

The long-run performance of PE and VC backed IPOs - Evidence from the Nordic and German markets

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OBJECTIVES OF THE STUDY

The purpose of this paper is to investigate the long-run value creation of financial sponsors through aftermarket performance of sponsor backed initial public offerings in Nordic countries as well as in Germany. More specifically, the aim is to find aftermarket performance differences within the sponsor backed and non-sponsor backed IPO groups. Finally, this study focuses on analyzing the long-run performance drivers of different IPO groups.

DATA AND METHODOLOGY

The final sample consists of 235 Nordic and 270 German IPOs issued between 2000 and 2011. In the Nordic countries, sponsor backed IPOs represent 27% of the total volume (50 IPOs). Out of the 50 Nordic sponsor backed IPOs, 29 are venture capital backed and 21 are private equity backed. In Germany, the share of sponsor backed IPOs is roughly 19% of the total number (43 IPOs) out of which 24 are VC-backed and 19 are PE-backed. My analysis is primarily based on comparing the buy-and-hold abnormal returns (BHARs) of sponsor backed and non-sponsor backed initial public offerings. The BHARs are generated by compounding monthly returns of a specific time-frame in addition to the first partial month following the first day of listing. Furthermore, OLS regressions are used in analyzing the drivers behind long-run aftermarket performance between private equity, venture capital and non-sponsor backed IPOs.

FINDINGS OF THE STUDY

I find that Nordic and German IPOs experience a significant 36-month underperformance compared to the equity market indexes. The pattern holds when IPOs are matched with firms according to their size and industry. Furthermore, the results show that sponsor-backed initial public offerings outperform their non-sponsor backed counterparts significantly, but both groups are unable to generate positive abnormal returns. The better performance of sponsor backed IPOs compared to non-sponsor backed is driven by the long-run returns of private equity backed initial public offerings with abnormal returns close, but insignificantly differing from zero. All in all, the results show that compared to the non-sponsor backed initial public offerings, PE and VC owners, as a whole, are able to create value in the long-run. In addition to the sponsor backed IPOs being initially less underpriced, the source of the value creation is related to better operational efficiency, which is in line with Jensen's (1986) PE value creation model.

Keywords private equity, venture capital, financial sponsors, initial public offerings, IPO performance, share price performance

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Tämän pro gradu-tutkielman tarkoituksena on tutkia pääoma- ja venture capital sijoittajien arvonluontia pääomasijoittajien omistamien yhtiöiden pörssilistautumisten pitkän aikavälin performanssin kautta. Lisäksi tutkielman tarkoituksena on löytää syitä ja vaikuttavia tekijöitä pääomasijoittajien ja muiden pörssilistautumisten pitkän aikavälin kehityksen takana.

DATA JA METODOLOGIA

Otokseni koostuu 235 pohjoismaisesta ja 270 saksalaisesta pörssilistautumisesta vuosien 2000 ja 2011 välillä. Pohjoismaalaisista listautumisista 50 on pääomasijoittajien omistamia, joista 29 on venture capital omisteisia ja 21 pääomasijoittajien omistamia. Saksalaisista listautumisista pääomasijoittajien omistamia yhtiöitä on 43, joista 24 on venture capital omisteisia ja 19 pääomasijoittajien omistamia. Analyysin metodi perustuu pitkän aikavälin indeksioikaistujen tuottojen vertailuun. Tuotot lasketaan olettaen, että sijoittaja ostaa osakkeen ensimmäisen kaupankäyntipäivän jälkeen ja pitää osaketta 36 kuukautta, jonka jälkeen kurssikehitystä verrataan verrokki-indeksien ja -ryhmien tuottoihin. Lisäksi tutkimuksessa käytetään OLS-regressiomenetelmää pitkän aikavälin kurssikehitykseen vaikuttavien tekijöiden analysoimiseksi.

TULOKSET

Tulokset osoittavat, että pohjoismaalaiset ja saksalaiset pörssilistautumiset pärjäävät merkittävästi yleisiä verrokki-indeksejä huonommin 36 kuukauden aikajänteellä listautumisesta. Sama kuvio toistuu, kun listautumisia verrataan verrokkiyrityksiin niiden koon ja toimialan perusteella. Lisäksi tulokset osoittavat, että pääomasijoittajien omistamat yritykset pärjäävät huomattavasti paremmin niihin yrityslistautumisiin verrattuna, joissa ei ole pääomasijoittajaomistuksia. Kummatkaan listautumistyyppit eivät kuitenkaan tuota verrokki-indeksejä korkeampia tuottoja 36 kuukauden aikajänteellä. Täten pääomasijoittajien omistamien yhtiöiden listautumiset eivät ole yhtä paljon yritysarvoa tuhoavia kuin toisen tyyppiset listautumiset. Suurin syy parempaan menestykseen pörssissä liittyy operatiiviseen tehokkuuteen, joka on linjassa Jensenin (1986) kehittämään pääomasijoittajan arvonluontimalliin sekä siihen, että tämän tyyppiset listautumiset ovat vähemmän alihinnoiteltuja alun alkaen.

Avainsanat pääomasijoittaminen, venture capital, pörssilistautumiset, pörssilistautumisten performanssi, osakkeen performanssi

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1. Introduction

“In truth, "equity" is a dirty word for many private-equity buyers; what they love is debt. And, because debt is currently so inexpensive, these buyers can frequently pay top dollar. Later, the business will be resold, often to another leveraged buyer. In effect, the business becomes a piece of merchandise.” – Warren Buffet (28 Feb, 2015)

1.1 Background

Private equity and venture capital, often referred simply as financial sponsoring, have been a source of corporate financing for decades. Although stemming back from the 1940s, it was not until the 1980s when private equity really hit big in the United States due to the leveraged buyout boom. In Europe, however, the role of private equity as an economic force was relatively small until the mid-1990s when the liberalization of regulation for institutional investors in Europe began. In recent years, financial sponsors have become even more important part of companies' financing. Since the financial crisis, traditional lenders such as banks had to adapt to tougher capital adequacy requirements and new regulatory frameworks leading to stricter policy regarding corporate lending. This gap has now been filled with private equity and venture capital, industries which are currently at their peak.

In short, private equity investors try to benefit from the increase in firms' value. The private equity process begins by screening and selecting potential target companies, continues by optimizing the company's operations and processes in order to create value and ends through divesting the company. Jensen (1986) states that the key value drivers for the private equity model are operational efficiencies that are achieved by closer monitoring, management expertise and higher levels of debt. Evidence of the PE value creation process was found in the study of Acharya et al (2013) who confirmed that financial sponsors are able to positively impact on firms operating performance. Furthermore, the performance improvement of portfolio companies was mainly driven by skilled portfolio managers in private equity firms.

On the other hand, financial sponsors have received wide criticism regarding their value creation. Most of the critics argue that financial sponsor firms are generally focusing only on short-run value creation. In other words, as financial sponsors make most of their money through divestments, they will do all they can in order to maximize the exit value of the companies. This, according to the public criticism, is generated by layoffs and other harsh efficiency improvement procedures leading to destruction of value in the long-run.

Perhaps due to the public criticism, the long-run value creation of financial sponsors has been investigated by the academics in recent years. Since private equity and venture capital firms invest mainly in private companies, the research regarding the long-run value creation of financial sponsors has focused on financial sponsor backed initial public offerings. Opposite to the public criticism, studies in North America show that financial sponsors are able to create value in the long-run. Brav and Gompers (1997) studied the long-run performance of VC-backed IPOs and found that venture capital backed IPOs perform superiorly compared to their non-VC backed counterparts. Similarly, Cao and Lerner (2009) discovered that PE-backed reverse leverage buyouts experience a significantly better equity market performance than other initial public offerings. Cao and Lerner argue that in addition to operational efficiencies (Jensen, 1986), financial sponsors want to build good reputation towards investors and hence, don't want to behave opportunistically in an IPO. This, in theory, would imply lower first-day returns and thus, better long-run aftermarket performance of sponsor backed IPOs compared to their non-sponsor backed counterparts.

The European evidence, however, is rather mixed and not as deeply explored as in North America. The long-run patterns of private equity backed initial public offerings was initially investigated by Frederikslust and van der Geest in 2001. Their study, consisting of initial public offerings in the Amsterdam Stock Exchange, shows that that PE backed firms don't significantly underperform their non-PE backed peers who appear to underperform significantly over a three-year period. In 2011, Levis attempted to fill in the existing gap of financial sponsor backed IPO literature by exploring the aftermarket performance of PE and VC-backed IPOs and compared it to equivalent samples of non-PE backed IPOs in the London Stock Exchange. According to his findings, PE-backed IPOs run a better operating and market performance compared to other IPOs in the three years following the public listing. However, venture capital backed IPOs were the worst performing group.

1.2 Framework

The purpose of this paper is to investigate the long-run value creation of financial sponsors through aftermarket performance of sponsor backed initial public offerings in Nordic countries as well as in Germany. First, I will start by studying the long-run performance of all IPOs in general, in order to discover whether the sample behaves according to the already established patterns of IPO

aftermarket performance. By doing this, I will be able to confirm the hypothesis that initial public offerings underperform their benchmarks in the long-run as has been witnessed in many studies such as Ritter (1991) and many more.

In this study, the framework for assessing the long-run value creation focuses on comparing the long-run performance of sponsor backed IPOs to their non-sponsor backed counterparts in the Nordic countries and Germany. More specifically, the aim is to find aftermarket performance differences within the sponsor backed and non-sponsor backed IPO groups. The main hypothesis is that sponsor-backed IPOs should outperform their non-sponsor backed counterparts in the long-run. Thus, they should be able to generate better long-run abnormal returns than the non-sponsor backed initial public offerings, which would imply that financial sponsors are able to create value, or to destroy less value compared to other IPOs, in the long-run

Last, the purpose of this study is also to focus on the long-run performance drivers of different IPO groups. As the long-run performance of initial public offerings is affected by many factors, I will run OLS regressions in order to identify the drivers behind it. More specifically, the aim is to find evidence that the long-run aftermarket performance of sponsor backed initial public offerings is driven by operational efficiencies according to Jensen's (1986) PE value creation model. Hence, the differences behind long-run aftermarket performance are also a subject of interest.

1.3 Contribution

This study contributes to existing research in many ways. First, at least to my knowledge, this paper is the only study focusing on the long-run aftermarket performance of sponsor backed initial public offerings in Nordics and Germany. By using a combined data set, I will be able to generalize the results towards a Northern European level. As the prior European studies have been focusing on UK and Netherlands, this thesis fills the existing gap in the European literature by investigating the remaining large Northern European markets. Second, by exploring the aftermarket performance patterns of sponsor and non-sponsor backed IPOs in two different geographical areas I will be able to discover behavioral differences between the Nordic countries and Germany. Last, this paper aims to find reasons behind the performance patterns and behavioral differences between different types of IPOs, thus investigating whether the long-run aftermarket performance of IPOs is affected by characteristic or ownership inconsistencies between IPO groups.

1.4 Key findings and limitations

By investigating 235 Nordic and 270 German IPOs between 2000 and 2011, I find that IPOs experience a significant 36-month underperformance compared to the equity market indexes. The pattern holds when IPOs are matched with firms according to their size and industry. Furthermore, the results show that sponsor-backed initial public offerings outperform their non-sponsor backed counterparts significantly, but both groups are unable to generate positive abnormal returns. The better performance of sponsor backed IPOs compared to non-sponsor backed is driven by the long-run returns of private equity backed initial public offerings with abnormal returns close to zero, but insignificant. All in all, the results show that compared to the non-sponsor backed initial public offerings, PE and VC owners, as a whole, are able to create value in the long-run compared to non-sponsor backed initial public offerings. In addition to the sponsor-backed IPOs being initially less underpriced than non-sponsor backed companies, suggesting that sponsors take reputational considerations into account in an IPO (Cao & Lerner, 2009), the source of the value creation is related to better operational efficiency, which is in line with Jensen's (1986) PE value creation model.

The most concrete limitation to my study is the quality of data. First, the initial data was collected from SDC Platinum database with many errors in it starting from the event dates i.e. the issue dates of the IPOs. In order to mitigate the errors in the sample, I gathered secondary samples from Dealogic and Argentum databases and made random checks around the sample, which improved the data quality significantly. Second limitation relates to the estimation of long-run abnormal performances. Previous studies have shown that the effect of long-run stock performances is very sensitive to the benchmarks they are compared to. To mitigate this limitation, multiple benchmarks controlling for the size, industry and geography were applied.

1.5 Structure

The rest of the paper is organized as follows. Section 2 presents a summary of IPO activity, their performance in short-run and long-run as well as a review of financial sponsors. In section 3, the hypotheses will be presented. Section 4 discusses the data, variables and methods of this study. In section 5, I present the empirical results. In Section 6, I briefly discuss the findings and connect them to the academic literature. Finally in section 7, I conclude the key results of this study and give suggestions for further research.

2. Literature Review

The literature review summarizes academic literature related to IPO activity and their performance in general. Moreover, this section presents a review of financial sponsoring covering the impact of PE and VC ownership to long-run performance of IPOs. The purpose of this section is to understand the dynamics behind IPOs and factors affecting IPO performance. Furthermore, financial sponsors, performance of sponsor-backed IPOs and the key drivers behind private equity and venture capital backed IPOs are in special interest.

2.1 IPO activity

An initial public offering can be considered as one of the biggest steps in a company's lifecycle. The IPO process is well-planned and includes various parties ranging from underwriters to law offices in addition to the company being listed. Typically, the IPO process is relatively time-consuming and is associated with high costs so what is the reason for companies to go public at all? The IPO literature has attracted lots of attention towards the dynamics and reasons for firms going public. Common motives for the going public decision seem to be the desire to raise capital for growth and to create liquidity for founders and other shareholders. According to Ritter and Welch (2002), the theories behind firms going public can be broadly categorized to two groups: *life cycle theories and market-timing theories*.

2.1.1 Life Cycle Theories

Life cycle theories of IPO activity tend to rationalize that the decision of going public is related to different entrepreneurial motives such as achieving higher valuation in the case of future acquisitions or acquiring money for growth. Zingales (1995) was the first to study the decision-making of firms going public and found out that potential buyers are more likely to spot potential targets when they are publicly listed. In addition, the initial owners are able to reduce the level of bargaining with the potential buyers after taking their firm public. Hence, initial owners of a company are able to gain a higher acquisition valuation of their companies. On the other hand, Black and Gilson (1998) find that IPOs are often conducted by venture capital firms to divest their investment by handing the company's ownership back to the initial owners.

In a study by Chemmanur and Fulghieri (1999), the researchers developed a model of the *going public -decision* of a firm. More specifically, they investigated the difference between private placement of shares to venture capitalists or going public. According to Chemmanur and Fulghieri (1999), venture capitalists are not willing to pay as much for a company compared to smaller and diversified public market investors. On the other hand, smaller investors can't gain sufficient information regarding their investment with an optimal cost. Hence, an entrepreneur is more likely to exit through an IPO when the company has grown larger and the proceeds of an IPO, i.e. gaining a higher valuation, outweighs the cost of going public. This way, IPO can be seen as a logical next step after the company has grown sufficiently large.

2.1.2 Market-Timing Theories

Market-timing theories analyze and focus on general market conditions when investigating IPO activity and the decision of going public. Thus, the market-timing theories predict that equity is issued in periods of high valuations and repurchased when the prices are low. In their study, Baker and Wurgler (2000), call these periods in which the equity is valued at high prices as “windows of equity” or “IPO windows”. Lucas and McDonald (1990) presented an information-theoretic model focusing on equity issues. Their model predicts that equity is issued, on average, after an abnormal positive return on stock and the equity markets in general. On the contrary, in the presence of a bear market, entrepreneurs planning to take their firm public are willing to wait until the markets have a more favorable pricing environment i.e. in bull market conditions. Similarly, Loughran, Ritter and Rydqvist (1994) show that equity issues seem to cluster around periods with favorable market conditions.

Choe, Masulis and Nanda (1993) studied the decision-making process of companies preparing equity issues. They found that firms issue equity at times where other promising firms issue equity. The researchers state that during these times, the adverse selection effects for the issuing firms are lower than in bear market conditions. Thus, the presence of good quality equity issues seems to decrease the level of uncertainty of equity values for companies that are planning to issue equity. This makes the choice of seeking public financing more attractive for entrepreneurs. Subrahmanyam and Titman (1999) also presented a theory, which highlighted the informational value of a favorable stock market environment. According to their theory, the presence of high

number of active investors in the market can launch a snowballing effect in which firms seek financing from the public markets due to improved informational efficiency.

2.2 IPO performance

2.2.1 Short-run performance

A well-known phenomenon related to initial public offerings is their underpricing, which has attracted attention among many researchers. Logue (1973), Ibbotson (1975) and Ritter (1984) state that companies leave substantial amounts of money on the table when going public. Thus, companies don't raise as much equity as they could. On the other hand, investors gain through IPOs on the cost of the issuing companies. Ljungqvist (2007) discovered that the average underpricing in the U.S. has been approximately 19%. In an earlier study, Keloharju (1993) found that the average initial excess IPO return in the Helsinki Stock Exchange was 8.7% between 1984 and 1989.

The most common theories for IPO underpricing are based on asymmetric information in the capital markets. Maybe the most known theory is Rock's (1986) winner's curse model. In short, Rock assumed that there were two types of investors: well-informed and uninformed. Well-informed investors would bid only on the underpriced IPOs and the uninformed investors in the IPO market would get relatively more overpriced shares. Hence, IPO companies use underpricing to compensate for the losses of uninformed investors as underpricing prevents them of withdrawing from the markets.

Benveniste and Spindt (1989) studied the processes of determining an issue price and the allocation of shares in initial public offerings. Their major contribution to the IPO literature is the partial adjustment model. According to Benveniste and Spindt (1989), underwriters compensate regular investors for revealing truthful information in the book-building process. Thus, underwriters tend to increase the expected profits for investors, who reveal truthful information, through underpricing and allocation of the shares. If initial public offerings were not underpriced, the regular investors would be more reluctant to give their information regarding the IPO.

Another theory related to information asymmetry is the signaling theory (Allen & Faulhaber, 1989). Allen and Faulhaber argue that firms can signal their worthiness through underpricing. Good firms can underprice their IPOs, because they're confident that they can recoup the money left on

the table by their future performance. On the other hand, bad firms cannot recoup the losses so signaling is more costly to them. Shortly, underpricing is used by companies in order to reduce the information asymmetry by signaling the worthiness of the companies. However, the signaling theory of Allen and Faulhaber (1989) has failed to find strong support amongst academic literature.

2.2.2 Other factors behind underpricing

There are many explanations for underpricing in the literature and generally speaking, underpricing can be seen as a sum of different factors (Ritter & Welch, 2002). Some of these factors are related to firm-specific details. According to Ritter (1984), relatively big companies tend to be less underpriced due to their enhanced prestige in the capital markets compared to small companies. Moreover, the size of the offering is found to have an effect on underpricing (Beatty & Ritter, 1986). Beatty and Ritter (1986) argue that investors tend to speculate more with small offerings than large offerings and hence the smaller offerings are underpriced more than the larger ones.

Loughran and Ritter (2004) studied the underpricing variation over time. Their research states that IPO underpricing is related to the state of the economy. For example, the underpricing of IPOs during the internet bubble (1997-2000) jumped abnormally to 65%. They discovered that during the internet bubble, companies started to seek underwriters with a reputation for relatively severe underpricing. During this period, underwriters began to allocate the hot IPO shares to personal brokerage accounts of the issuing firm executives. According to Loughran and Ritter (2004), issuing firms executives had an incentive to hire underwriters with underpricing reputation. After the internet bubble, underpricing decreased to 12% on average and the underpricing was considered to have returned close to average level (Loughran & Ritter, 2004).

2.2.3 Long-run performance

Extensive research has also been made on the aftermarket performance of initial public offerings. Ritter (1991) was one of the first to study the long-run performance of IPOs. Using a sample covering years between 1975 and 1984 he discovered that issuing firms significantly underperformed their non-issuing benchmarks from first day closing price to three-year anniversaries. Moreover, there was substantial annual as well as industry-specific variation in the underperformance and IPOs in the high-volume years performed the worst (Ritter, 1991). Thus, his findings were consistent with “windows of opportunities” explanation suggesting that firms

take advantage of investors valuing equity higher in bull market conditions. Similarly, Levis (1993) found that the underperformance of initial public offerings isn't just an American phenomena. He studied IPOs from 1980 to 1985 and reported that issuing companies in the United Kingdom underperform in the long-run. Furthermore, he found evidence that the underperformance exceeds the 36-month period observed in the study of Ritter (1991).

Loughran and Ritter (1995) extended the previous academic research by observing initial public offerings and seasoned equity offerings over five-year periods. Their research, covering firms issuing stock from 1970 to 1990, points out that the magnitude of the underperformance of IPOs and SEOs over long-term is exceptionally large. According to Loughran and Ritter (1995), 44 percent more money should have been invested in the issuing companies than their non-issuing benchmarks in order for an investor to have the same wealth five years later.

However, there has been some controversy on the matter of how IPOs perform in the long-run. Brav and Gompers (1997) show that after matching the benchmarks on the basis of size and book-to-market ratios, initial public offerings to don't actually underperform their benchmarks. Moreover, they find that the underperformance is significantly reduced after value-weighting the IPO returns. Thus, they conclude that the underperformance may be overstated by weighting returns in event time. Maybe, the most comprehensive data set was used in Gompers and Lerner (2003) who studied the long-run underperformance of U.S. IPOs from 1935 to 1972. The sample implied some underperformance when using event-time buy-and-hold abnormal returns. However, they found that the underperformance diminished when cumulative abnormal returns were used and that IPOs returned as much as the market when calendar-time analysis was used. Schultz (2003) also states that event-time analyses may indicate significant IPO underperformance even in situations where ex-ante expected abnormal returns are zero. Similarly to Gompers and Lerner (2003), he argues that using calendar-time returns seems to solve the problem.

2.3 Review on private equity and venture capital

Private equity and venture capital firms are usually in the form of partnerships or limited liability corporations (Kaplan & Strömberg, 2009). The firms provide various funds to the investors, which are typically mutual and pension funds and other large institutional investors. In a legal setting, the funds are organized as limited partnerships, where the financial sponsor firms act as the fund

managers, while the institutional investors provide capital for the fund. The funds are usually operated as closed end funds, with a typical life span of 10 to 12 years (Kaplan & Schoar, 2005).

2.3.1. The private equity process

The European Venture Capital Association identifies four phases in the private equity process. The process starts by *fundraising*, which typically lasts for about 6 months. In this phase, institutional investors and individuals with substantial amount of funds are able to subscribe to the fund. Once the fund is closed, the *investment phase* begins and the PE firms managing the fund invest the capital to potential companies according to their investment strategy. The funds are typically invested during the first five years of the fund. The third phase is called the *managing phase* in which the companies are managed under the fund managers alongside with the entrepreneurs. Fund managers typically exercise different types of active ownership in this phase in order to create value of their investments leading to higher valuations in the *exit phase*. In the exit phase, the assets are divested and the gains from the value creation are realized. Moreover, the capital gains are redistributed to the fund investors (EVCA, 2007).

2.3.2. Private equity value creation

Factors behind the value creation of PE-backed companies have been assessed in the finance literature. After investing in a company, private equity investors have a limited time frame for value creation of the portfolio companies and hence, different forms of active ownership is exercised. Active and close monitoring of the portfolio companies' financial performance is a typical way for a PE investor to exercise active ownership (Gorman & Sahlman, 1989). Involvement in the portfolio companies' strategic planning and decision-making is also an important way to add value (Sapienza et al., 1996). Furthermore, private equity investors are sensitive to professionalize the management, e.g. by hiring outside CEOs, and the internal processes of portfolio investments, which is especially the case in young ventures.

Acharya et al (2013) investigated the value creation of PE owner firms using a deal-level data covering the PE process from entry to an investment to exit. Their findings show that after controlling for leverage and sector returns, the abnormal performance of deals is positive. Furthermore, sales and operating margin improvement appear to drive the higher performance during the phase in which the company is private. The researchers state that this kind of performance is related to the management skills or 'human capital' of PE firm partners, who usually

are ex-consultants or investment bankers and ignite value creation programs, which seem to be working, in the entry phase of an investment.

Jensen (1986, 1989) summarized that private equity firms create value by closer monitoring, management expertise and utilizing higher leverage. These factors have a positive effect on the information asymmetries as well as operational and financial performance. Recently, Katz (2009) discovered similar findings. In her study, she examined the connection between firm's ownership structures to earnings quality and long-run performance. According to her results, professional ownership, tighter monitoring and reputational considerations lead to positive aftermarket performance for PE backed IPOs compared to their benchmarks. Furthermore, the effect is especially strong in cases where the proportion of the PE ownership is large.

2.3.3. IPO as an exit strategy

The way financial sponsors make money out of their investment is through an exit i.e. divestment of an asset. The sponsors typically hold their investments for three to ten years until making an exit. Povaly (2006) identified five main types of exits (i.e. divestments) related to private equity and venture capital investments. First, a portfolio company could be sold to a third party such as a strategic buyer through a trade sale, which are typically for exits for cash consideration. Exit can also happen through a secondary buyout in which a portfolio company is sold to another PE firm. Management can also buy the company from the PE firm, which is referred as management buyouts. The three first alternatives are typically full exits, where the ownership of financial sponsor is fully liquidated (Povaly, 2006). Fourth alternative is to take the company public via an IPO and the last alternative identified is write-offs in which no expected initial returns are returned.

IPOs have accounted for only 14 percent of all exits between 1970 and 2007, while trade sales and secondary buyouts have been more common with a 62 percent share (Kaplan and Strömberg, 2009). Thus, IPOs seem to be not in the favor of private equity and venture capital firms when they consider different types of exit strategies. One explanation could be that among the companies owned by financial sponsors, only the highly profitable ones that need few oversight will go public and the less profitable ones in the need for more monitoring will be sold in a trade sale (Bienz and Leite, 2004). Another reason why IPOs are not as common as M&A exits might be that the process is usually time consuming and costly. Furthermore, when taking the company public financial sponsors don't typically sell all of their shares due to lock-up agreements with underwriters,

performance incentives and liquidity considerations leaving them with a significant, although reduced, proportion of the company's ownership (Levis, 2009). These lock-up periods, typically lasting six to twelve months, prohibit private equity and venture capital firms of selling their shares and thus enhances closer monitoring, reduces information asymmetry and other potential conflicts with stakeholders (Gompers and Lerner, 1998).

2.4. Performance of private equity and venture capital backed IPOs

2.4.1. Impact on short-run performance

Meggison and Weiss (1991), Brav and Gompers (1997) and Lee & Wahal (2004) have studied the role of venture capitalists behind IPOs. According to Meggison and Weiss (1991) and Brav and Gompers (1997), venture-backed initial public offerings tend to be less underpriced as having a venture-capitalist behind a company gives a favorable signal to investors of the state of company. On the contrary, Lee and Wahal (2004) find that venture-backed IPOs are underpriced more than offers with no venture capitalists behind. They argue that venture capitalists are eager to liquidate their ownership through an IPO and hence might not wait for the most optimal time to execute this liquidation.

2.4.2. Impact on long-run performance

The private equity firms have received criticism in the media for being too short-sighted. On the other hand, Jensen (1986) argues that the key value drivers for the PE model are enhanced operational efficiencies, which are achieved through closer monitoring, management expertise and higher levels of debt. If PE firms were short-sighted, their aftermarket performance should be poorer than their non-PE backed counterparts. The long-run performance of venture and private equity backed IPOs has attracted some literature during the recent years especially in the United States.

Brav and Gompers (1997) studied the long-run underperformance of initial public offering by a sample covering U.S. IPOs from 1975 to 1992 (including venture capital backed and non-venture capital backed companies). According to their findings, venture backed IPOs perform superiorly compared to their non-VC backed counterparts in equal weighted returns, although value weighting reduces the underperformance of non-VC backed IPOs significantly. Moreover, they argue that the performance of VC backed IPOs is related to better management expertise and corporate

governance structures, which enhance the operating performance and decrease the level of information asymmetry generating a better long-run performance for VC-backed IPOs. The effect is further backed by Krishnan et al (2009), who state that more reputable VCs select companies with better quality and hence, are associated with a significantly better long-run performance.

The academic literature has also attracted interest towards reverse leverage buyouts (RLBOs) in which leverage buyouts are taken public again. In a study conducted by DeGeorge and Zeckhauser (1993), the researchers show that in the period going public again, RLBOs appear to outperform their peer companies and the net performance remains positive in the following period. In a more recent paper, Cao and Lerner (2009) investigate the long-run performance of RLBOs. Using a comprehensive sample of U.S. RLBOs between 1980 and 2002, they find that RLBOs consistently outperform other IPOs and the stock market indexes achieving statistically significant positive returns. The researchers also conclude that large RLBOs with more capital under management appear to perform better, which is driven by sponsorships of larger buyout groups. Furthermore, they argue that reputational considerations of financial sponsors make them to avoid opportunistic behavior in the IPO process leading to enhanced long-run performance.

In a European setting, Frederikslust and van der Geest (2001) studied the effect of PE backed IPOs on the Amsterdam Stock Exchange. They performed numerous tests using several benchmarks and found that PE backed firms don't significantly underperform their benchmarks, while their non-PE backed counterparts appear to underperform significantly over a three-year period. The researchers introduce double selection as a possible explanation for the outperformance referring to the investment and exit opportunity used by PE funds. In double selection, PE funds will only invest in companies able to fulfil the return objectives through cash flows i.e. dividends or increased share price in the exit. Thus, only the most successful companies will conduct an IPO, which also signals the potential investors that the quality of the company is good and attracts increased demand from investors investing in the company (Frederikslust & van der Geest, 2001).

However, the European literature seems to be relatively inconsistent in respect to how PE-backed IPOs perform in general. Jelic, Saadouni and Wright (2005) examined the performance of management buyouts exiting through IPOs in the London Stock Exchange from 1964 to 1997. According to their research, there was no significant evidence either for or against the private equity

or venture capital backed IPOs performing better in the long-run compared to their counterparts with no financial sponsor backing.

The rather inconclusive evidence of PE backed IPOs in Europe inspired Levis (2009) to fill the existing gap in the literature regarding aftermarket performance of VC and PE backed IPOs in Europe. By examining IPOs from 1992 to 2005 in the London Stock Exchange, he showed that the PE backed IPOs have a better operating and aftermarket performance compared to other IPOs and the stock market in general both in equal-weighted terms. Moreover, he finds that the aftermarket performance is related to the level of debt and proportion of retained ownership of the financial sponsors after flotation. According to Levis (2009), higher leverage and larger proportion of financial sponsor's ownership is positively related to superior aftermarket performance.

3. Hypotheses

As stated before, the previous literature on the effect of private equity and venture capital ownership to long-run performance of IPOs suggests that these types of IPOs perform superiorly to their non-backed counterparts. However in a European setting, the studies provide conflicting results. Some studies find that both PE and VC-backed IPOs outperform their NB benchmarks as well as provide positive long-run abnormal returns, while other studies show that only PE-backed IPOs perform superiorly. Thus, it can be concluded that the results vary in terms of geographical perspective. Furthermore, the studies also provide different results depending whether equal or value weighting is used. Typically, the use of value weighted averages mitigates the effect as well as the significance of the results.

3.1. Research question 1 – How do IPOs in Nordics and Germany perform in the long run?

Before assessing the question whether private equity backed IPOs perform better than their non-capital backed benchmarks, I look at the whole sample and determine how IPOs in Nordic countries as well as in Germany generally perform. More specifically, I will investigate whether IPOs outperform or underperform the equity markets and their non-issuing peers in long run. As stated earlier, the IPOs have been found to underperform the equity markets and comparable firms in the long-run. This is typically attributable to the windows of opportunities explanation (Ritter, 1991)

arguing that firms usually go public when markets conditions are favorable. Typically, these favorable conditions lead to exaggerated valuations during the first day of the IPO, a phenomena, which is referred in the literature as *IPO underpricing*. As a result of the high first-day abnormal returns, the initial public offerings have been shown to lead to mean reverting performances in long-run. Thus, my first testable hypothesis is:

Hypothesis 1: On average, companies going public in Nordics and Germany underperform their listed benchmarks in the long-run

The abnormal returns are measured by 36 month buy-and-hold returns starting from the date of the initial public offerings. Thus, I will expect the IPOs, as a whole, to provide negative long-run abnormal returns compared to their benchmarks, which in this study will be market indexes based on various different measures such as geography, size and industry.

3.2. Research question 2 – How do private equity and venture capital backed IPOs perform compared to the non-backed IPOs in the long-run?

Previously, it has been argued that private equity and venture capital backed IPOs perform better in the long-run compared to non-sponsor backed IPOs. The superior performance compared to non-sponsor backed IPOs seem to stem from better management expertise and enhanced operational efficiencies of the companies as well as reputational considerations of financial sponsors. Thus, the presence of financial sponsor as an owner of a company prior to the IPO should, according to the studies in the U.S. and the U.K., result in a better long-run abnormal return performance compared to their non-sponsor backed counterparts. Thus, the second testable hypothesis is:

Hypothesis 2: On average, private equity and venture capital backed (sponsor backed) companies going public outperform their non-sponsor backed counterparts in the long-run

Similarly to the first research question, the long-run performance is measured as buy-and-hold returns starting from the IPO date and lasting up to 36 months after the IPO. Hence, if the sponsor backed IPOs outperform, they provide better returns compared to their non-backed counterparts in a 36-month event window after the initial public offering. Furthermore, I will separate private equity backed and venture capital backed IPOs into subsamples to investigate their performance in relation to each other. Generally, as private equity owned companies are regarded being more

mature before going public, I expect them to perform better than the more immature venture capital backed IPOs.

4. Data and methods

4.1 Sample selection

The focus on this study is to measure the long-run aftermarket performance of sponsor backed IPOs and investigate the differences compared to non-sponsor backed counterparts. As almost no previous academic literature, at least to my knowledge, exist of the long-run performance of PE backed IPOs in the Nordic region, the sample used in this study consists of firms conducting an initial public offerings in the Finland, Sweden, Denmark and Norway. Furthermore in order to add significance to my study and make the results more generalizable to a Northern European level, German IPOs are added and studied in the sample also.

The Nordic countries are argued to have strong historical connections and similar legal framework (La Porta et al, 1998). Furthermore, the corporate governance recommendations in the region have developed similarly alongside with the stock exchange integration following the merger of the Helsinki, Copenhagen and Stockholm exchanges (Ikäheimo et al, 2008). Thus, for the purpose of my study I consider the Nordic region as one market. To add strength to my study due to a possible lack of observations of sponsor-backed IPOs, I also gather a similar sample from the German market. Using German data alongside with Nordic also acts as a sanity check regarding the usefulness of the method presented later in this thesis. Moreover, investigating the same effect in Germany enables me to generalize the results of my study to a Northern European level.

In his study of PE and VC backed IPOs in the UK, Levis' (2011) sample included listings on the Alternative Investment Market (AIM) in addition to the main market (London Stock Exchange). I will follow his literature in order to form a more comprehensive set of IPOs consisting of large and small companies. Hence, alongside with the main market IPOs, my sample includes listings to alternative Nordic markets such as the First North and Oslo Access. The difference between the main and alternative markets is that the latter one has lighter requirements and rules making it easier for smaller companies with shorter track record to go public.

4.1.1 IPO data

The initial sample of IPOs was obtained from the SDC Platinums's New Issue Database. Furthermore, Dealogic was used in order to get as comprehensive IPO sample as possible. The initial sample consists of 278 Nordic and 311 German common stock IPOs between 2000 and 2011. Time frame begins from 2000 after both Finland and Germany adopted the Euro as its currency as well as due to the fact that only couple sponsor-backed IPOs were executed prior to the year 2000. The time frame ends to 2011 due to the need of three-year post-IPO return data. Following the literature of Levis (2011), I excluded investment trusts, re-listings and transfers across markets.

4.1.2 PE ownership data

SDC Platinum's New Issue Database provides information regarding the ownership backing type of companies going public. According to the database, 119 initial public offerings out of the whole sample were sponsor-backed i.e. either private equity or venture capital backed. As done in the previous section, I used Dealogic in order to get a more comprehensive data regarding the ownership type of a company going public. Dealogic is widely used among the practitioners in the corporate finance industry and gave me an additional 6 observations regarding sponsor backing of companies conducting an IPO.

As argued by Levis (2011), identification between VC- and PE-backed IPOs remains a challenge as private equity firms commonly do both types of investing activities in Europe compared to the U.S. The researcher diminished this problem by utilizing hand collected data from prospectuses in addition to the information available from the databases. In my study, I trust the information received from SDC's New Issue Database and Dealogic and their distinction between VC- and PE-backed ownership. Thus, technically speaking, my sample may suffer from inaccuracies regarding the data received from my sources. This is mitigated by using the Dealogic data also as a sanity check increasing the accuracy of my data.

4.1.3 Stock price, benchmark and descriptive data

The historical stock price data for the single-name equities (IPO companies) was obtained from Thomson Reuters Datastream. The historical index price data for applied benchmarks was also retrieved from Datastream database. The lack of stock price data for IPO companies reduced the

sample size to a total of 505 IPOs in the Nordics and Germany. Furthermore, the subsample of initial public offerings backed by financial sponsor reduced to 93 companies. Descriptive data of IPOs was obtained primarily from SDC Platinum New Issues Database and Thomson Reuters Datastream.

4.2 Variables definition

This section present the variables used in this study. The variables are used to describe the IPOs in Nordic and Germany as well as to analyze the performance differences across each IPO group with an OLS regression. The summary statistics of the variables and other descriptive data is presented in section 4.3.

4.2.1 Natural logarithm of wealth relative

Natural logarithm of wealth relative is the dependent variable of the OLS regression analysis in this study and calculated as follows:

$$\log WR = \ln \left(\frac{1 + (\text{average return for IPOs})}{1 + (\text{average return for benchmarks})} \right)$$

Wealth relative implies how a stock performs against its benchmark, in this case the MSCI Europe index. Thus, a wealth relative of below 1 indicates that IPO has underperformed against its benchmark, while a wealth relative of over 1 indicates an outperformance relative to the benchmark. In this study, I use the logarithm of wealth relative to reduce the potential bias caused by very poor and very good performance of IPOs against their benchmarks.

4.2.2 First-day return

First-day return is a control variable in this study and is calculated as follows:

$$\text{first day return} = \frac{\text{first day closing price}}{\text{offer price}} - 1$$

Purnanandam and Swaminathan (2004) state initial public offerings with high first-day return a greater underperformance relative to IPOs with lower returns. Thus, IPOs tend to be mean-reverting in the long-run indicating that IPOs can be undervalued and overvalued at the same time. Similarly as was done in Levis (2011), I will use the natural logarithm of first-day return in the regressions in order to control the possible bias caused by very large and very small first-day returns in the sample.

4.2.3 Natural logarithm of total assets

Log of total assets is a proxy for firm size in my study. It is calculated as the natural logarithm of total assets at the time of the IPO. Using the logarithm of total assets reduces the possible bias caused by very large and very small IPOs in the sample. Firm size at the moment of the IPO is expected to have a positive effect on the long-run performance due to fact that larger firms are shown to have lower information asymmetries than smaller firms leading to more accurate initial valuations (Carter et al, 1998).

4.2.4 Price-to-book

Price-to-book variable expresses the price-to-book value of equity at the time of the offer. Hence, it indicates whether the company has the characteristics of a value or growth stock. Low price-to-book value stocks can be characterized as value stocks while high price-to-book value stocks can be considered as growth stocks. Bauman et al. (1998) show that value stock outperform growth stock in long-run. Thus based on their findings, price-to-book variable should be expected to have a negative coefficient. The negative coefficient is also found in studies such as Levis (2011) show that the academic literature is consistent with this view.

4.2.5 Bubble period

Bubble-period is a dummy variable, which equals to 1 if an IPO was executed during the technology bubble and 0 otherwise. In this study, I define the period to start in January 2000 last until June 2001 as was done in Levis (2011). I expect the variable to have a negative coefficient due to the fact that IPOs conducted during the bubble period experienced extremely high valuations which according to Levis (2011), were followed by extremely poor abnormal performance afterwards. Furthermore, in a general level, Ritter (1991) has shown that the long-run aftermarket performance of initial public offerings is related to timing in a way that companies going public in hot market conditions experience worse long-run returns than during other times.

4.2.6 Asset turnover

Asset turnover is a proxy for operational efficiency of the firm. It is calculated as follows:

$$asset\ turnover = \frac{net\ sales}{total\ assets}$$

Thus, asset turnover indicates the efficiency with which a company deploys assets to revenue generation. The variable is expected to have a positive coefficient indicating that efficient companies perform better than inefficient companies in the long-run.

4.2.7 EBITDA-margin

The variable *EBITDA-margin* is a measure of profitability of a firm. It is calculated as follows:

$$EBITDA - \% = \frac{\text{earnings before interest, taxes and depreciation}}{\text{net sales}}$$

The higher the EBITDA-margin, the profitable the firm is. The variable is expected to have a positive coefficient suggesting that higher profitability implies better long-run aftermarket returns.

4.2.8 Leverage

Leverage is an estimate of debt-to-assets ratio at the year of the IPO. It is argued that the level of debt of companies influences the stock performance of companies. Levis (2011) states that leverage has a positive impact on stock performance due to the fact that it generally increases earnings per share of a company's stock. On the other hand, evidence of the effect of leverage to the stock performance is rather mixed as some studies such as Cao & Lerner (2009) find out opposite effects.

4.2.8 Ownership variables

PEALL is a variable equaling to 1 if the IPO is sponsor backed i.e. either private equity or venture capital backed and 0 otherwise. By using the *PEALL*, I assume that there isn't no difference in the general characteristics of private equity and venture capital owners. More specifically, I use *PEALL* variable in separate regressions than the following PE and VC explanatory variables in order to capture the effect of professional ownership in general. Thus, I consider them to be professional institutional investors utilizing the same logic and value creative models when controlling their portfolio companies.

PE is an explanatory variable in this study, which equals to 1 if a company going public is owned by a private equity investor and 0 otherwise. Separating PE and VC owners from each other enables to investigate whether there are differences in the effect within the sponsor backed owners and their impact on long-run performance of initial public offerings.

Similarly, *VC* is an explanatory variable equaling to 1 if a company is venture capital backed and 0 otherwise. As stated earlier, the effect of private equity and venture capital ownership is mixed

among the finance literature. Still, as was shown in Brav & Gompers (1997), I will expect these companies to perform better than their non-sponsor backed counterparts and hence have positive coefficients.

4.3 Sample overview

The final sample consists of 235 Nordic and 270 German IPOs. In the Nordic countries, sponsor backed IPOs represent 27% of the total volume (50 IPOs). Out of the 50 Nordic sponsor backed IPOs, 29 are venture capital backed and 21 are private equity backed. In Germany, the share of sponsor backed IPOs is roughly 19% of the total number (43 IPOs) out of which 24 are VC-backed and 19 are PE-backed. Thus in both regions, there are more venture capital backed IPOs. The annual distribution of IPOs in the Nordics and Germany is presented in Table I.

Table I
Distribution of IPOs in Nordics and Germany between 2000 and 2011

Year	Nordic					Germany				
	NB	PEALL	VC	PE	ALL	NB	PEALL	VC	PE	ALL
2000	37	1	1	0	38	109	2	2	0	111
2001	12	1	1	0	13	20	0	0	0	20
2002	1	4	1	3	5	6	0	0	0	6
2003	0	0	0	0	0	1	0	0	0	1
2004	8	3	3	0	11	4	0	0	0	4
2005	19	8	6	2	27	1	8	5	3	9
2006	26	12	6	6	38	30	13	8	5	43
2007	36	11	6	5	47	32	11	7	4	43
2008	13	1	1	0	14	1	2	0	2	3
2009	3	0	0	0	3	3	0	0	0	3
2010	19	6	2	4	25	10	3	1	2	13
2011	11	3	2	1	14	10	4	1	3	14
Total	185	50	29	21	235	227	43	24	19	270

This table reports the annual distribution of IPOs used in this study. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs. The total sample consists of 235 Nordic IPOs and 270 German IPOs. 29 Nordic and 24 German IPOs are venture capital backed. 21 Nordic and 19 German IPOs are private equity backed.

Table I shows that the IPO volume in general follows the valuations observed in the equity markets. Thus, there are more IPOs in periods of high equity valuations. This observation supports the findings of the academic literature, which states that IPOs usually occur in periods where the IPO window is open (Baker & Wurgler, 2000). These periods are then followed by bear market conditions during which fewer IPOs are executed. Another interesting observation is that over 40% of the German IPOs were executed during the technology bubble in 2000. In the Nordics however,

most IPOs occurred in 2007, just before the beginning of the financial crisis launched by the fall of Lehman Brothers in 2008.

There are also differences in the total IPO volumes within the Nordic countries. Roughly 75% of all Nordic IPOs between 2000 and 2010 happened in Sweden and Norway, while Finnish IPOs accounted for less than 10% of the total volume. These two countries are also most developed in terms of private equity and venture capital involvement as the Swedish sponsor backed IPOs account for roughly 40% of the sponsor backed IPO volume with Norway following by 31%. Thus, it can be stated that equity financing is favored dramatically more in Sweden and Norway than in Denmark and Finland. Furthermore, the private equity industry in Denmark and Finland isn't as developed as in Norway and Sweden especially.

The IPO groups are also different in terms of industry distribution. Table II shows the industry composition of IPOs in the Nordic countries and Germany and points out how the IPOs differ in within groups and geographic region.

Table II
Industry distribution of IPOs by number (as a percentage of IPO volume)

	Nordics					Germany				
	NB	PEALL	VC	PE	ALL	NB	PEALL	VC	PE	ALL
Oil & Gas	11.9	12.0	10.3	14.3	11.9	6.1	14.0	16.7	10.5	7.4
Basic materials	3.2	2.0	0.0	4.8	3.0	3.1	7.0	0.0	15.8	3.7
Industrials	16.8	6.0	3.4	9.5	14.5	19.3	25.6	25.0	26.3	20.3
Consumer goods	8.1	18.0	10.3	28.6	10.2	7.0	11.6	0.0	26.3	7.7
Health care	11.4	26.0	37.9	9.5	14.5	7.0	14.0	20.8	5.3	8.1
Consumer serv.	10.8	10.0	6.9	14.3	10.6	11.4	9.3	4.2	15.8	11.1
Telecom.	1.6	0.0	0.0	0.0	1.3	0.9	0.0	0.0	0.0	0.7
Utilities	0.5	0.0	0.0	0.0	0.4	1.8	0.0	0.0	0.0	1.5
Financials	16.2	4.0	3.4	4.8	13.6	17.1	2.3	4.2	0.0	14.8
Technology	19.5	22.0	27.6	14.3	20.0	26.3	16.3	29.2	0.0	24.7
Total	100	100	100	100	100	100	100	100	100	100

This table reports the industry distribution of IPOs used in this study. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs. The total sample consists of 235 Nordic IPOs and 270 German IPOs. 29 Nordic and 24 German IPOs are venture capital backed. 21 Nordic and 19 German IPOs are private equity backed.

In the Nordic countries, the most non-sponsor backed IPOs seem to cluster around technology, industrials as well as the financials sectors. These sectors are the most common for non-sponsor backed IPOs in Germany also. Interestingly, financial and industrial sector IPOs were also among the most active industries in the study of UK IPOs (Levis, 2011). The popularity of technology

IPOs derives from the technology bubble where large number of technology companies went public. In addition, the fact that Nordics and Germany are among the most technology-oriented societies in the world may have resulted to a large proportion of tech IPOs observed in this sample.

When looking at VC and PE-backed IPOs as a whole, Table II shows that there are differences between Nordics and Germany. In the Nordics, sponsor backed IPOs occur mostly in the health care, technology and consumer goods sectors, while the most active sectors in Germany are technology and industrials.

Differences are found also within the sponsor backed IPO group. Most venture capital backed IPOs have clustered around technology and health care sectors both in the Nordics and Germany. Typically, companies in these sectors require heavy investments in research and product development. Thus, the requirement for funding earlier at an earlier phase of the company life cycle is somewhat larger compared to other industries and may be the reason for acquiring venture capital backed funding. The industrial sector has also been popular in VC-backed IPOs in the German markets.

On the contrary, most of the private equity backed IPOs in both regions have occurred in the consumer goods sector. In addition, the German PE-backed IPOs are common in the industrials sector also. The companies in consumer goods industries usually don't need as heavy R&D investment early at their life cycles as e.g. the technology companies. Thus, they are favored more by the private equity investors that have shorter investment horizons than venture capital investors. Investments in consumer good companies are usually used to internationalization, supply chain optimization and overall growth rather than product development making them more suitable investments for PE companies.

The summary statistics for size and operational characteristics of each IPO group presented in Table III. Similarly to Levis (2011), the figures are computed during or at the end of the fiscal year of the IPO. More specifically, Panel A presents the number of employees, market capitalization, total assets, net sales, EBITDA, price-to-book, market cap to EBITDA, asset turnover, operating margin (EBITDA to sales) and leverage ratios (total debt to total assets) for Nordic IPOs. Similarly, the same estimates for German IPOs are presented in Panel B.

Table III
Summary statistics of each IPO group used in this study

<i>Panel A. Nordic IPOs</i>					
		NB	PEALL	VC	PE
# of employees	Median	127	260	200	821
	N	(159)	(49)	(28)	(21)
Market capitalization (EURm)	Median	87.8	172.8	132.6	305.3
	N	(185)	(50)	(29)	(21)
Total assets (EURm)	Median	66.0	99.4	59.5	198.1
	N	(163)	(49)	(28)	(21)
Net sales (EURm)	Median	24.1	102.5	23.2	259.0
	N	(163)	(49)	(28)	(21)
EBITDA (EURm)	Median	1.7	10.0	2.0	27.1
	N	(160)	(49)	(28)	(21)
Price-to-book	Median	2.6	3.0	3.1	3.2
	N	(160)	(48)	(27)	(21)
MCAP / EBITDA	Median	6.4	8.6	8.1	8.7
	N	(147)	(47)	(27)	(20)
Asset turnover (Sales to total assets)	Median	0.5	0.8	0.5	1.1
	N	(158)	(49)	(28)	(21)
Operating margin (%) (EBITDA to sales)	Median	9.2 %	11.5 %	9.2 %	14.1 %
	N	(145)	(47)	(26)	(21)
Leverage (%) (Total debt to total assets)	Median	11.0 %	17.7 %	0.4 %	29.5 %
	N	(158)	(49)	(28)	(21)
<i>Panel B. German IPOs</i>					
		NB	PEALL	VC	PE
# of employees	Median	162	767	211	3152
	N	(218)	(41)	(23)	(18)
Market capitalization (EURm)	Median	109.2	272.9	156.4	465.8
	N	(228)	(43)	(24)	(19)
Total assets (EURm)	Median	58.5	174.8	83.3	556.7
	N	(221)	(42)	(23)	(19)
Net sales (EURm)	Median	25.9	158.0	41.8	581.4
	N	(221)	(42)	(23)	(19)
EBITDA (EURm)	Median	3.1	17.2	8.3	74.7
	N	(219)	(42)	(23)	(19)
Price-to-book	Median	3.0	3.2	3.4	2.7
	N	(215)	(40)	(23)	(17)
MCAP / EBITDA	Median	9.2	7.4	8.1	7.1
	N	(205)	(42)	(23)	(19)
Asset turnover (Sales to total assets)	Median	0.5	0.8	0.6	1.2
	N	(215)	(42)	(23)	(19)
Operating margin (%) (EBITDA to sales)	Median	11.0 %	11.8 %	9.3 %	12.4 %
	N	(211)	(42)	(23)	(19)
Leverage (%) (Total debt to total assets)	Median	4.6 %	10.2 %	0.7 %	25.0 %
	N	(215)	(42)	(23)	(19)

This table reports summary statistics of each IPO group used in this study. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs. The number of observations of each item depends on data availability and is shown in brackets. Accounting items are from the year of the IPO and market capitalization data is presented immediately after the IPO.

Table III provides evidence that private equity backed initial public offerings are much larger in terms of both the number of employees and market capitalization than their non-sponsor and VC-backed counterparts. For example, the market capitalization of PE-backed IPOs is 3.5 to 4.5 times larger than their non-sponsor backed counterparts both in the Nordic countries and Germany. Furthermore, other operational characteristics such as total assets and net sales follow the similar pattern. While the total assets is 3x larger and net sales roughly 11x larger for Nordic PE-backed IPOs than non-sponsor backed IPOs, the difference is even larger in Germany. German IPOs are almost 10x larger in terms of total assets and 22x larger in terms of net sales than the non-sponsor backed IPOs.

When comparing the venture capital backed IPOs to the non-sponsor backed, we observe that the market capitalization is approximately 1.5 times larger both in the Nordics and Germany. The similar 1.5x difference continues in Germany when looking at assets and sales. However in terms of total assets and sales, the VC-backed IPOs seem to be roughly the same size as their non-backed counterparts. Thus, there isn't that large difference in terms of size between non-sponsor and VC-backed IPOs, while the PE-backed IPOs stand out much larger both in the Nordic countries and in Germany.

In terms of relative valuations, there aren't as large differences between the different groups as there were by judging from the operational characteristics perspective. The price-to-book valuations of the VC and PE-backed IPOs are slightly greater than the non-sponsor backed valuations in Nordics. However in Germany, the price-to-book figures of PE-backed IPOs are even slightly lower than their non-sponsor and VC-backed counterparts. Similar patterns can be observed by looking at the MCAP to EBITDA multiples: in Nordics the multiples are a bit higher for VC and PE-backed IPOs, while in Germany the PE-backed IPOs have lower valuation than non-sponsor backed IPOs. The lower valuations in Germany is at least partly explained by the large fraction of IPOs executed during the technology bubble in 2000 when 109 non-sponsor backed companies went public, while there were no PE-backed IPOs. As the valuations during the tech bubble were higher compared to 2001-2011, the multiples reflect this and hence are higher for non-sponsor than PE-backed IPOs.

PE-backed IPOs are also more effective when looking at asset turnover than non-sponsor and VC-backed initial public offerings, which have roughly the same asset turnover figures of 0.5 both in Nordic and Germany. The operating margins similarly are higher for PE-backed IPOs as well as the leverage ratios. In fact, the leverage ratios show interesting differences between each IPO group. Both in Nordics and in Germany, the leverage ratios for PE-backed companies are substantially higher than for their non-sponsor and VC-backed counterparts: typical leverage ratios are 29.5% in Nordics and 25.0% in Germany for PE-backed IPOs. The leverage ratios for non-sponsor backed IPOs are at a somewhat low level both in Nordics (11.0%) and in Germany (4.6%). However, the leverage ratios for VC-backed IPOs are extremely low at below 1 percent in both regions. This could imply that VC-backed companies have restricted access to debt capital and hence have to seek funding from the equity capital markets.

Table IV
Annual levels of underpricing between 2000 and 2011 (all IPOs)

Year	Underpricing	# of IPOs
2000	38.5 %	149
2001	7.9 %	33
2002	4.5 %	11
2003	15.2 %	1
2004	21.1 %	15
2005	15.3 %	36
2006	10.5 %	81
2007	14.4 %	90
2008	3.8 %	17
2009	3.2 %	6
2010	-3.0 %	38
2011	1.1 %	28

This table reports first-day returns i.e. the IPO underpricing from 2000 and 2011. The total sample consists of 235 Nordic IPOs and 270 German IPOs.

Table IV reports the annual distribution of underpricing levels of initial public offerings. The highest level of underpricing was in 2000 during the technology bubble. Furthermore, in a more general level, Table IV shows that underpricing of IPOs and IPO volume seem to follow the state of the economy as was discovered by Loughran & Ritter (2004). More specifically, in addition to the technology bubble, IPOs issued between years 2004 and 2007, prior to the financial crisis, were relatively highly underpriced. Thus, the first-day return behavior in the sample is consistent with the academic literature stating that underpricing levels follow the equity market conditions i.e.

during bull market periods the IPOs tend to experience greater first day returns (higher level of underpricing) than during bear markets.

Table V gives a more detailed summarization of the first day IPO returns for each group in the sample. Opposite to the academic literature, there isn't large differences among the first day return of Nordic IPOs between different IPO groups. In fact, private equity backed IPOs seem to experience even higher first day returns on a median level. Hence, the Nordic pattern of first day returns can be observed to be collided with the findings of academic literature stating that PE and VC backed IPOs generate lower first day returns compared to non-sponsor backed companies.

Table V
First day returns for each IPO group between 2000 and 2011

	Nordic				Germany			
	NB	PEALL	VC	PE	NB	PEALL	VC	PE
Average (%)	11.6	12.2	12.9	10.6	25.9	10.0	15.3	3.3
Median (%)	2.5	1.2	0.0	6.5	3.4	2.5	3.6	0.8
Standard deviation (%)	54	52.7	62.3	29.7	61.4	27.5	35.5	8.2
Total number of issues	185	50	29	21	227	43	24	19

This table reports first-day returns i.e. the IPO underpricing for each IPO group. The total sample consists of 235 Nordic IPOs and 270 German IPOs. 29 Nordic and 24 German IPOs are venture capital backed. 21 Nordic and 19 German IPOs are private equity backed. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs.

However, the German IPOs perform in a way that it is expected. That is, the non-sponsor backed IPOs show higher first day returns than their sponsor-backed counterparts. The private equity backed IPOs, on average, show only modest first day returns of 3.3% meaning that they are relatively accurately valued. Venture capital backed IPOs are more underpriced with 15.3% first day returns, but are well below the non-backed average level of 25.9%, which is highly driven by the technology bubble in the early 2000's during which 109 non-backed IPOs occurred. On a more general level, it can be concluded that German IPOs show higher first-day returns than the Nordic IPOs. Furthermore, when looking at the whole sample, sponsor backed IPOs are less underpriced due to the larger fraction of German IPOs in the sample. This might also be due to the reputational issues (Cao et al, 2009) in addition to tech bubble explanation.

To conclude, private equity backed IPOs are larger in terms of size than their non-sponsor and VC-backed counterparts when looking at market cap, total assets, net sales and EBITDA. In Nordics, their valuations are also at slightly higher levels at the moment of IPOs in terms of price-to-book

and MCAP to EBITDA. However, the valuations of PE-backed IPOs are slightly lower in Germany, which is mostly attributable to the fact that most of non-sponsor backed IPOs in Germany were executed during the technology bubble when no PE-backed IPOs occurred. Furthermore, the PE-backed IPOs are more effective in terms of asset turnover and have higher operating margins and leverage ratios compared to non-sponsor and venture capital backed IPOs both in the Nordic countries and in Germany.

4.4 Methods

4.4.1 Applied benchmarks

Previous studies, such as Loughran & Ritter (1995), have shown that measuring long-run abnormal performance is sensitive to the benchmarks applied in the research. In this study, I will use several different benchmarks in order to measure the aftermarket performance of IPOs in my sample. Moreover, the use of various benchmarks gives a more comprehensive understanding of the effect being studied by mitigating the sensitiveness of the results towards specific benchmarks. More specifically, I will use five different benchmarks for measuring the long-run abnormal return.

First, I will use MSCI Europe index in order to compare the performance of both Nordic and German IPOs in my against a same general market benchmark. The use of a same benchmark index for both IPO panels enables to find out whether there are different characteristics between the performance of Nordic and German IPOs. Second, I will match the IPO groups to country-based indexes in order to eliminate country specific differences in performances. Hence, I will benchmark Swedish IPOs against Nasdaq Stockholm index, Finnish IPOs against Nasdaq Helsinki index etc. Third, a size-adjusted benchmark is used. The size adjusted benchmarks used in this thesis are the Nordic Small Cap, Mid Cap and Large Cap indexes for Nordic companies and SDAX, MDAX and DAX30 index for German companies. All IPOs in this study will be assigned into one of the three size-adjusted benchmarks in accordance to the market value of the IPO at the date of the offer. Fourth, I will apply industry benchmarks based on FTSE industry classification on the specified stock. The FTSE industry classification enables to divide the sample in to 10 different portfolios, which will be matched to their MSCI industry benchmarks. Last, I will use country and size benchmarks in order to match the IPOs in my sample simultaneously in accordance to their country and size characteristics. Thus, the data is divided into seven different subsamples based on the

country of IPO and three different size benchmarks (small cap, mid cap and large cap). This way the data is divided into 12 portfolios (4x3) in Nordics and 15 different portfolios (5x3) when Germany is taken into account. Summary of the benchmarks used in this study is presented in Table VI.

Table VI
Summary of the benchmarks used in this study

Benchmark	1	2	3	4	5
<i>Name</i>	<i>MSCI Europe</i>	<i>Country</i>	<i>Size</i>	<i>Industry</i>	<i>Country & size</i>
# of portfolios					
Nordics	1	4	3	10	12
Germany	1	1	3	10	3
Combined	1	5	6	10	15

This table shows the benchmarks used in calculating abnormal returns in this study. MSCI Europe refers to the MSCI Europe index, country benchmark consists of main indexes of Denmark, Finland, Sweden, Norway and Germany. Size benchmark includes Nordic Small Cap, Mid Cap and Large Cap indexes as well as SDAX, MDAX and DAX30. Industry benchmark refers to 10 European industry indexes of MSCI. Country and size index consists of 3 different indexes formed by market capitalization, which are split by 5 different geographical locations based on the country of origin.

4.4.2 Measurement of long-run abnormal returns

Earlier studies measuring the long-run performance of IPOs, such as Ritter (1991) and Keloharju (1993), were done by applying cumulative abnormal return (CAR) method. A problem with CAR method has been that using cumulative abnormal returns has been shown to create biased results in the long-run studies (Brown et al., 1985). However, more recent studies have used buy-and-hold abnormal return (BHAR) methods when measuring stock market returns as in Cao and Lerner (2009) and Levis (2011). The BHAR method has become more and more common in measuring abnormal returns due to it being the most accurate method to reflect investors' experience when holding a security for a long period (Fama, 1998). On the other hand, a common problem with BHAR method is that it may result to positively skewed returns leading due to the compounding effect (Lyon et al, 1997). A solution to this issue has been to use skewness adjusted t-statistics, which eliminate the bias (Lyon et al, 1999). In this study, I follow the recent strand of academic literature by applying the BHAR method and exclude the CAR method.

4.4.3. Buy-and-hold abnormal return method (BHAR)

Buy-and-hold returns can be expressed as the compounded returns of a specific investment vehicle over a specified time-frame. I will follow the literature of Levis (2011) and generate the BHARs

by compounding monthly returns of a specific time-frame in addition to the first partial month following the first day of trading. Moreover, in the case of public tender offers or other events leading to de-listings, the portfolio returns are allocated equally between the remaining IPO firms in the subsequent month. The buy-and-hold abnormal returns reported in both equal as well as value weighted terms and are calculated as follows:

$$BHAR = \frac{1}{N} \sum_{i=1}^N \left[\left(\prod_{t=1}^T (1 + r_{it}) \right) - \left(\prod_{t=1}^T (1 + r_{bt}) \right) \right]$$

In the BHAR equation, r_{it} and r_{bt} are the raw returns for a company i and its benchmark b at time period t .

As noted earlier, the BHAR method returns have been documented to be positively skewed, which has lead to negatively biased t-statistics. Hence, in order to test the null hypothesis that average buy-and-hold return is equal to zero for my sample firm, I follow the literature of Lyon et al. (1999) and employ the *bootstrapped skewness-adjusted t-statistic*. This method eliminates the skewness bias that may exist in a sample when long-run returns are measured by applying the buy-and-hold abnormal returns method. The bootstrapped skewness adjusted t-statistic formula is:

$$t_{sa} = \sqrt{n} \left(S + \frac{1}{3} \gamma S^2 + \frac{1}{6n} \gamma \right),$$

where

$$S = \frac{\overline{AR}_t}{\sigma(AR_t)}$$

and

$$\gamma = \frac{\sum_{i=1}^n (AR_{it} - \overline{AR}_t)^3}{n\sigma(AR_t)^3}$$

In the above equations, \overline{AR} presents the sample mean of buy-and-hold abnormal returns, $\sigma(AR_t)$ is the cross-sectional sample standard deviation of buy-and-hold abnormal returns and n represents

the number of firms in the sample. Moreover, γ is an estimate of the coefficient of skewness (Lyon et al, 1999).

The BHARs are calculated for the whole sample in order to find out how IPOs as a whole perform compared to their benchmarks. Furthermore, BHARs are calculated for non-backed and sponsor-backed subsamples as well as for PE and VC-backed IPOs in order to find out differences in the aftermarket performances of these groups. Three different results are obtained including Nordic, German and combined results of both regions generalizing the results to a Northern European level.

4.3.4. Regression method to analyze performance differences across IPO groups

This study will investigate the performance difference across IPO groups instead of solely focusing on the abnormal returns. As the nature, characteristics and initial valuation of PE and VC-backed IPOs may have an effect on their aftermarket performances, I will deploy a multivariate regression model for the whole sample to find out which factors influence the long-run performance. Furthermore, as Levis (2011) states, it should be noted that the explanatory variables are endogenous choices of VC and PE companies, which means that the e.g. firms leverage ratio may be influenced by the fact that the company is sponsor backed. Hence, the coefficients, as such, cannot be interpreted as evidence of causality.

The regressions are done in two ways. First, it will be investigated how the characteristics of a company at the time of the IPO affect the aftermarket performance. Thus, the following OLS regression model is used:

(Equation 1a):

$$\text{LogWR}_{nt} = \beta_0 + \beta_1 \text{first-day return}_{nt} + \beta_2 \log \text{ of total assets}_{nt} + \beta_3 \text{ price-to-book}_{nt} + \beta_4 \text{ bubble period}_{nt} + \beta_5 \text{ PEALL}_{nt}$$

In the above equation, the dependent variable is the natural logarithm of 36 month wealth relative quantifying the performance of IPO against its benchmark. All the other variables reflect the characteristics of a company at the time of the IPO. The variable first-day return describes the initial valuation of the company. Logarithm of market cap is a proxy for size. Price-to book captures the effect of positioning of a company between value and growth stock, while the bubble period variable reflects the timing of the IPO. The purpose of variable PEALL is to study the effect of financial sponsors on aftermarket performance. As noted earlier, it includes both private equity and

venture capital backed companies. In addition to this regression model, I will separate the PE and VC-backed IPOs in order to find performance differences across these types IPO types and so the variable PEALL is also split to two. Thus, the first regression model is presented more detailed as:

(Equation 1b):

$$\text{LogWR}_{nt} = \beta_0 + \beta_1 \text{first-day return}_{nt} + \beta_2 \log \text{ of total assets}_{nt} + \beta_3 \text{ price-to-book}_{nt} + \beta_4 \text{ bubble period}_{nt} + \beta_5 \text{ PE}_{nt} + \beta_6 \text{ VC}_{nt}$$

Second, I will add additional measures to the first regression to discover how operational characteristics affect the long-run performance of IPOs. Thus, the second OLS regression model is presented as follows:

(Equation 2a):

$$\text{LogWR}_{nt} = \beta_0 + \beta_1 \text{first-day return}_{nt} + \beta_2 \log \text{ of total assets}_{nt} + \beta_3 \text{ price-to-book}_{nt} + \beta_4 \text{ bubble period}_{nt} + \beta_5 \text{ asset turnover}_{nt} + \beta_6 \text{ EBITDA-\%}_{nt} + \beta_7 \text{ leverage}_{nt} + \beta_8 \text{ PEALL}_{nt}$$

In the above model, the effect of asset turnover and leverage is investigated in addition to the characteristics of the companies at the time of the offerings. The purpose of asset turnover is to capture the effect of company efficiency on its aftermarket performance. Moreover, capital structure may influence the long-run performance in some cases and thus, leverage is also investigated. Similarly as in the first model, PEALL variable is split into PE and VC variables and the model is also presented as:

(Equation 2b):

$$\text{LogWR}_{nt} = \beta_0 + \beta_1 \text{first-day return}_{nt} + \beta_2 \log \text{ of total assets}_{nt} + \beta_3 \text{ price-to-book}_{nt} + \beta_4 \text{ bubble period}_{nt} + \beta_5 \text{ asset turnover}_{nt} + \beta_6 \text{ EBITDA-\%}_{nt} + \beta_7 \text{ leverage}_{nt} + \beta_8 \text{ PE}_{nt} + \beta_9 \text{ VC}_{nt}$$

Both models are shown on first on a Northern European level, including both Nordic and German IPOs. Then, a more detailed categorization to each IPO group (i.e. to non-sponsor backed, sponsor backed etc.) is performed to find out whether there are performance differences within the groups.

5. Results

Overall, the results show that IPOs in general fail to outperform their benchmarks during an event window starting from the end of first trading day and lasting until 36 months after the IPO. Thus,

companies experience negative abnormal returns for the first 36 months of their lifecycle in stock exchanges. This is consistent both in the Nordics as well as in Germany. With the combined data set, the underperformance is extremely significant with abnormal returns varying between -22 to -30 percentage. The German IPOs, on average, perform poorer compared to the Nordic IPOs in the 36 month event window. All in all, the results confirm the first hypothesis (*hypothesis 1*) and are in line with the academic literature (e.g. Ritter, 1991 & Levis, 1993) suggesting that IPOs, on average, underperform against their benchmarks in the long-run.

The combined results also suggest that sponsor backed IPOs outperform their non-backed counterparts. However, the sponsor backed IPOs show negative buy-and-hold abnormal returns. In other words, sponsor backed IPOs experience negative returns, but not as negative as the non-sponsor backed IPOs. The results are somewhat conflicting as the Nordic sponsor-backed IPOs perform roughly similarly as the non-sponsor backed IPOs, while in Germany the sponsor-backed IPOs outperform their non-sponsor backed counterparts. Furthermore, the results suggest that the negative abnormal returns of sponsor backed IPOs is mainly driven by the performance of VC-backed IPOs. Private-equity backed IPOs, on average, experience extremely higher abnormal returns, which even sometimes are positive. However, the 36 month BHARs of PE-backed companies are insignificant from zero. Still, the combined results confirm the second hypothesis (*hypothesis 2*) showing that sponsor backed IPOs outperform their non-backed counterparts on a Northern European level.

Next, I will provide and analyze the results in more detail starting from the Nordics continuing with the German evidence. Last, the combined results of both Nordics and Germany, which can be considered as Northern European evidence, are presented.

5.1 Nordic evidence

Results for the Nordic sample are presented in Table VII. Panel A shows that Nordic IPOs, on average, experience negative abnormal returns compared to their benchmarks. The results are significant against the general European index, country benchmarks, size benchmarks and industry benchmarks. Thus, results are consistent with the findings of Keloharju (1993) regarding Finnish evidence as well as many others (e.g. Ritter, 1991) showing that IPOs underperform in long-run.

Table VII
Nordic buy-and-hold abnormal returns

Months	Equal Weighted					Value Weighted				
	MSCI	Country	Size	C+S	Industry	MSCI	Country	Size	C+S	Industry
<i>Panel A. All IPOs</i>										
12	-12*** (-3.58)	-9%*** (-3.17)	-8%** (-2.59)	-3% (-1.19)	-7%** (-2.44)	-3% (-0.47)	3% (0.43)	-11% (-1.14)	6%* (1.83)	6% (0.98)
24	-17%*** (-3.72)	-15%*** (-3.90)	-13%*** (-3.18)	-5% (-1.54)	-13%*** (-2.90)	-13% (-1.33)	-5% (-0.74)	-21% (-1.21)	0%* (1.80)	0% (0.07)
36	-17%*** (-3.05)	-16%*** (-3.14)	-13%** (-2.41)	-6% (-1.25)	-14%** (-2.51)	-3% (-0.31)	-3% (0.42)	-7% (-0.44)	6%** (1.99)	6% (0.63)
<i>Panel B. Non-sponsor backed</i>										
12	-12%*** (-3.13)	-10%*** (-2.89)	-9%** (-2.40)	-4% (-1.13)	-8%** (-2.16)	-3% (-0.48)	2% (0.49)	-14% (-1.36)	7% (1.53)	8%** (2.37)
24	-19%*** (-3.36)	-16%*** (-3.49)	-16%*** (-3.13)	-7%* (-1.72)	-13%** (-2.54)	-14% (-1.29)	-6% (-0.68)	-27% (-1.35)	-1% (-0.12)	3% (0.50)
36	-17%** (-2.58)	-16%** (-2.58)	-13%** (-2.07)	-5% (-0.89)	-12%* (-1.94)	-12% (-0.1)	6% (0.69)	-7% (-0.38)	9% (1.23)	13% (1.10)
<i>Panel C. Sponsor backed</i>										
12	-11%** (-2.08)	-8% (-1.49)	-6% (-1.29)	-3% (-0.70)	-7% (-1.28)	-9% (-0.41)	-1% (-0.05)	-4% (-0.05)	1% (0.04)	-3% (-0.12)
24	-11% (-1.61)	-10%* (-1.81)	-3% (-0.71)	1% (-0.05)	-10%* (-1.70)	-8% (-0.58)	-6% (-0.39)	0% (0.12)	2% (0.10)	-13% (-0.68)
36	-15%** (-2.16)	-16%** (-2.38)	-10%* (-1.67)	-9%* (-1.70)	-17%** (-2.37)	-13%* (-1.67)	-10% (-1.22)	-10% (-0.37)	-10% (-1.02)	-24%*** (-2.96)
<i>Panel D. Private-equity backed</i>										
12	-22%*** (-3.29)	-15%** (-2.21)	-16%** (-2.28)	-14%** (-2.14)	-20%** (-2.66)	-40%*** (-3.05)	-29%* (-1.99)	-32%** (-2.25)	-30%* (-2.03)	-41%** (-2.51)
24	-13% (-1.48)	-7% (-0.81)	-5% (-0.54)	-7% (-0.78)	-16%* (-1.90)	-24% (-1.36)	-20% (-1.01)	-19% (-1.01)	-25% (-1.18)	-35%* (-1.78)
36	2% (-0.14)	4% (0.31)	4% (0.29)	-2% (-0.23)	-5% (-0.40)	-1% (-0.09)	1% (0.05)	1% (0.07)	-7% (-0.45)	-17% (-1.30)
<i>Panel E. Venture capital backed</i>										
12	4% (-0.48)	-3% (-0.36)	0% (0.02)	4% (0.53)	1% (0.17)	20% (0.88)	25% (1.08)	22% (1.02)	30% (1.23)	34% (1.08)
24	-11% (-1.01)	-13%* (-1.70)	-4% (-0.47)	4% (0.47)	-9% (-0.87)	7% (0.48)	8% (0.65)	17% (0.98)	28% (1.38)	9% (0.43)
36	-29%*** (-3.72)	-31%*** (-4.46)	-23%*** (-2.88)	-16%** (-2.18)	-27%*** (-2.82)	-23%*** (-2.82)	-21%** (-2.22)	-19% (-1.65)	-12% (-0.96)	-30%** (-2.67)

The sample consists of 235 Nordic IPOs of which 185 are NB, 21 PE and 29 VC-backed. MSCI Europe refers to the MSCI Europe index, country benchmark consists of main indexes of Nordic countries. Size benchmark includes Nordic Small Cap, Mid Cap and Large Cap indexes. Industry benchmark refers to 10 European industry indexes of MSCI. C+S refers to country and size benchmark consisting of 3 different indexes formed by market capitalization, which are split by geographical locations based on the country of origin. Returns are measured as percentage returns from first-day close to either three-year anniversary or delisting day. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level. T-statistics are reported in the parentheses.

What is also evident from Table VII is that the sponsor backed IPOs experience roughly similar performance as the non-sponsor backed IPOs on equal-weighted terms. Depending on the benchmark, the 36 month BHARs of sponsor backed IPOs vary between -9% to -17%, while the non-backed IPOs experience a negative buy-and-hold return between -12% and -17%. All the results regarding sponsor backed IPOs are consistent at least at a 10% level. Thus, the Nordic financial sponsors, on average, are not shown to generate additional value for a company compared to non-backed companies during the first three years after the IPO.

Dividing financial sponsors to private equity and venture capital companies reveals striking differences between these IPO groups. Panels D and E show that the negative aftermarket performance of sponsor backed IPOs is mainly driven by the extremely poor performance of Nordic venture capital backed IPOs. The buy-and-hold abnormal returns of VC-backed IPOs vary between -16% and -31% and show to be generating significantly lower returns than the non-sponsor backed IPOs. Furthermore, splitting the sponsor backed sample into PE and VC-backed shows to increase the significance of the 36 month BHAR on VC-backed IPOs. On the other hand, the BHARs of PE-backed companies, although being closely on both sides of 0%, are insignificant.

However, value-weighting seems to decrease the significance of the results as e.g. in Brav & Gompers (1997). In this sample, insignificant results obtained from value-weighted averages is mostly due to there being many small companies in the sample. Thus, the performance of few large companies seems to dominate the results. Due to the previous reason, the results of the Nordic aftermarket performance of IPOs can be concluded to be consistent primarily on an equal-weighted basis.

When comparing the results with the UK study by Levis (2011) we find many similarities. First of all, all IPOs as a whole in the Nordics underperform relative to their benchmarks as was the case in United Kingdom. Second, the non-sponsor backed IPOs are observed to have similar negative buy-and-hold returns. However in his study, the results of Levis (2011) suggested that the BHARs of private equity backed IPOs were positive and significant, while the buy-and-hold returns for VC-backed IPOs were negative and insignificant. The results considering PE and VC-backed IPOs in the

The Nordic sample is therefore the opposite from the significance point of view. What can be stated from the Nordic sample considering PE and VC-backed IPOs is that VC-backed IPOs experience

extremely poor aftermarket performance, while the buy-and-hold returns of PE-backed companies do not significantly differ from zero.

5.2 German evidence

The results regarding the German sample, which are shown in Table VIII, provide similar results as the sample from the Nordic countries. When looking at the IPO group as a whole (Panel A), we find significant underperformance relative to the benchmarks. The underperformance is even greater than in Nordics as the German IPOs, on average, deliver a negative return varying from -30% to -41% depending on the benchmarks being compared to. The performance is even worse when looking at the non-sponsor backed IPOs, among which the buy-and-hold abnormal returns are between -31% and -45% in the 36 month period after the initial public offering. It is worth to note that despite of using the skewness adjusted t-statistic (Lyon et al, 1999), which removes the bias from the results, all of the BHARs in both panel A and panel B are significant at a 1% level making the results highly significant.

The sponsor backed IPOs, shown in Panel C, appear to perform better compared to the non-backed IPOs. However, they also experience negative buy-and-hold abnormal returns varying from -21% to -24%. In fact, the “best” return for sponsor backed IPOs is -10% against the size index, but it fails to be the only one being significant as all the other BHARs are significant at a 5% level. The sponsor backed IPOs deliver a return which is 10 to 15 basis points better than investing in a non-backed IPO.

Interestingly, panels D and E show a similar pattern, which was observed with the Nordic data. When looking at the 36 month buy-and-hold returns, we find that venture capital backed IPOs are the driver for negative performance of the sponsor backed IPO group. The 36 month BHARs of VC-backed IPOs (Panel E) vary between -21% and -38% all of them being significant at a 5% level except when matching the companies on a size basis. Similarly with the Nordic data, the BHARs for private equity backed IPOs (Panel D) are relatively close to 0%, although insignificant from zero. Thus, the case in the German sample is that VC-backed IPO experience negative, although not as low, returns as the non-sponsor backed IPOs, whereas the BHARs for private equity backed IPOs don't significantly differ from zero as was the case in the Nordic countries.

Table VIII
German buy-and-hold abnormal returns

Months	Equal Weighted				Value Weighted			
	MSCI	Country	Size	Industry	MSCI	Country	Size	Industry
<i>Panel A. All IPOs</i>								
12	-27%*** (-4.58)	-26%*** (-4.96)	-26%*** (-4.21)	-20%*** (-4.51)	-18%*** (-3.49)	-17%*** (-4.40)	-16%*** (-4.64)	-12%*** (-4.13)
24	-37%*** (-3.87)	-31%*** (-4.14)	-30%*** (-4.08)	-28%*** (-5.18)	-21%*** (-4.46)	-14%*** (-4.39)	-14%*** (-4.50)	-14%*** (-4.01)
36	-41%*** (-4.95)	-30%*** (-4.98)	-36%*** (-5.30)	-30%*** (-5.26)	-18%*** (-4.71)	-5%*** (-4.71)	-8%*** (-4.67)	-13%*** (-4.35)
<i>Panel B. Non-sponsor backed</i>								
12	-29%*** (-4.69)	-27%*** (-4.82)	-29%*** (-4.23)	-22%*** (-4.45)	-18%*** (-3.10)	-16%*** (2.71)	-17%** (-2.56)	-11%** (-2.22)
24	-39%** (-2.14)	-33%*** (-3.33)	-34%*** (-3.06)	-31%*** (-5.52)	-23%*** (-3.38)	-14%* (-1.89)	-15% (-2.01)**	-15%*** (-2.71)
36	-45%*** (-4.02)	-31%*** (-5.07)	-40%*** (-4.90)	-35%*** (-4.58)	-21%*** (-2.83)	-4% (-0.49)	-10% (-1.08)	-14%** (-2.18)
<i>Panel C. Sponsor backed</i>								
12	-14% (-1.36)	-16% (-1.59)	-10% (-1.05)	-11% (-1.24)	-17% (-1.62)	-20%* (-1.81)	-15% (-1.35)	-16%* (-1.81)
24	-19% (-1.38)	-23% (-1.50)	-10% (-0.73)	-15% (-1.05)	-12% (-0.80)	-17% (-1.12)	-12% (-0.80)	-10% (-0.66)
36	-21%** (-2.02)	-24%** (-2.33)	-10% (-0.96)	-21%** (-2.06)	-7%* (-0.37)	-11% (-0.57)	-2% (-0.12)	-7% (-0.38)
<i>Panel D. Private-equity backed</i>								
12	-13% (-1.22)	-16% (-1.57)	-11% (-1.13)	-16%* (-1.78)	-16% (-1.17)	-21% (-1.42)	-17% (-1.14)	-19% (-1.62)
24	-18%* (-1.75)	-23%** (-2.30)	-14% (-1.37)	-24%** (-2.44)	-11% (-0.55)	-18% (-0.88)	-16% (-0.78)	-15% (-0.75)
36	-2% (-0.14)	-6% (-0.38)	4% (0.30)	-11% (-0.68)	5% (0.18)	0% (0.00)	8% (0.36)	-1% (-0.02)
<i>Panel E. Venture capital backed</i>								
12	-15% (-0.90)	-17% (-1.01)	-9% (-0.57)	-7% (-0.48)	-19% (-1.21)	-18% (-1.23)	-10% (-0.71)	-10% (-0.77)
24	-20% (-0.88)	-22% (-0.91)	-7% (-0.28)	-7% (-0.30)	-15% (-0.69)	-15% (-0.72)	-4% (-0.19)	2% (0.08)
36	-36%** (-2.46)	-38%** (-2.73)	-21% (-1.48)	-21%** (-2.20)	-34%*** (-3.20)	-34%*** (-3.51)	-23%* (-2.01)	-22%** (-2.37)

The sample consists of 270 Nordic IPOs of which 227 are NB, 19 PE and 24 VC-backed. MSCI Europe refers to the MSCI Europe index, country benchmark consists of MSCI Germany index. Size benchmark includes SDAX, MDAX and DAX30 indexes. Industry benchmark refers to 10 European industry indexes of MSCI. Returns are measured as percentage returns from first-day close to either three-year anniversary or delisting day. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level. T-statistics are reported in the parentheses.

It is worth noting that the value-weighted returns for all IPOs in Germany (Panel A) are significant at a 1%. These BHARs vary from -5% to -18% showing substantially better returns than in equal-weighted terms. On the other hand, value-weighting doesn't influence the performance of panel E consisting of venture capital backed IPOs, which are also significant. Thus, it can be concluded that the extremely poor performance of IPOs, as a whole, is mostly attributable to the smaller firms in the sample.

5.3 Northern European evidence

The results of the whole sample used in this study are reported in Table IX. They can also be considered as the most significant results due to the large sample size of 505 IPOs. As the sample consist of all IPOs in the Nordics as well as in Germany, the results depict the Northern European patterns of IPO aftermarket performance relatively well. Furthermore, as evidence of the Amsterdam and London stock exchanges has been already investigated by Frederikslust et al (2001) and Levis (2011), these results fill the gap regarding the remaining large Northern European markets. Thus, the results can be interpreted to add new information regarding the aftermarket performance of sponsor backed IPOs in a Northern European context.

The results shown in Table IX are entirely consistent with the findings of academic literature (e.g. Ritter, 1991), which indicate that initial public offerings, on average, underperform relative to their benchmarks. Panel A in Table IX shows that Nordic and German IPOs, as a whole, significantly underperform the comparable benchmarks used in this study. It can be observed from the patterns that during the first 12 months after the IPO, the negative performance varies between -14% and -20%. The underperformance continues for the whole 36 month event window. The buy-and-hold returns 36 months after the IPO are between -22% and -30% indicating that the poor performance softens between the first and third year after initial public offerings. This could be due to the fact that investors can acquire more quality information regarding the companies when they are listed in the stock exchanges, which reduces the level of information asymmetry. This pattern of softening underperformance within the event window was also observed by Levis (2011), although the 36 month buy-and-hold returns regarding all IPOs in the UK were between -7% to -15%. Thus, it can also be concluded that Nordic and German IPOs experience a poorer performance relative to the benchmarks than in UK. Furthermore, the results show that there are significant differences in the long-term aftermarket performances across each IPO group.

Table IX
Combined, Northern European, buy-and-hold abnormal returns

Months	Equal Weighted					Value Weighted				
	MSCI	Country	Size	C+S	Industry	MSCI	Country	Size	C+S	Industry
<i>Panel A. All IPOs</i>										
12	-20%*** (-4.38)	-18%*** (-4.31)	-17%*** (-3.97)	-15%*** (-3.31)	-14%*** (-3.07)	-11%*** (-2.58)	-7%* (-1.75)	-14%** (-2.55)	-5% (-1.21)	-3% (-0.72)
24	-27%*** (-4.78)	-24%*** (-4.92)	-22%*** (-4.44)	-19%*** (-3.69)	-21%*** (-3.30)	-17%*** (-3.07)	-10%** (-2.06)	-28%* (-1.87)	-7% (-1.55)	-7% (-1.54)
36	-30%*** (-4.39)	-23%*** (-4.06)	-25%*** (-3.98)	-22%*** (-3.27)	-24%*** (-3.69)	-11%* (-1.75)	-1% (-0.24)	-7% (-0.89)	-1% (-0.22)	-3% (-0.55)
<i>Panel B. Non-sponsor backed</i>										
12	-22%*** (-4.01)	-20%*** (-4.99)	-20%*** (-4.86)	-17%*** (-4.30)	-15%*** (-4.85)	-11%*** (-2.63)	-7%* (-1.70)	-15%*** (-2.62)	-5% (-1.22)	-2% (-0.54)
24	-30%** (-4.05)	-25%*** (-4.54)	-26%*** (-4.36)	-22%*** (-3.74)	-23%*** (-3.23)	-19%*** (-3.01)	-10%* (-1.82)	-21%* (-1.87)	-8%* (-1.69)	-6% (-1.30)
36	-33%*** (-3.47)	-24%*** (-3.25)	-28%*** (-3.55)	-25%*** (-3.91)	-25%*** (-3.97)	-11% (-1.57)	1% (0.14)	-8% (-0.83)	0% (-0.07)	-1% (-0.11)
<i>Panel C. Sponsor backed</i>										
12	-12%** (-2.29)	-12%** (-2.24)	-8% (-1.62)	-6% (-1.30)	-9%* (-1.81)	-12% (-1.00)	-10% (-0.78)	-9% (-0.76)	-7% (-0.53)	-9% (-0.61)
24	-15%** (-2.05)	-16%** (-2.20)	-7% (-1.00)	-5% (-0.69)	-13%* (-1.71)	-10% (-0.97)	-11% (-1.03)	-6% (-0.48)	-5% (-0.36)	-11% (-0.94)
36	-18%*** (-2.98)	-20%*** (-3.35)	-11%* (-1.81)	-10%* (-1.77)	-19%*** (-3.10)	-10% (-1.03)	-10% (-1.08)	-6% (-0.70)	-6% (-0.68)	-16% (-1.59)
<i>Panel D. Private-equity backed</i>										
12	-18%*** (-2.83)	-16%*** (-2.65)	-14%** (-2.39)	-13%** (-2.23)	-18%*** (-3.25)	-27%** (-2.51)	-25%** (-2.32)	-24%** (-2.18)	-23%** (-2.08)	-29%** (-2.57)
24	-15%** (-2.33)	-15%** (-2.18)	-9% (-1.32)	-10% (-1.53)	-20%*** (-3.13)	-17% (-1.20)	-19% (-1.32)	-17% (-1.24)	-20% (-1.34)	-24% (-1.60)
36	0% (0.01)	-1% (-0.10)	4% (0.42)	1% (0.09)	-8% (-0.79)	2% (0.13)	0% (0.02)	5% (0.35)	1% (0.10)	-8% (-0.49)
<i>Panel E. Venture capital backed</i>										
12	-9% (-1.09)	-9% (-1.14)	-4% (-0.50)	-2% (-0.21)	-2% (-0.30)	7% (0.37)	10% (0.54)	11% (0.62)	15% (0.79)	17% (0.75)
24	-15% (-1.31)	-17% (-1.48)	-5% (-0.47)	-1% (-0.03)	-8% (-0.72)	-1% (-0.06)	0% (0.01)	10% (0.65)	16% (0.93)	6% (0.41)
36	-32%*** (-4.19)	-34%*** (-4.82)	-22%*** (-2.90)	-18%** (-2.42)	-28%*** (-3.54)	-27%*** (-3.76)	-25%*** (-3.23)	-20%** (-2.33)	-15% (-1.60)	-26%*** (-3.57)

The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. MSCI Europe refers to the MSCI Europe index, country benchmark consists of main indexes of Nordic countries. Size benchmark includes Nordic Small Cap, Mid Cap and Large Cap indexes. Industry benchmark refers to 10 European industry indexes of MSCI. C+S refers to country and size benchmark consisting of 3 different indexes formed by market capitalization, which are split by geographical locations based on the country of origin. Returns are measured as percentage returns from first-day close to either three-year anniversary or delisting day. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level. T-statistics are reported in the parentheses.

From Panel B we can observe that the 36 month BHARs of non-sponsor backed IPOs vary between -24% to -33% and are significant at a 1% level. Similarly to Panel A, the non-sponsor backed IPOs perform extremely poorly during the first 12 months after the IPO and the abnormal returns continue to decrease, although at a slower pace, towards the end of the event window. Again, comparing the results to the UK results investigated by Levis (2011) we find that the buy-and-hold abnormal returns are 5 to 10 percentage point under the UK IPOs. However, it is worth to note that the difference isn't as large as is the case with the whole IPO sample presented in Panel A.

The sponsor backed IPOs, of which we are most interested in this study, show a better long-run aftermarket performance than the non-sponsor backed IPOs. Although a statistically significant negative performance between -10% to -20% can be seen, the 36 month buy-and-hold abnormal returns observed from Panel C, are well over their non-sponsor backed counterparts. In addition, the results provide some evidence that the performance difference between non-sponsor and sponsor backed IPOs is created mostly in the first 12 months after the IPO as the difference in BHARs of is relatively stable between the 12 to 36 months period after the IPO. All in all, it can be stated that the PE and VC IPOs as whole, perform better compared to the non-sponsor backed IPOs in Nordic countries and Germany despite being able to create positive abnormal returns.

Furthermore, we can observe that the negative buy-and-hold abnormal returns of the sponsor backed IPOs is driven by the poor performance of venture capital backed IPOs in the sample. The 36 month BHARs for VC-backed companies shown in Panel E, are close to, and sometimes even worse than, their non-sponsor backed counterparts. The BHARs of -32% and -34% (against MSCI and Country benchmarks) are well below the ones obtained from matching the firms based on size and industry indicating meaning that the VC-backed IPOs experience better performance on a size and industry adjusted basis. All the results regarding venture capital backed companies are significant at least at a 5% level, most of them at a 1% level.

Panel D, consisting of private equity backed initial public offerings, show different results than in the case of VC-backed companies. It can be concluded from Panel D, is that the 12 month BHARs are roughly close to non-backed IPOs indicating that there isn't substantial differences in performances during the first year after an IPO. What is even more interesting is that value-weighting seems to increase the underperformance of PE-backed IPOs indicating that larger companies perform worse than smaller companies in the sample during the first 12 months.

Opposite to the VC-backed IPOs, private equity backed IPOs show to experience buy-and hold abnormal returns of -8% to +4%. However, none of the 36 month BHARs are significant even at a 10% level indicating that they don't significantly differ from zero.

Similarly to e.g. Brav & Gompers (1997) and Levis (2011), the results hold on an equal-weighted basis. However on value-weighted terms, the results aren't that robust and thus, the conclusions cannot be made on a value-weighted basis. The insignificance of value-weighted results arises from the large number of small companies in the sample. Hence, the large companies dominate the results creating bias when calculating the buy-and-hold abnormal returns as value-weighted averages. However, as most of the IPOs observed both in Denmark, Finland, Norway, Sweden and Germany happen to be relatively small, I consider the sample to be a better description of the IPO market in these countries. Thus, excluding IPOs of alternative exchanges such as Nasdaq First North and Oslo Access would create bias to the results if we were to only account for relatively larger IPOs usually happening in the main markets alone.

To conclude, the whole sample consisting of both Nordic and German IPOs show that IPOs, on average, underperform the relative to their peers by 22 to 30 basis points in long term. Both, non-sponsor and sponsor backed IPOs underperform, but the performance is more negative in the case of non-sponsor backed companies. However, I find support that the negative performance of sponsor backed IPOs is mostly driven by the poor performance of venture capital backed companies showing a negative buy-and-hold abnormal return varying from 18% to 34% depending on the applied benchmark. Private-equity backed IPOs show 36 month abnormal returns close to 0%, but fail to be significant. The results hold on equal-weighted terms, but using value-weighted averages create insignificant results. Mostly, the findings are consistent with the findings of Levis (2011) as IPOs underperform and sponsor backed IPOs perform better than their non-sponsor backed counterparts with one exception: PE-backed companies don't experience positive buy-and-hold returns significantly differing from zero.

5.4 Yearly patterns in the aftermarket performance of IPOs

As stated earlier, IPOs tend to cluster around the good states in the equity markets (Loughran et al., 1994). That is, IPO activity seems to follow a pattern in which companies go public when the market conditions are favorable and postpone IPOs in the bear market conditions. This holds in the

sample consisting of Nordic and German IPOs between 2000 and 2011, which can be seen from Figure 1. The figure shows that the years of heavy issuing were during the technology bubble in the early 2000s, before the financial crisis between 2006 and 2007 as well as after the economy started to recover from the financial crisis in 2010 and 2011. Thus, the data in my sample is consistent with the findings of academic literature regarding the relation between equity index development and IPO activity.

Figure 1
Monthly index price and IPO volume development between 2000 and 2011



This figure illustrates the relation between equity index development and IPO volume between 2000 and 2011. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. MSCI Europe index is used as the index benchmark.

What makes the patterns shown in Figure 1 meaningful and interesting, is that empirical evidence has also shown a relation between issuing activity and the long-run aftermarket performance of initial public offerings. More specifically, it has been shown that there is substantial performance variation in the underperformance of IPOs year to year. Ritter (1991) shows that the companies going public during years of heavy issuing perform worse than companies conducting an IPO at other times. Thus in this data, the three-year buy and hold returns should be at lower levels in these periods compared to others. Table X shows the yearly differences in IPO aftermarket performance by investigating the long-run performance of annual IPO cohorts.

Table X
36-month equal-weighted buy-and-hold abnormal return by cohort year

Year	ALL	NB	PEALL	VC	PE	IPOs total
2000	-47 %	-47 %	-54 %	-54 %	no obs.	149
2001	-52 %	-50 %	-101 %	-101 %	no obs.	33
2002	-46 %	-81 %	15 %	-1 %	21 %	11
2003	130 %	130 %	no obs.	no obs.	no obs.	1
2004	25 %	36 %	-18 %	-18 %	no obs.	15
2005	-5 %	8 %	-22 %	-18 %	-32 %	36
2006	-23 %	-24 %	-23 %	-38 %	-3 %	81
2007	-10 %	-7 %	-20 %	-36 %	-1 %	90
2008	-23 %	-30 %	9 %	48 %	-10 %	17
2009	-58 %	-58 %	no obs.	no obs.	no obs.	6
2010	-49 %	-56 %	-25 %	-67 %	-5 %	38
2011	-26 %	-41 %	17 %	-21 %	46 %	28

This table presents the yearly differences in aftermarket performances of the sample consisting of 505 Nordic and German IPOs. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs. Time period is between January 2000 and December 2011. The returns are calculated by compounding monthly returns for 36 months for IPOs gone public in a given year. MSCI Europe index is used as the index benchmark.

Table X provides some support to the findings of academic literature regarding the connection between issuing activity and aftermarket performance of IPOs. When looking at all IPOs, the best performance after going public is observed in 2003 and 2005, which aren't among the heaviest issuing years. The heavy issuing are associated with poor performance except in 2007 when 90 IPOs occurred the average BHAR was -10% making it one of the best performing years in the sample. What is extremely interesting is that the IPOs conducted before the financial crisis perform better than during the technology bubble. Thus, this would indicate that companies going public when the markets are at their highs have learned from previous crisis in order to achieve a better aftermarket performance.

When looking at how the IPO groups perform against each other, we find that there aren't significant differences between non-sponsor and sponsor backed IPOs. During the 12 year period, sponsor backed IPOs perform better compared to their non-sponsor backed counterparts in 5 years. However, it is interesting to see that private-equity backed IPOs outperform their non-sponsor benchmarks with the exception of year 2005. Moreover, VC-backed IPOs outperform the non-sponsor backed IPOs only during three years. This indicates that the venture capital companies are able to capitalize on the IPO windows as their 3-year performance is roughly at the same level.

This is further backed by the fact that no sponsor backed IPOs are executed in years 2003 and 2009, when equity market valuations were at low levels.

Table X also sheds light to the poorer aftermarket performance of the IPO group as a whole compared to the findings of Levis (2011)¹. In my sample, the 36 month buy-and-hold abnormal returns of companies executing an IPO in 2011 against MSCI Europe index are -47% compared to the -30% observed in the sample period. Furthermore, in this sample consisting of IPOs between 2000 and 2011, roughly 30% of the IPOs occurred during the technology bubble. Thus, the following conclusion can be made regarding the aftermarket performance: the exceptionally strong underperformance observed in Table IX are driven by the large number of going public during the bubble period.

5.5 Robustness of long-run aftermarket returns

As seen previously in Table III when the characteristics of initial public offerings were described, there are substantial differences in the operational features between different IPO groups. This could imply that the differences of aftermarket performance of IPOs is influenced by these characteristics. Thus, I follow the performance robustness check methods of Cao & Lerner (2009) and Levis (2011), which they used to investigate whether the characteristic differences between IPO groups affect the long-run aftermarket performance results. More specifically, in order to analyze the robustness of the results, I will use different cutoff points within the sample to find out whether the characteristic differences affect the results. Cut-off points in my sample differ from the cutoffs used in Cao & Lerner (2009) as well as Levis (2011) in order to get a meaningful proportion of IPOs for the purposes of the robustness checks².

The results are shown on the next page in Table XI. Panel A investigates the performance differences across IPO groups by restricting market capitalization to more than EUR 100m similarly as panel B restricts the assets excluding companies with assets under EUR 100m out of the sample. Similarly, Panel C presents the results according to sales, while Panel D examines the effect of leverage. Cutoff point for net sales is EUR 40m and 10% for leverage ratio.

¹ The 36 month buy-and-hold abnormal returns for the entire sample (all IPOs) were between -7% and -15% in the UK study by Levis (2011)

² E.g. in Levis (2011), the cut-off points were £40m for assets, £10m for sales and 10% for leverage

Table XI
Robustness checks of aftermarket performance of non-sponsored and sponsored IPOs

	ALL	NB	PEALL	VC	PE
<i>Panel A. MCAP > EUR 100m</i>					
MCAP (EURm)	265	248	316	226	426
36m BHAR (%)	-26 %	-31 %	-13 %	-30 %	2 %
# of IPOs included	280	211	69	35	34
% of IPOs included	55 %	51 %	74 %	70 %	79 %
<i>Panel B. Assets > EUR 100m</i>					
Total assets (EURm)	292	277	348	362	305
36m BHAR (%)	-16 %	-19 %	-8 %	-25 %	-1 %
# of IPOs included	187	136	51	17	34
% of IPOs included	37 %	33 %	55 %	34 %	79 %
<i>Panel C. Sales > EUR 40m</i>					
Net sales (EURm)	141	121	284	126	353
36m BHAR (%)	-16 %	-18 %	-11 %	-31 %	0 %
# of IPOs included	211	151	60	22	38
% of IPOs included	42 %	37 %	65 %	44 %	88 %
<i>Panel D. Leverage > 10%</i>					
Leverage (%)	28 %	27 %	29 %	24 %	30 %
36m BHAR (%)	-23 %	-29 %	-4 %	-18 %	3 %
# of IPOs included	224	172	52	17	35
% of IPOs included	44 %	42 %	56 %	34 %	81 %

This table presents robustness checks based on restrictions for each group. NB refers to non-sponsor backed IPOs, PEALL to venture capital and PE-backed IPOs (sponsor backed), VC to venture capital backed and PE to private equity backed IPOs. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. MSCI Europe index is used as a benchmark for calculating 36 month buy-and-hold returns. Results are restricted to four categories for the whole sample: market capitalization of EUR 100m or greater, total assets of EUR 100m or greater, net sales of EUR 40m or greater, and leverage (debt-to-assets) ratio of 10 percent or greater. Accounting items are from the year of the IPO and market capitalization at the moment of IPO.

When looking at Panel A in Table XI, we see that sponsor backed IPOs continue to have better buy-and-hold abnormal returns than their non-sponsor backed counterparts. The average return of -13% is a little better compared to the -18% obtained when analyzing the whole sample in Table IX. Again it is seen that the returns of sponsor-backed companies are driven by the good performance of PE-backed IPOs, while VC backed IPOs perform similarly to the non-sponsor backed IPOs. Thus, it is worthy to say that restricting market capitalization over EUR 100m doesn't change the behavioral differences of different IPO groups obtained when analyzing the whole sample. Furthermore, the buy-and-hold returns of all IPOs are somewhat better than results in Table

IX indicating that MCAP may have some effect on the long-run after market performance of initial public offerings i.e. larger IPOs perform better than smaller ones.

The results change more in Panel B, where companies going public are restricted to having assets worth of more than EUR 100m. The buy-and-hold abnormal returns for all IPOs are -16%, which is significantly better than -30% obtained from the full sample. The performance difference is slightly driven by the venture capital backed IPOs, which have BHARs of -25%. However, a larger impact to the aftermarket performance of IPOs comes from non-sponsor backed IPOs, showing a return of -19%. Thus, when looking at companies going public with assets worth more than EUR 100m, non-sponsor backed IPOs perform better than the venture capital backed IPOs by 6 percentage points. The performance difference is 3x bigger than when the whole sample was investigated. Private equity backed IPOs, on the other hand, perform in similar manner as was seen from Table IX, but the restriction excludes only 21% of PE-backed IPOs compared to the 65 to 70 percent in the non-sponsor and VC-backed IPO groups. Thus, the results indicate that company size, at least on an asset basis, has an effect on the aftermarket performance of initial public offerings.

Third robustness check is based on sales and the comparison between different IPO groups is restricted to companies with sales of over EUR 40m. Panel C shows similar patterns as was observed in Panel B. Table XI suggests that 42% of the all companies in the sample have sales of more than EUR 40m and experience buy-and-hold abnormal returns of -16% compared to the -30% regarding the whole sample. Sponsor-backed companies have a 36 month BHAR of -11%, while non-sponsor backed companies underperform by -18%. Thus, the performance gap between sponsor and non-sponsor backed companies narrow when restricting the sample for companies with sales of over EUR 40m. There isn't much difference in the performance of VC and PE-backed, but when looking at them as one group, they achieve better returns when the sales is restricted compared to the results obtained when there were no restrictions.

Last, panel C restricts the comparison between different IPO groups to companies with debt-to-assets ratio over 10%. The aftermarket performance of all IPOs seems to follow a similar pattern as was observed in Panel A, when leverage is used as the restrictive parameter. Non-sponsor backed IPOs seem to perform roughly at a similar level than in the situation, in which no constraints are

used. However, the average buy-and-hold abnormal returns of sponsor backed IPOs are only -4% compared to -18% when the full sample was investigated. Furthermore, when assessing the performance differences within the sponsor backed group we find that venture capital backed IPOs experience significantly higher abnormal returns than was the case with the full sample.³ Thus, the enhanced performance of sponsor backed IPOs is driven by the venture capital backed initial public offerings as the private equity backed IPOs perform roughly at the same level as was shown in Table IX.

All in all, the results suggest that the better performance of sponsor-backed companies relative to their non-sponsor backed counterparts is consistent across the different operational features investigated. Similarly as in Levis (2011), the evidence indicates that the underperformance of both non-sponsor and venture capital backed companies is related to their size, at least, in terms of assets and sales. In other words, larger non-sponsor and VC-backed IPOs achieve better long-run aftermarket performance than smaller ones. Thus, the evidence implies that the performance of IPOs, at least to some extent, is more attributable to the operational characteristic features of the companies going public rather than the characteristics of owners of the companies when going public.

5.6 Operating performance development of IPOs

Until this point, the results have shown that sponsor-backed IPOs, which, on average, consist of larger and more profitable companies, outperform their non-sponsor backed counterparts up to three years after the IPO. Furthermore, it can be concluded that the better performance is mainly driven by the exceptional performance of private equity backed IPOs compared to VC-backed. Underperformance is also related to the timing of the offering and hence, equity market valuation have an effect. An area that hasn't received any attention up to this point is the development of operating performance of companies going public. Thus, as was done in Levis (2011), the operating performance development is investigated in this chapter in order to gain understanding whether this has an effect and how different IPO groups differentiate from each other. The results of the development of operating performance across IPO groups are reported in Table XII. Panel A reports the asset turnover development while panels B and C show how operating margin and

³As was shown in Table 8, 36 month BHAR of VC-backed companies was -32%

leverage ratios have developed within a period starting from the year of the IPO and ending to three years after the IPO.

Table XII
Development of raw and industry-adjusted operating performance

	Raw unadjusted				Industry-adjusted			
	t=0	t=1	t=2	t=3	t=0	t=1	t=2	t=3
<i>Panel A. Asset turnover (sales-to-total assets)</i>								
NB	0.56	0.63	0.65	0.59	-0.06	-0.05	-0.04	-0.05
PEALL	0.98	0.95	0.92	1.03	0.30	0.22	0.24	0.34
VC	0.61	0.48	0.47	0.60	0.02	0.04	0.00	0.06
PE	1.61	1.58	1.61	1.61	0.62	0.52	0.72	0.66
<i>KW(1)</i>	<i>11.6***</i>	<i>4.8**</i>	<i>4.4**</i>	<i>8.9***</i>	<i>20.2***</i>	<i>9.9***</i>	<i>8.5***</i>	<i>11.2***</i>
<i>KW(2)</i>	<i>26.7***</i>	<i>17.6***</i>	<i>16.3***</i>	<i>19.3***</i>	<i>28.5***</i>	<i>16.8***</i>	<i>15.6***</i>	<i>19.3***</i>
<i>Panel B. EBITDA-margin (EBITDA-to-sales)</i>								
NB	10 %	5 %	4 %	6 %	0 %	0 %	-1 %	0 %
PEALL	11 %	10 %	10 %	8 %	2 %	3 %	4 %	2 %
VC	9 %	8 %	9 %	7 %	4 %	4 %	4 %	-1 %
PE	14 %	11 %	11 %	10 %	2 %	2 %	3 %	3 %
<i>KW(1)</i>	<i>0.1</i>	<i>2.0</i>	<i>5.2**</i>	<i>0.5</i>	<i>1.2</i>	<i>2.8*</i>	<i>4.9**</i>	<i>0.4</i>
<i>KW(2)</i>	<i>3.0</i>	<i>5.1*</i>	<i>8.0**</i>	<i>5.6*</i>	<i>1.6</i>	<i>4.0</i>	<i>5.6*</i>	<i>4.8*</i>
<i>Panel C. Leverage (Total debt-to-total assets)</i>								
NB	8 %	9 %	12 %	8 %	0 %	0 %	0 %	0 %
PEALL	21 %	15 %	18 %	18 %	0 %	1 %	1 %	1 %
VC	1 %	3 %	6 %	6 %	0 %	-1 %	-2 %	0 %
PE	33 %	29 %	31 %	32 %	21 %	21 %	15 %	17 %
<i>KW(1)</i>	<i>2.2</i>	<i>0.6</i>	<i>0.9</i>	<i>3.0*</i>	<i>2.7*</i>	<i>1.2</i>	<i>0.8</i>	<i>1.8</i>
<i>KW(2)</i>	<i>30.5***</i>	<i>16.1***</i>	<i>13.2***</i>	<i>15.1***</i>	<i>14.7***</i>	<i>7.7**</i>	<i>7.7**</i>	<i>7.1**</i>

This table presents the median asset turnover, EBITDA-margin and leverage ratios for the year going public and three years after. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. Industry-adjusted numbers are calculated as the difference between raw and industry-adjusted medians for each year. Kruskal and Wallis (KW) test is used for the median differences across each IPO group. KW(1) refers to the median difference between non-sponsor (NB) and sponsor backed (PEALL) IPOs, while KW(2) to the median difference between NB, VC and PE-backed IPOs. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level.

Table XII also shows that the performance differences between IPO groups don't change within an event period starting from the year of the IPO and ending three years later. In other words, the PE-backed IPOs have better performance in all three areas under investigation (asset turnover, EBITDA-margin and leverage) both in raw unadjusted and industry-adjusted basis.

Simultaneously, the venture capital backed and non-sponsor backed companies going public don't differ that much from each other.

Furthermore, by looking at Table XII, we see that while the asset turnover stays roughly at the same level for each IPO group, operating margins decline up to three years post IPO. Thus, it seems that while the companies are able to maintain their efficiency, the profitability declines after an initial public offering. This is consistent with the findings of Jain & Kini (1994) stating that the operating performance of initial public offerings experience a decline immediately after the IPO. The similar pattern is also clear in Panel C, where the development of leverage ratio is investigated. According to Panel C, only the VC-backed companies going public have increasing leverage ratios after an IPO and, in fact, at industry-adjusted basis even they seem to stay at same level after an IPO.

All in all, the evidence regarding the operating performance development suggests that investors seem to be somewhat surprised by the fact that operating performance doesn't develop favorably after the IPOs. After high initial valuations and significant first trading-day returns, this may be the reason for poor aftermarket performance of initial public offerings. Furthermore, the investors may view the private equity backed companies positively due to their operating performance figures being above their counterparts as well as their ability to repay debt, at least, in industry-adjusted terms. The evidence is in line with the study from the UK markets (Levis, 2011), although the operating performance of non-sponsor and VC-backed IPOs deteriorated more through the period under investigation. Still, the patterns regarding PE-backed IPOs are consistent as they had significantly higher efficiency and profitability margins as well as were able to repay debt at a faster pace.

5.7 Cross-sectional differences of all Nordic and German IPOs

This sections presents the regression model results on long-run IPO aftermarket performance. As discussed previously, the nature, characteristics and initial valuation of PE and VC-backed IPOs may have an effect on their aftermarket performance. In order to seek answers, I will construct a multivariate regression to find out which factors influence on the long-run performance. The dependent variable in the regression is the natural logarithm of 36-month wealth relative measured in equal-weighted basis.

Table XIII
Multivariate regression of long-run aftermarket performance of all Nordic and German IPOs

	<i>ALL IPOs</i>			
	(1a)	(1b)	(2a)	(2b)
First-day return	-0.528** (-2.32)	-0.535** (-2.33)	-0.519** (-2.26)	-0.524** (-2.27)
Log of total assets	0.123*** (3.76)	0.120*** (3.57)	0.146*** (4.08)	0.148*** (4.06)
Price-to-book	-0.020*** (-2.70)	-0.020*** (-2.81)	-0.020*** (-3.14)	-0.019*** (-3.12)
Bubble-period	-1.286*** (-5.72)	-1.285*** (-5.72)	-1.257*** (-5.61)	-1.259*** (-5.62)
Asset turnover			0.487*** (5.38)	0.495*** (5.15)
EBITDA-%			0.005*** (3.83)	0.005*** (3.81)
Leverage			0.083 (0.23)	0.095 (0.26)
PEALL	0.409*** (3.07)		0.297** (2.18)	
VC		0.280** (2.08)		0.182 (0.82)
PE		0.458*** (2.09)		0.297** (2.01)
Constant	-1.457*** (-7.84)	-1.434*** (-7.61)	-1.929*** (-9.32)	-1.939*** (-8.88)
<i>R</i> ²	0.205	0.204	0.274	0.273
<i>Observations</i>	456	456	438	438

This table presents the OLS regression results of the 36 month performance of IPOs. The dependent variable is the natural logarithm of wealth relative with MSCI Europe index used as a benchmark. The independent variables in the regression are logarithm of first day returns, logarithm of total assets, price-to-book ratio, bubble period dummy, asset turnover, EBITDA-margin, leverage ratio, PEALL referring to sponsor backed IPOs, VC referring to venture capital backed and PE referring to private equity backed IPOs. T-statistics, which are heteroscedasticity consistent as in White (1980), are reported in the parentheses. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level.

Regression results are shown in Table XIII. Columns 1a and 1b report regression results based on IPO characteristics at the time of the offer, while columns 2a and 2b take operating characteristics, such as asset turnover, EBITDA-margin and leverage into account. However, it should be noted that, similarly as in Cao & Lerner (2009) and Levis (2011), the coefficients in Table XIII should be interpreted with caution. This is due to the fact that the explanatory variables are endogenous

choices by the financial sponsors leading to the sample suffering from endogeneity. Thus, the regression results should be interpreted as indicative of correlation, not causality (Cao & Lerner, 2009).

The regression results support the previous findings of this study indicating that sponsor backed initial public offerings perform superiorly compared to their non-sponsor backed counterparts. In both models, 1a and 2a, the coefficient of PEALL is positive and significant at a 1% level suggesting that having a financial sponsor in the ownership of the company when going public has a positive effect on long-run aftermarket performance. Furthermore, when looking at columns 1b and 2b, we see that having a PE-backing has a positive effect on aftermarket performance, significant at 1% and 5% levels respectively. What is also interesting is that opposite to our previous findings, the coefficient of venture capital backing in column 1b is positive and significant at a 1% level. This would indicate that VC-backed IPOs perform relatively well compared to non-capital backed IPOs despite having similar characteristics. All in all, the results are completely in line with the findings of Levis (2011) suggesting that having a financial sponsor behind the company when going public positively affects the long-run aftermarket performance.

Based on the results presented in Table XIII, all of the control variables, excluding leverage due to insignificance, have coefficient signs that were expected and hence are consistent with the academic literature. The coefficient of the natural logarithm of first day return is negative and significant at a 5% level in each equation. This indicates that the higher the first day return is, the poorer the long-run aftermarket performance will be. The behavior of the variable is consistent with the view that higher price levels on first trading day gradually reverts towards mean, which is observed in numerous studies such as in Ritter (1991). Furthermore, as was discussed in Section 4.3, data regarding the whole sample showed that, on average, sponsor backed initial public offerings were less underpriced compared to their non-sponsor backed counterparts. This would suggest that sponsor backed IPOs perform better due to them being initially priced more correctly and thus, having less mean reversion in the long-run. I consider that this is, at least partially, explained by the reputation argument (Cao & Lerner, 2009) suggesting that financial sponsors tend to avoid opportunistic behavior due to wanting to maintain a good reputation in case of future IPOs.

The coefficient for the proxy for of size, the natural logarithm of total assets, is also positive and significant at a 1% level. This suggest that larger firms have better aftermarket performance compared to smaller ones. Again, this is consistent with the academic literature. In their study, Brav & Gompers (1997) where able to show that large firms perform better in the long-run compared to smaller firms. The authors conclude that larger firms perform better due to them being less volatile than smaller firms, which usually fall in the growth stock category.

The behavior of the size factor is further backed by the price-to-book variable. The results in Table XIII show a negative coefficient for the variable, which is significant at a 1% level suggesting that higher price-to-book ratios when going public have a negative effect on aftermarket performance. As discussed previously, high price-to-book stocks can be categorized as growth stocks while lower price-to-book values indicate that a company is a value stock. The academic literature argues that investors are more likely to be over-optimistic of small firms with high growth prospects. Thus, the high price-to-book stock carry more uncertainty in their valuations than low price-to-book companies making them more volatile and overvalued. This leads to underperformance in the long-run as the operational performance of IPOs seems to weaken post-IPO (Jain & Kini, 1994).

The bubble-period dummy is also negative and significant at a 1% level confirming the pattern that IPOs issued during the technology bubble had a significantly worse aftermarket performance than other IPOs. As stated earlier, this is consistent with the “windows of opportunity” hypothesis (Ritter, 1991) stating that companies going public during bubble periods are more overpriced than companies issuing equity at other times. This leads to worse long-run aftermarket performance than compared to a situation in which a company would go public when equity market valuations are more rational.

The operational characteristic variables are also consistent with the views of academic literature and common sense. The proxy for firm efficiency, asset turnover, is positive and statistically significant at a 1% level indicating that efficient companies perform better in the long-run. This, again, sounds reasonable as more efficient companies should experience a better aftermarket performance than inefficient companies in addition for them to be priced correctly. Similarly, variable EBITDA-% is positive and significant at a 1% level indicating that more profitable firms perform better in the long-run.

The only operational performance variable, which isn't consistent even at a 10% significance level is leverage. Although, it would make sense that higher leverage leads to better aftermarket performance, there are relatively inconsistent results regarding the effect of leverage on long-run aftermarket performance. While studies, such as Levis (2011), find that leverage has a positive effect on aftermarket performance of initial public offerings, others (e.g. Cao & Lerner, 2009) find no connection between leverage and long-run performance. Thus, it can be concluded that in my sample, I find no evidence that leverage ratios impact the long-run performance of initial public offerings similarly as in Cao & Lerner (2009).

To conclude, the results are also entirely consistent with the aftermarket performance patterns observed previously in Table VIII. Having a financial sponsor behind a company when going public is positively associated with the 36-month aftermarket performance as was observed from Table XII. In addition, the control variables presented in Table VIII behave entirely consistently with the previous literature regarding long-run performance of initial public offerings. Overall, these results are similar and, in fact, statistically more significant than the ones obtained by Levis (2011).

5.8 Cross-sectional differences across different IPO groups in Nordics and Germany

In order to find out how different performance characteristics impact on different IPO groups, I will run the previous regressions on each IPO group separately. This is to investigate whether different factors have different effect across IPO groups. The results are presented in Table XIV.

From Table XIV, it can be observed that non-sponsor backed IPOs behave similarly as the whole sample. They have negative coefficients for first-day return, price-to-book and bubble period. All of them significant at a 1% level. Furthermore, natural logarithm of total assets, EBITDA-margin and asset turnover have positive and significant coefficients at a 1% level. Thus, the results obtained from non-sponsor backed IPOs suggest that the higher the first day return, the poorer the long-run aftermarket performance. Furthermore, larger IPOs are expected to perform better in the long-run, value stocks will outperform growth stocks and IPOs issued during bubble periods will have a negative performance compared to IPOs issued during other periods. By looking at the operational characteristic variables, the evidence suggests that companies with higher efficiency and profitability experience a better long-run aftermarket performance than their counterparts.

When looking at the characteristics of sponsor backed initial public offerings at the time of the offer, the results in Table XIV show significant coefficients only for logarithm of total assets and bubble-period. The size proxy is positive and significant at a 5% level indicating that larger sponsor backed IPOs perform better in the long-run compared to the smaller ones. Again, we find that IPOs issued during bubble period, in this case during the technology bubble, will perform poorer. However, when adding operational features to the equation we find that variables bubble-period and EBITDA-% are the only significant ones at a 10% level. Thus, the results indicate that timing and profitability have an effect on long-run aftermarket performance of sponsor-backed IPOs.

Table XIV
Multivariate regression of long-run aftermarket performance of different IPO groups

	<i>NB</i>		<i>PEALL</i>		<i>VC</i>		<i>PE</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-day return	-0.670*** (-2.77)	-0.681*** (-2.76)	0.386 (0.59)	0.513 (0.80)	-0.384 (-0.72)	-0.228 (-0.44)	1.962 (1.57)	2.311** (2.26)
Log of total assets	0.118*** (3.23)	0.146*** (3.63)	0.128** (1.12)	0.074 (0.98)	0.047 (0.64)	0.064 (0.61)	0.180 (0.95)	0.143 (0.83)
Price-to-book	-0.025*** (-4.36)	-0.024*** (-3.91)	-0.000 (-0.02)	-0.022 (-0.97)	-0.004 (0.29)	-0.034* (-1.77)	-0.119 (-1.30)	-0.118* (-1.85)
Bubble-period	-1.238*** (-5.42)	-1.205*** (-5.20)	-1.269*** (-2.91)	-0.536* (-1.69)	-0.972** (-2.50)	-0.629** (-2.30)	n.a. n.a.	n.a. n.a.
Asset turnover		0.546*** (5.14)		0.201 (1.30)		-0.096 (-0.54)		0.945*** (2.87)
EBITDA-%		0.005*** (3.49)		0.066* (1.98)		0.074** (2.59)		2.705 (0.97)
Leverage		1.138 (0.35)		0.574 (0.66)		-0.698 (-0.61)		2.436 (1.52)
Constant	-1.409*** (-6.99)	-1.959*** (-8.36)	-1.183*** (-3.33)	-1.098** (-2.49)	-0.893** (-2.56)	-0.609 (-1.31)	-1.082 (-0.86)	-3.021** (-2.26)
<i>R</i> ²	0.197	0.269	0.073	0.150	0.077	0.194	0.175	0.411
<i>Observations</i>	368	352	88	86	52	50	38	38

This table presents the OLS regression results of the 36 month performance of IPOs for each group. The dependent variable is the natural logarithm of wealth relative with MSCI Europe index used as a benchmark. The independent variables in the regression are logarithm of first day returns, logarithm of total assets, price-to-book ratio, bubble period dummy, asset turnover, EBITDA-margin, leverage ratio, PEALL referring to sponsor backed IPOs, VC referring to venture capital backed and PE referring to private equity backed IPOs. NB refers to non-sponsor backed IPOs. T-statistics, which are heteroscedasticity consistent as in White (1980), are reported in the parentheses. An asterisk refers to significance at the 10% level; two at the 5% level; three at the 1% level.

Separating the sponsor backed initial public offerings to VC-backed and PE-backed provides implications regarding the factors within these groups impacting the long-run aftermarket performance differences. By looking at columns 5 and 6 in Table XIV, the results show that variables price-to-book, bubble-period and EBITDA-% are significant at least at a 10% level. Thus, within the venture capital backed IPO group, the results indicate that value stocks outperform growth stocks in the aftermarkets. Furthermore, timing is also a factor as IPOs issued during bubble period seem to underperform in the long-run. Last, significant at a 5% level, EBITDA-margin shows a positive coefficient suggesting that profitable VC-backed companies achieve better long-run aftermarket performance.

The private-equity backed IPOs offer interesting and somewhat different results as can be seen from table XIII. According to the results, variables first-day return, price-to-book and asset turnover have coefficients significant at least at a 10% level. However, the coefficient sign of first-day return implies different effect on long-run aftermarket performance than were obtained from previous regressions. More specifically, the results suggest that the higher the first-day return, the better the long-run aftermarket performance of private equity backed IPOs. I consider that this pattern is largely explained by the double selection phenomenon (Frederikslust & van der Geest, 2001). As discussed in the literature review section, double selection stems from private equity investors invest in companies fulfilling their return objectives and out of these companies, only the most successful ones go public. Thus a PE-backed company going public signals good quality to potential investors attracting demand for the company's shares. Thus, in a way, the value of a private equity backed company going public is "certified", which would explain why the coefficient signs of variables first-day return and significant.

In addition, price-to-book variable has a negative coefficient significant at a 10% level, while the asset turnover variable has a positive coefficient significant at a 1% level. The first suggests that, according to the academic literature, higher price-to-book ratios are negatively correlated with the long-run aftermarket performance. The latter, on the other hand, implies that higher efficiency within the private equity backed IPO group is positively correlated with 36-month aftermarket performance. As stated earlier, Jensen (1986) argues that the key value driver for the private equity value creation model is the enhanced operational efficiencies. Thus, this result is entirely consistent

with the findings of Jensen (1986) suggesting that enhanced efficiency is positively correlated with long-run performance of initial public offerings.

In conclusion, there are some differences in regressions of the 36-month aftermarket performance of different IPO groups. The evidence presented in Table XIV shows that non-sponsor backed initial public offerings behave accordingly to the findings in the academic literature. The performance of sponsor backed IPOs is somewhat related to timing and profitability of the companies. Furthermore, separating the sponsor backed IPO group into VC and PE-backed provides interesting implications. While the aftermarket performance of venture capital backed IPOs is connected to the valuation, timing and profitability of the IPOs the way the academic literature suggests, private equity backed initial public offerings provide partially surprising, although explainable, results. The coefficient of the first-day-return of PE-backed IPOs is positive and significant at a 5% level indicating that higher first-day return is associated with better performance. This finding supports the double selection hypothesis (Frederikslust & van der Geest, 2001) suggesting that PE-backed IPOs signal good quality. Thus, the most attractive private equity backed IPOs, with highest first-day returns, will actually be the best performers in the long-run.

6. Discussion of results

In this section, I will link the results obtained in section 5 to the previous academic literature. In addition, I will provide a short overview of my results and discuss their contribution to the academic literature and to the Nordic and German IPO and private equity scene in general. In short, the empirical findings on my study suggest the following:

- On average, all IPOs underperform the general market indexes and comparable companies based on size and industry in the long-run
- The level of underperformance of initial public offerings varies in time and sponsor-backed IPOs, on average, are less underpriced than non-sponsor backed IPOs when looking at the whole sample
- Companies conducting an IPO during the technology bubble experienced worse long-run buy-and-hold abnormal returns than IPO companies before the financial crisis

- Sponsor backed initial public offerings outperform their non-sponsor backed counterparts in the Nordics and in Germany
- The better performance of sponsor backed IPOs compared to non-sponsor backed is driven by the PE-backed initial public offerings

The results suggest that IPOs in the Nordic countries as well as in Germany underperform in the long-run compared to all of the applied benchmarks. This holds against the general market indexes and also for size and industry benchmarks. The findings are largely consistent with the academic literature as numerous studies such as Ritter (1991) and Levis (1993) conclude that, on average, initial public offerings underperform their benchmarks in the long-run. The buy-and-hold returns for all IPOs in the sample were roughly between 25% and 30% indicating a significant underperformance. In other words, an investor would have made significantly higher returns by investing to market indexes than by investing in portfolios consisting of IPOs between 2000 and 2011.

The underperformance of all IPOs stems from various factors acknowledged by the academic literature. First, due to the significantly high first-day returns, IPOs tend to experience a mean-reversion in the long-run as has been witnessed in many studies such as in Purnanandam and Swaminathan (2004). This indicates that there is a large information asymmetry regarding the true value of the company among the owners and investors at the moment of initial public offering. After the companies have been listed in the stock exchanges, this information asymmetry is reduced due to stricter reporting standards leading to investors lowering their valuations in the long-run.

Timing of the initial public offerings is also a significant factor leading to underperformance. As Ritter (1991) stated, IPOs typically occur in “windows of opportunities” meaning that companies usually go public when the equity markets valuations are high i.e. in bull market conditions. According to Ritter (1991), the IPOs issued during bull market conditions tend to perform worse in the long-run compared to other times. I found evidence of this pattern in my study although, as always, there are couple of years during which there may be worse performance. Interestingly, I discovered that the companies going public before the financial crisis had better long-run abnormal returns than companies during the technology bubble. This would indicate that investors have

learned from the mistakes done in 2000 after making significant losses due to being overly optimistic as was observed by Ljungvist et al (2003). In fact, the learning behavior of investors was observed by Greenwood et al. (2009), who suggest that investors that have experienced a bubble are not as willing to participate when similar conditions occur next time. Thus, my results provide support to the claim that investors are able to learn from their previous mistakes.

The valuations at the time of the offer have also a significant impact on long-run aftermarket performance. The evidence in this study suggests that higher price-to-book valuations lead to bigger underperformance in the long-run, which is in line with the findings of Jain & Kini (1994). In their study, the researchers discovered that high price-to-book companies have more uncertainty regarding their valuations compared to low price-to-book companies (Jain & Kini, 1994). The uncertainty and leads to these stocks being more volatile, which affects negatively on their long-run aftermarket performance.

6.1 Performance differences between IPO groups

Studies in North-America have shown that venture capital and private equity backed initial public offerings are able to outperform their non-sponsor backed counterparts and, even some cases, the stock markets in general. In his study, Jensen (1986) claimed that private equity owners create value for companies under their ownership. He identified that the key value drivers for the PE model are enhanced operational efficiencies, which are achieved through closer monitoring, management expertise and higher levels of debt. Thus, the academic findings in North America seem to support the claim of Jensen (1986). The evidence suggest that financial sponsors are able to create more value for their companies than more traditional owners as the long-run aftermarket performance of initial public offerings is better compared to their non-sponsor backed counterparts.

However, the European evidence is mixed in this sense as some studies have found the sponsor backed IPOs outperform their counterparts, while others have found no significant differences in the aftermarket performance. In other words, there's a disagreement among the researchers whether private equity and venture capital companies are able to create value in the long-run instead of just focusing on making exits of their investments and being short-sighted. The main purpose of this study was to investigate the differences in the long-run aftermarket performance of private equity, venture capital and non-sponsor backed initial public offerings.

My results suggest that sponsor backed IPOs, on average, are able to outperform their non-sponsor backed counterparts in a period starting from the end of the first trading day and lasting 36 months post-IPO. However, the sponsor backed IPOs in the Nordic countries and Germany are not able to outperform the equity market indexes and their non-issuing counterparts based on size and industry. These types of IPOs have 36-month buy-and-hold abnormal returns varying from -10% to -20% indicating, still, a significant underperformance relative to their benchmarks in the equity markets. This confirms my hypothesis that sponsor backed IPOs as a whole experience better long-run performance in the aftermarkets.

When separating the sponsor backed initial public offerings into two subgroups, PE and VC-backed, I found an interesting pattern. According to my results, there is a severe difference in the performance patterns of private equity and venture capital companies. The venture capital backed IPOs perform similarly to the non-sponsor backed IPOs in the long-run. Thus, the venture capital firms are not able to create long-run value for the shareholders of these companies. On the other hand, regression results imply a positive correlation between venture capital ownership and long-run performance implying that venture capital backed companies, although having slightly poorer operational characteristics than non-sponsor backed companies, are able to generate similar performance.

The better performance of the sponsor backed IPO group seems to stem from the long-run performance of private equity backed initial public offerings. Although achieving buy-and-hold abnormal returns not significantly differing from zero, the 36-month average BHARs clearly drive the buy-and-hold abnormal returns of sponsor backed IPOs upwards. The results indicate that private equity companies are able to create more long-run value compared to the venture capital firms.

In addition for PE-backed IPOs being less underpriced than other IPOs in the sample, suggesting that reputational factors are taken into consideration by financial sponsors at the time of the IPO (Cao & Lerner, 2009), the long-run value creation of private equity owners is consistent with the PE value creation model, initially noticed by Jensen (1986). The results provide positive correlation between operational efficiency and long-run aftermarket performance when solely investigating the PE-backed IPOs. This implies that closer monitoring and management expertise are the key factors by which financial sponsors contribute to their portfolio companies. Opposite to Jensen's

model (1986), I find no evidence that higher levels of debt is a key driver of the aftermarket performance PE-backed IPOs similarly as was shown in Cao & Lerner (2009).

6.2 Performance differences between geographic regions

In addition to the performance differences between IPO groups, difference in the patterns on the long-run performance of PE and VC-backed IPOs in the Nordic countries and Germany were also a subject of interest. The aim was to find out whether there were any geographical differences in the patterns of aftermarket performance of initial public offerings. Differences in the long-run performance patterns would give at least minor indication on the geographical differences of the professional characteristics of private equity and venture capital companies. A pattern, which was consistent in both regions was that the performance of private equity backed IPOs was driving the BHARs of the sponsor-backed IPO group upwards. However, according to the results, there were geographical differences in the long-run aftermarket performance patterns.

When looking at VC and PE-backed initial public offerings as a whole, the results show that the Nordic sponsor backed IPOs perform similarly as their non-sponsor backed counterparts. The 36-month buy-and-hold abnormal returns were negative and roughly at the same levels. In Germany, on the other hand, sponsor backed IPOs significantly outperform the non-sponsor backed initial public offerings, although the evidence suggests that the better performance is, at least, partly related to the fact that no sponsor IPOs were executed in Germany during the technology bubble.

7. Conclusions

This paper explored the patterns of long-run aftermarket performance of sponsor and non-sponsor backed initial public offerings in Nordics and in Germany. Utilizing a sample of 235 Nordic and 270 German IPOs, of which 93 are sponsor-backed, I conducted a variety of empirical analyses on the performance differences of different IPO groups. The purpose was to find evidence whether Nordic and German financial sponsors are able to create value in the long-run by assessing their 3-year performance in the stock exchanges. Furthermore, the patterns behind long-run aftermarket performance were also a subject of interest.

The empirical results suggest that Nordic and German sponsor backed initial public offerings, as a whole, are able to outperform their non-sponsor backed counterparts in the 36-month post-IPO period. The outperformance varies between 5 to 15 percentage points depending on the benchmark applied. The higher buy-and-hold abnormal returns of sponsor backed IPOs is driven by private equity backed initial public offerings despite showing abnormal returns insignificant from zero, as the performance of VC-backed IPOs is similar and significant compared to the non-sponsor backed IPOs. Furthermore, the results show that IPOs in Northern Europe, i.e. in the Nordics and Germany, on average, significantly underperform the general equity indexes, which holds when firms are matched on a size and industry basis also, making the results consistent with the findings of Ritter (1991) and many others.

Furthermore, I find evidence that the performance of sponsor backed initial public offerings is mainly related with lower level of initial underpricing indicating that reputational considerations are taken into account by financial investors, as in Cao & Lerner (2009), in addition to enhanced operational efficiencies. Separating venture capital and private equity backed IPOs into subsamples shows that the long-run performance of these IPO groups is related with higher profitability and better asset turnover i.e. efficiency. Thus, the results give support for the private equity value creation model by Jensen (1986), which states that financial sponsors achieve value creation through closer monitoring and management expertise leading to enhanced operational efficiencies. Furthermore, at least to some extent, the long-run performance is related to the sponsor backed initial public offerings being larger in size compared to non-sponsor backed IPOs. Therefore, it cannot be totally overruled that sponsor backed initial public offerings perform better than their non-sponsor backed counterparts solely due to the operational factors stemming from more sophisticated ownership.

What is also evident from the results is that timing is an important factor in the long-run aftermarket performance of initial public offerings. The results from OLS regressions give indication that companies going public during a stock market boom have a worse three-year aftermarket performance than companies conducting an IPO at other times. This phenomenon was already founded by Ritter (1991), who concluded that IPOs issued during bull market conditions are worse long-run performers than IPOs issued in bear markets. Furthermore, the data in my study suggests that investors seem to have experienced a learning experience as the three-year performance after

the financial crisis of 2008, although being negative on average, was significantly better than the IPOs' issued during the technology bubble. The learning behavior of investors was observed by Greenwood et al. (2009), who suggest that investors that have experienced a bubble are not as willing to participate when similar conditions occur next time. Thus, my results provide further support to the claim that investors are able to analyze and learn from their previous mistakes.

The results are robust both with the buy-and-hold abnormal return and the ordinary least square regression method. In addition to the BHAR and OLS methods, the robustness of the results was tested by adding several restrictions to the sample on the basis of market cap, sales, assets and leverage in order to restrict the sample into smaller subsamples. The results don't change despite performing robustness checks and thus, it can be comfortably stated that sponsor backed initial public offerings perform better than their non-sponsor backed counterparts. However, again it has to be noted that private equity backed initial public offerings are the drivers for sponsor backed IPO group as venture capital backed initial IPOs perform similarly to the non-sponsor backed initial public offerings.

Despite measuring the buy-and-hold abnormal returns of IPOs against several benchmarks, I acknowledge that none of them are related to price-to-book value of various firms. In order to mitigate this, I added a price-to-book variable the OLS regressions and found that the valuations have an effect on the long-run performance of initial public offerings. Still, it would be convenient to use price-to-book benchmarks in future studies regarding the long-run performance of initial public offerings. Furthermore, the data in this study is limited to the Nordic countries and Germany and thus provide further support to the European level long-run performance IPO study performed in the U.K. and Netherlands. However, many significant European markets still remain undiscovered, such as the Euronext Paris and Southern European stock exchanges. Therefore, I see that a European level study including all major stock exchanges simultaneously as well as exploring the financial sponsor reputation argument more deeply, would be interesting in the eyes of academics and IPO enthusiasts around the globe.

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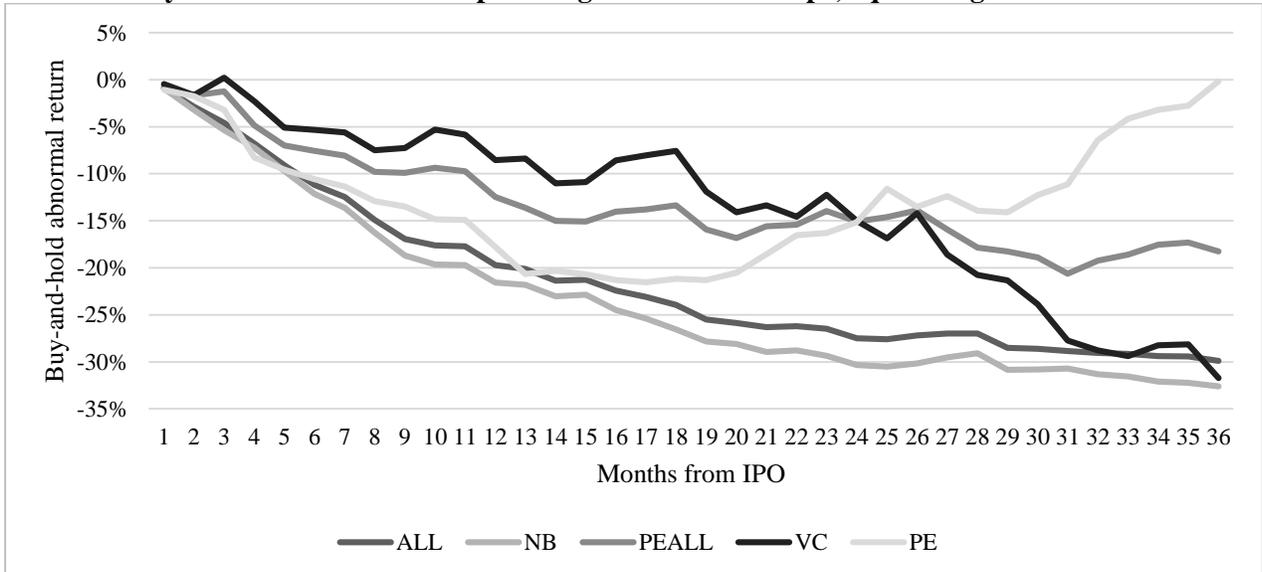
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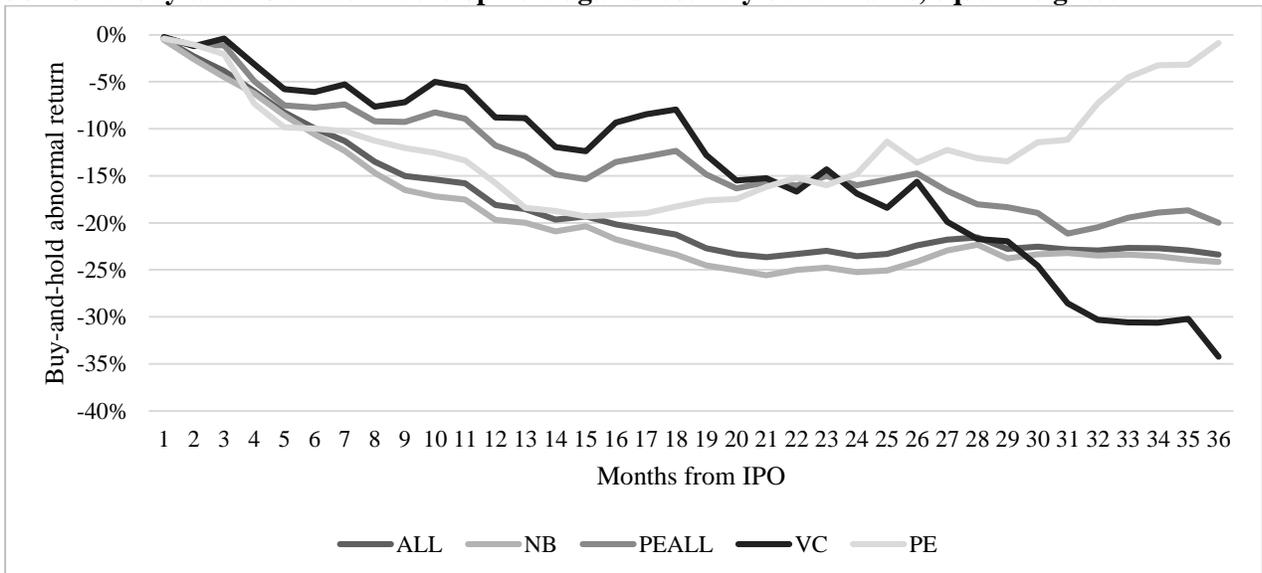
Appendix A. Monthly equal-weighted BHAR development against benchmarks

Figure 2
36-month buy-and-hold return development against MSCI Europe, equal-weighted



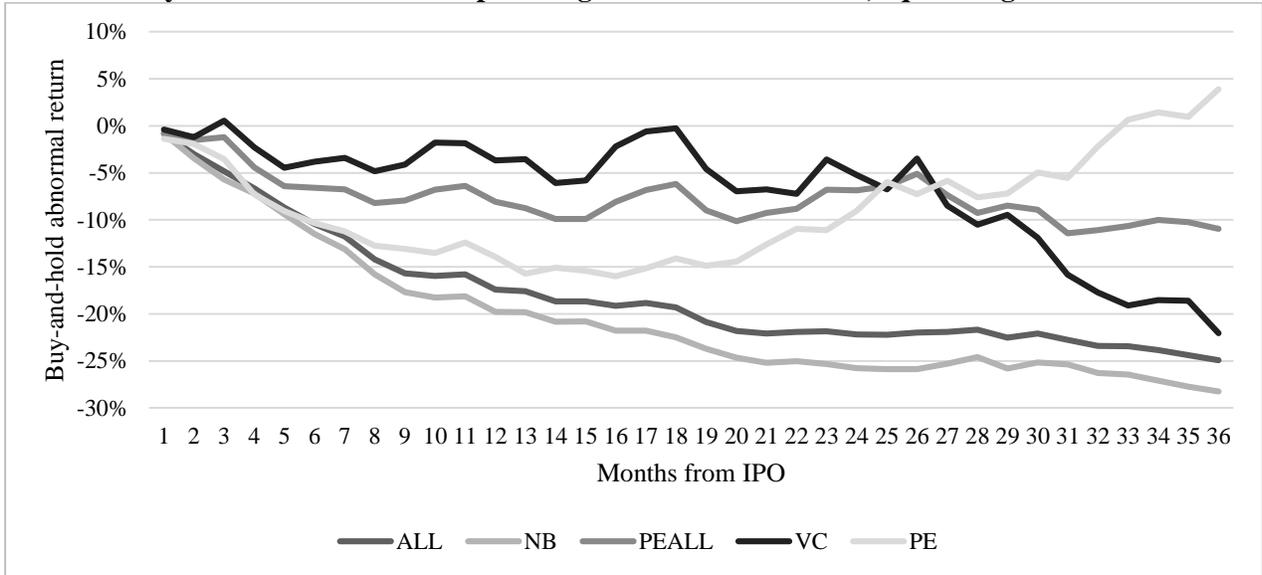
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against MSCI Europe index. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 3
36-month buy-and-hold return development against country benchmarks, equal-weighted



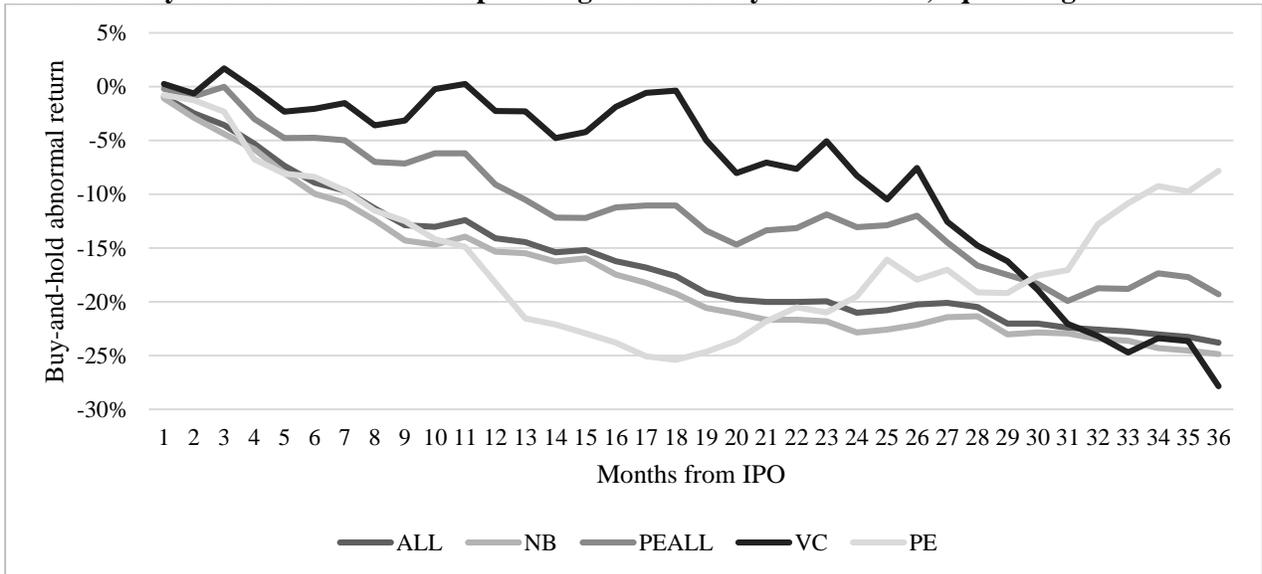
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against country benchmark. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 4
36-month buy-and-hold return development against size benchmarks, equal-weighted

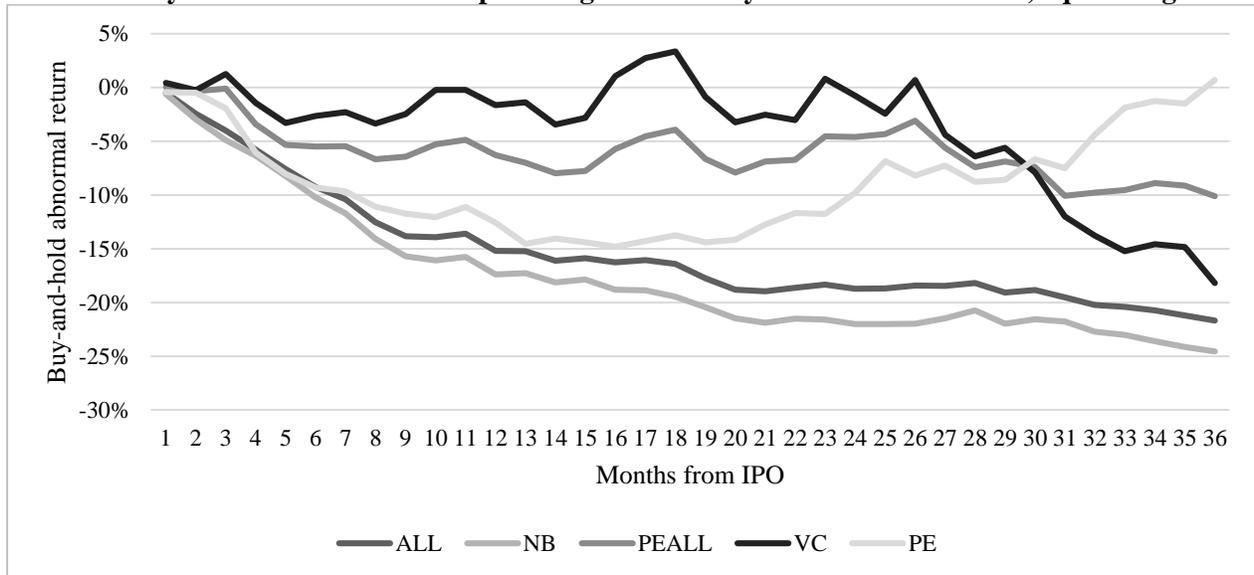


This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against size benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 5
36-month buy-and-hold return development against industry benchmarks, equal-weighted



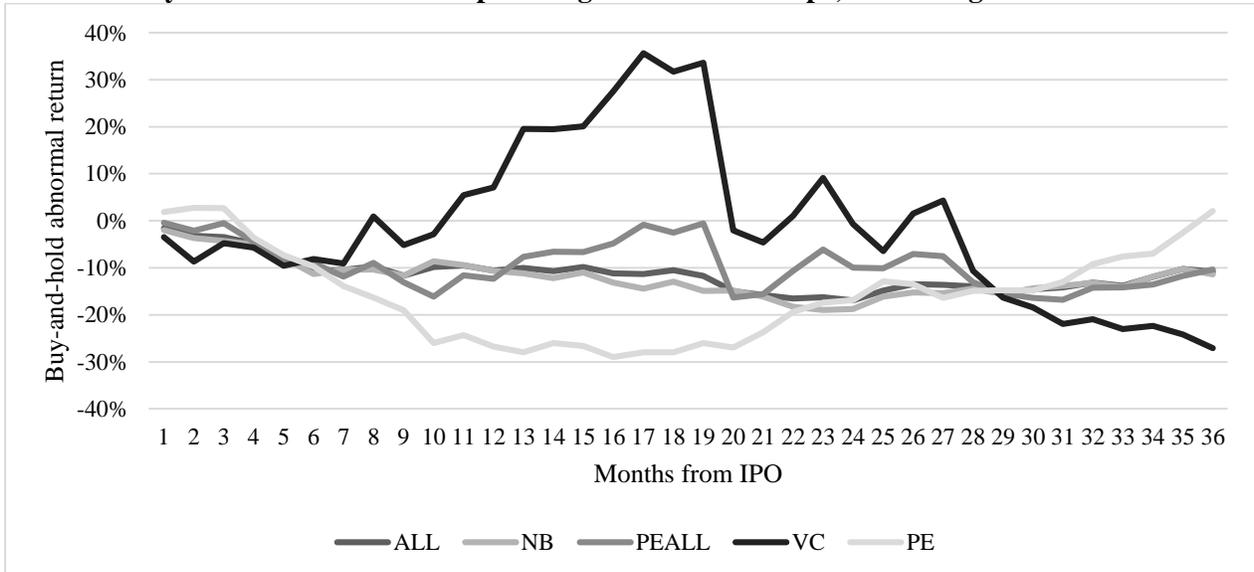
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against industry benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 6**36-month buy-and-hold return development against country and size benchmarks, equal-weighted**

This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against country and size benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

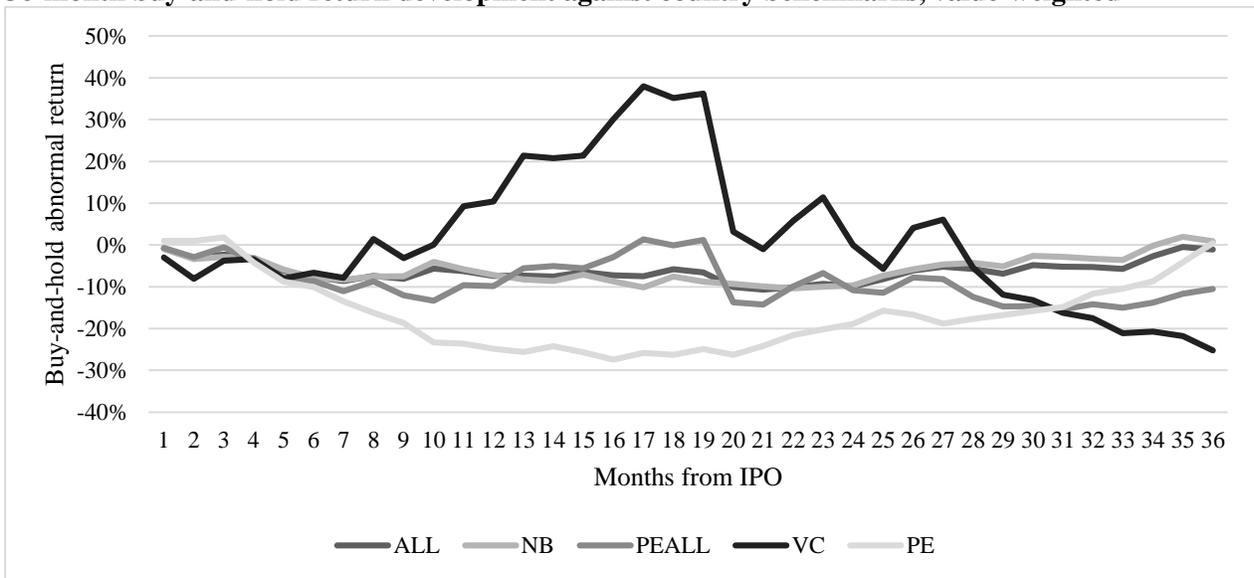
Appendix B. Monthly value-weighted BHAR development against benchmarks

Figure 7
36-month buy-and-hold return development against MSCI Europe, value-weighted



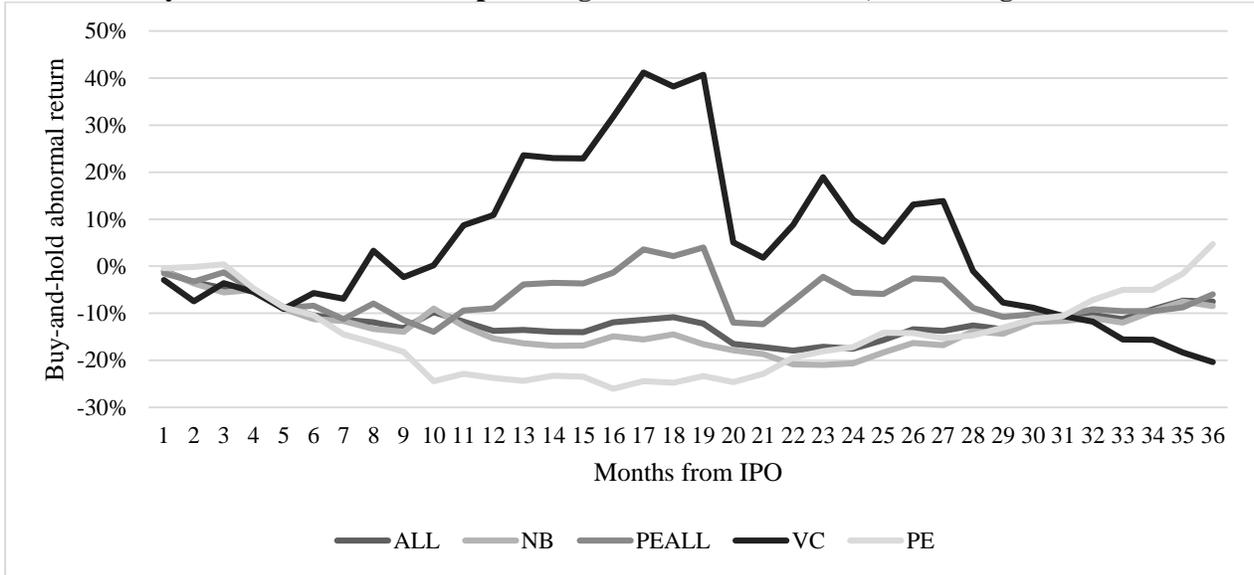
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against MSCI Europe index. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 8
36-month buy-and-hold return development against country benchmarks, value-weighted



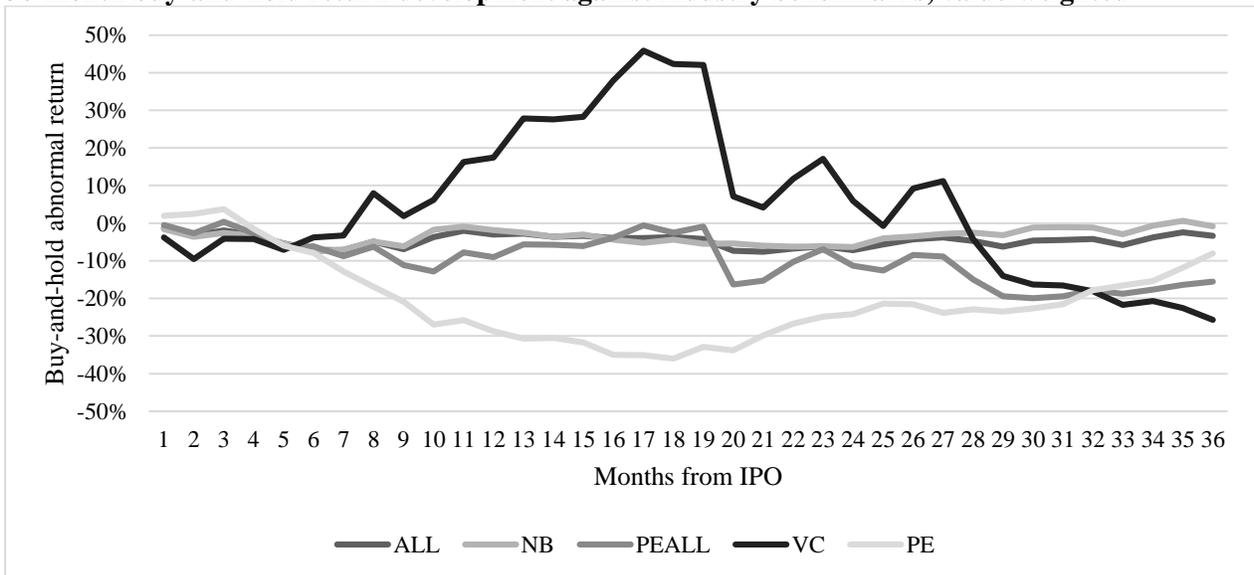
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against country benchmark. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 9
36-month buy-and-hold return development against size benchmarks, value-weighted



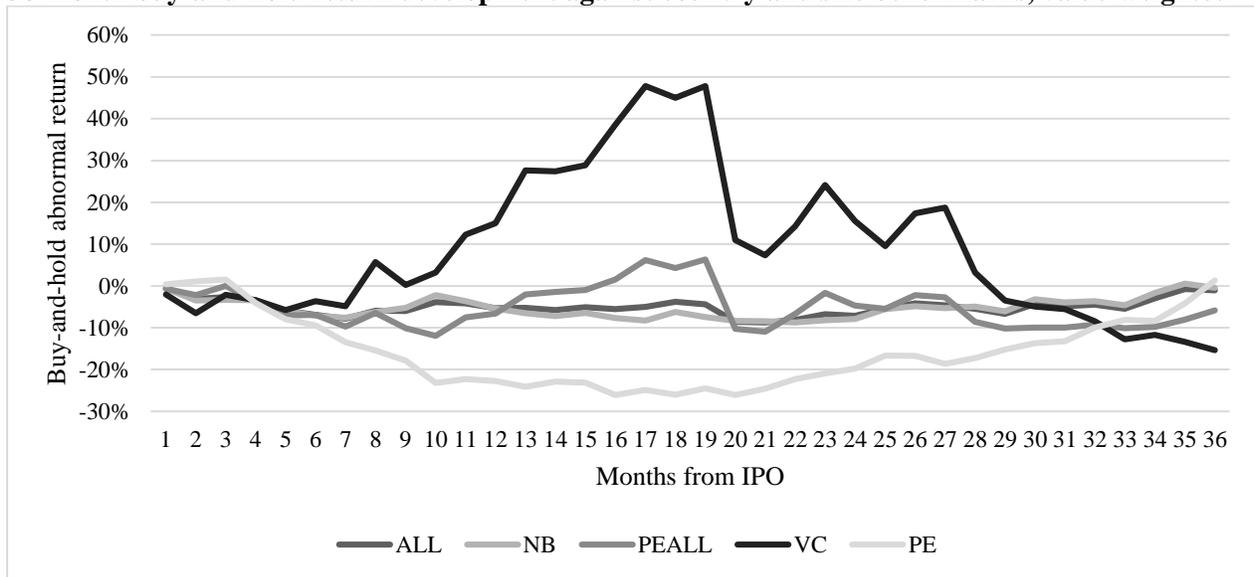
This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against size benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 10
36-month buy-and-hold return development against industry benchmarks, value-weighted



This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against industry benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.

Figure 11
36-month buy-and-hold return development against country and size benchmarks, value-weighted



This figure shows the monthly development of buy-and-hold abnormal returns for each IPO group against country and size benchmarks. The sample consists of 505 Nordic and German IPOs of which 412 are NB, 40 PE and 53 VC-backed. NB refers to non-sponsor backed, PEALL to sponsor backed, VC to venture capital backed and PE to private equity backed initial public offerings.