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Nordic IPOs and Private Equity affiliation

An empirical study on after-market performance

Abstract

Using a sample of 250 Nordic IPOs, consisting of private equity-backed (PE) and non-backed (NB) issues from January 2010 to March 2017, this paper examines the long-term performance of IPOs in the Nordic market. We compare and contrast the after-market performance of PE-backed IPOs to NB IPOs in an event study regime. We present raw buy-and-hold returns (BHRs) for each IPO over a holding period of three years, and calculate buy-and-hold abnormal returns (BHARs) against the FTSE Nordic market index. BHARs adjusted for industry and size are also calculated to control for robustness. Our findings are statistically significant and suggest that Nordic IPOs underperform the market three years after flotation, regardless of sub-group belonging. However, PE-backed issues perform considerably better than NB issues three years after the IPO, albeit still presenting marginally negative 36 month BHARs. Somewhat surprising is that non-backed IPOs outperform the market in the first two years after flotation, to significantly deteriorate thereafter. Moreover, the performance of IPOs seems to be related to market conditions and IPO-cyclicality. We observe that IPOs issued in years with high activity experience more negative after-market performance, which we mainly ascribe to investor sentiment and initial overvaluation.

Key words: Initial Public Offering, Private Equity, Nordic market, After-market performance

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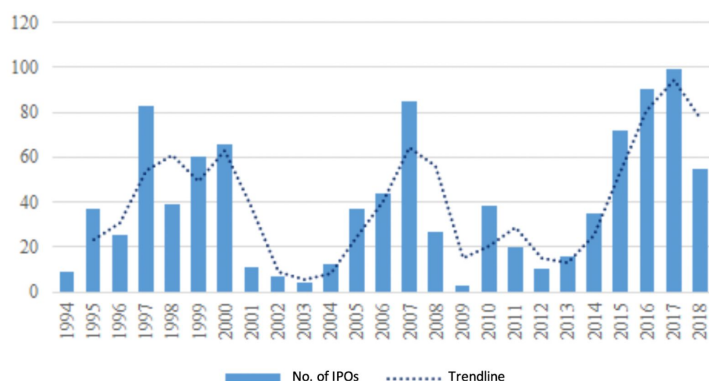
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1. Introduction

Following the financial crisis in 2007-2008, the risk appetite among investors decreased and as a consequence, the amount of firms going public was significantly reduced. IPO activity in the Nordics dropped from 85 IPOs in 2007 to 27 IPOs in 2008 (PWC, 2009). Since then, the global economy has reversed and the financial markets have recovered. Alongside, the amount of IPOs have steadily been increasing in the last decade, reaching record heights in 2017 in the Nordics with 99 IPOs recorded (EY, 2018). The cyclical pattern of IPO activity is closely linked to the prevailing economic conditions in the market (figure 1). The IPO activity dropped somewhat in 2018 and 2019 due to geopolitical turbulence and shifting trade politics (Hartman, 2019), but the transaction value remained at the same level (Montalvo, 2019). The Nordic IPO market 2019 was mainly driven by the large listings of Volkswagen’s truck unit Traton, and Investor’s private equity giant EQT (Hellström & Ramnarayan, 2019).

While IPOs have increased in popularity as private companies seek access to capital in the public market to a larger extent, empirical studies reveal a less appealing side to these investment opportunities. Early research, primarily from the US and UK markets, have shown that IPOs perform poorly in the after-market. That is, on average, IPOs tend to underperform the market in the long-run (e.g. Ritter, 1991; Levis, 1993; Loughran & Ritter, 1995). Although this phenomenon of long-term underperformance is widely researched in an international context, the number of studies in the Nordic market is limited. Further research has also tried to seek explanations to the general underperformance of IPOs by looking at the ownership structure of firms going public.

Figure 1 - IPO Activity in the Nordic Markets 1994-2018



Source: Bloomberg 2020

On this note, private equity (PE) involvement in IPOs is a topic that has garnered public scrutiny recently. The strategy of private equity firms to invest and take outright control in underperforming and undervalued businesses, turn them around through active management, and then exit within a few years have shown to be very profitable in many cases (Barber & Goold, 2007). Essentially, PE firms buy companies, fix them, and then sell them (Leslie & Oyer, 2008). These transactions are often characterised by high degrees of leverage, which means that modest increases in firm value leads to substantial profit for equity-holders (Cao & Lerner, 2009). However, it also comes with greater risk and the private equity industry has been involved in and blamed for downfalls of businesses that have brought public attention. Last year, The Washington Post published an article calling private equity out, referring to a report by a coalition of nonprofit organizations stating that out of the 14 largest retail bankruptcies since 2012, private equity firms were involved in 10 of them, including the controversial bankruptcy of Toys R Us in 2017 (Bhattacharai, 2019).

The investment process of private equity firms ends with the divestment of the portfolio company, and the financial gain of the investment becomes realized. In this step, private equity firms have several exit routes to opt for. Most commonly is the sale to another PE firm, trade sale, or public offering (Invest Europe, 2019). Focusing on the latter, researchers in the US and the UK have studied the effect of PE involvement in IPOs, and found evidence that these PE-backed IPOs, including both venture capital (VC) and buyouts (BO), outperform non-backed (NB) IPOs in the long-run (Brav & Gompers, 1997; Levis, 2011). As such, private equity seems to have a positive effect on long-term performance after an initial offering. The presence of private equity sponsorship behind IPOs in Europe has increased in the last decade, with 40-50% of all European IPOs being PE-backed from 2013 to 2017 (PWC, 2018a). Looking specifically at the Nordic PE market, it is one of the most prominent in Europe, being the second largest buyout market in 2017-2018 with 18% of the total deal value, behind the UK market (PWC, 2019).

To investigate whether the same performance patterns of IPOs can be found in the Nordic region, we collect a sample of 250 Nordic IPOs between January 2010 and March 2017, consisting of 140 NB, 106 PE-backed, and 4 uncategorized IPOs. We present raw

buy-and-hold returns (BHRs) for each IPO over a holding period of three years, and calculate buy-and-hold abnormal returns (BHARs) against the FTSE Nordic market index. BHARs adjusted for industry and size are also calculated to check for robustness. Our findings suggest that IPOs in the Nordic underperform the market in the long-run, confirming patterns from the US and UK markets. These results are statistically significant at the 1%-level. We do, however, observe striking differences between our PE-backed and NB sub-samples, as the overall underperformance is mainly attributed to the poor returns of NB IPOs. The PE-backed sub-sample reported better BHARs, although marginally negative. The results of both these groups were statistically significant at the 5%-level.

The rest of this paper is organized as follows. Section 2 presents a background to the Nordic market, providing key characteristics which will be used for later analysis. Section 3 provides related literature, theories, and the formulation of hypotheses. In section 4, the sample selection, methodological approach, and data criticism is thoroughly presented, and section 5 provides descriptive statistics of the sample. Section 6 presents the empirical findings and analysis of the study. Section 7 outlines the main conclusions of this paper and discusses possible explanations for IPO long-run underperformance, and differences between IPO-types. Moreover, it offers suggestions for future research.

2. Background

2.1 The Nordic Market

The general research on private equity is based on American theory and empirical data, extended to the UK. Due to them being the leading and most developed financial markets and thus most influential, one could argue that there is reason to believe that findings and assumptions from these major markets would hold in smaller markets. However, cultural, economic, and political circumstances may cause discrepancies between different markets.

The concept of the Nordic or “Norden” evokes unequivocally positive associations for most people living in the Nordic countries, giving a sense of a community and values that are transcending the boundaries of language and culture (Østergaard, 2002). Due to the similarities and proximity of the countries, which all have welfare systems based on high taxation, high degree of social security, and comprehensive public service, there is reason to regard the Nordic region as one coherent market (Spliid, 2013). Moreover, the language as well as cultural and economic ties generates a high degree of confidence among the countries, and as a result, cross-border investments within the Nordic region are perceived as less risky (Spliid, 2013). Furthermore, to regard the Nordic region as one market has become even more justified since the markets of Sweden, Finland, and Denmark merged into the OMX-integrated markets, leading to converging institutional features that separates them from the continental markets (Westerholm, 2006).

2.2 Private equity-industry and Performance

Private equity as a concept has gained substantial foothold in the Nordic region. Sweden is considered to be a leading country when it comes to its PE-industry, with the UK being the only European country with greater international presence, relative to GDP (SVCA, 2017). Moreover, some of Europe's largest PE firms are located in Stockholm, including second and seventh largest PE firms in EQT and Nordic Capital, as well as Altor and IK (SVCA, 2017). The success of Swedish PE can largely be attributed to the history of it, with IK and Nordic Capital being early movers (both started in 1989) and thereby able to exploit opportunities during the 1990's banking crisis to purchase assets on a discount, thus generating good

performance and reputation from the start (SVCA, 2017). Nordic PE transactions represent 0.7% of GDP, slightly lower than the corresponding number for the US which is 0.9% (Spliid, 2013). However, Swedish PE transactions represent 1.1% of GDP, which is even higher than in the US. Altogether, the Nordic PE funds have shown stable performance the last decades. The average net return (net IRR) in the period from 2000 to 2016 was just above 18% for Swedish and Danish PE funds (SVCA, 2017). Corresponding returns for Finland and Norway was 16-17% and 14% respectively, for comparison the net IRR for UK funds was 12-13% (SVCA, 2017).

2.3 Funding and Corporate Governance

The relatively small Nordic market means that PE firms need to largely rely on international investors in order to grow, which consequently means that they need to offer offshore setups to accustom their investors for different tax conditions (Spliid, 2013). From 2007-2015, the share of outside funding in Sweden, Norway, Denmark, and Finland were 80%, 62%, 25%, and 23% respectively (SCVA, 2017). All Nordic countries have an investor-friendly legal environment thanks to the legislation being clear and investor protective, and the law enforcement is strong (Spliid, 2013). According to La Porta et al. (1996), strong investor protection is associated with larger capital markets, applying to both debt and equity, thus enabling outside financing. However, the rigid legislation applies to labor laws as well. This results in low labor market flexibility, except for in Denmark, making it expensive and difficult to cut costs through staff reduction (Spliid, 2013). Consequently, this becomes an obstacle for investing PE firms to improve efficiency in the portfolio company. Furthermore, there are certain implications of taxation in the Nordic. Since one of the main functions for PE firms is to utilize unused debt capacity, regulation regarding interest expense deductibility becomes relevant. In 2007, Denmark passed a law limiting interest expense deductibility to 80% of EBIT, and the deductible interest expense cannot surpass the tax value of assets multiplied by the market rate plus 2.5% (Deloitte, 2008). For the other Nordic countries, the legislation has been more slack. Sweden had no rules at all, and in neither Norway nor Finland were there any formal rules, but deductibility on loans from a parent or associated company may be limited (Spliid, 2013). Following the European Union's Anti-Tax Avoidance Directive (ATAD) in 2016, legislation in member states has become more rigid. In accordance with this, Denmark and Sweden have, among other rules, implemented a

threshold for interest expense deductibility at 30% of EBITDA, whereas Finland implemented a threshold at 25% of EBITD (PWC, 2018b). Another aspect to consider for foreign investors in the Nordic is that they become subjects to high taxation on carried interest. In Denmark carried interest is regarded as remuneration for workload and in Sweden as personal income, hence in both countries it is taxed at the personal income tax rate; significantly higher than at the capital gain tax rate of 20% in the US for example (Spliid, 2013).

Another important factor to consider is how fund managers are able to control the portfolio company. The mantra in existing literature is that PE firms create value through improved management - which is achieved by mitigating the principal-agency problem (Leslie & Oyer, 2008). By offering co-ownership to the manager, he gets financial incentive to work in the interest of the owners. As Murphy (1999) puts it; “ the fundamental shareholder-manager agency problem is not getting the CEO to work harder, but rather getting him to choose actions that increase rather than decrease shareholder value”. Consequently, the focus of the principal-agency relies solely on financial incentives as a motivational factor, thus ignoring intrinsic and cultural values as determinants of management style and motivation (Spliid, 2013). Corporate culture in the US, as well as in European countries such as Italy, Germany, and France are characterized by significant masculinity, while the Nordic countries by the opposite; hence, for Nordic managers, competition and money rewards should not be values to strive for (Hofstede, Hofstede & Minkov, 2010; Spliid, 2013). Thus, overcoming the principal-agency problem, and subsequently create value, could potentially be more difficult in the Nordic.

3. Previous Research, Theories and Hypotheses

3.1 Empirical After-Market Performance

Previous studies on IPO long-run performance are based on measuring IPO firms' stock returns for a longer time period after the initial offering, usually 3-5 years. In order to draw any conclusions about IPO performance, long-run stock returns are compared to similar returns of a relevant benchmark. There is no definite method on how to conduct such a study, and previous studies differ in the use of return metrics, time regimes and benchmarks (Schöber, 2008).

One of the first studies on IPO long-run performance was conducted by Jay Ritter (1991). Previous research had studied the short run performance of IPOs and concluded that the shares of IPOs generally performed very well immediately after the initial offering. Perhaps it was surprising then that Ritter found out the opposite effect in the long-run performance of IPOs. With a sample of 1526 IPOs in the US during 1974-1984, his results showed significant underperformance of 17% three years following the initial public offering on average. The underperformance was measured relative to a set of comparable firms matched by size and industry and the returns were measured from the closing price of the first trading day.

Ritter together with Loughran further extended his research in 1995 and included 4753 US companies going public between 1970 and 1990. The results of this study confirmed his earlier research, suggesting that IPOs underperformed in the five following years after going public. The results showed that an investor would have to invest 44 percent more money in issuing firms than in non-issuing firms to have the same wealth five years later (Loughran & Ritter, 1995). Both studies of Ritter (1991) and Loughran and Ritter (1995) documented clear patterns over time in the long-run underperformance of IPOs. More specifically, they found that years with high IPO activity, meaning that many firms went public that year, were associated with the most severe long-run underperformance. Ibbotson and Jaffe (1975) referred to these periods as "hot markets". Levis (1993) further tested the robustness of the results from Ritter (1991) by conducting a similar study, calculating cumulative average

benchmark-adjusted returns (CAR) on 712 IPOs in the UK between 1980-1988. The results from the UK market were consistent with the results from the US, showing a statistically significant IPO underperformance after 36 months. The benchmark-adjusted holding period returns resulted in -8.1% three years after the initial offering. Additional research by Lee, Taylor and Walter (1996) found evidence that Australian IPOs significantly underperform comparable market movements in the three-year period following the listing. Their findings suggested a CAR at month 36 of -51%, and their study further showed that 23 of the monthly average returns were significantly negative while only one month was significantly positive. Their sample consisted of 266 Australian IPOs between 1976-1989 and the results confirmed previous research by Ritter.

There is a lack of similar studies on IPO long-term performance in the Nordic markets. Loughran, Ritter and Rydqvist (1994) looked at 162 IPOs in Sweden between 1980-1990 and found slight positive abnormal long-run performance of 1.2% after 36 months. This study was based on equally-weighted average returns and the raw holding period returns for the 162 IPOs were 55.7% after three years. Moreover, Westerholm (2006) analyzed long-run performance of Nordic IPOs between 1991-2002. The results showed weak long-term returns in Sweden, contrary to the findings of Loughran, Ritter and Rydqvist (1994), and in Finland. In Denmark, long-run returns matched the market index almost exactly and in Norway, the IPOs even outperformed the market index by 3.3% per year. Furthermore, the study concludes that the relatively high listing requirements of the Nordic markets have not protected them from poor long-run performance (Westerholm, 2006). The overall results for the whole sample in Westerholm's study suggested a significant negative 5-year BHAR of 3.18%, compared to the market (Westerholm, 2006).

3.2 Theoretical explanations for IPO underperformance

Theoretical explanations and reasons for why IPOs seem to underperform in the long-run are less abundant than theories explaining the underpricing phenomena (Kooli & Sutet, 2004), and some researchers suggest that there is no convincing theory that can explain the poor long-term performance of IPOs (Jakobsen & Sorensen, 2001). Ritter (1998) seeks answers in behavioural theories such as the divergence of opinion hypothesis, fads in the market, and the

window of opportunity hypothesis. The divergence of opinions hypothesis was first presented by Miller (1977), and suggests that the most optimistic investors, who are expecting high future cash flows and growth for the IPOs, are the ones that eventually will be the buyers. Hence, their valuations will determine the initial trading price. When there is uncertainty about the intrinsic value of an IPO prospect, the valuation of optimistic investors will be higher than those of pessimistic investors. The theory argues that this could be a reason for declining long-term returns for IPOs, as optimistic investors tend to overvalue them at the time of flotation.

According to Aggarwal and Rivoli (1990), fads are likely to occur when there is greater uncertainty surrounding intrinsic values, such as for newly issued securities. They argue that riskier securities are more likely to be traded when there are higher levels of noise, implying that they do not conform to standard rationality assumptions, causing over-optimism. Moreover, IPO investors are expected by nature to be more speculative than other investors, which consequently lead to higher levels of price volatility. As such, a fad may be defined as a temporary overvaluation by investors accruing to over-optimism (Aggarwal & Rivoli, 1990). A type of fad was introduced by Ritter (1998), which he refers to as the “impresario” hypothesis. He argues that IPOs are purposely underpriced by investment bankers to create the appearance of excess demand. As such, the hypothesis predicts that companies with the highest initial returns should have the lowest subsequent returns. The high demand invokes a momentum effect initially with increased returns in the early after-market, but leads to poor performance in the long-run.

Many researchers are unsatisfied with these behavioural explanations as they all assume a certain extent of investor irrationality. However, if we assume a fully efficient market, phenomena such as the generally accepted IPO long-run underperformance, could be assumed to diminish over time as investors, and consequently the market, learns and corrects for this anomaly. Nonetheless, as underperformance continues to persist, it might indicate that market inefficiencies at least to some extent may be ascribed to investor irrationality, explained by behavioural theories.

3.3 Private Equity-backing

Given the widespread evidence of the underperformance of initial public offerings in the aftermarket, another strain of literature is examining the factors affecting said underperformance. Studies by DeGeorge and Zeckhauser (1993), Holthausen and Larcker (1996), and Cao and Lerner (2009) suggest that leveraged buyouts (LBOs) returning to public, so called reverse LBOs (RLBOs), outperform new firms going public. Moreover, RLBOs does not show evidence of a deterioration of returns over time, as opposed to IPOs (Cao and Lerner, 2009). Cao and Lerner (2009) further states that reverse leveraged buyouts are usually carried out by professional late-stage private equity (PE) investors, and has led to an increased public scrutiny of the PE-industry.

Levis (2011) in his paper, states that there has been a lack of evidence regarding the performance of sponsored (venture capital [VC], and PE) and non-sponsored IPOs, especially outside of the US. Gompers (1995) writes in his early paper that “venture capitalists provide access to top-tier national investment and commercial bankers”, and thus expect VC-backed firms to be less dependent upon internally generated cash flows to undertake necessary investments. Moreover, VCs tend to stay on the board of directors (BoD) long after the IPO and continue to provide access to funds that nonventure-backed firms lack, as well as help put in place management structures that help the firm perform better in the long-run (Gompers, 1995). Gompers (1995) argues that if VC-backed firms on average perform better than non-backed firms, the market should incorporate these expectations in the pricing of IPOs and thus, long-run performance should be similar. However, he continues, if the market underestimates the impact of VCs in the pricing, the long-run performance may differ. To follow this up, Brav and Gompers (1997) present in their paper evidence from 934 venture-backed IPOs and 3407 nonventure-backed IPOs in the US between the years 1975 and 1992, building on the methodology of Loughran and Ritter (1995). Their findings suggest that returns of non-backed IPOs are significantly lower than those of VC-backed, and below relevant benchmarks when returns are weighted equally. These findings mainly attribute underperformance to small, low book-to-market firms (Brav & Gompers, 1997).

A first explanation provided by the authors is that the earnings of small firms declined in the 1980's due to the recession and did not recover when large firms did. Another explanation given is that of investor sentiment, arguing that small firms are more of a subject to fads. Since their equity is held primarily by individuals, asymmetric information is likely to be prevalent due to individuals being less thorough than institutional investors when tracking returns. Megginson and Weiss (1991) suggests that institutions may avoid investing in small firms since they usually invest large sums and could lead to holdings above 5 percent, which many institutions want to avoid for regulatory reasons. Consequently smaller firms may underperform since institutional holdings are positively correlated with IPO long-run performance (Fields, 1996). Barry et.al (1998) provides further explanation and argues that small non-backed firms go public with lower tier underwriters than similar VC-backed firms, which has been associated with poor long-run performance (Michealy & Shaw, 1991).

To address the existing gap in the literature, Levis (2011) conducted a similar study in the UK consisting of 1595 IPOs listed on the two London Stock Exchange markets, the Official List (Main market) and the Alternative Investment Market (AIM), from 1992 to 2005, where IPOs are grouped into: VC-backed, PE-backed, or non-backed. In line with the findings of Brav and Gompers (1997), Levis (2011) found that non-backed IPOs emerge as poor performers.. Furthermore, he refers to the perspective offered by Purnanandam and Swaminathan (2004), that IPOs overvalued at offer tend to further increase in the early aftermarket and revert to fair value in the long-run. The findings of Levis (2011) is that PE-backed IPOs are, on average, reasonably valued at offer, but start trading at relatively modest first-day returns due to the market perception of aggressive pricing by PE-sponsors and high leverage at the time of the issue. According to him, the stable operating performance, continued involvement of PE sponsors as well as the debt reduction immediately after the IPO, are unexpected and positively viewed by investors and ultimately leads to positive aftermarket performance, consistent with the view of Purnanandam and Swaminathan (2004). According to Levis (2011), operational efficiencies driven by closer monitoring, management expertise, and higher level of debt characterises the PE model. Even though this normally accrues during the period the firm is under PE control, he argues that, in line with Gompers (1995), it is reasonable to assume that financial and management practices put in place are maintained for a time after the exit. Lock-up agreements, performance

incentives, and liquidity considerations lead to the PE involvement not being completely terminated at the time of the IPO, and could induce better operating performance and thus, superior aftermarket performance depending on initial valuation (Levis, 2011).

Another possible explanation to IPO long-run underperformance can be derived from the “Certification hypothesis” which was introduced by Megginson and Weiss (1991) to explain how the presence of a PE-sponsor can affect the underpricing of an IPO. This hypothesis argues that PE-firms’ involvement in a company going public acts as a “certification” of the intrinsic value of the shares that are being issued by rather unknown or uncertain firms. Megginson and Weiss (1991) mean that this certification is of value when there is information asymmetry between the issuing firm and the outside investors. They argue that insiders in the issuing firm may have incentives to shroud negative information regarding the firm in order to sell their equity to a higher price. Furthermore, rational investors are aware of this possible incentive, and will therefore offer a lower amount for the shares, unless they can be credibly assured of the price by the issuing firm. Hence, the Certification hypothesis argues that PE-sponsorship works as a third party certifier and that investors are more likely to believe published information if this certification of the firm quality is present (Megginson & Weiss, 1991). Consequently, the hypothesis suggests that PE-backed IPOs are less underpriced, or have lower initial returns, than non-backed IPOs. This could imply that PE-backed IPOs are less overvalued, or more “correctly” priced in the early aftermarket, which will have implications for long-term performance.

An additional explanation for the performance patterns of IPOs is presented by Teoh, Welch and Wong (1998), that found that issuers with higher levels of earnings management at the time of flotation had poorer stock returns in the subsequent three years. Their study showed that firms in the quartile classified as more “aggressive earnings managers” experienced on average 15 to 30 percent worse three-year performance in comparison to firms in the opposite quartile, classified as being the most “conservative earnings managers”. These findings suggest that the usage of earnings management as a “window-dressing” tool to make financial statements more appealing is not useful in the long-run. Once investors and the market realises that the financial statements were falsely inflated, prices will drop and the long-term performance will suffer (Teoh, Welch & Wong, 1998). Adding on to this, Katz

(2009) explored the ownership structure and how it affects IPO performance. This study differentiated the sample into PE-backed IPOs and non-backed IPOs and the findings indicated that PE-backed firms that generally engage less in earnings management, have higher earnings quality and report more conservatively before and after the IPO. This is interesting considering the findings by Teoh, Welch and Wong (1998) about the effect of earnings management on IPO long-run performance. Based on Katz (2009) findings, the presence of a monitoring PE-sponsor restrains the usage of earnings management, and could thus shield firms from poor long-run performance in that regard.

3.4 Hypotheses

The general perception among researchers is, and has been for a long time, that IPOs underperform the market in the long-run. This has been evidenced by several researchers, mainly in the US and the UK. Another widespread assumption is that said underperformance is mainly derived from non-sponsored IPOs. By analyzing the characteristics of the Nordic presented in the background section, we will try to determine whether these assumptions should hold in the Nordic, or if there is reason to believe otherwise. Considering that IPO long-run underperformance has mainly been explained by behavioural theories and investor sentiment, we do not believe that the Nordic market's characteristics should have any particular impact on the research question, i.e. we believe that Nordic IPOs should underperform the market in the long-run in a similar fashion as what has been established in previous studies on other markets. Consequently, the first hypothesis is formulated below:

H1: IPOs in the Nordic underperform the market in the long-run

However, if we consider the impact of private equity, market effects are of greater importance. The Nordic market being relatively small, it is much reliant on outside funding in order to operate efficiently. The environment is investor friendly which attracts international funding, and up until 2016, there was slack legislation regarding interest expense deductibility. These characteristics contributed to private equity being able to thrive in the area, since its early entrance. However, high taxation and protective labor laws could result in difficulties to realize financial gain through operational efficiency improvements to some extent. Furthermore, the more decentralized and feminine corporate culture may also

insinuate struggles to control the management of the portfolio company. As such, there also exist traits that talk against PE-funds beneficially investing in the Nordic, and thus contribute to an efficient PE-market. Following the implementation of ATAD, non-EU states may also be disincentivized to invest in EU countries for tax reasons. However, as the time period for our sample ends in early 2017, it is reasonable to assume that this study is rather unaffected by this.

Nonetheless, as the PE-industry in the Nordic evidently has been strong historically, and currently is, it might indicate that these obstacles are not an issue in practice. On the contrary, the high returns of Nordic PE-funds in relation to other European countries including the UK, could mean that the Nordics should be rather attractive to invest in. As such, the operational implications have little impact on performance, as other market mechanisms outweigh these. Hence, the Nordic PE-market is assumed to operate efficiently and should conform to general patterns. We therefore expect that Nordic IPOs behave similarly as in the US and UK markets, i.e. that PE-backed IPOs outperform non-backed IPOs. Consequently, the second hypothesis is formulated below:

H2: Private equity-backed IPOs in the Nordic outperform non-backed IPOs in the long-run

4. Sample and Methodology

4.1 Sample Selection

The study conducted is based on a quantitative method and the sample is based on several selection criteria. How these criteria have been chosen and a motivation for why these parameters are set is discussed further in the following section. The final sample resulted in a total of 250 IPOs in Sweden, Norway, Denmark and Finland. The sample used to analyze the effect of PE-backing was further reduced to 246 IPOs due to lack of information about four firms' ownership structure at the time of their IPO. As a result, the sub-samples consisted of 140 non-backed and 106 PE-backed IPOs.

4.1.1 Time frame

In order to achieve more significant results, it is preferable to collect a large amount of data. Due to the Nordic IPO market being quite limited in size, relative to other markets such as the US and UK, the time frame of the sample selection was set to include IPOs from January 2010 through March 2017. The lower time limit of 2010 was set in an attempt to eliminate any potentially distorting effect on results from the preceding financial crisis 2007-2008. Previous studies have repeatedly acknowledged the significant influence of the previous period of the Dotcom-bubble (2000-2002) on the results (Levis, 2011). Additionally, IPOs are sensitive to cyclical movements in the market (figure 1). Thus, the year of 2010 was chosen as a lower boundary as it sets the start of the most recent IPO-wave. The method of the study is based on measuring stock price returns three years following the IPO. Hence, the upper limit of the time frame was set in order to include as many IPOs up to date as possible in the sample.

4.1.2 Markets

The sample consists of IPOs in the Nordic markets. Sweden, Norway, Denmark and Finland are all included in this definition. The IPOs in the sample have been collected from both primary and secondary stock exchange lists in each of the Nordic countries in order to get a larger sample population. The following stock lists have been included in the study; Nasdaq Stockholm, Nasdaq Copenhagen, Nasdaq Helsinki, Oslo Børs, First North Sverige, First

North Denmark, First North Finland, NGM Equity and Spotlight Stock Market. A common process for some smaller firms going public is to first list on one of the smaller stock exchange lists, such as First North, NGM Equity or Spotlight. Some of these firms eventually end up changing lists to the primary Nasdaq Lists due to successful growth. However, this change of listing is not to be considered as a first public offering, which is why they have not been included in this study. The choice of measuring the results of the Nordics as one coherent market is motivated by the previously mentioned similarities and proximity of the four countries included. Østergaard (2002) mentions shared values between these countries which gives a sense of community, and Spliid (2013) further identifies similar welfare systems, including high taxations and high degrees of social security, between the Nordic countries. The fact that these countries are economically and culturally similar motivates the categorization of the countries into one unit, the Nordic. Additionally, the integration of Swedish, Finnish and Danish stock markets into the OMX-integrated markets have clearly distinguished these markets from other continental markets (Westerholm, 2006).

4.1.3 SEOs, Private placements, Cross-listings and Delistings

Any offerings or listings that were not classified as IPOs, such as Secondary Equity Offerings or Seasoned Equity Offerings (SEO), have been excluded from the sample. These equity offerings are issued by firms that already are publicly traded, which is why these transactions fall outside of the criteria of the sample. Private placements have been excluded as well since they are not an offer to the public, but directed at certain investors. Furthermore, any cross-listings within the time period in the Nordic markets were excluded from the sample. Even though the interest for foreign companies to list themselves in Nordic equity markets have increased in recent years (Blume, 2017; Mølne, 2017), these cross-listings have been removed from the sample due to them not meeting the criterias of an IPO. A firm that is cross-listing is already publicly traded on another stock list in another country. The main idea of this study is to measure the long-run performance of firms after they go public for the first time in order to investigate the market's initial reaction to this event, why cross-listings have been excluded. Additionally, even though some firms have been delisted within three years after the IPO, either by going private again or in the worst case bankruptcy, these firms have still been included in the study in order to avoid any survivorship bias.

4.1.4 Data sources

The necessary data in order to conduct this IPO long-run performance study has primarily been collected from Bloomberg terminal and Datastream. Bloomberg has mainly been used to find general data about all IPOs in the Nordics within the set time frame. The initial sample gathered from Bloomberg resulted in 289 Nordic IPOs from January 2010 through March 2017. However, due to the mentioned selection criteria and in a few cases a lack of historical stock price information, the final sample was reduced to 250 IPOs. Historical stock prices, which are used to calculate daily and monthly returns, have been collected from Datastream. This database has been the source of stock prices for both the IPO sample and the associated benchmarks which will be presented in the methodology section below. In any cases of uncertainty or incomplete information about IPO dates or historical stock prices, alternative databases such as Yahoo Finance and Bureau van Dijk's Zephyr database have been used to cross-check the validity of the primary sources and further complement the data.

4.1.5 Distinguishing Private equity-backed IPOs

In order to be able to address the second hypothesis of this study, whether PE-backing has an effect on IPO long-term performance or not, it has been necessary to clearly distinguish if the firms in the sample were backed by private equity at the time of the IPO. The classification of a transaction to be private equity-backed is a challenge for several reasons. For one, there is no best practice in how to classify an IPO as sponsored by private equity. Also, there is no general consensus in the literature as to how large the threshold pre-IPO ownership-stake should be in order to be considered as sponsored. Moreover, there are dispersed ideas as to how financial sponsors should be classified.

Private equity as an asset class has been a constant source of confusion for the uninitiated, largely since there has been a wide use of different terminology (Fraser-Sampson, 2007). As presented in the literature in previous sections, there has been different use and definitions of sponsors in prior studies. Levis (2011) in his study on the UK market uses two classes of financial sponsors; VC and PE. Meanwhile studies in the US, such as Brav and Gompers (1997) and Barry et al. (1998), makes no distinction between different types of sponsors but consistently refer to them as VCs. According to Fraser-Sampson (2007), traditionally in

Europe the asset class as a whole has been called “Private Equity”, and further sub-divided into “Buyout” and “Venture Capital”. Furthermore, he argues, that even though this classification often holds in the US as well, sometimes the whole asset class is referred to as “Venture Capital” there, and large buyouts are called “Private Equity”. Other studies in the UK such as Coakley, Hadass, and Wood (2007), also refers to all sponsoring as venture capital. Coakley, Hadass, and Wood (2007) also note that, as opposed to the US, many venture capitalists operate mainly in management buyouts (MBOs) and expansion capital.

Levis (2011) states that the identification of VC-backed and PE-backed IPOs is a challenge due to limited publicly available information for private companies, as well as the overlapping nature of the sponsors’ involvement in both VC and PE transactions. Moreover, he writes that it is worth noting that unlike the US where buyout firms and VCs are largely distinct, the overlap is significant in the UK, further stating that 40% of the sponsors in his study are involved in both kinds of transactions (Levis, 2011). This is in line with Cao and Lerner (2009) that also notes that private equity firms that typically make buyout investments have also made venture capital investments in the past. Hence, it is not possible to classify a firm to be either a private equity firm or venture capitalist, but what is dictating the classification is the particular transaction in question. Levis (2011) chose to also include RLBOs in his study, classifying them as PE-backed, thus increasing his sample size and more easily looking at buyouts as a sub-group. As Cao and Lerner (2009) note, buyout groups typically hold large equity ownership in firms prior to the offering and retain large stakes afterwards. For his study, Levis (2011) defined an IPO as PE-backed where the sponsor had a controlling interest at the time of the offering. In contrast, he defines VC-backed IPOs as companies that have received single or multiple round start-up, development, or expansion venture capital at some point.

A common procedure in the literature has been to classify a venture-backed (i.e. sponsored of any kind) IPO as those IPOs where the backing firm is included in the directories of British Venture Capital Association (BVCA), European Venture Capitalist Association (EVCA), or National Venture Capitalist Association (NVCA - US)(Coakley, Hadass & Wood, 2007). Despite the names, the associations does not represent the Venture community, but overwhelmingly by the Buyout community (Fraser-Sampson, 2007). However, worth noting

is that EVCA changed its name to Invest Europe in 2015 to reflect the evolving industry, and is from there on including private equity, venture capital, and infrastructure investment firms, as well as pension funds and insurance groups (Invest Europe, 2020). This highlights the necessity of reviewing traditional techniques and methods in evolving landscapes.

On another note, the literature does not limit financial sponsors to private equity firms or venture capitalists. Hedge funds, industrial investors, asset managers, banks, and universities for example may engage in venture- or buyout-like transactions (Schöber, 2008). Thus, making the distinction between financial sponsor and strategic investor becomes increasingly difficult. To separate these two types of investors, Schöber (2008) argues that financial sponsors' core business is to take temporary equity interest in a company to realize a financial gain, and exit the investment within several years. In contrast, a strategic investor could be seen to be seeking long-term control or sustainable returns over time.

The chosen approach for this paper is the one which is deemed most appropriate to answer the particular research question. What needs to be considered is the trade-off of value gained by using different classifications, against the cost of potentially categorizing the sample inaccurately. As pointed out, there is no established practice to determine neither classification for sponsoring nor ownership thresholds. Moreover, firms may be involved with both PE- and VC-like transactions, increasing the subjectivity in determining affiliation in the particular transaction. For one, this paper looks into firms going public for the first time, hence RLBOs are not included in the sample which reduces the importance of separating buyouts from venture capital. Secondly, the purpose of the study is to see if an IPO backed by a firm with temporary active management with the goal to realize financial gain and then exit, will differ in performance from firms without such backing. Hence, in a similar vein to Brav and Gompers (1997), Barry et. al (1998), and Coakley, Hadass, and Wood (2007), it makes sense to not make any distinction between the type of financial sponsor. However, referring to both types of sponsoring as venture capital could give birth to considerable confusion. Therefore, adopting the terminology of Fraser-Sampson (2007), referring to the whole asset class, i.e. any type of financial sponsoring, as private equity is deemed appropriate.

To be as precise as possible, a set of complementing techniques have been used to determine whether or not an IPO is PE-backed, starting with individually researching each IPO and analysing pre-IPO shareholders. The primary source of information has been each firm's listing prospectus, where shareholders with a minimum holding of 3% of total share capital are listed. As such, and in accordance with Coakley, Hadass, and Wood (2007) among others, if an IPO has a PE-sponsor with at least 3% equity stake, it is to be considered PE-backed. The listing prospectus of each IPO has mainly been obtained from the prospectus register/archive of the financial supervisory authority in each country; Finansinspektionen (Sweden), Finansinspektionen/Finanssivalvonta (Finland), and Finanstilsynet (Norway and Denmark). However, in some instances, the prospectus could not be accessed using these sources, and was retrieved using other channels, such as the firm's investor relations website, the Bloomberg terminal, or Bureau van Dijk's Zephyr database. Generally, older IPO prospectuses were harder to come by. Four of the listing prospectuses could not be found using any channel, nor was it possible to come by the annual report from the year before listing and in that way obtain a list of existing shareholders. Consequently, we had no choice but to not include them in our sub-samples.

4.1.6 Data collection criticism

Even though the data collection process has been executed with thorough and extensive verification efforts, it is still reasonable to assume that the final dataset may suffer from some deficiencies. First of all, the final IPO sample for the chosen time period may be incomplete due to limited access to other databases. The IPO sample is mainly relying on data from Bloomberg terminal and stock price data from Datastream, implying that any inconsistencies within these databases will accordingly affect the results in this study. One remark that was made is that the efficiency of information decreased the further back in time the IPO was tracked. Consequently, it is likely that the degree of erroneous data increases with older IPOs.

Secondly, our data may suffer from erroneous classification of PE-backing. To minimize the risk, we rely on the member classification by any of the Nordic venture capital and private equity associations (DVCA, FVCA, NVCA, and SVCA) as well as Invest Europe. However, some strategic investors, banks, and funds have VC- and/or PE-units not related to their core business, and are not listed in these registers. Therefore, a thorough analysis of investors has

been made to determine if the investment is of private equity or strategic nature. Only in cases where it was apparent did we classify it as PE-backed, otherwise as non-backed. Naturally, this manual identification process requires certain levels of subjectivity. Moreover, some criticism may be directed towards our decision to not make any distinction between VC- and BO-backed IPOs, but to classify both groups as PE-backed. This could lead to potential shortcomings of our analysis due to different characteristics in the sponsoring and subsequent performance patterns.

Finally, criticism may also be directed at the chosen ownership threshold to be classified as PE-backed. While we chose to include all shareholders listed in the prospectus, i.e. holders of minimum 3% stake, others may argue that a larger stake is required in order to exercise influence. Additional concerns may be regarding our decision to look at the Nordic as one coherent market. Although there are several similar characteristics, there also exist differences. As Swedish IPOs pretty heavily outnumber the other countries, our study is exposed to a Swedish bias.

4.2 After-Market Performance Methodology

In previous research, no definite method on how to measure and analyze the long-term performance of IPOs has been established. Most long-run performance studies are conducted through an event setting (Ritter, 1991; Loughran & Ritter, 1995; Brav & Gompers, 1997; Levis, 1993; 2011). In this case, an event setting means calculating returns for a given number of months following the IPO. The two most common return metrics used are buy-and-hold abnormal returns (BHAR) and cumulative abnormal returns (CAR).

4.2.1 Event time regime

The time frame of the measurement of long-term performance is ranging from three to five years post-IPO in previous studies. In this study, a post-IPO holding period of three years have been chosen, which is in line with previous research by Ritter (1991), Loughran and Ritter (1995), and Levis (1993; 2011). Using a shorter time frame would have given the opportunity of including more recent IPOs, however the time frame of three years post IPO was set in order to ensure sufficient comparability with existing empirical literature. On the other end, using a longer time frame would give more input to the long-run performance of

IPOs, however this would have significantly reduced the sample size since only IPOs from the first half of decade could have been included. In this case, the study will include IPOs in the Nordics until March 2017, which leaves room for collecting three years of stock price data for all observations in the sample.

4.2.2 Buy-and-hold Abnormal Return

Buy-and-hold abnormal returns (BHARs) is used as the return metric to calculate abnormal returns, as this includes the compounding effect on returns that an investor would get over a multi-period investment. However, an issue with BHAR is that the data tend to be heavily skewed to the right (positive skew) due to extreme winners (Schöber, 2008). The skewness is a result of no upside limits of IPO long term returns while the downside is limited to a maximum of -100% return. Due to this, the average BHAR is way higher than the median BHAR due to some extreme positive outliers. As a consequence, the study focuses on median BHAR as it is less affected by outliers and thereby gives a more accurate picture of the long-run performance of IPOs (Schöber, 2008). The statistical significance of the buy-and-hold abnormal returns are tested through Wilcoxon signed-rank test.

In order to calculate buy-and-hold returns for the 36 event months following the IPO, the first partial IPO month return has been calculated by compounding daily returns, from the closing price of the first day trading, up to the end of the month of the IPO. The reason for calculating from the closing price instead of the offer price is to exclude any effects from underpricing, in line with previous research such as Aggarwal and Rivoli (1990), Levis (1993), and Ritter and Loughran (1995). The closing price of the first day of trading reflects the market's true valuation of the firm at the time of going public. From then on monthly returns are compounded for the remaining 35 event months. If an IPO is delisted before the 36th month we use monthly returns until the delisting month. This means that the sample diminishes the further into the event period. For instance, event month 36 has 237 observations while the first event month has 250 observations. Accordingly, there are a total of 13 delistings that eventually drops out from the sample. The reason why these observations are included in the study even though they are data incomplete is to avoid any survivorship bias, which potentially could have skewed the results. BHAR is calculated by subtracting the

buy-and-hold returns of a comparable benchmark from the actual raw buy-and-hold returns of each IPO. The formula for calculating BHAR can be written as follows:

$$BHAR_{1,T}^i = \prod_{t=1}^T (1 + R_t^i) - \prod_{t=1}^T (1 + R_t^{i,BM})$$

In the formula above, R_t^i refers to the simple return of firm i in period t and $R_t^{i,BM}$ refers to the simple return of the comparable benchmark in the same period. T refers to the analyzed holding period.

The study includes calculations of BHAR for each of the 36 following months which allows us to examine potential patterns in the IPO long-run performance. This will enable the findings to be presented in graphs, giving indications of eventual trends and patterns. The event setting makes it possible to compare all IPOs over time regardless if the IPO date was in 2010 or 2017. The event months are sorted and calculated accordingly, making it possible to see the median abnormal return for that given event month for the total sample.

4.2.3 Benchmarks

To determine if the aftermarket performance of an IPO is abnormal, it becomes necessary to measure the returns of the IPO against the returns of a comparable benchmark for the same period. If an IPO has generated higher returns than its corresponding benchmark, it can be said that the IPO has overperformed, or has a positive BHAR. Oppositely, if the returns of the IPO is lower than the returns of the corresponding benchmark, the IPO has underperformed in relation to this benchmark which implies a negative BHAR. There are mainly two different types of benchmarks dominating in previous empirical studies on aftermarket performance. The first one includes comparisons with broad equity market index, such as the FTSE Nordic Index, and the second type involves comparing raw returns to comparable firms with similar characteristics. Commonly used benchmarks for the second type include comparing against industry adjusted benchmarks and size adjusted benchmarks (Fama, 1998; Schöber, 2008). The drawback of comparing IPO returns to a broad equity index is that it does not reflect unique characteristics of the firm. This is why researchers have tried to complement with other benchmarks (e.g. Ritter, 1991; Loughran & Ritter, 1995; Levis, 2011). Due to the complementary nature of using both types of benchmarks, this study will include buy-and-hold returns of the FTSE Nordic index, BHR of FTSE Nordic index by

industry (according to the 10 FTSE industry classifications) and FTSE Nordic size indexes (classified as small, mid and large cap). The latter two benchmarks are used to incorporate certain risk characteristics related to industry and size. Monthly returns for these respective benchmarks from January 2010 to March 2017 have been collected in order to compute their respective BHR to compare them with the specific buy-and-hold returns of the IPOs in the sample.

In order to match the IPOs in the sample with the industry benchmarks, each IPO has been classified to a certain industry. The classifications are in line with the Industry Classification Benchmark (ICB) which was introduced by Dow Jones and FTSE. The ICB table contains 10 classifications which are; Financials, Basic materials, Healthcare, Industrials, Oil & gas, Technology, Utility, Consumer goods, Consumer services and Telecom. To clarify how this benchmarking process is carried-out; if a firm in the sample is categorized as an Industrial, the BHR of this IPO will be matched against the FTSE Nordic Industrials index BHR for the same period. The same principle applies to the size benchmark. If the same firm is classified as a small cap, its BHR will accordingly be matched against the BHR of the FTSE Nordics small cap benchmark for that specific period. The classification of small, medium and large cap firms in our sample follows the same criteria as the FTSE Nordic small, medium and large indices. This implies that small cap firms have market values of less than €150M, medium cap firms have market values between €150M and €1000M, and large cap firms have market values exceeding €1000M. The market value of the IPOs is calculated as the closing price of the first day of trading, multiplied by the amount of total shares outstanding after the offer.

4.2.4 Test statistics

To test the first hypothesis of whether IPOs are underperforming in the long-run in the Nordics, we test if the measured abnormal return is significantly different from zero. One way of doing so is by conducting a Student's t-test, which is commonly used when the test statistic follows a normal distribution. However, as previously explained the distribution of BHAR has a tendency to be skewed to the right due to the nature of return data and extreme outliers. This is also the case for our sample as illustrated in figure 2. An alternative to a Student's t-test is to use a non-parametric test such as the Wilcoxon signed-rank test. Lyon

and Barber (1996; 1997) argue that the Wilcoxon signed-rank test is more suitable when a sample does not assume normal distribution. They further argue that it is superior when there are extreme outliers skewing the data, since the null hypothesis is that the median of the differences is zero. In our case, the Wilcoxon signed-rank test tests the null hypothesis that the median abnormal return is equal to zero. As the distribution of the sub-samples are positively skewed as well, the same procedure has been applied to test the significance of the results from the sub-samples. In this case, the null hypothesis tested is that the median abnormal returns for each sub-sample is equal to zero.

5. Descriptive Statistics

Table 1 presents the annual distribution of IPOs for the entire sample, and the PE and NB sub-samples. The total number of IPOs in our sample are 250, reflecting all IPOs conducted in the Nordic between January 2010 to March 2017. Out of these, 140 IPOs (56%) are non-backed, 106 (42%) PE-backed, and 4 (2%) unclassified. The IPO activity in the sample indicates significant trends. The first one is a declining activity each year in the period 2010 to 2012. After that, a clear annual increase in activity from 2012 until the peak in 2016 when 84 firms, or a third of the total sample, went public. It is also three times the amount of IPOs conducted in 2010. In the first three months of 2017, 5 IPOs were floated which is the lowest activity for any given year in our sample. However, looking at the activity pattern, we can assume this number to be substantially higher if we included the full year. This is also the case as 2017 became a record year as seen by IPO volume (EY, 2018). The setting of the event time limits us from including all IPOs from that year. Ignoring 2017, the last three years (2014-2016) constitutes 70% of the total sample, which indicates a “hot market” period and market recovery after low activity in the preceding year in the wake of the financial crisis. This is in accordance with previous research that IPO activity is highly cyclical and varies over time (Schöber, 2008).

Table 1 - Annual Distribution

IPO Year	Total number of IPOs	Number of firms per IPO type	
		PE	NB
2010	28*	9	17
2011	16	6	10
2012	9*	4	4
2013	16	7	9
2014	33*	13	19
2015	59	28	31
2016	84	35	49
2017	5	4	1
Total	250	106	140

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified (*). The table shows the sample distributed by IPO year.

Table 2 summarizes the industry classification of the total IPOs and within the two sub-groups. It shows that Healthcare and Industrials are the two most common industries for firms going public in the Nordics. These two industries account for approximately 37% of the total IPOs. The healthcare sector is the leading industry for PE-backed IPOs, representing 25% of the PE-backed sample. The healthcare sector is usually characterized by research-intensive high growth businesses, which could explain why it is common for these types of firms to raise capital from early stage private equity investors, so called venture capital. This is in line with reports by SCVA (2018) that Biotech (Healthcare) together with ICT (Technology and Telecommunications) historically have been the sectors which receive the most venture capital. Looking at Technology and Telecom, we find indication of relatively strong PE-presence where 37% and 46% respectively of IPOs in these sectors are PE-backed.

In the PE-backed sample, around 90% of the IPOs are distributed among five industries which are Industrials, Consumer goods, Healthcare, Consumer services and Technology. This shows that PE-firms tend to focus their investments in certain industries. Industrials, Consumer goods and Consumer services firms account for about 49% of the total PE-backed sample. These sectors are usually not associated with high-growth businesses, but rather with more mature and stable businesses. Hence, these PE-backed IPOs could derive from later stage PE-investments, such as buyouts. The report from SVCA (2018) states that Consumer goods and services are the sectors which historically have experienced the most buyout investments. The data in our sample supports this as both of these sectors have 59% and 50% respectively of IPOs being PE-backed. Additionally, table 2 shows that PE-backing is more rare in industries such as Oil & gas, Financials, and Utilities where the larger part of IPOs are non-backed.

Table 2 - Industry Classification

Industry class	Total number of IPOs	Number of firms per IPO type	
		PE	NB
Oil & Gas	7	2	5
Basic Materials	6	2	4
Industrials	46*	19	26
Consumer Goods	37	22	15
Healthcare	46*	27	18
Consumer Services	22	11	11
Telecommunications	13	6	7
Utilities	9	2	7
Financials	37	5	32
Technology	27*	10	15
Total	250	106	140

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified (*). Industry class is based on FTSE Industry Classification Benchmarks (ICB).

Another important firm characteristic to consider is the size of the firm going public. Table 3 shows the amount of small, medium, and large cap IPOs in the total sample and further how many of them that are PE-backed and non-backed. The statistics over the size distribution is in line with expectations, with small cap firms making up for the largest part (68%) of the sample. Medium cap firms account for 26%, and large cap firms 6% of the total IPOs. A more thorough analysis shows that the proportion of PE-backed IPOs relative to the total IPO sample increases as the IPOs become larger in size. 39% of the small cap IPOs are PE-backed, 47% of the medium cap IPOs are PE-backed, and 57% of the large cap IPOs are PE-backed. These statistics are in line with prior research by Levis (2011) who found that PE-backed IPOs at the time of flotation are larger in terms of market capitalization than other IPOs. However, it is clear that PE-firms invest in firms in all different ranges of size, as all three size groups are represented by significant portions of PE-backing.

Table 3 - Size Classification

Firm size	Total number of IPOs	Number of firms per IPO type	
		PE	NB
Small	170*	67	99
Medium	66	31	35
Large	14	8	6
Total	250	106	140

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified (*). The size classification follows the FTSE small, medium and large cap market value criteria. Firms classified as: Small cap < €150M market value < Medium cap < €1000M market value < Large cap.

Table 4 illustrates the sample distribution by geography. The Swedish markets have experienced the largest number of IPOs (64%), followed by Norway (17%), Finland (11%), and Denmark (8%). Looking at the sub-samples, a similar pattern of considerable Swedish presence can be found where Sweden accounts for 68% of all PE-backed IPOs. However, Norway, Finland, and Denmark account for 10.5%, 10.5%, and 11% respectively. These similar numbers indicate a relatively weak PE presence in Norway and high in Denmark put in relation to non-backed IPOs, whereas Finland seems to follow the trend. Remarkable is that IPOs in Denmark more often than not tend to be PE-backed.

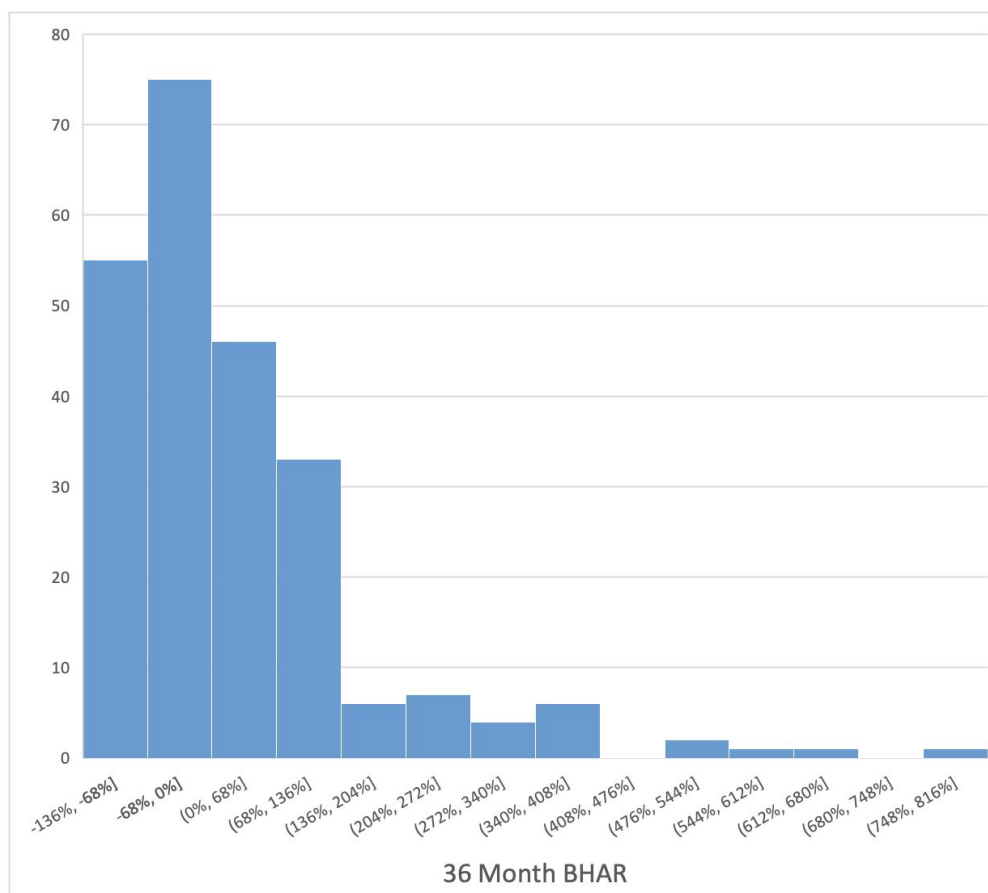
Table 4 - Distribution by Country

Country	Total number of IPOs	Number of firms per IPO type	
		PE	NB
Sweden	161	72	89
Norway	42*	11	28
Finland	27*	11	15
Denmark	20	12	8
Total	250	106	140

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified (*). The table shows the sample distributed by country.

In figure 2 the distribution of the 36 month BHAR, with the FTSE Nordic market index used as a benchmark, is plotted. The figure is based on 237 observations, as 13 IPOs in our total sample delisted within 36 months after the initial offering. The histogram clearly shows how the distribution of the BHARs has a fat right-hand tail, implying a large positive skewness. The non-normally distributed data of buy-and-hold abnormal returns is expected, as it confirms previous research suggesting that BHAR usually is skewed to the right due to extreme positive outliers (Schöber, 2008). These outliers are a result of the compounding effect that has no limit for the upside, as explained in the previous methodology section. As a result of the skewed data, average BHAR tend to be biased upwards, especially when measured over longer time periods. As a consequence, the analysis and discussion will mainly focus on the results of median BHARs.

Figure 2 - Distribution of 36 Month BHAR using FTSE Nordic Market Index



The distribution of 36 month BHAR for the total sample containing 237 companies that went public in the Nordics between 2010 and 2017. 13 companies delisted within the 3-year period of the event study, hence the reduced sample from 250 to 237 observations.

6. Results & Analysis

6.1 IPO long-run performance

The overall results of the event study confirms the first hypothesis of long-run underperformance of IPOs compared to their benchmarks in the Nordics. The results are presented in table 5, and are based on the total sample containing 250 IPOs in the Nordics between 2010 and 2017. The median raw buy-and-hold returns are presented in the second column and represents the actual return an investor would get during the investment holding-period. The median raw BHR is 1.6% after 6 months, and increases to 5.7% within 12 months and further to 10.7% after 24 months. However, after 2 years, the median raw BHR starts to diminish, and after 36 months of holding, the median IPO has decreased to a return of -3.2%. In order to get a better sense of an IPOs relative three-year performance, the BHR is compared to the same holding period returns of comparable benchmarks. Column 3 in table 5 shows the buy-and-hold returns in relation to the returns that the FTSE Nordic index benchmark would have given for the same holding period. The median buy-and-hold abnormal return is marginally positive after 12 months, with 0.1% at the 5% significance level. After 24 months, the median BHAR is still marginally positive with 0.6% at the 1% significance level. 36 months into the event study, the median BHAR has decreased to -10.8% at the 1% significance level. In column 4, the same pattern of buy-and-hold returns is captured when comparing the IPOs to their respective industry benchmark. The median BHAR when adjusting for industry is positive within the first 2 years of holding period, with a BHAR of 3.5% at the 1% significance level after 24 months. After 36 months, the median BHAR has dropped down to -6% at the 1% significance level. Column 5 presents median BHAR when compared to size adjusted benchmarks. In this column, IPOs underperform their relative size indexes already after 6 months, with a BHAR of -0.5%. The BHAR decreases steadily within 2 years after the IPO and after 36 months, the BHAR is -28.3%, however this result is not statistically significant. The larger negative BHAR with size adjustment is due to the BHR of the size benchmark outperforming both the industry and market benchmark.

Table 5 - Full Sample Buy-and-hold Abnormal Returns (BHARs) by Benchmarks

Months after IPO	Median Raw BHR (%)	Median BHAR (%) by Benchmarks		
		FTSE Nordic	Industry	Size
6	1.6	0.1**	2.3***	-0.5*
12	5.7	0.1**	3.4**	-5.2
18	10.1	2.0***	5.6***	-6.3*
24	10.7	0.6***	3.5***	-6.3**
30	5.0	-4.6***	-1.8***	-17.3*
36	-3.2	-10.8***	-6.0***	-28.3

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified. For each IPO, Buy-and-hold Returns (BHRs) are calculated by compounding monthly returns for 36 months. Buy-and-hold Abnormal Returns (BHARs) are estimated for three different benchmarks: FTSE Nordic Market Index, FTSE 10 Group Industry Classification, and Size-adjusted index. Significance levels refers to Wilcoxon signed rank test, where significance levels of 10% (*), 5% (**), and 1% (***) are highlighted.

The reason that the size-adjusted benchmark outperforms the market benchmark could be due to it including returns from Small, Medium and Large cap, whereas the FTSE Nordic market index only includes returns from Large cap firms. The Small cap index especially, but also the Medium cap index, have seen greater returns than the Large cap index for the observed period (table 6), and as a result of this the negative abnormal returns measured against these indexes are even greater. This will also have implications for our sample. Since the IPO firms included in the sample are heavily biased towards small firms, most of the returns will be compared to the Small cap index, and thus cause greater negative BHAR. Since small firms have outperformed larger firms during the measured period, one could also expect for our IPO sample to perform better than the market index consisting of large firms, *ceteris paribus*. This is however not the case, which further highlights the underperformance of IPOs in the long-run. Additionally, our results could be argued to be in line with the findings of Brav and Gompers (1997) that small issuers underperform in the long-run.

Table 6 - FTSE Nordic Size Index Performance 2010-2017

FTSE Nordic Size indexes BHR (%)		
Large cap	Medium cap	Small cap
41.1	92.0	129.7

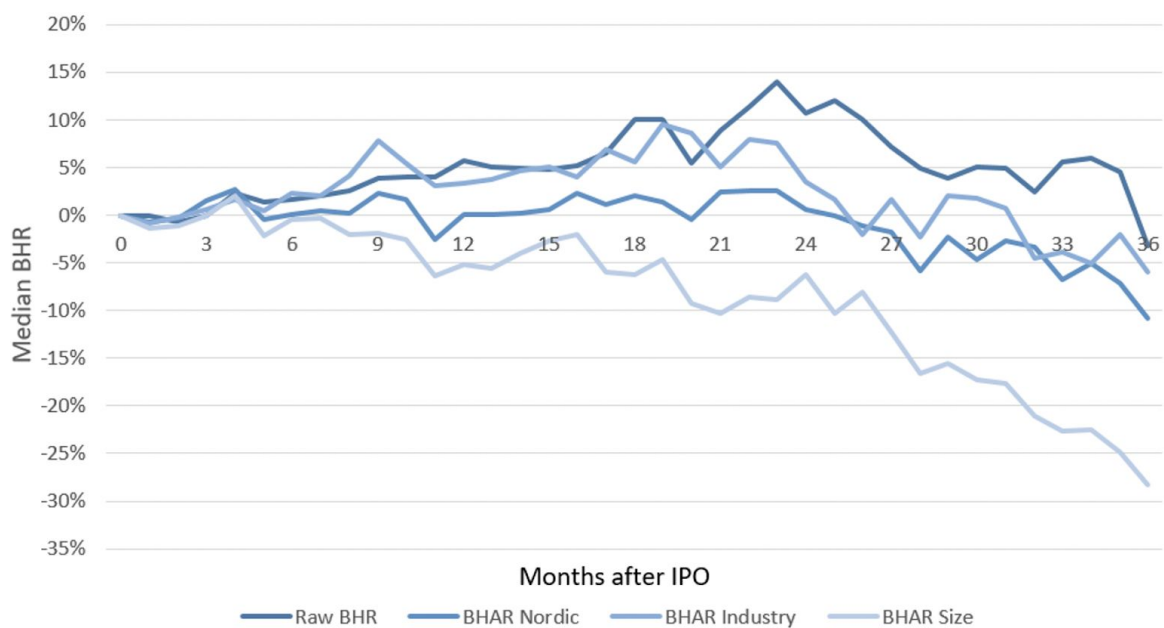
Buy-and-hold Returns (%) of each Nordic size index for the period 2010-2017.

Figure 3 is a graphic illustration of the results in table 5 and it shows the monthly development of the median BHR and BHARs adjusted for the different benchmarks. The figure indicates that the pattern of the BHAR-curve is similar for all different benchmarks. The BHAR relative to the Nordic market and BHAR adjusted for industry benchmarks are both positive in the first two years after the IPO. However, they both decrease in the third year, ending up with negative abnormal returns after month 36. These curves indicate that IPOs are outperforming their relative benchmarks in the short- to mid-term (1-2 years), but in the longer run they start to underperform the benchmarks. The pattern of the BHAR adjusted for size benchmarks is similar, however it is negative from start and keeps decreasing over the 36 months. These findings of significant IPO long-run underperformance in the Nordics are in line with much of the existing IPO long-run performance literature on other markets (Ritter, 1991; Levis, 1993; Loughran & Ritter, 1995; Lee, Taylor & Walter, 1996). The magnitude of underperformance from our results in the Nordics is not as large as in other studies on other markets. However existing studies from the Nordics also suggest relatively better long-run performance, with Loughran, Ritter, and Rydqvist (1994) finding a three-year outperformance of 1.2% in the Nordics, and Westerholm (2006) a five-year underperformance of just -3.18%.

The theoretical explanations of IPO long-run underperformance provided in previous sections are mainly based on the belief that investors are to some extent irrational and that the market consistently over-values IPOs due to various reasons, such as overly-optimistic investors (Miller, 1977), "fads" (Aggarwal & Rivoli, 1990), and issuing firms taking advantage of "hot markets" (Ritter, 1998). They suggest that early aftermarket overvaluations thereby are leading to poor long-run performance as the market realizes the intrinsic value as time goes on post-IPO. Considering that many of the previous studies were published as early as the 90's, the phenomenon of IPO long-run underperformance has been known for a long time.

Hence, one reason why the results of this study shows less IPO long-run underperformance than previous studies, could be that the market has slowly changed its behaviour when valuing IPOs. This would imply that such market “fads” or “hot markets” are no longer present to the same extent as before, as the market may have partly corrected this anomaly. However, our findings still suggest that IPOs are underperforming their relative benchmarks, implying that IPOs still are subject to mispricing.

Figure 3 - Full Sample Development of Raw Buy-and-hold Returns (BHRs) and Buy-and-hold Abnormal Returns (BHARs) by Benchmarks



The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified. The figure illustrates median raw BHR and BHAR adjusted by each benchmark over a holding period of 36 months following the IPO.

Looking at the IPO-activity during the time period for our sample, table 7 illustrates the median 36 month BHAR adjusted for the Nordic market index for all IPO years. The table shows signs of high IPO-activity periods being associated with poor long-term performance. In 2010 and 2011, the IPO market had recuperated from the financial crisis back in 2007-2008 and the number of IPOs had a rebound from previous years (see figure 1). The median 36 month BHAR from IPOs during these years showed severe underperformance of -68% and -34% respectively. Severe long-term underperformance is also documented for firms going public in 2016 and 2017, which both were years when the number of IPOs was high (figure 1). For companies going public in 2012-2014, the median 36 month BHAR is

positive and indicates long-run outperformance of the market. These years can be classified as a low IPO-activity period as few companies went public during this time. The results from table 7 clearly shows a pattern indicating the existence of “hot markets” as in the findings of Ritter (1991) and Loughran and Ritter (1995).

Table 7 - Full Sample Buy-and-hold Abnormal Returns (BHARs) by Cohort Year of Issue

Three-year Median Buy-and-hold Abnormal Returns (%) by Cohort Year of Issue (FTSE Nordic Benchmark)		
Year	Obs.	BHAR
2010	24	-67.9
2011	16	-34.3
2012	8	30.3
2013	14	10.7
2014	32	52.4
2015	59	14.3
2016	80	-26.5
2017	4	-53.0
TOTAL	237	

The total sample contains 250 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs, 106 PE-backed IPOs, and 4 unclassified. For each cohort of IPOs that were floated in a given year, the returns are calculated by compounding monthly returns for 36 months using FTSE Nordic Market Index as the benchmark. The returns reported in the table are based on 237 of 250 IPOs as 13 companies delisted within 36 months.

6.2 Comparative analysis of Private equity-backed IPOs and Non-backed IPOs

In table 8, we analyze the median raw buy-and-hold returns for the individual sub-samples, where median BHRs are reported in intervals of 6 months. Figure 4 illustrates the development of raw BHRs for each month over the holding period of 36 months. The results reveal no striking differences between the IPO-types over the first 24 months, with positive returns for PE-backed IPOs (Non-backed) in the range of 0.7% (1.8%) to 10.7% (9.6%). We observe that initially in the early after-market, non-backed IPOs perform better than PE-backed IPOs, albeit just slightly. After that point, returns start to gradually deteriorate for both groups. PE-backed IPOs showed slight drops to 9.0% and 7.9% in month 30 and 36 respectively, whereas non-backed IPOs experienced substantial drops to 4.2% in month 30, and a negative of -9.2% three years after the IPO. Our findings suggest that for people investing in IPOs, similar positive returns can be expected for both groups in the first two years. However, in year 3 subsequent to the IPO, reflecting the long-run, PE-backed IPOs start to clearly outperform non-backed and still provide positive returns after 36 months which non-backed IPOs do not.

Table 8 - Raw Buy-and-hold Returns (BHRs) by IPO-type

Months after IPO	Median Raw Buy-and-hold Returns (%) by IPO-type		
	All	PE-backed	Non-backed
6	1.6	0.7	1.8
12	5.7	5.5	4.9
18	10.1	10.0	9.6
24	10.7	10.7	9.5
30	5.0	9.0	4.2
36	-3.2	7.9	-9.2

The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The table lists raw Buy-and-hold Returns (BHRs) for the IPO sub-samples in intervals of six months following the IPO.

Figure 4. Development of Raw Buy-and-hold Returns (BHRs) by IPO-type



The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The figure illustrates median raw Buy-and-hold Return (BHR) for PE-backed and non-backed IPOs over a holding period of 36 months following the IPO.

The unadjusted raw BHRs are also compared against several benchmarks to examine the relative performance of IPOs. Buy-and-hold abnormal returns for each IPO-type are calculated using the FTSE Nordic Market Index to account for general stock market effects. Median BHARs per IPO-type are reported in intervals of 6 months in table 9, and the development over the full holding period is illustrated in figure 5. As can be seen in table 9, non-backed IPOs show statistically significant positive abnormal returns in the first 24 months, fluctuating between 0.5% and 2.9%. During the same time frame, PE-backed IPOs showed negative but not significant BHARs in the range of -3.5% to -0.2% for the first 18 months, and significant negative performance after 24 months (-1.4%), 30 months (-4.7%), and 36 months (-2.7%). For non-backed IPOs, after the two-year mark, significant negative performance are reported taking on values of -2.6% after 30 months before reaching as low as -15.2% after 36 months. Thus, the earlier observed deterioration of raw returns after 24 months extends to abnormal returns, where PE-backed IPOs initially underperform non-backed IPOs, but in the long-run show significantly less underperformance. The implication of our results is that investing in PE-backed IPOs and holding it over three years

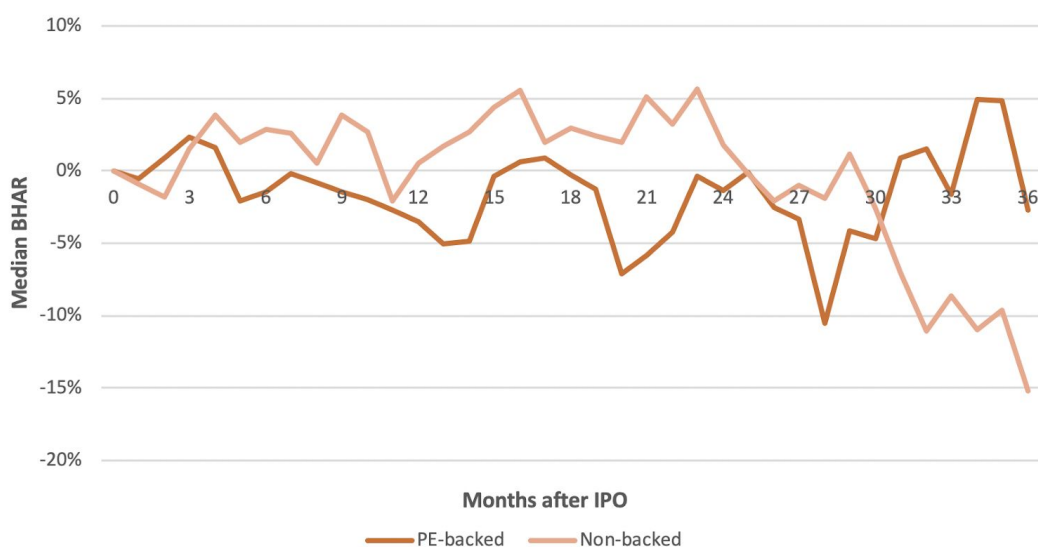
would result in less gains than investing in a market index, but would still significantly outperform investments in non-backed IPOs for the same holding period.

Table 9 - Buy-and-hold Abnormal Returns (BHARs) by IPO-type using FTSE Nordic Market Index Adjustment

Months after IPO	Median Buy-and-hold Abnormal Returns (%) by IPO-type using FTSE Nordic Market Index		
	All	PE-backed	Non-backed
6	0.1**	-1.4	2.8***
12	0.1**	-3.5	0.5**
18	2.0***	-0.2	2.9**
24	0.6***	-1.4*	1.8***
30	-4.6***	-4.7*	-2.6**
36	-10.8***	-2.7**	-15.2**

The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The table lists Buy-and-hold Abnormal Returns (BHARs) for the IPO sub-samples in intervals of six months following the IPO. The returns are adjusted using FTSE Nordic Market Index. Significance levels refers to Wilcoxon signed rank test, where significance levels of 10% (*), 5% (**), and 1% (***) are highlighted.

Figure 5. Development of Buy-and-hold Abnormal Returns (BHARs) by IPO-type using FTSE Nordic Market Index Adjustment



The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The figure illustrates median Buy-and-hold Abnormal Returns (BHAR) adjusted using FTSE Nordic Market Index for PE-backed and non-backed IPOs over a holding period of 36 months following the IPO.

To try to account for cross-sectional differences, the raw BHRs are compared to corresponding benchmark industry portfolios to remove specific industry movements. These industry BHARs are reported in table 10 in intervals of 6 months for each sub-sample. Considering PE-backed firms, we see initial negative returns of -1.5% after 6 months that improves at month 12 (2.6%) and 18 (2.9%). These returns are, however, not significant. Statistically significant negative returns can after that point be found at month 24 (-0.8%), 30 (-3.8%) before ending up at a negative -1.7% in month 36 subsequent to the IPO. Figure 6 provides a more detailed development of the results, plotting the abnormal returns over the full 36 months holding period. Here we can see that the development of the returns are far from stable, moving back and forth between negative and positive values multiple times. Thus, no clear pattern can be established. Non-backed IPOs on the other hand, provide statistically significant positive results that are consistent from the third month of seasoning (1.8%) until month 28 (-0.5%), with peaks as high as 12.5% in month 22 (figure 6). The returns recover at month 30 at 4.3%, but decrease thereafter before reaching negative -6.0% at the three-year mark, even lower than the returns of PE-backed IPOs. Once again, it is difficult to establish a clear trend, with returns fluctuating extensively at positive values for the larger part of the period. However, the results may indicate a significant deterioration of returns after month 30 for non-backed IPOs. The results of the industry adjusted BHARs are consistent with market adjusted BHARs in that non-backed IPOs outperform PE-backed at month 6, 12, 18, 24, and 30, before presenting significantly worse 36 month BHARs.

Table 10 - Buy-and-hold Abnormal Returns (BHARs) by IPO-type using Industry Adjustment

Median Buy-and-hold Abnormal Returns (%) by IPO-type using Industry Adjustment			
Months after IPO	All	PE-backed	Non-backed
6	2.3***	-1.5	5.7***
12	3.4**	2.6	3.5***
18	5.6***	2.9	8.0**
24	3.5***	-0.8*	4.6***
30	-1.8***	-3.8*	4.3**
36	-6.0***	-1.7*	-6.0**

The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The table lists Buy-and-hold Abnormal Returns (BHARs) for the IPO sub-samples in intervals of six months following the IPO. The returns are adjusted using FTSE 10 Group Industry Classification Index. Significance levels refers to Wilcoxon signed rank test, where significance levels of 10% (*), 5% (**), and 1% (***) are highlighted.

Figure 6. Development of Buy-and-hold Abnormal Returns (BHARs) by IPO-type using Industry Adjustment



The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The figure illustrates median Buy-and-hold Abnormal Returns (BHAR) adjusted using FTSE 10 Group Industry Classification Index for PE-backed and non-backed IPOs over a holding period of 36 months following the IPO.

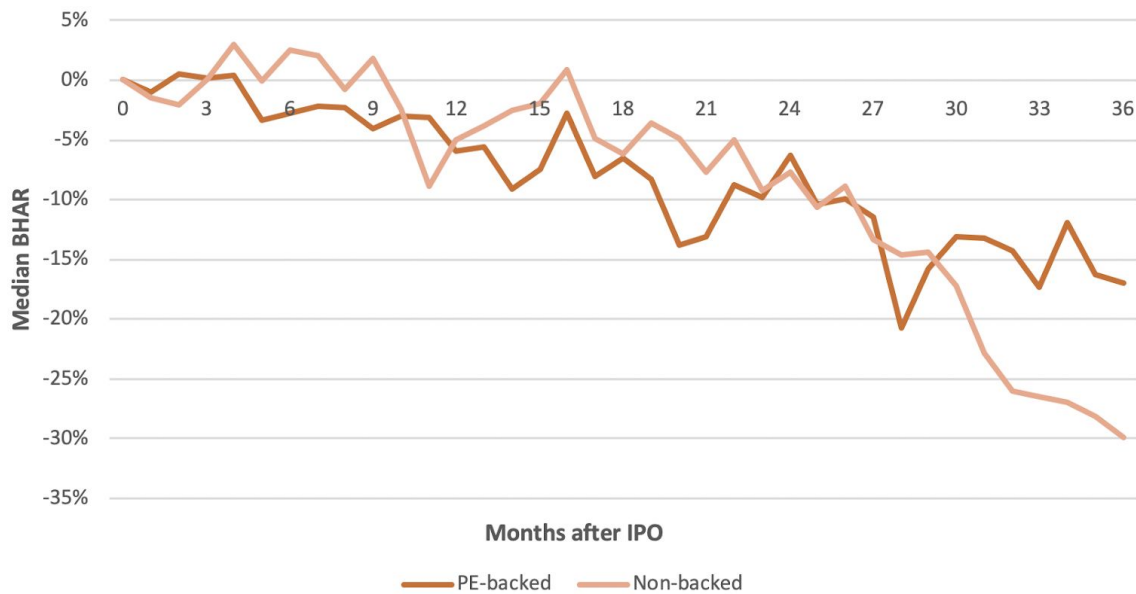
In a further attempt to purge our results from firm-specific effects, we also compare our raw returns against returns of similar-sized firms. Our results are presented in intervals of 6 months in table 11, and the monthly development over the full 36 month holding period is illustrated in figure 7. Looking at figure 7, we see that PE-backed IPOs present size adjusted BHARs of approximately 0% in the first four months following the IPO, implying no substantial differences in raw returns and benchmark returns. However, from month 5 and forward, we observe a clear trend of deteriorating returns, assuming values of -2.8% in month 6, that further decreases to -16.9% 36 months subsequent to the IPO. The findings are, however, not statistically significant at any point of our measured period. The non-backed IPOs perform better than PE-backed IPOs initially, presenting significant returns of 2.5% after 6 months. Non-backed IPOs continued to provide significant returns and performed slightly better than their PE-backed counterparts until 24 months after the IPO. They also provided positive returns of 0.9% at month 16, after which they started to decline in a similar fashion as the returns of the PE-backed IPOs. Looking at figure 7, we see that the returns of PE-backed IPOs somewhat stabilized after 30 months and only slightly decreased thereafter ending up at -16.9% after 36 months, whereas we observe a continuous drop for non-backed IPOs from month 26 throughout the rest of our analyzed time frame, ending up at as low as -29.9%, albeit not statistically significant. Once again we observe a better initial performance of non-backed IPOs, but substantially worse performance in the long-run.

Table 11 - Buy-and-hold Abnormal Returns (BHARs) by IPO-type using Size Adjustment

Months after IPO	Median Buy-and-hold Abnormal Returns (%) by IPO-type using Size Adjustment		
	All	PE-backed	Non-backed
6	-0.5*	-2.8	2.5**
12	-5.2	-5.9	-5.0**
18	-6.3*	-6.5	-6.2*
24	-6.3**	-6.3	-7.7**
30	-17.3*	-13.1	-17.3
36	-28.3	-16.9	-29.9

The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The table lists Buy-and-hold Abnormal Returns (BHARs) for the IPO sub-samples in intervals of six months following the IPO. The returns are adjusted using Size-adjusted Index. Significance levels refers to Wilcoxon signed rank test, where significance levels of 10% (*), 5% (**), and 1% (***) are highlighted.

Figure 7 - Development of Buy-and-hold Abnormal Returns (BHARs) by IPO-type using Size Adjustment



The sub-samples contains 246 companies that went public in the Nordics between 2010 and 2017. Of these, 140 were non-backed IPOs and 106 PE-backed IPOs. The figure illustrates median Buy-and-hold Abnormal Returns (BHAR) using Size-adjusted Index for PE-backed and non-backed IPOs over a holding period of 36 months following the IPO.

The results of the entire sample are in line with early evidence in the US by Ritter (1991), Loughran and Ritter (1995), Brav and Gompers (1997), and in the UK by Levis (1993, 2011). The 36-month BHARs are negative and statistically significant which supports the pattern of IPO long-run underperformance. However, looking at the individual IPO-groups in our sub-samples, we observe striking differences between them. Although both groups present negative long-run BHARs, the magnitude of the negative returns differ considerably, with the overall negative performance of IPOs being mainly attributed to the poor performance of non-backed IPOs. As presented in table 3, non-backed firms tend to be smaller than their PE-backed counterparts. This confirms prior findings of lower returns by small and non-backed IPOs (Brav and Gompers, 1997; Levis, 2011). However, looking at the development of the returns of both groups, we observe that while PE-backed IPOs report negative BHARs already in the early after-market, NB IPOs report positive abnormal returns in the first 24 months following the event, opposing prior findings such as those of Levis (2011).

Looking at the literature to seek answers for this, one explanation could be that the market consistently over-values NB IPOs, which ultimately leads to poor long-run performance as the firm value reverts to its intrinsic value. Barry et. al (1998) suggest that NB firms use lower tier underwriters, which Michealy and Shaw (1991) argue is associated with long-run underperformance. Contrastingly, PE-backed IPOs attract top underwriters and have lower first-day returns, which Megginson and Weiss (1991) ascribes to the certification by recognized financial actors. According to Ritter (1998), underpricing leads to early after-market overvaluation as the initial low price attracts great demand, which creates a bandwagon effect for a period thereafter. Consequently, as NB IPOs are more underpriced, they get more overvalued in the early after-market that ultimately leads to poor long-run performance as the market prices them at their intrinsic values. Opposingly, PE-backed IPOs are more correctly priced and do not get inflated to the same extent by excess demand in the early after-market. Meanwhile, Levis (2011) argues that the market perception is that PE-backed IPOs are overpriced, and as a result less traded. Thus, we should not expect any significant overvaluation of PE-backed IPOs in the early after-market and consequently less long-run underperformance. This is supported by our findings that the returns of PE-backed IPOs only marginally decline over time, whereas the returns of NB IPOs are much more volatile and significantly drop over time as the market prices them correctly.

Furthermore, looking at the complete findings in the study, the BHARs between the two sub-groups adjusted for all different benchmarks, all point in the same direction. The curves in figure 5, 6 and 7 indicate that the PE-backed IPO sample performs less poorly, relative to the different benchmarks, than the non-backed IPO sample in the long-run. The PE-backed IPOs' outperformance of the non-backed IPOs is consistently observed across all benchmarks at around month 30 to month 36. Controlling for industry returns, we observe that both IPO-groups present less negative BHARs than when compared to the market. One possible explanation for this could be that firms in our sample are concentrated in industries that have lower risk and therefore lower expected returns, which implies lower benchmark returns for our BHARs. Considering the magnitude of our size BHARs, they are significantly more negative. They are however for both groups following the same movement pattern. The fact that the same pattern can be observed for all BHARs adjusted for the different benchmarks including size, industry and market, further adds robustness to our findings of PE-backed

IPOs significantly outperforming non-backed IPOs in the long-term. This validates our failure to reject the second hypothesis; that PE-backed IPOs outperform non-backed IPOs in the Nordics in the long-run. This also indicates that the magnitude of the BHARs are mainly driven by the actual raw buy-and-hold returns of the individual IPOs, and that the variations caused by using different benchmarks only are marginal, as the overall results are consistent with each other.

The overall results of significant long-run underperformance for the total IPO sample in the Nordic is mainly driven by the non-backed sample. A reason for why our overall results show less negative BHAR than previous studies in other markets is possibly due to the large PE-activity in the Nordics. In our total sample, 42.4% of the firms were PE-backed, which strengthens the long-term BHAR for the total sample as these PE-backed IPOs generally have better 36 month BHAR. As previously mentioned, the Nordic PE-industry was the second largest PE-market in Europe by deal value in 2017-2018 (PWC, 2019). The investor-friendly legal environment attracts bulks of capital from both domestic and foreign investors, which is a necessity for successful PE-investments in the region. Some of Europe's largest PE-firms are located in the Nordics and they have historically been very successful, averaging high net returns on their PE-funds in the Nordics. The large presence of private equity investments in the Nordic region affects the overall BHAR in a positive way as the results show that PE-backed IPOs significantly outperforms non-backed IPOs. The long-term benefits that come from PE-involvement could be explained by either operational efficiency benefits or PE-sponsorship leading to less overvaluation at the time of flotation. However, the former explanation assumes that the market keeps underestimating the magnitude of the impact that a PE-sponsor can have on the performance of a company, and thus does not incorporate this in the pricing of the IPO. Otherwise, if the market considers that PE-backed IPOs on average perform better than non-backed, this expectation should already be incorporated in the price. The latter explanation draws on the Certification hypothesis, that PE-involvement acts as a certification of the real firm value. This implies that the early after-market price for PE-backed firms will more closely reflect the intrinsic value, resulting in less negative stock performance over the long-run. Adding on to this, one could argue that the certification that comes from the PE-backing is more accepted and recognised by the market when the PE-firm behind the investment is more established and has proved itself with a solid historical track

record. One could argue that the PE-firms in the Nordic are mature and well-established, which implies that the market perceives their presence in IPO as even more justifying or certifying of the intrinsic value. Consequently, the price of these PE-backed IPOs more closely reflect the real value, implying less overvaluation.

Another possible explanation to why PE-backed IPOs seem to perform better in the long-run than non-backed IPOs could derive from the findings of Teoh, Welch and Wong (1998) in conjunction with the findings of Katz (2009). The former study found a significant relationship between high levels of earnings management at time of flotation and poor long-term performance after three years. The study by Katz (2009) found that PE-backed firms generally engage less in earnings management and that they tend to report more conservatively at the time of flotation. This study has not measured the degree of earnings management used by the issuing firms so no conclusions can be made about how this managerial behaviour affects long-term performance. However, with the findings of Katz (2009) in mind, it could be fair to assume that our PE-sample has been less engaged in activities involving earnings management than our non-backed sample. This could be the case due to PE-sponsorship functioning as a monitoring unit for the PE-backed firms, restraining their use of earnings management. If this assumption would hold for our sample, it could be a contributing factor to why the PE-backed sample consistently performs better in the long-run than the non-backed sample, similar to the relationship observed by Teoh, Welch and Wong (1998). Earnings management would in this regard function as a “window-dressing” tool at the time of the IPO, raising the value of the firms with more aggressive earnings management for a shorter period of time. However, in the long-run the market will realize that the manipulation of the financial statements is not representative of the actual performance of the firm, correcting the price to the intrinsic value, resulting in poor long-term performance for such IPOs that have been incorporating higher degrees of earnings management.

7. Conclusion

Using a sample of 250 Nordic IPOs, consisting of private equity-backed and non-backed issues from January 2010 to March 2017, this event study has examined the long-term performance of IPOs in the Nordic market. The focus of the study has been to investigate whether IPOs in the Nordics underperform their relative benchmarks in the long-run, and more specifically if the presence of private equity ownership affects said performance.

The overall results of the total sample of 250 issuing firms suggests that Nordic IPOs underperform in the long-run. These findings support prior research by Ritter (1991), Levis (1993), Loughran and Ritter (1995), and Lee, Taylor, and Walter (1996) among others that IPOs tend to underperform their relative benchmarks in the long-term. The study has measured raw BHR as well as BHAR adjusted for three different types of benchmarks for 36 months after the IPO. The results from the BHARs adjusted for the Nordic market benchmark and industry benchmark show significant long-run underperformance after 36 months. The results from the BHAR adjusted for size benchmark also show IPO underperformance in the long run, although not significant. The observed underperformance after 36 months in this study is not as severe as in previous studies, which could be a sign that the market slowly has adapted and started to correct for this anomaly as this phenomenon has been known to the public for a long time. The overall results also indicate a pattern for the returns following an IPO, with positive abnormal performance in the first two years after flotation which later on are followed by negative abnormal returns after three years. These findings could be explained by behavioural theories suggesting that IPOs consistently are overvalued in the short run due to fads, overly-optimistic investors and hot markets. As time goes on, the market eventually realizes that the initial valuations of the IPOs were too high and the price drops, resulting in poor long-term performance. Furthermore, the study finds signs of an existing pattern of hot market periods associated with poor long-term performance, as suggested by Ritter (1991) and Loughran and Ritter (1995). The results indicate that IPOs issued in years of high IPO-activity tend to have a more negative 36 month BHAR, while IPOs issued in low IPO-activity years tend to have better long-run performance.

The second point of analysis in our paper studies IPO performance in the after-market and considers the effect of private equity affiliation when firms go public for the first time. Our findings support prior research of Brav and Gompers (1997) and Levis (2011) that non-backed IPOs emerge as poor performers, as opposed to PE-backed IPOs in the long-run. This could be explained by the fact that small firms in our sample are predominately non-backed, which Brav and Gompers (1997) argues underperform larger firms going public. However, even though PE-backed IPOs perform relatively better than their counterparts in the long-run, they still underperform comparable benchmarks. Our findings are robust across all benchmarks and for all periods, with the exception of months 12 and 18 when the BHARs are adjusted for industry. Surprisingly, NB IPOs outperform PE-backed IPOs in the first 24 months across all benchmarks, even reporting initially positive BHARs. These returns decline over time however, as NB IPOs perform substantially worse than PE-backed IPOs after 36 months.

The implications of our results are that PE-backed IPOs either are managed more efficiently and thus perform more consistently over time, or that PE-backed IPOs are not overvalued to the same extent as NB IPOs in the early after-market, leading to less volatile returns over time and consequently less underperformance in the long-run. The initial overvaluation of non-backed firms going public could be explained by investor sentiment, meaning that investors over or under react to information available and different fads. Brav and Gompers (1997) suggest that there is less available information pertaining to smaller firms and that they are more subject to fads, which consequently affect our NB sub-sample more considerably. Additionally, Levis (2011) argues that investors trade PE-backed IPOs less due to the market perception that these securities are more aggressively priced. This implies an imbalanced early after-market where non-backed IPOs experience a bandwagon effect due to excess demand which inflates the price, which PE-backed IPOs do not. Other explanations could be that sponsorship by PE firms certifies the value of IPOs thanks to their prior reputation which they seek to maintain (Megginson and Weiss, 1991), and that PE-backed IPOs show less earnings management than their NB counterparts (Teoh, Welch, and Wong, 1998), resulting in more correct pricing and less initial overvaluation.

The fact that PE-backed IPOs perform relatively well in the Nordic comes as little surprise as private equity has a long positive history in the region with high activity and returns, even compared to other countries on the PE frontier. Looking at our sample, we observe a strong presence of PE among IPOs that constitutes more than 40% of the initial offerings in the total sample. The large portion could be assumed to explain to some extent why the overall results in the study are less negative than prior studies. Other underlying sources that explain any potential differences in findings could be ascribed different methodologies. In this study, this pertains mainly to the technique of distinguishing private equity affiliation, which have no obvious best practice. Moreover, one could argue that conventional techniques and performance may not be persistent over time, which further inclines appraisal of appropriate approaches to analyse data.

With this study we try to contribute to the limited research in recent years regarding the long-run performance of IPOs in the Nordic, further examining how it is affected by private equity-sponsorship. We present empirical evidence of PE-backed IPO performance covering most of the last decade, and contrast the results to non-backed IPOs in the region during the same period. Our findings suggest that the strong PE foothold in the Nordic contributes to less initial overvaluation and leads to better long-term performance relative to non-backed IPOs. However, our results do not support that the returns of Nordic IPOs are shielded from long-run underperformance in regard to sponsored offerings. We provide plausible explanations to the performance patterns that derives from prior empirical studies and established theories. Our belief is that the market is heavily influenced by investor sentiment, and thus, we try to explain our findings from a behavioural perspective. We do not however, explicitly test for this. Further research is called for regarding the underlying drivers of financial performance of PE-backed IPOs in the Nordic.

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9. Appendix

Firm name	Sub-group	IPO Date	Country
5TH PLANET GAMES A/S	NB	2015-06-30	Denmark
AAC CLYDE SPACE AB	PE	2016-12-30	Sweden
ACADEMEDIA AB	PE	2016-06-30	Sweden
ACARIX AB	PE	2016-12-30	Denmark
ACOUSORT AB	PE	2017-01-31	Sweden
ADDERACARE AB	NB	2016-12-30	Sweden
AEROWASH AB	PE	2017-02-28	Sweden
AGRINOS AS		2010-12-31	Norway
AHLSSELL AB	PE	2016-10-31	Sweden
AINO HEALTH AB	NB	2016-12-30	Sweden
ALELION ENERGY SYSTEMS AB	PE	2016-06-30	Sweden
ALIMAK GROUP AB	PE	2015-06-30	Sweden
ALLIGATOR BIOSCIENCE AB	NB	2016-11-30	Sweden
APPSOTR AB	PE	2016-12-30	Sweden
ARCUS ASA	PE	2016-12-30	Norway
ARISE AB	NB	2010-03-31	Sweden
AROCCELL AB	PE	2011-05-31	Sweden
ASETEK A/S	PE	2013-03-29	Denmark
ASIAKASTIETO GROUP OYJ	PE	2015-03-31	Finland
ATTENDO AB	PE	2015-11-30	Sweden
AURORA LPG HOLDING AS		2014-01-31	Norway
B2HOLDING ASA	NB	2016-06-30	Norway
B3 CONSULTING GROUP AB	NB	2016-06-30	Sweden
BACTIGUARD HOLDING AB	NB	2014-06-30	Sweden
BESQAB AB	NB	2014-06-30	Sweden
BIMOBJECT AB	NB	2014-01-31	Sweden
BORREGAARD ASA	NB	2012-10-31	Norway
BOULE DIAGNOSTICS AB	PE	2011-06-30	Sweden
BRANDBEE HOLDING AB	PE	2016-06-30	Sweden
BRANDWORLD AB	NB	2010-03-31	Sweden
BRAVIDA HOLDING AB	PE	2015-10-30	Sweden
BRIGHTER AB	PE	2012-02-29	Sweden
BUFAB AB	PE	2014-02-28	Sweden
BULK INVEST ASA	PE	2013-10-31	Norway
BULTEN AB	PE	2011-05-31	Sweden
BYGGMAX GROUP AB	PE	2010-06-30	Sweden
BYGGPARTNER I DALARNA HOLDING AB	NB	2016-12-30	Sweden
CAMURUS AB	PE	2015-12-31	Sweden
CAPACENT HOLDING AB	NB	2015-10-30	Sweden
CAPIO AB	PE	2015-07-31	Sweden
CELLCURA AS	PE	2010-10-29	Norway
CELLINK AB	NB	2016-11-30	Sweden
CERENO SCIENTIFIC AB	PE	2016-06-30	Sweden
CHALLENGER MOBILE AB	NB	2010-07-30	Sweden
CHR HANSEN HOLDING A/S	PE	2010-06-30	Denmark
CLEAN MOTION AB	NB	2016-05-31	Sweden
COLLECTOR AB	NB	2015-06-30	Sweden
COM HEM HOLDING AB	PE	2014-06-30	Sweden
CONSTI YHTIOT OYJ	PE	2015-12-31	Finland
COOR SERVICE MANAGEMENT HOLDING AB	PE	2015-06-30	Sweden
CRUNCHFISH	PE	2016-11-30	Sweden

CURANDO NORDIC AB	PE	2016-12-31	Sweden
CXENSE ASA	NB	2014-07-31	Norway
CYBER SECURITY 1 AB	NB	2016-09-30	Sweden
CYXONE AB	NB	2016-06-30	Sweden
DANSKE ANDELSKASSERS BANK A/S	NB	2011-07-29	Denmark
DETECTION TECHNOLOGY OYJ	NB	2015-03-31	Finland
DIGNITA SYSTEMS AB	NB	2016-06-30	Sweden
DIVIDEND SWEDEN AB	NB	2016-03-31	Sweden
DNA OYJ	NB	2016-12-30	Finland
DOMETIC GROUP AB	PE	2015-11-30	Sweden
DUSTIN GROUP AB	PE	2015-02-27	Sweden
EAB GROUP OYJ	NB	2015-12-31	Finland
EAM SOLAR ASA	NB	2013-03-29	Norway
ECOMB AB	PE	2011-02-28	Sweden
ECORUB AB	NB	2010-06-30	Sweden
EDGEWARE AB	PE	2016-12-30	Sweden
EKOMARINE AB	NB	2010-04-30	Sweden
ELTEL AB	PE	2015-02-27	Sweden
EMBRACER GROUP AB	PE	2016-11-30	Sweden
ENORAMA PHARMA AB	PE	2016-06-30	Sweden
ENTRA ASA	NB	2014-10-31	Norway
ENVIROLOGIC AB	NB	2014-04-30	Sweden
ENZYMATICA AB	NB	2011-06-30	Sweden
EPISURF MEDICAL AB	PE	2010-11-30	Sweden
EUOPRIS ASA	PE	2015-06-30	Norway
EVLI BANK PLC	NB	2015-12-31	Finland
EVOLUTION GAMING GROUP AB	NB	2015-03-31	Sweden
EXPRES2ION BIOTECH HOLDING AB	PE	2016-08-31	Sweden
FASTOUT AB	PE	2016-01-29	Sweden
FDT SYSTEM HOLDING AB	NB	2012-08-31	Sweden
FERRONORDIC AB	NB	2013-12-31	Sweden
FINEPART SWEDEN AB	PE	2016-12-30	Sweden
FIT BIOTECH OYJ	PE	2015-07-31	Finland
FX INTERNATIONAL AB	NB	2011-04-29	Sweden
GAPWAVES AB	NB	2016-11-30	Sweden
GARO AB	NB	2016-03-31	Sweden
GASPOROX AB	NB	2016-10-31	Sweden
GEBERIT PROD (f.d SANITEC)	PE	2013-12-31	Finland
GJENSIDIGE FORSIKRING ASA	NB	2010-12-31	Norway
GOMSPACE GROUP AB	NB	2016-06-30	Sweden
GRANGES AB	NB	2014-10-31	Sweden
GULLBERG & JANSSON AB	PE	2012-06-29	Sweden
HAMLET PHARMA AB	NB	2015-10-30	Sweden
HANCAP AB	NB	2015-04-30	Sweden
HAVYARD GROUP ASA	NB	2014-07-31	Norway
HEEROS OYJ	NB	2016-11-30	Finland
HEMBLA AB	NB	2014-04-30	Sweden
HEMFOSA FASTIGHETER AB	NB	2014-03-31	Sweden
HERANTIS PHARMA OYJ	PE	2014-06-30	Finland
HOEGH LONG HOLDINGS LTD	NB	2011-07-29	Norway
HOIST FINANCE AB	PE	2015-03-31	Sweden
HOIVATILAT OYJ	NB	2016-04-29	Finland

HUBBR AB	NB	2010-12-31	Sweden
HUMANA AB	PE	2016-03-31	Sweden
IMMUNOVIA AB	NB	2015-12-31	Sweden
INDEX PHARMACEUTICALS AB	PE	2016-10-31	Sweden
INSR INSURANCE GROUP ASA	NB	2014-04-30	Norway
INTERNATIONELLA ENGELSKA SKOLAN	NB	2016-09-30	Sweden
INVENT MEDIC SWEDEN AB	NB	2016-02-29	Sweden
INWIDO AB	NB	2014-09-30	Sweden
ISCONOVA AB (F.D. NOVAVAX AB)	PE	2010-11-30	Sweden
ISS A/S	PE	2014-03-31	Denmark
IZAFE GROUP AB	NB	2011-04-29	Sweden
KANCERA AB	NB	2011-02-28	Sweden
KAROLINSKA DEVELOPMENT AB	PE	2011-04-29	Sweden
KID ASA	NB	2015-11-30	Norway
KOGGBRON FASTIGHETER AB	NB	2011-03-31	Sweden
KOTIPIZZA GROUP OYJ	PE	2015-07-31	Finland
LAURITZ.COM GROUP A/S	PE	2016-06-30	Denmark
LAYERLAB AB	PE	2010-05-31	Sweden
LEHTO GROUP OYJ	NB	2016-04-29	Finland
LEOVEGAS AB	NB	2016-03-31	Sweden
LIFCO AB	NB	2014-11-28	Sweden
LINK MOBILITY GROUP ASA	PE	2013-12-31	Norway
LITIUM AFFÄRSKOMMUNIKATION AB	NB	2016-05-31	Sweden
LOUDSPRING OYJ	PE	2014-06-30	Finland
MABI RENT AB	NB	2010-06-30	Sweden
MAGNOLIA BOSTAD AB	NB	2015-06-30	Sweden
MAHA ENERGY AB	NB	2016-07-29	Sweden
MATAS A/S	PE	2013-07-31	Denmark
MAXFASTIGHETER I SVERIGE AB	NB	2016-06-30	Sweden
MEDFIELD AB	PE	2012-05-31	Sweden
MELTRON AB	NB	2016-07-29	Sweden
MENUPAY AB	PE	2017-02-28	Sweden
MINESTO AB	PE	2015-11-30	Sweden
MOBERG PHARMA AB	NB	2011-05-31	Sweden
MORPOL ASA	NB	2010-06-30	Norway
MOXIETECH GROUP AB	NB	2015-11-30	Sweden
MQ HOLDING AB	PE	2010-06-30	Sweden
MULTICLIENT GEOPHYSICAL ASA	PE	2013-05-31	Norway
MULTICONSULT ASA	NB	2015-05-29	Norway
MULTIDOCKER CARGO HANDLING AB	PE	2017-01-31	Sweden
NAPATECH A/S	PE	2013-12-31	Denmark
NEPA AB	NB	2016-04-29	Sweden
NETCONNECT ASA		2010-06-30	Norway
Nets A/S	PE	2016-09-30	Denmark
NEXSTIM OYJ	PE	2014-11-28	Finland
NILSSON SPECIAL VEHICLES AB	PE	2015-12-31	Sweden
NNIT A/S	NB	2015-03-31	Denmark
NOBINA AB	PE	2015-06-30	Sweden
NOHO PARTNERS OYJ	NB	2013-11-29	Finland
NORDAX GROUP AB	NB	2015-06-30	Sweden
NORDIC NANOVECTOR ASA	PE	2015-03-31	Norway
NORDIC WATERPROOFING HOLDING AB	PE	2016-06-30	Sweden

NORTH ENERGY ASA	NB	2010-02-26	Norway
NORWAY ROYAL SALMON ASA	NB	2011-03-31	Norway
NP3 FASTIGHETER AB	NB	2014-12-31	Sweden
OCEAN YIELD ASA	NB	2013-07-31	Norway
ODFJELL DRILLING LTD	NB	2013-09-30	Norway
ONCOLOGY VENTURE SWEDEN AB	PE	2015-07-31	Denmark
ORGANOCLICK AB	NB	2015-02-27	Sweden
ORSTED A/S	NB	2016-06-30	Denmark
OVARO KIINTEISTOSIJOITUS OYJ	NB	2013-10-31	Finland
OW BUNKER A/S	PE	2014-03-31	Denmark
PANDORA A/S	PE	2010-10-29	Denmark
PANDOX AB	NB	2015-06-30	Sweden
PARADOX INTERACTIVE AB	NB	2016-05-31	Sweden
PARANS SOLAR LIGHTNING AB	NB	2010-06-30	Sweden
PEN CONCEPT GROUP AB	NB	2016-08-31	Sweden
PHARMALUNDENSIS AB	NB	2010-07-30	Sweden
Photocat A/S	NB	2015-11-30	Denmark
PIEZOMOTOR UPPSALA AB	NB	2016-06-30	Sweden
PIHLAJALINNA OYJ	PE	2015-06-30	Finland
PIONEER PROPERTY GROUP ASA	NB	2015-06-30	Norway
PLATZER FASTIGHETER HOLDING AB	NB	2013-11-29	Sweden
PLEJD AB	PE	2016-04-29	Sweden
PRIME LIVING AB	NB	2015-06-30	Sweden
PRIVANET GROUP OYJ	NB	2016-06-30	Finland
PROPR AS	PE	2016-09-30	Norway
PROVIDE IT SWEDEN AB	NB	2016-06-30	Sweden
RAYBASED	NB	2016-08-31	Sweden
REC SOLAR ASA	NB	2013-10-31	Norway
RECIPHARM AB	NB	2014-04-30	Sweden
RECYCTEC HOLDING AB	NB	2013-01-31	Sweden
REDWOOD PHARMA AB	NB	2016-06-30	Sweden
RENONORDEN ASA	PE	2014-12-31	Norway
RESPIRATORIUS AB	PE	2012-07-31	Sweden
RESURS HOLDING AB	PE	2016-05-31	Sweden
RHOVAC AB	PE	2016-03-31	Sweden
ROBIT OYJ	NB	2015-05-29	Finland
SAFETURE AB	NB	2014-10-31	Sweden
SAVOSOLAR PLC	NB	2015-04-30	Finland
SBANKEN ASA	NB	2015-11-30	Norway
SCANDI STANDARD AB	PE	2014-06-30	Sweden
SCANDIC HOTELS GROUP AB	PE	2015-12-31	Sweden
SCANDINAVIAN CHEMOTECH AB	NB	2016-12-30	Sweden
SCANDINAVIAN TOBACCO GROUP A/S	NB	2016-02-29	Denmark
SCATEC SOLAR ASA	NB	2014-10-31	Norway
SCIBASE HOLDING AB	PE	2015-06-30	Sweden
SEATWIRL AB	PE	2016-12-30	Sweden
SELVAAG BOLIG ASA	NB	2012-06-29	Norway
SERNEKE GROUP AB	NB	2016-11-30	Sweden
SEVAN DRILLING ASA	NB	2011-05-31	Norway
SHORTCUT MEDIA AB	NB	2016-06-30	Sweden
SIILI SOLUTIONS OYJ		2012-10-31	Finland
SINCH AB	NB	2015-10-30	Sweden

SJÖSTRAND COFFEE INT AB	PE	2016-02-26	Sweden
SLEEPO AB	NB	2016-01-29	Sweden
SMART EYE AB	PE	2016-12-30	Sweden
SOLVTRANS AS	NB	2010-03-31	Norway
SPAREKASSEN SJAELLAND-FYN AS	NB	2015-12-31	Denmark
SPORTJOHAN AB	NB	2010-03-31	Sweden
STATOIL FUEL & RETAIL ASA	NB	2010-10-29	Norway
STILLFRONT GROUP AB	PE	2015-12-31	Sweden
STYLEPIT A/S	NB	2012-11-30	Denmark
SWEDENCARE AB	NB	2016-06-30	Sweden
SWEDISH STIRLING AB	NB	2016-11-30	Sweden
SYNACT PHARMA AB	PE	2016-07-29	Sweden
TALENOM OYJ	NB	2015-06-30	Finland
TEAM TANKERS INTL LTD	NB	2015-03-31	Norway
TF BANK AB	NB	2016-06-30	Sweden
THULE GROUP AB	PE	2014-11-28	Sweden
TOBII AB	PE	2015-04-30	Sweden
TOBIN PROPERTIES	NB	2016-10-31	Sweden
TOKMANNI GROUP CORP	PE	2016-04-29	Finland
TOLERANZIA AB	PE	2015-12-31	Sweden
TRANSIRO INT AB	PE	2016-12-30	Sweden
TRANSMODE AB	PE	2011-05-31	Sweden
TRANSTEMA AB	NB	2015-05-29	Sweden
TROAX GROUP AB	PE	2015-03-31	Sweden
UNIFIED MSG SYSTEMS ASA	NB	2017-01-31	Norway
UNITED BANKERS OYJ	NB	2014-11-28	Finland
VADSBO SWITCHTECH GROUP AB	NB	2016-05-31	Sweden
VERKKOKAUPPA.COM OYJ	PE	2014-04-30	Finland
VIBROSENSE DYNAMICS AB	NB	2015-05-29	Sweden
VINCIT OYJ	NB	2016-10-31	Finland
VOLATI AB	NB	2016-11-30	Sweden
VOW ASA	NB	2014-04-30	Norway
WALLENIUS WILHELMSSEN ASA	NB	2010-06-30	Norway
WAYSTREAM HOLDING AB	NB	2015-11-30	Sweden
WILLAK AB	NB	2016-09-30	Sweden
WILSON THERAPEUTICS AB	PE	2016-05-31	Sweden
WNTRESEARCH AB	NB	2010-12-31	Sweden
XBRANE BIOPHARMA AB	PE	2016-03-31	Sweden
XINTELA AB	PE	2016-03-31	Sweden
XXL ASA	PE	2014-10-31	Norway
ZALARIS ASA	PE	2014-06-30	Norway
Zealand Pharma A/S	PE	2010-11-30	Denmark
ZENERGY AB	PE	2015-12-31	Sweden

Sub-group refers to Private Equity-backed (PE) and Non-backed (NB) IPOs.