points out that the IPO market was "hot" between 2005 and 2008 specifically, which can be seen in Figure 2. Furthermore, it is clear that a "hot" market is underway starting

2014. Figure 3 also provides insight into how the relative distribution of PE-backed and non-PE-backed IPOs in Sweden between 2005 and 2016.

Figure 2: IPO activity in Sweden - Yearly. Measured in IPOs per year in Sweden based on the cleaned sample of 234 firms. Of these firms 60 were PE-backed at the time of the IPO and 174 were non-PE-backed. Based on Table Appendix 3.

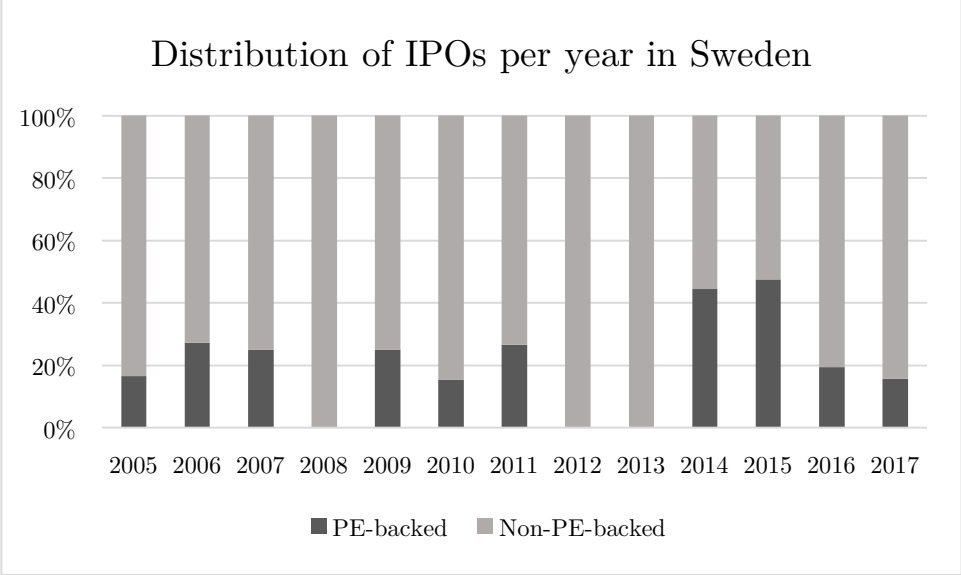

Figure 3: Distribution of IPO activity in Sweden. Distribution of IPO activity between PE-backed firms and non-PE-backed. Measured in IPOs per year in Sweden based on the cleaned sample of 234 firms. Of these firms 60 were PE-backed at the time of the IPO and 174 were non-PE-backed. 2nd degree polynomial trend line as visual aid to illustrate the shifting trends throughout the period of the study. Based on Appendix 4.

Table 1 shows summary statistics for the return on stocks of individual firms the year after the IPOs as well as equity ratios. Both accumulated returns are presented as well as excess accumulated returns, compared to index returns. In order to exclude extreme outliers in the data, the variables have been winsorized on the 95th percentile. This means that the observations in the bottom 5th percentile and in the top 5th percentile have been excluded. This was done in order to avoid including extreme values which were generated when the denominator (price at the end of the IPO year) was close to zero, which led to some observations having values that would not have been feasible to use as actual returns for an investor. As can be seen, the average returns are higher for non-PE-backed firms both in return and excess returns. However, the median returns in both categories are higher for PE-backed firms.

Summary statistics

	Mean	**Median**	**Std. Dev.**	**Min**	**Max**
Return year 1					
Non-PE-backed	0.1398	0.0244	-0.4609	-0.7000	1.5882
PE-backed	0.1069	0.0459	-0.5555	-0.6682	1.5882
Excess return year 1					
Non-PE-backed	0.0983	-0.0041	0.5300	-0.8267	1.6578
PE-backed	0.0890	0.0348	0.4473	-0.7265	1.5877
Equity ratio year 1 (%)					
Non-PE-backed	71.3265	79.0000	24.9754	8.0000	99.0000
PE-backed	70.6491	74.0000	22.9545	25.0000	99.0000

Table 1: Summary statistics: Returns year 1 after IPOs. Based on the cleaned sample of 234 firms, describing both accumulated return and excess return for PE-backed and non-PE-backed firms. Includes statistics on mean return, median return, standard deviation from the mean as well as minimum and maximum returns during the studied period. Of these firms 60 were PE-backed at the time of the IPO and 174 were non-PE-backed. Also summary statistics for equity ratio for the firms during year 1 after the IPO.

While mean and median returns differ somewhat between PE-backed and non-PE-backed firms, the difference between mean and median returns are quite large. This implies that the average returns were carried up by a limited number of "over-performing" firms, while the larger mass of the sample was closer to the median. However, the standard deviation is quite large for all groups relative to the mean values. The minimum and maximum returns observed during the studied time period differs very little between PE-backed and non-PE-backed firms.

Figure 4 shows time series summary statistics for excess return during the first year after the firms' IPOs. Excess return is defined as firm return less the return on OMX Stockholm PI during the same period (see Section 3.4.3 for detailed definition). The mean and median values in both tables follow the same pattern during the period albeit excess return showing a slightly more pronounced trend than those of the return on the firm level. Both tables show negative excess returns in the wake of the 2008 financial crisis, only recovering in the last 2 to 3 years. Standard deviations are relatively large in both the return and the excess return variable, and the same years are diverging from the overall sign on the minimum and maximum values per year.

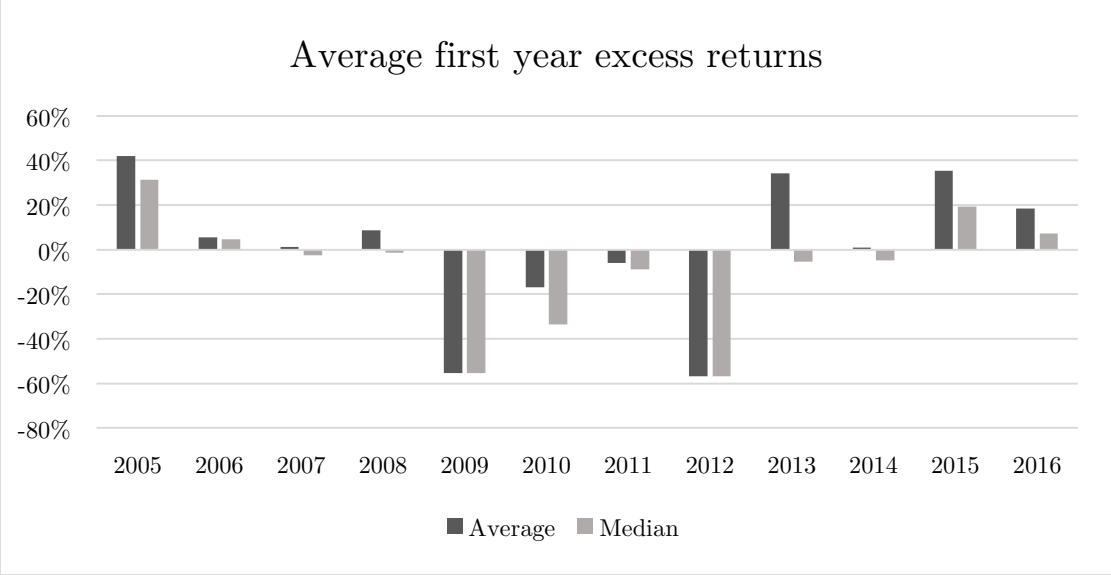

Figure 4: First year excess returns after IPOs. Measured in excess return year 1 after IPO per year in Sweden based on the cleaned sample of 234 firms. Of these firms 60 were PE-backed at the time of the IPO and 174 were non-PE-backed. Based on Table A4 found in Appendix.

Table 1 above shows the equity ratio for the firms in the sample. Equity ratio is a key ratio commonly used in Europe, instead of the in the US more commonly used debt to equity ratio. Equity ratio is calculated as:

$$Equity\ ratio = \frac{Book\ value\ of\ equity + (1 - \tau) * Untaxed\ reserves}{Total\ assets}$$

where τ is the corporate tax rate. The equity ratio is used as a measure to control for debt levels in firms. Table 3 describes summary statistics for the firms in the cleaned sample, divided into PE-backed and non-PE-backed firms. As can be seen, the PE-backed firms generally have a higher equity ratio than non-PE-backed, albeit very slightly. The standard deviation for PE-backed firms is slightly larger too and the

minimum level in the sample is significantly lower than non-PE-backed. This indicates that the difference in the mean and median values should not be taken to0 seriously, as despite there being a difference, the difference in standard deviation and minimum level signifies that the spread is larger for PE-backed firms too.

As can be seen in Figure 6, the debt level in the sample firms is fairly low, with both the mean or median equity ratio between 70% and 80%. However, the standard deviation is fairly large, and the minimum values are very low, especially for non-PE-backed companies. The equity ratio summary statistics are included mainly to give an impression of the financial stability of the sample firms.

3.3 Statistical framework

3.3.1 Fixed effects model

A time fixed effects model is used in order to control for fixed effects in the dependent variable within years. When using panel data to test a hypothesis or to evaluate a model, there is always a risk that all effects can not be explicitly observed. This is called the omitted variables problem, and can be illustrated by a basic unobserved effects model (UEM):

$$y_{it} = \boldsymbol{x}_{it}\boldsymbol{\beta} + c_i + u_{it}, \qquad t = 1, 2, \ldots, T \tag{FE.1}$$

In this model, c_i is the so called unobserved effect, also called e.g. unobserved heterogeneity or latent variable, and u_{it} is the standard idiosyncratic error term. The unobserved effect can be treated in one of two ways: as a random effect (RE), or as a fixed effect (FE) that could technically be estimated for each observation i. However, fixed effect does not necessarily mean that c_i is non-random, rather that it is an individual, unobserved fixed effect that for practical purposes is allowed to be correlated with other predictors in $\boldsymbol{x}_{it}$.

3.3.2 Application

FE models are used when analyzing variables that vary over time and it is important to capture the change in those variables over time (Torres-Reyna, 2007). In this paper, the data is structured in such a way that there is one data point per firm, and the year this is observed varies between firms.

Consider the case with "hot" and "cold" IPO markets as described by Yung et al. (2008). Certain firms will do their IPO in a market where returns on IPOs are generally higher, and others when they were lower, which in turn means that the

good performance of some firms will simply be a function of the IPO market state. This is an example of potential endogeneity in an OLS model: if PE firms happen to be lucky with their IPO timing of portfolio companies in good market states, more than other owners, then this study would be likely to show a positive effect of being PE-backed without any of the superior returns being attributable to the PE firms. The IPO market state is in this case an omitted variable that is correlated with the PE-backed independent variable. The same could be true the other way around and for several other factors than only IPO timing. Therefore, an FE model is a good tool to use since it controls for fixed effects within the different years. The FE model absorbs what differences in excess return that are specific to the different years, thus eliminating the effect of for example lucky IPO market timing.

In this study, a regression controlling for robust standard errors is run, correcting for eventual heteroskedasticity. Heteroskedasticity is a major concern in OLS regressions, since it, while not affecting the precision of the estimation of coefficients, underestimates the true variance in the model and covariance between variables (Johnston, 1972). By controlling this, as is done in Table 10, any eventual heteroskedasticity is taken into account and hence provides a more correct and relevant estimation of the model.

3.4 Study and model design

3.4.1 The Model

The model used in this study is a Fixed Effects multiple OLS model. The model used to predict excess return for firms that recently went public is the following:

$$r_i - r_{index} = \beta_0 + \beta_1 \text{Size}_i + \beta_2 \Delta EBIT_i + \beta_3 Turnover_i + \beta_4 PE_i + \sum_{j=1}^{13} \beta_{5j}\, year_{ij} + u_i$$

In the model, β_0 is a constant, and u_i is a residual. The year variables are dummies numbered from year j=1 to year 13, i.e. 2005 is considered year 1, 2006 year 2, and so on up until 2016 which is numbered as year 13. Detailed explanations of the other variables are found both in Section 3.4.3 of this paper and in Table 2 below.

Variable definitions

Variable	Definition	Denotation
Firm return	The accumulated stock return for firm i the year after the IPO, used as a measure of performance	r_i
Index return	The Nasdaq OMX Stockholm PI return the year after firm i's IPO, used as a benchmark of "normal" return on the Swedish stock market	r_{index}
Size	The size, measured in net revenue of firm i the year after the IPO	$Size_i$
EBIT margin growth	The change in EBIT margin for firm i from the year of the IPO to the year after, used as a measure of the firm's operational performance	$\Delta EBIT_i$
Stock turnover	The total stock turnover in number of shares during the year after used as a measure of productivity within the firm	$Turnover_i$
PE-backed	Dummy variable signifying if the firm i was owned by a PE firm previous to the IPO, given the value 1 if firm i was PE-backed and 0 otherwise	PE_i
Year fixed effects dummies	Dummy variables signifying if the firm i underwent the IPO in year j, given the value 1 if so, otherwise 0.	$year_{ij}$

Table 2: Variable definitions. The variables used in the regression model are presented in more detail, providing what the variable signifies, a definition, and the denotation in the statistical model. The variables described are firm return, index return, firm size, EBIT margin growth, stock turnover, and PE-backing as a dummy.

Given the definitions of r_i and r_{index} in Table 4, $r_i - r_{index}$ represents the excess return for firm i, defined as the excess return above the market as a whole the first year after the IPO of a given firm. Excess return, as opposed to raw returns as the dependent variable and index return as an explanatory variable, is used primarily to simplify the model.

3.4.2 Clarification on comparison

This study compares firms over the course of one year, the year after which the firms were introduced on a public exchange, and only focuses on that year. This is illustrated in Figure 5. The return of a stock the first full year after the IPO is used for several reasons:

1. A very common characteristic of IPOs, which have been studied extensively is the phenomenon of underpricing (Dietrich, 2012). If the studied period would start at the IPO date, this could lead to unreliable results.
2. There is a lot of noise in the stock price right after an IPO, which reduces the relevance of the stock return as a performance indicator for the firm during the first months subsequent to the IPO. This leads to the fact that even if the most extreme underpricing bias was to be avoided by starting sometime close to, but not at, the IPO date, the returns would be arbitrarily skewed due to random factors influencing the stock price in the noisy period after the IPO. This is still a potential problem for firms that underwent an IPO in e.g. December, since the first data point would be the 31st of that month, but this approach should limit the issue.
3. The limited availability of monthly or even quarterly financial reports data for non-public firms in Sweden limits the possibilities to perform actual performance measurements on other periods than full calendar years. Hence, in combination with the above two arguments for not using the time immediately subsequent to the IPO, the first full year was chosen for the study.
4. A limited dataset and a skewedness towards the end of the timeframe, i.e. a significantly higher number of firms underwent IPOs in 2014-2016 than in the years before, lead to few observations in the years 2 and 3 and so forth after the IPO date. Therefore, only the first year is used in this study.

The main point is to look at a horizon that is not too short, in order to reduce noise, but also not too long, in order to reduce the risk of other factors affecting the returns of firms after the IPO.

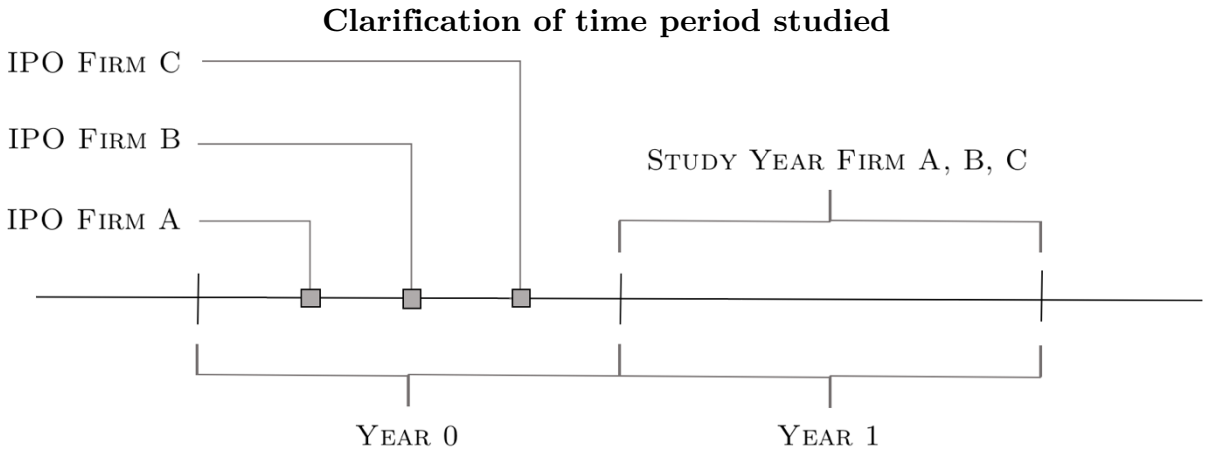

Figure 5: Clarification on time period studied. The figure illustrates the definition of year 1 in this study. Gray squares represent IPO events at different dates during year 0 for firms A, B, and C.

Finally, a short clarification of the choice of peer group is warranted. In this study, PE-backing is denoted with a dummy variable to signify PE-backing or not. This is in line with e.g. the approach used by Xiaolei (2014), where the coefficient of the dummy variable indicates the effect of PE-backing. This could potentially lead to a selection bias since not all firms that reach an IPO are necessarily similar in relevant ways. An alternative approach would have been to use industry specific indices as peers to implicitly get a larger and more similar set of comparable returns.

3.4.3 Variables

Excess return $(r_i - r_{index})$

The excess return is defined as stock return for a firm during the first year after the IPO, less the return of the OMX Stockholm PI index during that same period:

$$return_i - return_{index} = r_i - r_{index}$$

The return of one firm is made up of the accumulated return on the stock price, excluding potential dividends, during the first whole calendar year after the IPO of the firm. The return is computed as the stock price for the firm i at December 31st (or the closest trading day prior to that date) the year subsequent to the IPO, divided by the stock price at December 31st (or the closest trading day prior to that date) the year of the IPO. Since the stock price recovered from FinBas is adjusted for corporate actions such as splits and new issues, so is the return, which increases comparability with other firms and as time series data.

The index used is the OMX Stockholm PI, which is the price index (PI) for the whole Nasdaq OMX Stockholm exchange, and is also called OMX Stockholm All-Share index. The reason the PI is used, as opposed to the gross index (GI) that represents gross return rather than simply the price changes, is due to the nature of the price data which does not include e.g. dividends and buy-backs. Hence, to make the comparison as relevant as possible, such events should be excluded from the index return as well. Furthermore, it is safe to assume that the dividend-ratio in firms that were just recently made public would match those of firms with a longer public record. Note that in the data, the index prices are recorded at the firm level, meaning that every stock price observation is paired with the index price on that same day.

PE-backing (PE_i)

As the main focus of this paper, the dummy variable representing whether or not firm i was owned by a PE firm prior to the IPO or not is the one of most interest. The dummy is given the value 1 if a firm was PE-backed, and 0 otherwise.

By using a dummy to describe PE ownership, it is possible to find results that predict the effect of PE ownership directly, instead of comparing results from one regression with PE-backed firms with one with non-PE-backed. Based on previous research, it is suggested to include previous ownership in models looking at IPO performance (Xiaolei, 2014). However, while Xiaolei (2014) suggests that a VC dummy be included, the definition of PE in this paper comprises VC as a part of PE, the use of the PE dummy is in line with the previous literature.

Size ($Size_i$)

The size of the firm is an important metric and in this model net revenue is used as the size indicator. Net revenue for all firms were collected from the Serrano database, and then adjusted so that all values were in denoted in the same way. Net revenue, or size, is in the model denoted in million SEK. Size can be measured in different ways, including e.g. market capitalization or number of employees. In this paper revenue is used due to the consistency over time for this type of firms as well as due to the fact that it is an impartial measure that can not be manipulated or is affected by for example a daily slump in public sentiment or other outside very short-term factors, in a way contrary to the stock price. Number of employees as a measure of size in the 21st century is also a quite misleading measure of size, especially when comparing across industries. This is due to the varying nature of labor intensity that nowadays is more extreme than ever before.

Including size in the model is common practice and is used in order to control for the fact that larger firms generally get more attention than smaller firms, as well as the

fact that it affects the value of the firm, and thus return (Modigliani and Miller, 1963).

EBIT margin growth ($EBIT_i$)
The change in EBIT margin (or operating margin) from one year to the next is used in order to measure the firms' operational performance. EBIT margin for each year is readily available in the Serrano dataset, but has been calculated manually for each firm to verify the data. The operating margin is used in order to measure operational performance. Operating margin is a good measurement of that since it excludes any financing costs as well as tax structures, which among other things make comparison between firms easy. Depreciation and amortization expenses are included in EBIT.

In this model, the change (or growth) in EBIT margin is used instead of the EBIT margin for a given year. This is done in order to increase the dependability of the metric as a comparable metric across firms. By using a growth metric, it is a firm's ability to increase its own margins, i.e. increased profitability, that is measured, rather than a comparison to peer firms that may or may not have e.g. similar depreciation levels, fixed costs.

Stock turnover ($Turnover_i$)
Stock turnover, or trading volume, is used in the model as a measure of liquidity in the stock. Chen et al. (2010) found that liquidity is a working trading strategy, and using annual stock turnover as a measure of liquidity is in line with their method. Liquidity has been studied extensively and has been found to be an important factor when estimating stock returns (Amihud et al., 2005; Spiegel and Wang, 2005). By incorporating it into the model of this study, the model is able to better explain the underlying factors that generate excess return for the firms. The stock turnover is recovered from FinBas on a monthly basis and then accumulated to a calendar year basis. The variable stock turnover is denoted in thousand shares.

Year fixed effects
The year fixed effects dummies are one per year in the study, ranging from 2005 to 2016. The dummies are given the value 1 if the firm underwent an IPO in that specific year and 0 otherwise. The coefficients for the dummies are not presented in the regression results since they are built into the FE model that is run. In the standard OLS model being tested, the year dummies are excluded, since including them would incorporate a fixed effect in the standard OLS model, rendering it identical to the standard FE model.

4 Results

4.1 Regression results

The results of the estimation of the regression models are presented in Table 3. Three different regressions are run in order to present the different results as well as to clarify that the robust FE model provides the best results in this case. In the robust fixed effects model, standard errors are adjusted for all years in the model. The effect of PE-sponsoring is -0.15468, significant at the 99%-level. The coefficient for the PE dummy signifies that returns during the first year after an IPO is 15.468% lower for reverse LBOs than for non-PE-backed firms, which is quite a large effect. The coefficient for the PE dummy in the standard FE regression is the same as in the robust one, and the coefficient is somewhat smaller in the standard OLS regression at -0.14029.

Regression results

	(1)		**(2)**		**(3)**	
Size	1.62e-06	(1.17)	1.62e-06	(1.15)	8.56e-07	(0.72)
EBIT margin growth	1.02638	(0.32)	1.02638	(0.45)	1.45074	(0.63)
Stock turnover	2.27e-06	(2.63)**	2.27e-06	(1.32)	4.21e-06	(2.57)
PE dummy	-0.15468	(-3.22)***	-0.15468	(-1.80)*	-0.14029	(-1.67)*
Constant	-1.90585	(-0.30)	-1.90585	(-0.42)	-2.78192	(-0.61)
R^2 within	0.0354		0.0354		-	
R^2 between	0.3561		0.3561		-	
R^2 overall	0.0423		0.0423		0.0305	
Time fixed effects	Yes		Yes		No	
Robust	Yes		No		No	
Estimation method	OLS		OLS		OLS	

Table 3: Regression results. Model (1) is the results from a fixed effects OLS regression with robust standard errors to control for heteroskedasticity. Model (2) is a fixed effects model without the heteroskedasticity correction. Model (3) is a standard OLS regression. Coefficients represent beta-estimates. Within parentheses are the reported t-values. The asterisks * indicates significance on a 90% level, ** indicates significance on a 95% level, *** indicates significance on a 99% level.

Presented in Table 3 are also the R-squared statistics for the regression model. The *R-squared within* statistic is the explanatory power of the model within the panel data, i.e. within the different years studied. For the two FE regressions, it is quite low at 0.0354 which can be interpreted as the model explaining 3.54% of the variance

in excess return within each year during the studied period. This low number is likely due to the fact that the number of observations within individual years are quite small. *The R-squared between* is the explanatory power of the model between the years in the model, which means that the model explains 35.61% of the variance between years. The *R-squared overall* is a weighted average between the two others and can be interpreted as the total explanatory power of the model. Since there is no panel data in the standard OLS regression, there is only one R-squared reported, the total one. This one is at 0.0305 which means that the model only explains 3.05% of the variance in excess return during the first year after an IPO.

In order to reassure that regression (1) in Table 3 provides good results as a model, and not only on a coefficient basis but as a whole, test statistics are provided in Table 4. Statistics are provided for both the main regression (1) above in Table 3 but also for the one without the heteroskedasticity correction (2), in order to strengthen the argument for using this particular model. The test is run on the 176 firms in the regression sample, which in turn is divided into 13 groups, one per year starting 2005 and ending in 2016. an F test is performed in order to evaluate the model in order to determine the probability that all the β are equal to 0. The F test for β in the FE robust regression clearly shows that there is no significant risk that all β are equal to 0, which confirms the validity of the model. This means that it the hypothesis that all β are equal to 0 can be rejected and thus that the model is valid for drawing academic conclusions. This is furthermore not the case in a regular FE model, where the hypothesis that all all β are equal to 0 cannot be rejected, which deems the alternate model useless.

Test statistics

Statistic	**FE robust**	**FE**
Observations	176	176
Groups	13	13
Probability > F (β)	0.0001	0.2170
Probability > F (u_i)	-	0.0414
Correlation(u_i, Xb)	0.0279	0.0279
σ_u	0.3079	0.3079
σ_ε	0.4851	0.4851
ρ (rho)	0.2872	0.2871

Table 4: Test statistics: FE robust. Test statistics for the robust FE regression. Presented statistics include number of observations, number of groups (years) in the regression, the likelihood that all estimated coefficients in the model are equal to 0, the likelihood that all error terms are equal to 0, standard deviation of residuals within u_i and ε_i, the correlation between the error term and the regressors, and the variance that is due to the error term.

The rho-statistic indicates what fraction of the variance in the model can be explained by u_i which in this case is 28.718% for both regressions. Furthermore, the standard deviations of u_i, which includes both omitted effects and the error terms is 0.3079 and the standard deviation of the error terms ε_i is 0.4851. The correlation between u_i and the regressors is only slightly smaller than 3%, which is good. However, since these are both FE models, it would be accepted that the correlation was larger.

4.2 Test diagnostics

In an OLS regression, there should be little or no correlation primarily between the independent variables (Woolridge, 2010) and in order to verify that the chosen independent variables do fulfil this requirement, a correlation analysis is performed. According to Zady (2000), correlation coefficients at 0.29 and lower should be interpreted as "low to no correlation". The largest correlation coefficient in this model between independent variables is between annual stock turnover and the PE dummy, but it is only 0.1844 and should thus not pose a problem.

The other condition for an OLS model is that the error term ε_i cannot be correlated with any of the independent or explanatory variables (Woolridge, 2010). As can be seen in Table 5 it is clear that there is no correlation between ε_i and the other explanatory variables.

Correlation with error term

	$r_i - r_{index}$	$Size_i$	$\Delta EBIT_i$	$Turnover_i$	PE_i	u_i
Excess return	1.0000	.	.	.	.	.
Size	0.0731	1.0000	.	.	.	.
EBIT margin growth	0.0525	0.0582	1.0000	.	.	.
Stock turnover	0.1809	0.0984	0.0718	1.0000	.	.
PE dummy	-0.0854	0.0232	0.0940	0.1844	1.0000	.
Error term	0.9110	0.0000	-0.0000	0.0000	0.0000	1.0000

Table 5: Correlation. Correlation between the independent variables, the dependent variables and the error term in the regression model. Diagonal is the correlation between each variable and itself and is always 1, while the lower half below the diagonal is the correlation between variables.

In order to test for normality in the sample, a Skewness-Kurtosis All Normality test is performed on the relevant variables. The test is designed in order to detect departures from normality, in which case the distribution would have a skewness of 0 and a kurtosis of 3. The test detects any departures from these two states on the 95% confidence level. As can be seen in Table 6, the variables all pass the the test and the hypothesis of normality is thus not rejected. If this would have been the case, alternative regression models might have had to be tested such as log-log or level-log regressions (Benoit, 2011).

Another condition for an OLS model is that the error term is normally distributed (Woolridge, 2010). Once the regression is run, the error term can be predicted in order to control that this is not the case. To control for normality in the error term it is included in the Normality test in Table 6. As can be seen in Table 6, the error term does pass the normality test and hence the hypothesis that u_i is normally distributed is not rejected.

Skewness/Kurtosis tests for normality

			Joint	
Variable	**Pr(Skewness)**	**Pr(Kurtosis)**	**Adj. Chi2**	**Prob>chi2**
Excess return	0.0000	0.0071	27.62	0.0000
Size	0.0000	0.0000	.	0.0000
EBIT margin growth	0.0000	0.0000	.	0.0000
Stock turnover	0.0000	0.0000	.	0.0000
PE dummy	0.0000	0.0002	37.60	0.0000
Error term	0.0000	0.0097	25.73	0.0000

Table 6: Skewness/Kurtosis test for normality. Presentation of results from a test of skewness and kurtosis within the independent variables and the dependent variables in the regression model.

The covariance between the estimators is presented in Table 7. As can be seen, the covariance between the independent variables in the regression model is consistently quite small. This is tested in order to make sure that the variables are not too dependent on each other and that each one is relevant to include in the model given the presence of the others.

Covariance

$e(V)$	$Size_i$	$\Delta EBIT_i$	$Turnover_i$	PE_i	$Constant$
Size	1.898e-12				
EBIT margin growth	-8.262e-07	10.209			
Stock turnover	-2.611e-12	5.892e-07	1.067e-10		
PE dummy	2.008e-08	-0.0127	2.545e-07	0.002	
Constant	1.631e-06	-20.368	-1.373e-06	0.024	40.639

Table 7: Covariance. Covariance between the independent variables and the dependent variables in the regression model.

4.3 Limitations

While the model is confirmed to be a working model given the F test that tests the likelihood of all coefficients in fact begin zero and the statistical significance of the coefficient for the PE dummy, the model does come with some limitations. The main limitation is, as stated before in Section 3.1.5, the limited availability of data – or reliable data. The fact that only 55% of the firms from the original sample had enough data is an issue that could lead to a selection bias. This could stem from e.g. if firms listed on smaller exchanges had less data available and thus were excluded from the regression sample and one of the two groups (PE-backed or non-PE-backed) were overrepresented on those exchanges. Then the data would be skewed and the results less reliable.

Another factor that was presented in Section 2.1 and mentioned again in relation to the data in Section 3.4.2 is underpricing. While the time period is selected in order to avoid noise such as underpricing, the fact that underpricing seems to be more prevalent among non-PE-backed firms than for PE-backed could be an issue. Depending on when during the year the firms underwent the IPO and on how severe the potential underpricing is, this could still affect the reliability of the results. Excessive underpricing for non-PE-backed IPOs within the study would inflate the results: the higher return for non-PE-backed firms than for reverse LBOs could simply stem from a more aggressive underpricing in combination with the IPO, rather than from actual performance.

5 Discussion and Analysis

5.1 Other firms improve more than PE-sponsored

Going from private to public generally comes with much stricter reporting responsibilities, both from the exchange where the firm is listed and from legal regulation (Katz, 2009). Despite the fact that there is a more dramatic difference in the US and other countries than in Sweden, the difference is still there. Increased reporting demands and tighter monitoring are in place for public firms for several reasons but one thing it does for firms that recently became public is that it forces managers to go over the business in order to know what to report and verify that things work as they should and that which is reported is correct. This should lead to a better understanding of the business, of possible improvements that could or should be made, as well as a legal obligation to identify problems and errors. While the reporting requirements differ somewhat between different exchanges, the change to a stricter reporting environment is imminent.

The fact that increased and more standardized reporting forces managers to better get to know the business may in turn, voluntarily or serendipitous, lead to easier identification of problems and improvement possibilities. The difference between PE-sponsored and non-PE-sponsored firms in this area is that PE-backed firms already have experienced this when they were bought by the PE firms. PE firms' tendency to implement stricter reporting requirements and monitoring upon investing in a firm, both in order to control the portfolio companies and their managers and in order to be able to present LPs with information on their investments, functions as a growth driver in itself. This can be referred back to Kaplan and Strömberg (2009) who claim that one of the key rationales behind PE investing is the ability to with the right incentives drive managers to improve the firm and deliver better results. Therefore, the low hanging fruit in terms of operational and financial improvements, that non-PE-sponsored firms generally should be able to identify and subsequently pick do not necessarily exist in PE-backed IPO firms, or should at least be more scarce. Hence, non-PE-backed firms should have an easier time to identify and correct errors, as well as identify and implement possible improvements.

Another reason built on a similar argument is the help of professional outsiders. Once a company decides to go public, it goes through a robust vetting process by both external consultants in the due diligence processes and by underwriters in the IPO. Companies are e.g. introduced to new structures, frameworks and ways of working which leads to a lasting professionalization of the company which is confirmed in an interview (E Öhlén, 2018, personal communication, May 17). This professionalization by outsiders has already taken place in PE-backed companies in the same way the

improvements from increased reporting happened: PE firms do exactly the same thing when they invest in a company. Once they acquire a portfolio company, they professionalize both management teams, boards of directors and either hire external consultants, act as consultants themselves, or both. Hence, the effect of professionalization in conjunction with going public should be smaller for PE-sponsored firms.

Thus, one possible explanation to why PE-backed firms would underperform non-PE-backed firms in the year or few years following an IPO is that many of the managerial perks associated with going public have already been implemented by PE firms. Kaplan and Strömberg (2009) also note that the fact that while the lower levels of capital expenditure during the time of PE ownership potentially lead to increases in current cash flows, increasing the value of the firm short term, they could hurt future cash flows, e.g. in the post-IPO period studied in this paper.

5.2 Management issues

PE firms usually have very incentive-driven compensation schemes for managers. While many companies use bonuses to incentivize management, PE firms tend to prefer that a larger fraction of the compensation is equity-based in order to effectively align interests (see Section 1.2.2). This is also done by often letting management co-invest in the portfolio company. This alignment of incentives has several perks both for managers and for the PE owners throughout the holding period, one of which is of course that managers are driven not by yearly bonuses but by the same end-goal as the PE firms themselves: a high valuation upon exit. (Kaplan and Strömberg, 2009)

This management compensation structure could potentially affect the 1 year returns after an IPO negatively. As noted before, one of the most common reasons for firms to go public is in order for managers to cash out (Mello and Parsons, 2000). This is in itself an issue for public shareholders since while the PE incentive schemes are often in place with several restrictions on how much can be cashed out during the PE holding period, it is implied in Mello and Parsons (2000) conclusion that these do not necessarily stretch beyond the PE firms' exit. This can be unfortunate for both the company and the new public shareholders: (1) proven effective incentive structures are abandoned, and (2) the management team is cut loose. This could potentially be a bigger issue in PE-backed firms than in non-PE-backed firms since the change in incentive structure is likely to be larger for the former.

Even though both of these issues need not occur – new equity based compensation schemes can be implemented and management might stay in the company – it is a

big risk. At the very least, managers who do cash out in the event of an IPO has a temporary loss of incentives due to the "hopefully" substantial payoff from the sale of equity, which in itself could be an issue.

5.3 Dressing the bride or simply better

A third potential reason as to why PE-backed firms' stocks would underperform non-PE-sponsored can be found in financial factors such as liquidity and price. Like Chen et al. (2010) found, high liquidity in a stock is related to lower returns, due to a decreased risk premium. The question of why PE-backed firms would be more liquid during year 1 after going public remains however. One reason could be what Klamer (2017) showed in her study on PE firms' exiting behavior. She shows that PE investors generally do not exit reverse LBOs all at once, but rather stay on afterwards and slowly sell off their shares. In this case, a smaller share of the company is sold in the event of an IPO, driving up the price, while the PE firms continuously after the IPO keep selling shares, thus working against a higher stock price in the short to medium term. This combination could then explain the lower returns of reverse LBOs compared to their non-PE-backed peers; higher starting price and larger actors selling shares in the subsequent months or years.

Finally, regarding price, which connects to Section 6.1, it is also possible that the fact that the potential improvements made by the PE owners – or the identification and correction of problems – actually led to the PE-sponsored firms to perform better. This would then in turn lead to a higher price at the date of the IPO and going forward, leaving less room for high returns, due either to a higher starting price point or to a lower risk premium. If nothing else, PE firms should be more accustomed to and familiar with the financial landscape around the IPO process, and thus manage to get a higher price for their reverse LBO. This could be the effect regardless of whether the PE-backed firm is actually better or if PE firms simply are better at "dressing the bride", contrary to Katz's (2009) findings in the US.

Thus, the fact that PE-backed firms are posted at a higher price, due to higher valuation or to better manipulation, could lead to lower returns, as e.g. "dressing the bride" situations would likely not be discovered by external investors within the period this study focuses on.

6 Conclusion

6.1 Conclusion

This study set out to investigate the lasting value creation in PE owned companies in Sweden. In order to answer the question whether or not PE funds actually generate consisting value in their portfolio companies in terms of operational structures or such, the study focuses on finding out if they outperform their non-PE-owned peers after the PE funds' exits. The chosen method in this paper was to look into post-IPO returns and compare PE-backed IPO firms (or reverse LBOs) with non-PE-backed. This approach was chosen in order to compare firms' actual performance, in terms of public market returns, and in order to reduce interfering factors that would appear if one was to study other types of exit methods. In e.g. divestments to other PE firms or strategic buyers, the new owners would be very heterogeneous as well as very unlike public owners, which would make both the effect of the previous (PE) owner hard to distinguish and comparisons to peers hard.

The study was conducted on 176 IPOs on the Swedish public equity market, of which 60 were reverse LBOs and 116 were non-PE-sponsored. The main econometric model is a time (year) fixed effects model that controls for heteroskedasticity. This model was chosen in order to assure that potential heteroskedasticity did not influence the validity of the results. The results show with statistical significance that there is a negative relationship between PE-backing in IPOs and year 1 excess returns. The relationship estimated in this study shows that PE ownership before an IPO leads to 15% less return during year 1 after the IPO. This is a large effect, but could despite the selection of the studied time period be somewhat inflated by more prevalent underpricing among non-PE-backed firms in the IPO process.

The reasons for this negative relationship are discussed with the main points seen as potential causes are as follows: (1) PE-backed firms have already exhausted a lot of their potential improvements before the IPO, compared to non-PE-backed, (2) issues such as bigger differences in incentive structures and larger cashing out possibilities for management once PE-backed firms go public might decrease their potential improvement compared to non-PE-backed, and (3) PE firms are better at obtaining a higher valuation for their portfolio companies in reverse LBOs than other types of owners.

6.2 Future research

As far as geographical scope goes, it would be interesting going forward to see more studies on Northern European markets such as the Nordics, since many of the reverse LBO studies that have been made have focused on the US, UK or China. There is an issue with data availability, both in terms of complete datasets and in terms of relatively few data points, but as time progresses it will be easier to conduct this type of studies.

Another interesting topic going forward would be to investigate quantitatively (or qualitatively in case studies) why PE-backed firms underperform in terms of excess returns in the medium term. It would of course also be valuable to see if the conclusions of this paper holds over other time periods, which unfortunately was not possible to investigate in this study.

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Appendix

Data cleaning process

	No. of firms
Orignial sample	**302**
FactSet	
Dropped due to:	
Non-Swedish firms	11
Lack of data	57
Serrano and FinBas	
Cleaned sample	**234**
Distribution (PE/non-PE)	*60/174*
Not in regression due to:	
Incomplete data	56
Not public long enough	2
Cleaned data	
Regression sample	**176**
Distribution (PE/non-PE)	*53/123*

Appendix 1: Data cleaning process. The process of collecting the samples illustrated. Bold lines representing samples, italics with database names representing where the above line were generated from, italics distribution representing the distribution of PE-backed and non-PE-backed firms in the sample above.

Public stock exchanges

Market	**Freq.**	**Percent**	**Cum.**
AktieTorget	100	42.74	42.74
OMX Stockholm	67	28.63	74.79
First North Sweden	59	25.21	100
Nordic OTC	6	2.56	46.15
Nordic Growth Market (NGM)	2	0.85	43.59

Appendix 2: Public stock exchanges. Number of IPOs per stock exchange during the period 2005-2017. Based on the cleaned sample of 234 firms.

Number of IPOs

Year	IPOs	PE-backed	Non-PE-backed
2005	6	1	5
2006	11	3	8
2007	24	6	18
2008	10	0	10
2009	4	1	3
2010	13	2	11
2011	15	4	11
2012	4	0	4
2013	6	0	6
2014	18	8	10
2015	42	20	22
2016	62	12	50
2017	19	3	16
Total	234	60	174

Appendix 3: Number of IPOs. Number of IPOs per year and by PE-backing or not. Based on the cleaned sample of 234 firms.

Summary statistics: Excess return first year after IPO

Year	Mean	Median	Std. Dev.	Min	Max
2005	0.4209	0.3126	0.3613	0.0353	0.9186
2006	0.0545	0.0457	0.3168	-0.6283	0.5241
2007	0.0109	-0.0255	0.4705	-0.5767	1.4869
2008	0.0878	-0.0141	0.3672	-0.2413	0.8514
2009	-0.5549	-0.5549	0.3446	-0.7986	-0.3112
2010	-0.1694	-0.3342	0.6479	-0.8267	1.3577
2011	-0.0590	-0.0889	0.3882	-0.5443	0.8419
2012	-0.5675	-0.5675	0.2986	-0.7786	-0.3563
2013	0.3431	-0.0529	0.8772	-0.6189	1.4599
2014	0.0087	-0.0480	0.3071	-0.5243	0.6099
2015	0.3531	0.1923	0.5181	-0.2830	1.6578
2016	0.1854	0.0718	0.5024	-0.7265	1.5300

Appendix 4: Summary statistics: Excess return year 1 after IPO. Summary statistics for excess returns year 1 after IPO per year, including mean returns, median returns, standard deviation, minimum return and maximum return. Based on the cleaned sample of 234 firms.