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Underpricing and Long-Run Performance Patterns of Nordic Private Equity-Backed and Non-Private Equity-Backed IPOs

Master Thesis

by

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MSc in Business with Major Finance

Supervisor: Leon Bogdan Stacescu

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Abstract

This thesis examines the performance of initial public offerings (IPOs) in the Nordic region, specifically focusing on the influence of private equity (PE) backing. The analysis is based on a sample of 825 IPOs listed on the stock exchanges of Denmark, Finland, Iceland, Norway, and Sweden from January 2001 to February 2023. Contrary to expectations, the findings reveal that PE-backed IPOs do not demonstrate lower underpricing on average compared to venture capital (VC)-backed and nonsponsored IPOs. Additionally, the analysis contradicts the assumption that PE-backed IPOs involve more underwriters and engage prestigious investment banks as global coordinators.

Furthermore, PE-backed firms exhibit significant underperformance relative to the market and do not outperform non-sponsored and venture capital-backed IPOs in the aftermarket, contrary to previous research. Additionally, there is no clear evidence to support the notion that PE-backed IPOs outperform their industry peers. These findings provide valuable insights into the performance of IPOs in the Nordic region, emphasizing the need to reassess assumptions about the impact of PE backing on underpricing and long-run performance. The results contribute to the existing literature and highlight the complexities of IPO dynamics in the context of private equity involvement in the Nordic IPO market.

Keywords – Nordic IPOs, Private Equity, Underpricing, Long-run abnormal-returns

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1 Introduction

In recent years, the Nordic region has witnessed a surge in initial public offerings (IPOs) as companies seek to access the public markets for capital and growth opportunities. This trend has been accompanied by a growing interest in understanding the dynamics and outcomes of IPOs in this unique economic landscape. Of particular interest is the role of private equity (PE) backing in shaping the performance and valuation of IPOs.

The purpose of this thesis is to explore the intriguing relationship between PE-backed and non-PE-backed IPOs in the Nordic region. Specifically, we seek to answer two fundamental research questions that are at the core of this paper. First, do PE-backed IPOs experience lower degrees of underpricing compared to their non-PE-backed counterparts? Second, do PE-backed IPOs demonstrate superior long-run performance in comparison to non-PE-backed IPOs? To address these research questions, we have assembled a comprehensive dataset comprising 850 initial public offerings listed on the stock exchanges of Denmark, Finland, Iceland, Norway, and Sweden from January 2001 to February 2023. This extensive sample allows us to capture a wide range of IPO characteristics and market conditions, providing a robust foundation for our analysis. Additionally, to capture the impact of recent events such as the COVID-19 pandemic and other factors influencing the IPO market in recent years, we have extended our data collection up until February 2023.

The investigation of underpricing and long-run performance across sponsorship status in the Nordics is a captivating research area. Although these issues have received considerable attention in the existing literature, there is still more to uncover regarding their dynamics specifically within the Nordic context and in modern times. Extensive research demonstrates that IPOs in general tend to be underpriced, leading to positive first-day returns. Additionally, studies indicate that IPOs often exhibit long-run underperformance compared to their respective country indices and industry peers. These phenomena have attracted the interest of notable scholars who have proposed various hypotheses to explain them. Factors such as information asymmetry, IPO market cyclicality, underwriter reputation, syndicate size, and financial sponsorship status have

been identified as influential factors.

An intriguing finding from the research is that private equity-backed IPOs experience lower levels of underpricing and demonstrate reduced long-run underperformance compared to non-sponsored IPOs. This suggests that private equity funds possess better pricing abilities, allowing them to bring IPOs closer to their true value and serve as indicators of company quality.

In examining the phenomenon of underpricing, we define the initial return as the percentage change between the IPO offer price and the first day closing price. Our analysis considers various explanatory variables, including financial sponsorship status, market activity period, and industry of the IPO. Furthermore, continuous variables such as underwriter rank, syndicate size, and fraction sold by the issuing company are incorporated into our analysis. In addition to underpricing, we investigate the long-run performance patterns of IPOs. Long-run performance is assessed using both buy-and-hold abnormal returns (BHAR) and cumulative abnormal returns (CAR) methodologies. Similar to our analysis of underpricing, we examine the impact of various explanatory variables on long-run performance, including financial sponsorship status, market activity period, industry of the IPO, underwriter rank, syndicate size, and fraction sold by the issuing company.

The variables will be tested individually and also incorporated into a multivariate regression model, enabling us to identify the factors that significantly influence underpricing and long-run performance of PE-backed and non-PE-backed IPOs. Finally, we will use both a conventional t-test supplied with a Wilcoxon Signed Rank test to address the non-normality distribution in returns.

The analysis of first-day returns and underpricing in the Nordic IPO market reveals several key findings. Existing literature show evidence that IPO underpricing generally tend to be positive, and PE-backed IPOs exhibit comparatively lower levels of underpricing than non-PE-backed IPOs. Our findings support this notion, as the average equal-weighted returns for all firms were 9.9%, with PE-backed IPOs at 8.9%, VC-backed IPOs at 8.4%, and non-sponsored (NS) IPOs at 10.9%. However, contrary to current literature, we find no evidence for differences in underpricing levels for PE-backed IPOs

compared to NS- and VC-backed entities.

Moreover, the literature suggests that IPOs launched during hot market periods generally exhibit greater underpricing compared to those launched during cold market periods, and that PE-backed IPOs are expected to be less affected by IPO cyclicality. Our results align with these findings, as all companies exhibited significantly different underpricing levels of 11% and 3% in hot market periods (HMA) and cold market periods (LMA), respectively. Notably, PE-backed IPOs did not exhibit any significant differences in underpricing across market periods.

Furthermore, existing literature highlights that IPOs involving prestigious underwriters and larger syndicate sizes tend to experience lower levels of underpricing. Although our findings reveal negative coefficients for underwriter rank and syndicate size, consistent with the effects indicated in current literature, neither of these coefficients were statistical significance.

Lastly, when examining the impact of industry on underpricing, prior studies propose that riskier and less mature companies and industries are more likely to exhibit higher levels of underpricing. Our model showed that industry emerged as the strongest explanatory factor for underpricing, with the basic materials industry displaying the highest level of underpricing.

Turning to the aspect of long-run performance, existing literature indicates that IPOs generally exhibit underperformance in the aftermarket, while PE-backed IPOs tend to experience lower degrees of underperformance compared to non-PE-backed IPOs. Our findings regarding long-run performance yielded mixed results depending on the abnormal return metric used. When considering median buy-and-hold abnormal returns (BHARs) calculated using country-specific indices and the MSCI Nordic index, our results align with previous studies, indicating long-run underperformance. Similarly, median cumulative abnormal returns (CARs) displayed similar patterns of underperformance using country-specific indices. However, when using the MSCI Nordic index, no evidence of long-run underperformance was observed. Interestingly, our research did not find significant differences in abnormal returns among the three subgroups, contrary to previous studies.

Furthermore, we examined the differences in long-run performance based on

listing periods. Prior literature suggests that IPOs listed in hot market periods (HMA) tend to exhibit greater underperformance compared to those listed in cold market periods (LMA), while PE-backed IPOs are expected to be less affected by market cyclicality. Our study revealed that all Nordic IPOs demonstrated underperformance in both HMA and LMA periods, with abnormal returns of -18.4% and -22.1%, respectively. However, contrary to previous literature, we did not find any significant difference in long-run performance between the HMA and LMA listings. Nevertheless, consistent with prior research, PE-backed IPOs did not exhibit significant differences in abnormal returns between the two periods.

Lastly, existing literature suggests that underwriter rank and syndicate size play a role in reducing long-run underperformance. Interestingly, our model did not provide evidence for the impact of underwriter rank and syndicate size on long-run performance. Nonetheless, the positive coefficients observed align with previous findings.

From our research, we learn that PE-backed IPOs in the Nordic countries do not exhibit lower underpricing or superior long-run performance compared to non-sponsored IPOs. This finding emphasizes that private equity backing alone should not be the sole factor considered for investment decisions. Furthermore, it suggests that the unique characteristics and anticipated benefits associated with PE-backed IPOs may not have as significant an impact in the Nordic context as initially anticipated.

The following section outline the motivation behind our research and highlight its contribution to the existing literature. Chapter 2 provides a comprehensive review of relevant literature on underpricing and IPO long-run performance. Chapter 3 offers an industry overview, focusing on the Nordic private equity market. In Chapter 4, we present our research questions and hypotheses, while the subsequent chapters 5 and 6 detail our data collection process, methodology, and analysis. In Chapter 7, we present our results and engage in a thorough discussion. Finally, Chapter 8 summarizes our main conclusions, identifies study limitations, and suggests potential directions for future research

1.1 Motivation

Studying the underpricing and long-run performance of Nordic private equity-backed and non-private equity-backed IPOs is particularly intriguing and significant in the current economic context. Several factors make this research question highly interesting and important.

The past decade of record-low interest rates has created an optimal climate for VC/PE investments and acquisitions. Following the 2008 financial crisis, there has been a surge in investment activity (McKinsey, 2020). The recent global pandemic has further heightened IPO activity and equity valuations, making it an ideal time to investigate IPO underpricing and long-run performance (NASDAQ, 2022). Especially, we find the timing exceptionally relevant considering the 8-10-year investment horizon of PE funds, positioning 2023 as a very interesting year for conducting this research. In 2021, there was a remarkable growth in PE-backed IPOs in the Nordic region, with a 257% increase compared to the average number of IPOs in the past five years. Nordic private equity played a significant role in the European IPO market, comprising one-third of all Nordic listings and 12% of all European listings in that year (Argentum, 2021). These statistics emphasize the growing importance of PE-backed IPOs in the region and warrant an in-depth examination of their underpricing and long-run performance. The recent pandemic, coupled with government financial stimulus packages and a search for alternative income sources, has resulted in a surge of new investors participating in IPOs. For instance, Norway witnessed a 33.5% increase in retail investors from 2019 to 2021, with many being frequent participants in the IPO market (E24, 2021). However, the initial euphoria and high valuations were followed by a challenging reality in 2022. Rising inflation, interest rate hikes, geopolitical uncertainties, and a global energy crisis led to market turbulence, causing valuation dumping and recession fears. Hence, this study aims to educate retail investors interested in the IPO market, providing them with valuable insights.

The significance of this study lies in its contribution to understanding IPO market dynamics and the impact of private equity backing on underpricing and long-run performance. By focusing on the Nordic region, where PE-

backed IPOs have gained significant traction, we can gain valuable insights into the implications of financial sponsorship. This research is aimed towards investors and researchers seeking informed decision-making in the IPO market and additionally guide retail investors navigating the risks and opportunities associated with IPOs.

2 Literature Review

In this literature review, we embark on a comprehensive exploration of the IPO underpricing and long-run performance landscape. Our aim is to provide a concise yet informative overview of the most relevant papers in this field, while establishing the necessary theoretical framework for our thesis. The review is divided into three distinct sections: underpricing, long-run performance, and private equity. Each section delves into the central theories within its domain, serving as a valuable point of reference for our subsequent analysis and findings. It is important to note that while we include various theories in the review to provide a comprehensive understanding of the IPO landscape, not all of these theories will be directly tested in this thesis. Specifically, our focus will be on examining the impact of market activity, hot market issues, the realignment of incentives, underwriter reputation, and syndicate size on IPO performance. These variables will be analyzed across all three subgroups to gain a comprehensive understanding of their impact on IPO outcomes.

2.1 IPO Underpricing

The literature on Initial Public Offerings (IPOs) covers a range of topics that have been extensively studied by scholars. This literature review aims to synthesize the existing research on five key factors that have been found to influence IPO underpricing: information asymmetry, hot market issues, the changing nature of underpricing over time, underwriter reputation, and the size and structure of IPO syndicates. By providing a comprehensive overview of these factors, this review seeks to shed light on the underlying mechanisms that drive IPO underpricing.

2.1.1 Information Asymmetry

Information asymmetry may arise from different perspectives between the three participants: outside investors, underwriters, and management and initial shareholders of the company. Akerlof's 1970 paper "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism" is a pioneering work on

information asymmetry between insiders and outsiders. Akerlof argues that the inability of buyers to accurately assess the quality of used cars leads to overpricing of low-quality cars and underpricing of high-quality cars. This work has been applied to the market for IPOs where investors may lack access to complete information necessary for accurate valuation of a company. Consequently, IPOs may be undervalued, leading to underpricing (Akerlof, 1970).

Other theories suggest that underpricing in IPOs can also be attributed to costly information acquisition. This refers to the high costs that investors incur in obtaining information about a company prior to investing, which can be particularly high for new companies. As a result, investors may underprice the IPO to compensate for the cost of obtaining information. According to Booth and Chua (1996), the underwriting investment bank determines the final issue price based on their assessment of the company's value, which is then adjusted by the total expenses incurred by potential investors in gathering information about the company (Booth & Chua, 1996).

Lastly, there are also theories that highlights that there is information asymmetry between the underwriter and the issuer. The underwriter is in a favorable position of knowledge regarding demand for the IPO and they have a good orientation of market conditions. The underwriter can profit from this by purposely underprice the stock and allocate shares to their largest clients. The underpricing then results in a "successful" IPO, since the book is filled and got a positive first day return, while the largest clients are pleased by getting allocated a profitable deal (Benveniste & Spindt, 1989). This creates a win-win situation for the underwriter and its clients, but money left on the table for the issuing company.

2.1.2 Hot Market Issues

Hot market issues refer to periods in which there is a high demand for new securities issues, due to a positive market sentiment or strong performance of existing IPOs. The seminal paper by Ibbotson and Jaffe (1975) explores the concept of hot markets, which are periods characterized by high demand and a large number of IPOs. They find that hot markets lead to significant

underpricing of IPOs, with initial returns averaging 33.5%. This is attributed to the combination of the high demand for new issues, limited supply of shares available for sale and overall favorable market conditions with low interest rates.

Ritter (1984) also examines the effect of market conditions on IPO underpricing with a particular focus on the 1980 hot issue market. He defines hot markets as periods in which the number of IPOs is high, and the first-day returns are large. Ritter finds that hot markets lead to higher levels of underpricing, with first-day returns averaging 18.8% in hot markets compared to 9.7% in cold markets. He also finds that underpricing is higher for smaller, riskier firms and for companies with greater uncertainty surrounding their future prospects. Loughran and Ritter (2004) looks at how IPO underpricing changes over time and found similar results for hot markets during the "Dot-com" period from 1999-2000 with an average underpricing of 65%, followed by only 12% in the cold market period in 2001-2003 (Loughran & Ritter, 2004).

Mazumder and Saha (2021) conducted a contemporary study on the impact of Covid-19 on IPOs in 2020. Their findings reveal a negative effect of the pandemic on the short-term performance of IPOs, with decreased average initial returns indicating reduced investor willingness to invest in IPOs during this period (Mazumder & Saha, 2021).
This study is particularly intriguing as it examines the intersection of a hot market defined by economic uncertainty and volatility, which mirrors the economic environment in the final years of our sample period.

2.1.3 Why Has Underpricing Changed Over Time?

Loughran and Ritter (2004) address the intriguing question of why some periods exhibit high underpricing while others demonstrate low underpricing in their research paper. They explore three hypotheses, namely the changing risk composition, the realignment of incentives, and the changing issuer objective function, as potential explanations for the variations in underpricing (Loughran & Ritter, 2004). Considering our research spanning a period of 22 years, we believe this paper holds significant relevance to our study as it sheds light on various aspects and factors contributing to underpricing, and how these

dynamics evolve over time.

2.1.3.1 The Changing Risk Composition

First introduced by Ritter (1984), examines how riskiness based on technological or valuation uncertainty affects IPO underpricing. The results showed that riskier companies were more underpriced than less risky ones. This follows a model where underpricing stems from an equilibrium condition that prompts investors to participate in the offering (Ritter, 1984). Although it found changes in the risk characteristics of new IPOs, these factors were found to be too minor to explain much of the variation in underpricing over time (Loughran & Ritter, 2004).

2.1.3.2 The Realignment of Incentives

The hypothesis was first introduced by Ljungqvist and Wilhelm (2003) when they looked at IPO underpricing during the Dot-com bubble. Their hypothesis was based on underpricing stemming from reduced CEO ownership, increased ownership fragmentation, fewer secondary shares in the IPO, and an increased frequency and size of friends and family share allocations. These factors made key executives from the issuing company less motivated to bargain for a higher IPO price, therefore accepting a larger underpricing. However, Loughran and Ritter (2004) found little support for the realignment of incentives hypothesis. Instead, they explained that changes in ownership characteristics might partly be a response to underpricing and as much as a cause (Loughran & Ritter, 2004).

2.1.3.3 The Changing Issuer Objection Function

In this hypothesis, the authors hypothesize two reasons for IPO underpricing (Loughran & Ritter, 2004). The first reason is based on the issuers' increased emphasis on analyst coverage, defined as "Analyst Lust." The authors examined how issuers are more focused on looking for underwriters with highly ranked analysts to cover their company instead of focusing on the ones that give them the highest offer price. The analyst lust results in each issuer facing a local oligopoly of underwriters, regardless of the total number of competing

underwriters, since there are usually only five Institutional Investor all-star analysts covering each industry (Loughran & Ritter, 2004). The second reason is based on the cooperation between key executives of the issuing firm and underwriters by later allocating hot IPOs to them through personal brokerage accounts, defined as "IPO spinning." The purpose of these side payments is to influence the issuer's choice of lead underwriter. By cooperating, the underwriter creates an incentive to seek, rather than avoid, underwriters with a reputation for severe underpricing (Loughran & Ritter, 2004).

2.1.4 Underwriter Reputation

The underwriter plays a crucial role in the IPO process by managing the issue and marketing the shares to quality investors. Several academic peers have researched the field and examined the relationship between underwriter reputation and underpricing. Carter and Manaster (1990) found that IPO underpricing and underwriter reputation is negatively correlated and that prestigious underwriters are associated with IPOs of lower first day returns (Carter & Manaster, 1990). The authors propose that prestigious underwriters are less likely to offer overvalued issues, as it could negatively affect their reputation. This assurance reduces the risk of investing in the IPO, resulting in less underpricing. They suggest that underwriters with a high reputation have greater bargaining power and the ability to attract issuers with less risky securities, leading to less underpricing in their IPOs (Carter & Manaster, 1990). This is supported by the findings of Michaely and Shaw (1994) that showed that prestigious underwriters had less underpricing and significantly higher long run performance of the stock.

2.1.5 The IPO Syndicate: Size and Structure

An IPO syndicate is a group of underwriters that collaborates to manage and market the offering. Studies have shown that the size and composition of the syndicate can impact the dynamics of IPO underpricing. Corwin and Schultz (2005) conducted an analysis of 1638 IPOs from 1997 through 2002, and their findings indicate that syndicate members play a crucial role in producing information (Corwin & Schultz, 2005, p. 443). They found that an increase in

syndicate size led to a decrease in underpricing, suggesting that larger syndicates can mitigate the effects of information asymmetry in the IPO process (Corwin & Schultz, 2005).

Recent studies by Dunbar and King (2023) show that there has been a significant change in size and composition of the syndicate members in the last two decades. The authors follow up on Corwin and Schultz (2005) paper since they observe a lack of cross-sectional variation in the paper's sample from 1997 to 2002 where most IPOs only had one lead manager in the syndicate (Dunbar & King, 2023, p. 2). The authors find that syndicate concentration has a significant impact on the pricing of IPOs. Less concentrated syndicates lead to larger absolute and more negative price adjustments, as well as more downward revisions from the filing price. The addition of lead underwriters is also associated with more negative absolute price adjustments, with joint leads having the greatest impact followed by phantom leads and co-managers. However, there is no statistical relationship between first-day returns on either syndicate concentration or the number of underwriters in different roles (Dunbar & King, 2023, p. 3).

2.1.6 Previous Findings

Table 2.1: Summary of previous literature on underpricing

The table shows a summary of initial public offerings from earlier studies. The table includes the initial return method for each study, sample period, average underpricing, country, and the sponsorship status of each IPO. The studies are stated chronologically and sorted on sponsor status.

Study	Sample Period	First-day return calculation	Average underpricing	Country	Sponsor Status
All IPO Types					
Reilly & Hatfield (1969)	1963 - 1966	First Friday's price after IPO	9,9%	US	All
Ibbotson (1975)	1960 - 1969	First end of month price after IPO	11,4%	US	All
Ibbotson & Jaffe (1975)	1960 - 1970	First end of month price after IPO	16,8%	US	All
Ritter (1984)	1960 - 1982	First closing bid price after IPO	18,8%	US	All
Ritter (1984)	1977 - 1982	First closing bid price after IPO	26,5%	US	All
Ritter (1984)	1980 - 1981	First closing bid price after IPO	48,4%	US	All
Beatty & Ritter (1986)	1981 - 1982	First closing bid price after IPO	14,1%	US	All
Ibbotson et al. (1988)	1960 - 1987	Bid price end of the month after IPO	16,4%	US	All
Ibbotson et al. (1994)	1960 - 1992	Bid price end of the month after IPO	15,3%	US	All
Ibbotson et al. (1994)	1960 - 2006	First closing bid price after IPO	18,7%	US	All
Booth & Chua (1996)	1977 - 1988	First day close after IPO	13,1%	US	All
Van der Geest & Van Frederikslust(2001)	1985 - 1998	First day close after IPO	16%	Netherlands	All
Lowry & Schwert (2002)	1985 - 1997	First day close after IPO	13,9%	US	All
Schertler (2002)	1997 - 2000	First day close after IPO	49,2%	Germany	All
Schertler (2002)	1997 - 2000	First day close after IPO	9,2%	France	All
Loughran & Ritter (2004)	1990 - 1998	First day close after IPO	15%	US	All
Loughran & Ritter (2004)	1999 - 2000	First day close after IPO	65%	US	All
Loughran & Ritter (2004)	2001 - 2003	First day close after IPO	12%	US	All
Westerholm (2006)	1991 - 2002	First day close after IPO	17%	Nordic	All
Hesjedak (2007)	2004-2006	First day close after IPO	3,2%	Norway	All
Vu & Laird (2008)	1996 - 2007	First day close after IPO	57,8%	Australia	All
Ferretti & Meles (2011)	1998 - 2008	First day close after IPO	4,7%	Italy	All
Levis (2011)	1992 - 2005	First day close after IPO	18,6%	UK	All
Falck (2013)	2001-2012	First day close after IPO	3,2%	Norway	All
Shulzhuk & Ismanova (2014)	1993-2008	First day close after IPO	4,5%	Norway	All
Non-sponsored IPOs					
Van der Geest & Van Frederikslust(2001)	1985 - 1998	First day close after IPO	17%	Netherlands	NS
Bergström et al. (2006)	1994 - 2004	First day close after IPO	14,7%	UK	NS
Bergström et al. (2006)	1994 - 2004	First day close after IPO	9,5%	France	NS
Vu & Laird (2008)	1996 - 2007	First day close after IPO	70,7%	Australia	NS
Ferretti & Meles (2011)	1998 - 2008	First day close after IPO	6,6%	Italy	NS
Levis (2011)	1992 - 2005	First day close after IPO	21,1%	UK	NS
Venture capital-backed IPOs					
Vu & Laird (2008)	1996 - 2007	First day close after IPO	32,1%	Australia	VC
Levis (2011)	1992 - 2005	First day close after IPO	14,9%	UK	VC
Private equity-backed IPOs					
Van der Geest & Van Frederikslust (2001)	1985 - 1998	First day close after IPO	13%	Netherlands	PE
Schertler (2002)	1997 - 2000	First day close after IPO	52%	Germany	PE
Schertler (2002)	1997 - 2000	First day close after IPO	16%	France	PE
Bergström et al. (2006)	1994 - 2004	First day close after IPO	10,3%	UK	PE
Bergström et al. (2006)	1994 - 2004	First day close after IPO	4,2%	France	PE
Schöber (2008)	1990 - 2006	First day close after IPO	9,9%	US	PE
Vu & Laird (2008)	1996 - 2007	First day close after IPO	39,6%	Australia	PE
Ferretti & Meles (2011)	1998 - 2008	First day close after IPO	1,9%	Italy	PE
Levis (2011)	1992 - 2005	First day close after IPO	9,1%	UK	PE

2.2 Long-Run Performance

According to the numerous studies mentioned in table 2.1, IPOs are known to experience positive first-day returns for shareholders. However, when considering the long-run performance of IPOs over a 1 to 3-year period, they appear to be overpriced. In the following, there will be presented four relevant studies for why IPOs tend to underperform in the long run.

2.2.1 Over-Optimism

Ritter (1991) analyzed 1526 IPOs and a control sample matched by industry and market capitalization from 1975 to 1984 and found that the 3-year holding period return for IPOs was 34.47%, compared to 61.86% for comparable firms (Ritter, 1991). Ritter noted that the underperformance was particularly prominent among young growth companies, especially those that went public during high-volume years defined as hot markets. He hypothesized that investors tend to be periodically overoptimistic about the earnings potential of such young growth companies (Ritter, 1991, p. 4). This hypothesis was further supported by a study conducted by Theo et al. (1998), which delved into the over-optimism phenomenon highlighted by Ritter (Teoh et al., 1998). The findings from these studies suggest that IPOs tend to be overpriced in the years following their initial public offering, particularly for young growth companies. This indicates that investors may exhibit over-optimism in their expectations, potentially leading to long-run underperformance.

The paper offers a valuable perspective on IPO expectations and their fluctuations, considering factors such as company characteristics and the listing period. This perspective holds particular relevance for our study, as our sample includes listings from both the main markets and multilateral trading facilities (MTFs). These MTF venues are often associated with young growth companies and have experienced a significant growth in recent years.

2.2.2 Divergence of Opinions

Miller (1977) argues that IPOs can experience significant volatility in pricing due to risk, uncertainty, and divergence of opinion among investors. Miller

suggests that in listings when there is high uncertainty about the prospects of an IPO and investors hold diverging opinions about its value, then it is the marginal investor with the highest expectations that ends up participating in the listing and accept the offer price (Miller, 1977). However, over time as more information becomes available and the true value of the company becomes evident, the market tends to correct these initial pricing discrepancies, and the valuation of the marginal investor is likely to converge towards the mean valuation. Consequently, the stock price may experience a decline (Miller, 1977).

These insights are particularly relevant to our thesis as we focus on IPO listings during periods characterized by high uncertainty. By considering Miller's findings, we can gain a deeper understanding of the dynamics of IPO pricing and how diverging opinions and risk perceptions impact the initial valuation and subsequent performance of IPOs in contexts of heightened uncertainty.

2.2.3 Pseudo Market Timing

In his paper, Schultz (2003) posits that pseudo market timing, characterized by the practice of timing the IPO issuance to favorable market conditions rather than underlying firm value, is a common phenomenon among IPO firms. This can lead to overpricing of IPOs and subsequent long-run underperformance (Schultz, 2003). Schultz identifies several factors that contribute to pseudo market timing, including the influence of investment banks on IPO pricing decisions, the strategic utilization of short-term market fluctuations by issuing firms, and the impact of market sentiment on IPO pricing. He supports his arguments with empirical evidence, drawing from a substantial sample of IPOs from the 1980s and 1990s, which indicates the prevalence of pseudo market timing in IPO markets and its potential negative impact on long-run IPO performance (Schultz, 2003).

2.2.4 Underwriter Reputation

Chemmanur and Fulghieri (1994) propose a model that examines the role of investment bank reputation in financial intermediation and information production in the context of IPOs. According to their model, investment bank reputation serves as a signal of the quality of information produced by the bank, which in turn affects various aspects of IPOs such as pricing, allocation, and long-run performance (Chemmanur & Fulghieri, 1994). This notion is supported by the findings of Carter et al. (1998), who show that IPOs underwritten by reputable investment banks tend to exhibit better long-run performance compared to those underwritten by less reputable banks, as measured by buy-and-hold abnormal returns over an extended post-IPO period (R. B. Carter et al., 1998).These findings suggest a positive correlation between underwriter reputation and long-run IPO performance, indicating that reputable underwriters may be associated with higher-quality IPOs that perform better in the long term (R. B. Carter et al., 1998).

2.2.5 Previous Findings

Table 2.2: Overview of previous findings on IPO long-run performance

The table summarizes previous studies on the long-run aftermarket performance of initial public offerings (IPOs). It includes information on the sample period, abnormal return metric/method, holding period, benchmark index/method, mean (%) and median (%) returns, market studied, and ownership structure classification. The studies are categorized by subgroup and publication year.

Study	Sample Period	Return metric	Time horizon	Bencmark	Mean (%)	Median (%)	Country	Sponsor status
All IPO Types								
Ritter (1991)	1975 - 1984	CAR	3 years	CRSP value NASDAQ	-29.1	n.a.	US	All
		BHAR	3 years	CRSP value-weighted AMEX-NYSE	-27.4	-55.2	US	All
Loughran & Ritter (1995)	1970 - 1990	BHAR	5 years	CRSP value-weighted NASDAQ Index	-50.7	-55	US	All
Schuster (2003)	1988 - 1998	BHAR	3 Years	Value-weighted Dow Jones STOXX size indices	8.4	n.a.	Europe	All
Carter et al. (2006)	1979 - 1991	BHAR	3 Years	CRSP value-weighted AMEX- NYSE index	-19.9	-50.7	US	All
Brav et al. (2000)	1975 - 1992	CAR	5 Years	S&P 500 index	-38.3	n.a.	US	All
		BHAR	3 Years	S&P 500 index	-12.1	-30.5	US	All
Gompers & Lerner (2003)	1935 - 1972	CAR	3 years	CRSP value-weighted index	-4.5	n.a.	US	All
		BHAR	3 years	CRSP value-weighted index	-16.7	n.a.	US	All
Eckbo & Norli (2005)	1972 - 1998	BHAR	5 Years	Matching firms (MCAP & Book-to-market)	-28.8	n.a.	US	All
Westerholm (2006)	1991 - 2002	BHAR	5 Years	All-Share market index	4.54	-3.13	Nordic	All
Zheng (2007)	1980 - 1997	BHAR	5 Years	CRSP value-weighted AMEX- NYSE index	-28.2	na	US	All
Gregory et al. (2010)	1975 - 2004	BHAR	3 Years	Matching firms (Size-Decile control portfolio)	4.54	-3.13	US	All
Levis (2011)	1992 - 2005	BHAR	3 Years	FTSE All-Share Index	-13.5	n.a.	UK	All
		BHAR	3 Years	Industry-adjusted FTSE indices	-13.7	n.a.	UK	All
Non-sponsored IPOs								
Brav & Gompers (1997)	1975 - 1992	BHAR		S&P 500 index	-49.3	n.a.	US	NS
Levis (2011)	1992 - 2005	BHAR	3 Years	FTSE All-Share Index	-20.2	n.a.	UK	NS
		BHAR	3 Years	Industry-adjusted FTSE indices	21.7	n.a.	UK	NS
Van der Geest & Van Frederikslust (2001)	1985 - 1998	CAR	3 Years	Market weighted CBS index	-15.6	n.a.	Netherlands	NS
Bergström et al. (2006)	1994 - 2004	CAR	3 Years	FTSE All-Share Index	-72.9	n.a.	UK/France	NS
Venture capital-backed IPOs								
Brav & Gompers (1997)	1975 - 1992	BHAR	3 Years	S&P 500 index	-20.7	n.a.	US	VC
Levis (2011)	1992 - 2005	BHAR	3 Years	FTSE All-Share Index	-3.9	n.a.	UK	VC
		BHAR	3 Years	Industry-adjusted FTSE indices	-4.8	n.a.	UK	VC
Private equity-backed IPOs								
Van der Geest & Van Frederikslust (2001)	1985 - 1998	CAR	3 Years	Market weighted CBS index	-2	n.a.	Netherlands	PE
Bergström et al. (2006)	1994 - 2004	CAR	3 Years	FTSE All-Share Index	-28.6	n.a.	UK/France	PE
Levis (2011)	1992 - 2005	BHAR	3 Years	FTSE All-Share Index	13.8	n.a.	UK	PE
		BHAR	3 Years	Industry-adjusted FTSE indices	21.8	n.a.	UK	PE
Buyout-backed IPOs								
Schöber (2008)	1990 - 2006	CAR	5 Years	S&P500 index	3.1	19.1	US	BO
		BHAR	5 Years	S&P500 index	3.2	-37	US	BO
Cao & Lerner (2009)	1981 - 2003	BHAR	3 Years	S&P 500 / NYSE/Amex/Nasdaq index	13.5	0.4	US	BO

2.3 Private Equity

In the following section, we delve into several papers that explore the unique characteristics and performance of PE-backed IPOs in comparison to VC-backed and NS entities. Specifically, these studies investigate the differences in underpricing and long-run performance among these different ownership structures. By examining the findings of these papers, we can gain insights into the distinct dynamics and outcomes associated with PE-backed IPOs, contributing to a comprehensive understanding of their performance in the IPO market.

2.3.1 Underpricing of PE-backed IPOs

Bergström et al. (2006) examined 152 PE-backed and 1 370 NS IPOs across the London and Paris stock exchange. The authors find that IPOs backed by PE firms tend to be underpriced to a lesser extent compared to NS IPOs. This suggests that private equity firms, which typically take an active role in managing their portfolio companies, is better at pricing IPOs closer to their fundamental value (Bergström et al., 2006). Levis (2011) conducted a study comparing the performance of PE- and VC-backed IPOs with NS IPOs. The results of the study align with the findings of Bergstrom et al. (2006), suggesting abnormal performance of PE-backed IPOs. However, no evidence of abnormal performance is found for VC-backed IPOs. The study highlights that the underlying factors driving the abnormal returns in PE-backed IPOs include improved operational efficiencies, closer monitoring, access to management expertise, and higher levels of debt (Levis, 2011).

2.3.2 Long-Run Performance of PE-backed IPOs

Bergström et al. (2006) conducted a study revealing that private equity (PE)-backed initial public offerings (IPOs) exhibited higher average buy-and-hold abnormal returns compared to non-backed (NS) IPOs over a three-year period following their public debut. However, the study also acknowledged the presence of significant performance variation among individual firms and the potential influence of different investment strategies employed by PE firms (Bergström et al., 2006, p. 2). Levis (2011) supported these findings in terms of long-run performance and attributed the drivers to factors such as high leverage, close monitoring, and management expertise, which are similar to those affecting IPO underpricing. On the contrary, research done by Viviani et al. (2008) on 168 IPOs from Borsa Italia Stock Exchange in the period of 1995 to 2005 showed opposite results. Their results showed that PE-backed IPOs were negatively correlated with long-run results which contradicts the results of Bergström et al. (2006) and Levis (2011). These ambiguous results in Europe makes it interesting for us to further explore the hypotheses in the Nordic Markets.

3 Industry Overview

This section provides an overview of the private equity (PE) industry, focusing on its structure and the life cycle of PE funds. Additionally, it explores the characteristics and factors driving the growth of the Nordic private equity market. The section highlights the stable economies, favorable business environment, deep industry expertise, access to capital, and government support that have contributed to the region's prominence in the global PE landscape. By understanding these key aspects, we can gain valuable insights into the dynamics of the PE industry and its significance in the Nordic context.

3.1 Fund Structure

Generally, the fund consists of three main parts; General Partners (GP), Limited Partners (LP) and the Portfolio Firms (PF) (Petro et al., 2012). GPs assume the responsibility of managing the private equity fund and strive to enhance the performance of the target investments through various means, such as operational efficiencies and value-added enhancements. The compensation for GPs typically consists of predetermined fees based on the invested capital and a portion of the fund's overall performance (Petro et al., 2012).

LPs are the investors who contribute capital to the private equity fund and do not engage in its daily operations. LPs primarily comprise institutional investors such as pension funds, sovereign wealth funds, and high-net-worth individuals (Metrick & Yasuda, 2009).

PFs represent the companies in which private equity funds make investments. Typically, these firms are privately held entities, and the holding period before divestment typically spans from 2 to 7 years (Petro et al., 2012). However, it is important to note that portfolio firms may also include companies that were already publicly listed prior to their acquisition by the private equity fund. In these situations, the PE-fund buys the company and delist it from the stock exchange in order to make it private again.

3.2 Fund Life Cycle

This section provides an overview of the different stages involved in the life cycle of a private equity fund. The time horizon of the fund average around 10 where its life cycle is divided into four main stages: fundraising, investment, value-creation and divestment (Lerner et al., 2004).

3.2.1 Fundraising

The fundraising phase, occurring within the first 18 months of a private equity fund's establishment, is critical for defining its investment focus and strategy (Petro et al., 2012). Fund managers aim to attract capital by presenting a compelling investment thesis and demonstrating their expertise in identifying and nurturing promising companies. However, the fundraising phase can be challenging, especially during periods of economic turbulence when capital markets become less liquid. Uncertainty in the macroeconomic environment and market volatility can hinder private equity funds from securing the required capital commitments. Investors may exhibit limited confidence and exercise caution in allocating capital, leading to a more rigorous due diligence process and heightened scrutiny of investment opportunities (Petro et al., 2012).

3.2.2 Investment

During the investment stage, which spans from year one to four of a private equity fund's life cycle, general partners actively seek out investment opportunities in both publicly listed and privately held companies. Their exploration is guided by the fund's predefined strategy and focus, aiming to identify businesses that align with their investment objectives. (Petro et al., 2012). The stage represents a critical period for private equity funds, as the selection of promising companies sets the foundation for future value enhancement and eventual divestment. Through meticulous due diligence and strategic decision-making, general partners aim to build a well-diversified portfolio that aligns with the fund's investment strategy and maximizes returns for their investors.

3.2.3 Value-Creation

During the value-creation phase, spanning from year two to seven of a private equity fund's life cycle, general partners actively drive value creation within the portfolio firms. They employ a range of strategies, including implementing operational efficiencies, optimizing capital structures, and introducing new business strategies, with the aim of enhancing the performance and value of the invested companies (Metrick & Yasuda, 2009). These efforts are geared towards positioning the portfolio firms for potential liquidation, where the increased value realized from these improvements can translate into attractive returns for the fund and its investors.

3.2.4 Divestment

During the divestment period, which typically spans from the fourth year until the eventual liquidation of the private equity fund, the focus shifts towards realizing the investments made in the portfolio companies. The fund seeks to exit these investments through various strategies, including secondary buyouts, trade sales, or IPOs, depending on factors such as market capitalization, timing, and sector competitiveness. The choice of the exit strategy is crucial as it determines the most favorable path to maximize returns for the fund and its investors (Petro et al., 2012). In our research paper, we specifically investigate the divestment strategy of IPOs and analyze the factors that influence the decision to take a portfolio company public. By examining the performance and characteristics of PE-backed IPOs, we aim to provide insights into the effectiveness and value creation potential of this divestment.

3.3 The Nordic Private Equity Market

The emergence of Nordic private equity (PE) firms has significantly impacted the European market, contributing to the region's reputation as competitive player in the global private equity landscape. This section examines the key factors driving the rise of Nordic PE firms and their growing prominence within the industry (Spliid, 2013).

3.3.1 Stable Economies and Favorable Business Environment

The Nordic countries, including Denmark, Finland, Norway, and Sweden, boast stable economies characterized by strong GDP growth rates, low unemployment, and well-functioning financial systems. These factors create a favorable business environment that attracts both local and international investors to the region (Spliid, 2013).

3.3.2 Investor Confidence and Cross-border Synergies

The Nordic region benefits from a high degree of investor confidence driven by shared language, cultural, and economic ties among the countries. Nordic investors perceive cross-border investments within the region as less risky compared to ventures in other European countries due to these shared synergies and trust. The region's reputation for strong corporate governance, transparency, and political stability further enhances investor confidence (Spliid, 2013).

3.3.3 Deep Industry Expertise and Innovation

Nordic PE firms have harnessed the region's deep industry expertise and innovative mindset to establish themselves as key players. The Nordic countries are known for their strengths in sectors such as technology, healthcare, clean energy, and design. PE firms operating in the region leverage this expertise to identify attractive investment opportunities aligned with global trends (Spliid, 2013). The regional performance of Nordic PE has, in fact, consistently outperformed European and U.S. peers based on pooled horizon returns (Berchwood Partners, 2013)

3.3.4 Access to Capital and Investor Appetite

The Nordic region benefits from access to a significant pool of capital, thanks to its sophisticated institutional investor base, including pension funds, sovereign wealth funds, and family offices. These investors provide the necessary financial resources for PE investments. The strong track record of successful exits and

solid returns from Nordic PE investments has further fueled investor appetite and attracted capital to the region. In the Nordic region, the availability of credit is scarcer compared to the well-diversified U.S. market. While the bond market plays a significant role in financing deals in the U.S., banks are the primary providers of capital in Europe, including the Nordics (Bienz, 2017). Consequently, Nordic PE firms heavily rely on international investors for growth, necessitating the use of offshore fund structures, such as limited partnerships located in tax havens. Despite this, deal structuring in the region generally follows internationally recognized approaches without encountering significant obstacles (BVCA, 2014)

3.3.5 Government Support and Policy Framework

The Nordic governments have recognized the importance of private equity as a driver of economic growth and employment. They have implemented supportive policies and frameworks that foster entrepreneurship, innovation, and investment activity. Initiatives such as tax incentives, research and development grants, and regulatory reforms have enhanced the attractiveness of the Nordic region for PE investments (Spliid, 2013).

In summary, the emergence of Nordic private equity firms has been driven by stable economies, investor confidence, deep industry expertise, access to capital, and supportive government policies. These factors have positioned the Nordic region as an attractive destination for PE investments and have contributed to its growing prominence within the industry.

4 Research Questions and Hypotheses

In this section, we present the main research questions and hypotheses that guide our study on underpricing and long-run performance in the context of different sponsorship statuses. To provide a clear structure for our hypotheses, we have divided them into two parts: Underpricing and Long-Run Performance. Within each part, we begin by stating the more general hypotheses to consider the inverse relationship typically observed between underpricing and long-run performance.

The first set of hypotheses focuses on underpricing, where we first state a general hypothesis that consider the overall relationship between IPOs and underpricing. The general hypothesis lay the foundation for our subsequent examination. Here, we state the more specific variables that could impact underpricing, like market timing, underwriter reputation etc.

The second set of hypotheses investigate the long-run performance of IPOs. Similar to the underpricing section, we initially present a general hypothesis that encompass the broader relationship between IPOs and long-run performance. These general hypotheses serve as a starting point for our subsequent analysis of individual variables that could potentially affect long-run performance.

Lastly, we have structured our hypotheses into main and sub hypotheses. This approach enables us to initially test our hypotheses across all entities, regardless of sponsorship status, establishing a foundation for comparison. Subsequently, we focus on examining the performance of PE-backed entities in comparison to VC-backed and NS entities.

4.1 Research Questions

Our thesis aims to explore the intriguing relationship between PE backing and IPOs in the Nordic region. By examining the unique characteristics of PE-backed IPOs, we seek to address two fundamental research questions:

1) *Do PE-backed IPOs experience lower degrees of underpricing compared to non-PE-backed IPOs?*

2) *Do PE-backed IPOs demonstrate superior long-run performance compared to*

non-PE-backed IPOs?

Our research questions are rooted in the relevant literature on IPOs and PE backing, as highlighted in sections 2.1.6 and 2.5.5. Previous studies, such as those by Bergström et al. (2006) and Levis (2011), have indicated the potential for lower levels of underpricing in PE-backed IPOs compared to non-PE-backed IPOs. Moreover, the discourse surrounding the superior long-run performance of PE-backed IPOs, as demonstrated by Viviani et al. (2008), adds further context to our investigation. These research questions are the foundation of our investigation, and we aim to provide valuable insights into the impact of PE backing on IPOs in the Nordic context. Our objective is to conduct a comprehensive analysis, incorporating robust data and methodologies, to contribute to the existing body of knowledge.

4.2 Main Hypotheses

Building upon the aforementioned research questions, we formulate a set of hypotheses that guide our analysis. The hypotheses are inspired of -or derived from existing literature and is divided into two main categories: Underpricing and Long-Run Performance.

4.2.1 Underpricing Hypotheses

The majority of current research indicates that the average IPO, regardless of country, industry and sponsor status is significantly underpriced, leaving money on the table for the issuing firm. Hence, our first hypothesis is:

Hypothesis 1: *The average level of underpricing in Nordic IPOs will be positive.*

The subsequent hypothesis aims to investigate the effects of sponsorship status during the process of listing. Bergström et al. (2006) and Levis (2011) provides empirical evidence that PE-backed companies experience a lower degree of underpricing compared to VC-backed and NS companies.

Hypothesis 1a: *Private equity-backed IPOs will exhibit lower levels of underpricing compared to non-private equity-backed IPOs on the Nordic stock exchanges.*

The second hypothesis focus on the cyclical nature of IPOs and the impact of market conditions on underpricing levels. Previous well-established research like Ibbotson and Jaffe (1975), Ritter (1984) and, Loughran and Ritter (2004) indicates that during hot market periods with high IPO activity, there tends to be a higher degree of underpricing.

Hypothesis 2: *All Nordic IPOs will experience higher degree of underpricing during Hot Market periods compared to Cold Market Periods, regardless of sponsor status.*

The subsequent hypothesis examines how the underpricing levels of private equity-backed IPOs compare to venture capital-backed and non-sponsored IPOs during hot and cold market periods. Levis (2011) suggest that the difference in underpricing levels between hot and cold markets is less prominent for private equity-backed IPOs compared to venture capital-backed and non-sponsored IPOs. The relatively lower underpricing is explained by the PE funds incentive to maximize valuation since they use IPOs as an exit strategy.

Hypothesis 2a: *PE-backed IPOs level of underpricing will be less affected by Hot and Cold Markets compared to VC-backed and NS companies.*

In line with previous research by Ljungqvist and Wilhelm (2003) and Loughran and Ritter (2004), our third hypothesis examines the relationship between selling shareholder incentives and underpricing in initial public offerings (IPOs). Existing studies have provided evidence that companies selling a larger proportion of their shares during the IPO process have greater motivations to negotiate for a higher offering price (Ljungqvist & Wilhelm, 2003; Loughran & Ritter, 2004).

Hypothesis 3: *IPOs with a larger fraction of shares sold are expected to exhibit lower levels of underpricing compared to IPOs with a smaller fraction of shares sold.*

Hypothesis four and five examines the influence of underwriter reputation and the composition of the IPO syndicate on the phenomenon of underpricing. Empirical studies have consistently demonstrated that IPOs under the guidance of prestigious underwriters tend to experience reduced levels of underpricing, indicating the significance of underwriter reputation as a mitigating factor

(Carter & Manaster, 1990). Furthermore, the study of IPO syndicate size uncovers an interesting relationship where an increased number of underwriters has a moderating effect, resulting in a decrease in underpricing as studied in Corwin and Schultz' (2005) paper.

Hypothesis 4: *IPOs including high-ranked underwriters exhibit lower level of underpricing compared to IPOs without.*
Hypothesis 5: *IPOs with large syndicates will experience lower underpricing compared to small syndicates.*

4.2.2 Long-Run Performance Hypotheses

IPO long-run performance is highly covered in the current literature with evidence showing that IPOs generally underperform against the market returns in the same period. However, research regarding pre-IPO ownership structure of the company has documented that PE-backed companies tend to experience less underperformance than NS companies as supported by Bergström et al. (2006) and Levis' (2011).

Hypothesis 7: *Nordic IPOs will underperform in the long run compared to market returns.*
Hypothesis 7a: *PE-backed IPOs will experience a lower degree of long-run underperformance compared to VC-backed and NS companies.*

Empirical evidence indicates that IPOs in hot market periods tend to demonstrate higher levels of underperformance (Ritter, 1984). However, recent studies have shown mixed findings regarding the relative performance of PE-backed IPOs compared to VC-backed and NS companies (Carter & Manaster, 1990). To further explore this relationship, we propose the following two hypotheses.

Hypothesis 8: *Nordic IPOs listed during Hot Market periods will underperform more compared to IPOs listed during Cold market periods.*
Hypothesis 8a: *PE-backed IPOs will underperform less than VC-backed and NS companies during Hot Market Periods.*

According to previous studies, it has been observed that companies often choose to go public during periods when stock market valuations for their industry

are high, indicating a potential strategy of market timing (Schöber, 2008). This suggests that firms aim to capitalize on favorable industry valuations when deciding the timing of their IPOs. Furthermore, studies by Levis (2011) suggests that PE-backed IPOs perform equally or even better in the long run when benchmarked against industry-specific indices compared to NS IPOs.

Hypothesis 9: *PE-backed IPOs will exhibit superior long-run performance, as measured against an industry-specific index, in comparison to VC-backed and NS IPOs.*

Lastly, we want to test if whether there is a relationship between underpricing of an IPO and the subsequent returns in the following years to investigate the cause and effect between initial pricing and long-run aftermarket performance.

Hypothesis 10: *Underpriced IPOs will experience lower long-run performance.*

5 Data Collection and Descriptive Statistics

This chapter focuses on the collection and analysis of data pertaining to our research.. The data has been meticulously gathered from various databases, cross-referenced with official prospectuses, and supplemented through collaboration with professional research departments within the private equity industry in Norway. Our objective is to provide a comprehensive overview of the collected data and present the descriptive statistics that defines the variables used in our models. Additionally, we acknowledge and discuss the limitations associated with our data, ensuring a transparent and rigorous approach to our analysis.

5.1 Initial Sample Generation

Our data collection process for constructing the final sample of 825 IPOs spanning from January 2001 to February 2023 involved meticulous efforts and the utilization of multiple reliable databases. By employing a comprehensive approach, collaborating with a reputable private equity entity, and manually cross-checking missing observations, we have compiled a substantial and comprehensive dataset that ensures the robustness of our research.

To gather the majority of our data observations, we relied on prominent databases such as Refinitiv Eikon, Pitchbook, and Bloomberg. These renowned sources provided us with a wealth of information crucial for our analysis. Additionally, we established a collaborative partnership with Argentum, a leading private equity investor in Norway managing assets on behalf of the Norwegian Government, pension funds, and private investors. Their contribution of a comprehensive dataset covering the years 2008 to 2022 greatly supplemented our initial dataset, adding valuable insights to our analysis. We are also grateful to Carsten Bienz and his research partner Michael Axenrod for providing us with valuable information to enhance the depth of our data.

To ensure data integrity and avoid duplicates, we merged all the individual datasets using the International Securities Identification Numbers (ISIN) across

all data sources. This meticulous merging process resulted in a gross dataset of 1244 IPOs. However, we encountered instances where several hundred observations lacked sufficient information regarding IPO prices, underwriter status, and financial sponsor status. To address these gaps, we conducted a manual verification process by cross-referencing each missing observation with the IPO prospectus, whenever available on the respective company's website. This rigorous manual check enabled us to fill in the missing information accurately and enhance the overall completeness of our dataset.
Following the extensive process of manually filling in additional information from various sources, we applied the following exclusion criterion to refine our sample to its final size of 825 IPOs:

i. Companies that were already traded over-the-counter (OTC) were excluded from our analysis. This decision was made because OTC-traded companies do not provide sufficient market price information, which could compromise the accuracy of our comparisons regarding first-day trading returns.

ii. We excluded cases involving list transfers to other stock exchanges. This exclusion criterion was applied to minimize potential bias or distortion that could arise when comparing the performance of different types of IPOs, such as PE-backed, venture capital, and non-private equity-backed IPOs.

iii. Listings of savings banks that issued equity certificates instead of common equity, as well as companies that issued other types of shares such as depositary receipts or equity certificates, were excluded from our analysis. Our focus was solely on ordinary or common shares, as this ensured a more accurate and homogeneous comparison across the different types of IPOs under investigation.

iv. Listings with missing information on IPO price, underwriters, or ownership structure pre-IPO. This exclusion criterion was necessary to ensure the effectiveness of our hypothesis testing and to minimize uncertainties arising from incomplete data.

In cases where companies had both VC and PE ownership at the time of the IPO, we made use of the largest shareholder's classification, if available, to categorize the IPO. However, it is important to acknowledge that when utilizing the information provided by Argentum, there may be some bias due to potential

differences in their practices compared to ours.

5.2 Classification of Initial Public Offerings

5.2.1 Private Equity and Venture Capital Classification

One crucial aspect addressed in this thesis pertains to the classification of private equity and venture capital, which holds significant importance for achieving accurate results. Distinguishing between these definitions is pivotal in the subsequent examination of underpricing and long-run performance (Levis, 2011). Nevertheless, classifying initial public offerings (IPOs) backed by private equity (PE) and venture capital (VC) poses a remaining challenge due to the convergence of several factors, including limited publicly accessible information concerning private enterprises and the overlapping involvement of sponsors in both VC and PE transactions (Cao & Lerner, 2009).

To classify the ownership at the time of the IPO, we adopt the argumentation of Schöber (2008). According to this framework, a "buyout-backed IPO" refers to a company in which financial sponsors hold a "substantial equity interest" through a buyout-type investment. The article defines a "substantial equity interest" as a collective ownership stake in the company, amounting to at least 10% of the company's equity prior to the initial public offering (IPO).

In addition, a "PE-backed IPO" is defined as an IPO that receives support or sponsorship from a private equity firm before being listed. Similarly, a "VC-backed IPO" is defined as an IPO that receives support or sponsorship from a venture capital firm prior to listing. To differentiate between VC-backed and PE-backed investments, Cumming (2012) defines VC investments as providing funding during the seed-stage of a business, with the purpose of supporting research, evaluation, and development of an initial concept before the business enters the startup phase. It is important to note that the primary difference between the two classifications lies in the fact that VC investments do not seek majority control of the company, implement new management strategies, or undergo operational turnarounds.

To ensure objective and accurate classifications, we rely on the membership

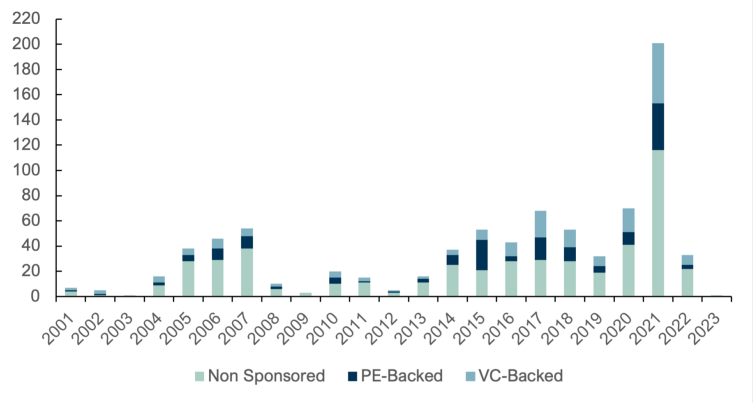
lists and classifications provided by the national Venture Capital Association (VCA) in the respective Nordic countries. When VCA classifications were unavailable, we manually assigned classifications based on Cummings'(2012) definition in conjunction with the information available on the websites of the PE or VC companies. Ambiguous transactions were excluded to maintain clarity and facilitate a comprehensive understanding of the performance of different classifications.

5.2.2 IPO activity

To investigate the potential impact of the timing of initial public offerings (IPOs) on IPO underpricing and long-run performance, we categorize each year as either a high market activity (HMA) or low market activity (LMA) period, drawing from the concepts introduced by Ibbotson and Jaffe (1975) and Ritter (1984). Their seminal research highlights the substantial underpricing of IPOs during hot markets, characterized by robust demand, limited share supply, and favorable market conditions, including low interest rates. Accordingly, we define the Hot Market Activity (HMA) as the period with the highest IPO activity. To determine the IPO activity, we rely on PWC's comprehensive overview of the Nordic stock market (PWC, 2022) and data from the respective stock exchange websites. This approach helps us mitigate any potential bias in our sample selection. Based on the aforementioned criteria, we classify the HMA periods as the timeframes between 2005-2007 and 2014-2021. Consequently, the remaining periods are designated as the Low Market Activity (LMA). Furthermore, to explore potential variations among the three sub-groups (HMA, LMA, and others), we incorporate the ownership classification as mentioned earlier in our analysis.

Table 5.1: Annual distribution of IPO

The dataset consists of a total of 825 initial public offerings (IPOs) from the period 2001 to 2022. This includes 171 IPOs backed by private equity (PE), 182 IPOs backed by venture capital (VC), and 472 non-sponsored (NS) IPOs. The sample encompasses IPOs from the Nordic countries, including Iceland. The 11 industries are classified according to FTSE Russel ICB standards.



5.2.3 Industry Classification

The industries are classified using FTSE Russel's Industry Classification Benchmark (ICB), which is a comprehensive, rule based, and transparent classification methodology based on research and market trends. ICB is globally used by stock exchanges to categorize listed companies, including all Nordic exchanges in our sample. The benchmark consists of a four-tier structure that includes 4 levels of granularity: 11 Industries, 20 Supersectors, 45 Sectors, and 173 Subsectors (FTSE Russel, 2023).

Our choice to use the least granular classification of companies is rooted in five arguments.

i. Sufficient level of granularity: Industry level already provides a reasonable level of detail in categorizing companies based on their core business activities. It offers a good balance between capturing meaningful differences in stock returns and avoiding excessive fragmentation of data.

ii. Enhanced interpretability: Industry-level analysis allows for easier interpretation and communication of results. Industry classifications

are more commonly recognized and relevant across geographical areas, as some countries may have more niche business sectors. This facilitates the discussion and dissemination of findings.

iii. Robustness and stability: Industry classifications are relatively stable over time compared to more granular levels. Changes in Supersector, Sector, and Subsector classifications may occur more frequently, leading to challenges in maintaining consistency and comparability over different time periods.

iv. Reduced multicollinearity: Testing at the Industry level can help mitigate multicollinearity issues that may arise when including highly correlated variables from more granular levels. This can enhance the reliability of regression analysis results and reduce the risk of biased estimates.

v. Computational efficiency: Working with Industry-level data simplifies the analysis process, requiring fewer computations and potentially reducing the computational burden. This is particularly beneficial when dealing with a large dataset of 800+ observations.

In order to enhance the assessment of the influence of pre-IPO ownership and industry on initial public offerings (IPOs), the IPOs have been further categorized into three distinct groups: PE, VC and NS IPOs. These categorizations have been applied across all 11 industries as part of the analysis. Table 5.2 presents an overview of the distribution of IPOs across industries and subgroups. From the table we observe that the top 25% percentile industries in terms of IPO volume are industrials, consumer discretionary, healthcare, and technology, collectively accounting for 63% of the total IPO volume in the sample. Among PE-backed IPOs, these same four sectors dominate, representing the majority of IPOs, with 70% originating from these industries.

Table 5.2: Distribution of industry composition

The dataset consists of a total of 825 initial public offerings (IPOs) from the period 2001 to 2022. This includes 171 IPOs backed by private equity (PE), 182 IPOs backed by venture capital (VC), and 472 non-sponsored (NS) IPOs. The sample encompasses IPOs from the Nordic countries, including Iceland. The 11 industries are classified according to FTSE Russel ICB standards.

	Number of firms listed			
Industry	**PE**	**VC**	**NS**	**All firms**
Basic Materials	7	5	24	36
Consumer Discretionary	45	23	58	126
Consumer Staples	6	9	30	45
Energy	13	15	58	86
Financials	12	3	45	60
Health Care	24	55	47	126
Industrials	31	26	98	155
Real Estate	3	3	37	43
Technology	21	35	54	110
Telecommunications	7	7	5	19
Utilities	2	1	16	19
Total	**171**	**182**	**472**	**825**

5.2.4 Underwriter Reputation Classification

To classify the underwriter's prestige and reputation at the time of listing, we utilize four criteria based on deal performance and industry reputation. All criteria are ranked on a scale of 0-9, following Carter & Manaster's (1990) method, where a top rank of 9 is assigned to underwriters in the top 10 percentile of the respective criterion, while a rank of 0 is given to the bottom 10 percentile. Subsequently, we calculate the average scores across all four criteria to obtain a total score.

The first criterion is based on the underwriters' total deal value throughout the sample period from 2001 to 2022. Deal value is computed by aggregating the total fee proceeds from all deals conducted within the specified period and adjusting for inflation. This criterion draws inspiration from Carter & Manaster's (1990) suggestion that prestigious underwriters are capable of participating in larger equity offerings.

The second criterion for evaluating underwriters is deal volume, which measures the number of IPOs in which the underwriter has been involved during the specified sample period. Given that our dataset focuses on Nordic IPOs while many underwriters have a global presence, we rely on Bloomberg data to determine the total volume of transactions conducted by each underwriter. This approach ensures that deal volume is accurately captured, considering the underwriters' broader activity beyond the Nordic region.

The third criterion assesses the global reach of underwriters, which evaluates their ability to execute cross-border transactions and their overall international presence. To measure this criterion, we consider two factors: the total number of cross-border deals and the diversity of countries in which each underwriter has conducted deals. This approach provides insight into the underwriters' capability to navigate international markets and engage in cross-border transactions effectively. By considering both the quantity and geographical spread of their cross-border deals, we gain a comprehensive understanding of the underwriters' global reach and their experience in operating across multiple countries.

Lastly, we assess each underwriter based on rankings and awards from independent third-party organizations. Since our sample of underwriters are global actors, this was done using a combination of an international and Nordic ranking organizations.

To measure the global underwriters, we use Vault's ranking of "Most Prestigious Investment Banking Firms" which is a survey done on industry professionals across the 85 leading investment banks globally (Vault, 2023). For the Nordic ranking we use Kantar Sifo's yearly ranking of "Domestic Equity" from 2002 until 2022 called Prospera. The Prospera ranking is conducted by leading Nordic actors across three segments: Large Institutions, Small Institutions, and Private Investors, which assesses each underwriter across 14 parameters (Kantar Sifo, 2023).

Since the rankings may employ different scales, we normalize each ranking to fit a scale of 0-9 to ensure comparability across criteria. This indexing process allows us to aggregate the rankings and assign a unified scale to measure the

reputation of each underwriter effectively.

5.2.5 IPO Syndicate Classification

The IPO Syndicate is simply classified using the number of underwriters for each IPO. This is in line with Corwin and Schultz's (2005) method where they found that an increase in IPO syndicate size led to a decrease in underpricing. A multi-step approach was used as part of the data collection process to determine the number of underwriters for each IPO. Refinitiv Eikon was initially used as the primary source to obtain an initial sample of underwriters for the IPOs. However, due to potential limitations in the data coverage, it was necessary to conduct additional verification. To address the gaps in the data, we performed manual cross-referencing with Bloomberg to supplement and validate the information obtained from Refinitiv Eikon. This step aimed to ensure a comprehensive and accurate representation of the underwriters involved in each IPO.

Furthermore, to further enhance the data accuracy, we conducted a meticulous review of the IPO prospectuses. By examining these official documents, we could capture any missing or overlooked information about the underwriters' involvement in the IPOs. This thorough examination of the prospectuses allowed us to fill in any remaining gaps in the dataset. Table 5.2 presents the average and median underwriter rank and syndicate size across all three subgroups. Our dataset show that PE-backed IPOs generally have higher ranked underwriters and larger syndicate size for their listings with a 6,23 and 2,03 score, respectively.

Table 5.3: Distribution of industry composition

The table presents the average and median score for underwriter rank and syndicate size. Underwriter rank is scaled from 0-9, based on four equal-weighted criteria: total deal size, deal volume, global reach and third-party independent ranking.

Panel A. Underwriter rank				
IPO type	**PE**	**VC**	**NS**	**All firms**
Average	6,23	5,82	6,21	6,20
Median	7,44	7,30	7,43	7,42
Observations	171	182	472	825
Panel B. Syndicate size				
IPO type	**PE**	**VC**	**NS**	**All firms**
Average	2,03	1,93	2,02	2,02
Median	2,00	1,00	2,00	2,00
Observations	171	182	472	825

5.3 Data Collection for Underpricing and Long-Run Performance

The process of collecting stock price data from 2001 to 2022 in the Nordic region has been a manual and time-intensive process aimed at achieving a comprehensive and accurate dataset comprising of 825 observations. Our data collection efforts encompassed three primary databases: Bloomberg, Refinitiv Eikon, and Infront. For instances where the databases did not provide the required data, we conducted manual checks by referring to the IPO prospectus to ensure a complete and comprehensive dataset as possible.

To calculate the first day returns, it was essential to use the unadjusted IPO prices. The majority of the unadjusted IPO price data was sourced from Refinitiv Eikon, and any missing values were cross-verified and supplemented using Bloomberg.

Conversely, the adjusted IPO price was employed for calculating long-run returns and primarily collected from Bloomberg. We manually cross-checked any missing data with Refinitiv Eikon and Infront to ensure data integrity and completeness. Additionally, daily stock price developments were collected from

January 2001 to December 2022, considering total returns that account for dividends and stock splits, following the established practices of Loughran and Ritter (1995). Daily unadjusted stock prices were also collected for the same time frame to facilitate the computation of first day returns.

In order to facilitate precise comparisons between IPO returns and the broader market, various market indices have been collected for the same sample period to serve as benchmarks. Given that the IPOs in our sample encompass diverse industries and market capitalizations, we have opted to employ all-share indexes that encompass all companies listed on each respective exchange. This approach ensures a comprehensive and unbiased comparison. Additionally, comparable indices have been gathered for each of the ten industries mentioned in section 5.3.3, allowing for industry-specific analyses and assessments.

5.4 Data Source Limitations

During the extensive data collection process for this research we encountered several potential limitations that are important to consider. The following section will systematically go through the potential data source limitations that we assessed during our sample process.

5.4.1 Data Availability

The selected timeframe for the study, covering the period from 2001 to 2020, presents certain limitations regarding the availability of data for the variables of interest. It is important to acknowledge that our sample may not capture all IPOs that occurred during this period, particularly in the early years of 2000. This limitation arises from the relatively lower data availability in the used databases and IPO prospectuses during that time.

The potential missing data from the early years could impact the overall representation of IPOs and their characteristics in the analysis. Therefore, the findings and conclusions drawn from the study should be interpreted within the context of this limitation.

Despite this limitation, our comprehensive data collection process aimed to minimize any gaps by utilizing multiple data sources. By cross-checking

information from Refinitiv Eikon and Bloomberg, we aimed to capture a more complete picture of the IPO landscape in the Nordics. Additionally, we also consulted IPO prospectuses to ensure the inclusion of any missing data points.

5.4.2 Classification Challenges

The primary concern regarding our dataset centers around the potential misclassification of IPOs into the three main subgroups. This primarily stems from the limited information available about the shareholder structure before the IPO, which can introduce distortions in the subgroup analysis and subsequent results. It is important to highlight that this problem is most prominent in the earlier IPOs, particularly those occurring before the financial crisis, as they have a higher prevalence of missing prospectuses. To address the incompleteness of our sample, we took measures to mitigate this issue thorough a personal collaboration with Argentum's research department in Norway, Carsten Bienz and Michael Axenrod for additional datasets to cross check with.

However, it is worth noting that due to the ambiguous distinction between private-equity and venture capital players, as discussed in section 5.3.1, there is a possibility of wrongful classification of some IPOs. This misclassification could potentially introduce a bias towards either PE or VC-backed IPOs, thereby impacting the overall analysis and findings.

6 Methodology

The following section is split into two parts. The first part will present the methodologies used in the IPO underpricing analysis, including definition of initial returns, statistical tests for hypothesis testing and lastly the final multivariate regression model where relevant control variables are included. The second part will be of similar form, regarding the mythologies used for testing IPO long run performance. In this part, we systematically go through our decisions regarding time regime, weighting scheme and benchmarks used to finally compute the abnormal returns used as our dependent variable.

6.1 Underpricing

The existing literature on underpricing, listed in table 2.1, exhibits variations in methodologies, particularly concerning the calculation of initial returns and its time period definition, choice of hypothesis testing methods, and the inclusion of control variables in multivariate regression models. In this section, we aim to provide a comprehensive discussion of each aspect and outline our methodological choices. Our objective is to ensure internal robustness and validity in our model while maintaining relevance and comparability with the current literature.

6.1.1 Initial Returns

Previous empirical studies on IPO underpricing have used various methodologies, leading to differences in the choice of time periods and calculation methods. Earlier papers often utilized longer time periods, while more recent studies, in line with Schöber (2008), primarily focused on the first trading day. Additionally, differences exist in the calculation of initial returns, with some studies considering the average between bid and ask price, while others solely using the bid price (Ritter, 1984; Beatty & Ritter, 1986). However, Ritter and Welch (2002) highlight that the majority of papers use the first day closing price for initial return calculations, a practice consistent with the methodologies of more recent publications (Loughran & Ritter, 2004; Lowry & Schwert, 2002;

Schöber, 2008). Regarding adjustments based on daily market returns, we align with Welch and Ritter's (2002) argument that the market returns are relatively insignificant to warrant comparison with daily market returns. Consequently, our study defines underpricing as the initial return calculated on the first day closing price without adjustment for daily market returns.

$$R_i = \frac{P_{t+1,i} - P_{t,i}}{P_{t,i}} \tag{6.1}$$

Where R_i is the initial return of IPO firm i, $P_{t+1,i}$ is the first day closing price, and $P_{t,i}$ is the IPO offer price company i.

Additionally, to capture any potential timing effects between the IPO year of issuance, we create a sample where we calculate the underpricing for each period with the following formula:

$$R_{g,a}^{ew} = \frac{1}{n_{g,a}} \sum_{i=1}^{n_{g,a}} R_i \tag{6.2}$$

Where $R_{g,a}^{ew}$ is the equal weighted average initial return for group g, R_i is the initial return of IPO i, and $n_{g,a}$ is the total number of IPO firms in each group.

6.1.2 Statistical Tests for Hypotheses Testing

To examine the presence of underpricing among different groups in our sample, we employ a two-sided t-test. This statistical test allows us to determine whether the first-day returns for the various groups in all market periods deviate significantly from zero. The t-test is a widely recognized and extensively used method in the field of econometrics, offering robustness and reliability in hypothesis testing. Furthermore, to investigate whether PE-backed IPOs exhibit lower levels of underpricing compared to other groups, we assess the statistical significance of the differences between the equal-weighted average first-day return of PE-backed IPOs and non-sponsored IPOs, as well as between PE-backed IPOs and VC-backed IPOs. These comparisons enable us to determine if there are significant variations in underpricing between the different types of IPOs. Similarly, we explore the impact of IPO market activity levels on underpricing by examining the differences between sub-groups.

Considering how the utilization of t-tests aligns with established econometric standards and previous research in the field, and its suitability for examining differences between means makes it a well-suited choice for assessing underpricing across various IPO groups and market conditions.

6.1.3 Multivariate Regression Model for Robustness Checking

The inclusion of a multivariate regression model in our analysis serves as a valuable complement to the individual statistical tests for examining IPO underpricing. The additional variables are mainly included to reduce omitted variable bias (OVB) and account for potential influences on the degree of underpricing, as documented by scholars in table 2.1.

Our chosen dependent variable is the initial return, calculated as the difference between the IPO offer price and the first-day closing price. To address potential effects of market conditions, inspired by Ibbotson and Jaffe (1975), we introduce a dummy variable (HMA DUMMY) that takes the value of 1 if the IPO occurred during a high market activity period, and 0 otherwise. Additionally, we examine the impact of sponsorship status by including dummy variables for private equity (PE DUMMY) and venture capital (VC DUMMY) backing at the time of the IPO, based on Bergström et al. (2006). To capture potential asymmetrical information issues, our model incorporates the number of underwriters in each transaction (UNDERWRITERS) and the reputation of the lead underwriter (RANK), following Carter and Manaster (1990) and Corwin and Schultz (2005). Moreover, to test "The realignment of incentives" hypothesis by Ritter and Loughran (2002), we include a continuous variable (SOLD) representing the size of the equity stake sold in the IPO, applicable to both venture capital and private equity cases.

To further enhance our analysis, we include control variables for each industry, where Basic Materials is included in the intercept to avoid the dummy variable trap. By including these control variables, we aim to isolate the impact of IPO underpricing from broader industry trends or conditions that could potentially influence the initial return, consistent with prior studies (Ritter, 1991).

Lastly, to ensure the robustness and accuracy of our statistical analysis, we will

employ heteroscedastic-consistent standard errors, which account for potential variability differences or heteroscedasticity in our data, maintaining the validity of our results across different observations.

$$\begin{aligned} Underpricing_{\mathrm{i}} = \quad & \beta_0 + \beta_1 * \mathrm{PE\ DUMMY_i} + \beta_2 * \mathrm{VC\ DUMMY_i} + \\ & \beta_3 * \mathrm{HMA\ DUMMY_i} + \beta_4 * \mathrm{RANK_i} + \\ & \beta_5 * \mathrm{SYNDICATE_i} + \beta_6 * \mathrm{SOLD_i} + \\ & \beta_{7\text{-}17} * \mathrm{INDUSTRIES_i} \end{aligned} \tag{6.3}$$

Where $Industries_i$ will comprise of a dummy variable for each of the 10 industries and Industry Basic Materials will be included in the intercept.

Additionally, we will also run a model where we exclude the variable (SOLD). Our reasoning is because the limited number of observations for the SOLD variable (342 out of 825) may introduce potential issues of statistical power and precision. By excluding this variable, we can ensure a larger sample size and potentially improve the reliability of the estimated coefficients for the remaining variables.
The alternative model, excluding the SOLD variable, is as follows:

$$\begin{aligned} Underpricing_i = \quad & \beta_0 + \beta_1 * \mathrm{PE\ DUMMY}_i + \beta_2 * \mathrm{VC\ DUMMY}_i + \\ & \beta_3 * \mathrm{HMA\ DUMMY}_i + \beta_4 * \mathrm{RANK}_i + \\ & \beta_5 * \mathrm{SYNDICATE}_i + \beta_{6-16} * \mathrm{INDUSTRIES}_i \end{aligned} \tag{6.4}$$

6.2 Long-Run Performance

Prior studies show that there is no exact science on how to conduct long-run IPO performance, as it depends on a number of critical factors, each affecting the final outcome. Building on prior research methods summarized Schöber's (2008) paper, we have highlighted five crucial factors need to be considered. Firstly, the choice of the metric used to measure abnormal returns, such as Buy and Hold Abnormal Returns (BHAR), Cumulative Abnormal Returns (CAR) and Wealth Relative (WR) significantly impacts the results. Secondly, the selection of an appropriate benchmark,

whether it is a region, country or industry specific index plays a decisive role. The third factor is the methodology for cross-sectional aggregation, which includes options like equal-weighted, value-weighted, or median abnormal returns. Fourthly, the analysis framework, whether event time or calendar time, can lead to differences in outcomes. Lastly, the non-normality of long-run stock returns presents challenges, necessitating careful selection of test statistics and critical value computation methods for assessing statistical significance. The following section will provide a comprehensive discussion for the choice of our methodologies.

6.2.1 Time Regime

When we conduct the analysis of long-run IPO performance, we have the choice to choose between event time and calendar time. Event time refers to a specific time regime utilized in an analysis, where the focus is on the timing of events or occurrences rather than the passage of calendar time. Under this framework, we define the IPO date as the initial event, then calculate the abnormal returns for each subsequent event time unit, which is measured in trading days and months in our analysis, then lastly average it across all sample firms. By using event time as the framework, we implicitly assume that the returns for each IPO is independent. However, in practice there exists cross-sectional dependence among IPO stocks, as highlighted by previous researchers (Schöber, 2008). This is due to the clustering of IPOs in time, leading to significant overlap in the measurement periods for the returns of IPO stocks within the sample. Consequently, common shocks can impact the returns of multiple IPO firms, creating cross-sectional dependence. This phenomenon has implications for the analysis, as t-statistics in an event time regime may be inflated, potentially leading us to mistakenly infer statistical significance where none exists. To mitigate the cross-sectional dependence issue, we incorporate time-specific dummy variables, such as the Hot Market Activity (HMA) indicator. Since there are some deviations across researchers on how to define HMA, we will also run additional tests where we replace the HMA dummy with annual dummies to thoroughly test the cross-sectional dependence for each specific year. This helps to alleviate any potential confounding factors stemming from cross-sectional dependence, resulting in more reliable and robust analysis.

6.2.2 Weighting Scheme

In the cross-sectional aggregation of abnormal returns, two weighting schemes are commonly used: equal-weighted and value-weighted. Equal-weighted returns assign equal importance to all IPO firms, giving more weight to smaller firms. This approach tends to result in larger abnormal returns, particularly for anomalies observed among smaller firms. However, spurious conclusions can arise if the chosen benchmark does not adequately control for the "size effect" or if the asset pricing model struggles to explain the returns of small stocks. On the other hand, value-weighting can pose challenges when a small number of very large firms dominate the sample. This dominance can distort overall performance measures and obscure the performance patterns of smaller firms. Extensive discussions by research pioneers shed light on the pros and cons of these weighting schemes in the context of event studies with long-run abnormal returns (Fama, 1998; Loughran & Ritter, 2000).

Given the advantages and disadvantages of both weighting methods, our research will employ equal-weights as the preferred approach. As we preferably would like to test for both methods, it is important to state that this decision is solely driven by the absence of reliable data on market capitalization or asset values at the time of each company's IPO.

6.2.3 Abnormal Return Metrics

According to prior scholars, the two most common metrics used to calculate abnormal returns are BHAR and CAR (Schöber, 2008). We choose to follow these practices to enable comparability with existing research. The following section will provide a definition for each metric and a discussion of the advantage and disadvantage of the two.

The buy-and-hold abnormal return for company i until month T ($BHAR^i_{1,T}$) is the difference between the compounded return of the stock of company i and the compounded return of the benchmark.

$$BHAR^i_{(1,T)} = \prod_{t=1}^{T}(1 + R^i_t) - \prod_{t=1}^{T}(1 + R^{(i,B)}_t) \tag{6.5}$$

In simple terms, the BHAR is calculated by comparing the stock returns of a firm (R_i) to the benchmark returns ($R^{(i,B)}$) over a specific holding period (T). However, if the firm delists before the holding period ends, the BHAR calculation is

adjusted accordingly. This adjustment follows standard practices observed in long-run performance studies of IPO firms (Ritter, 1991; Loughran & Ritter, 1995; Brav & Gompers, 1997; Gompers & Lerner, 2003).
BHARs offer the advantage of accurately capturing the experience of a buy-and-hold investor. However, they can exhibit extreme values due to the compounding effect over multiple periods. Consequently, there are concerns regarding the reliability of statistical tests conducted using BHARs. Additionally, some argue that mean BHARs can be heavily influenced by a small number of firms with substantial share price increases.

Responding to these considerations, some academics advocate the use of Cumulative Abnormal Return (CAR). The CAR for company i until month T ($CAR^i_{(1,T)}$) is calculated by summing the monthly abnormal returns for company i over time.

$$CAR^i_{(1,T)} = \sum_{t=1}^{T}(1 + R^i_t) - (1 + R^{(i,B)}_t) \tag{6.6}$$

To handle the delisting of firms before the end of the holding period when computing Cumulative Abnormal Returns (CARs), we adopt the approach outlined in Holthausen and Larcker (1996). In this methodology, we assign zero values to both the monthly returns of the delisted firm's stock and the benchmark. This assumption reflects a trading strategy where any proceeds from delisted firms, if applicable, are reinvested in the market. Consequently, all abnormal returns for delisted companies are considered zero following their delisting event (Holthausen & Larcker, 1996).
CARs provide a straightforward measure of the cumulative abnormal performance of a stock over a specified period, capturing the overall impact of events and market movements. However, it is important to acknowledge a potential drawback of CARs: their susceptibility to an upward bias caused by additive cumulation in the presence of bid-ask spreads. Despite this limitation, the benefits of CARs in terms of interpretability and comparability with existing research make them a valuable tool for studying long-run performance (Blume & Stambaugh, 1983; Roll, 1983; Conrad & Kaul, 1993).

In the following, we will use both BHAR and CAR since they both have their advantages, and to be able to compare our findings with prior studies. However, our discussion concentrates on BHAR as they are the most appropriate metric of investor experience.

6.2.4 Benchmark

Although unadjusted stock returns are of interest because of their ability to exactly reflect the return of a buy and hold investor, using a benchmark and analyzing abnormal returns is crucial when assessing long-run performance. Firstly, normal unadjusted returns do not provide a clear basis for comparison or evaluation since they are influenced by overall market movements and cannot isolate the performance of a specific investment. By using a benchmark, which represents the market or a relevant sector, we can compare the performance of an investment against the overall market or a similar set of companies. Moreover, abnormal returns allow us to measure the performance that is over and above what can be attributed to general market movements. They capture the excess returns or deviations from what would be expected based on the benchmark. This is important because it helps us understand whether the investment has outperformed or underperformed relative to the market.

According to Schöber (2008), the existing literature highlights two primary types of benchmarks that dominate the analysis of long-run IPO performance. The first type is a broad equity market index, which provides a measure of the overall market return. Utilizing a broad equity index offers advantages such as data availability and facilitates comparison with prior research findings.
Secondly, a comparable firm or a portfolio of comparable firms, such as an industry-specific index, can serve as a benchmark. This approach has the advantage of capturing the characteristics similar to the company under analysis, enabling a more accurate comparison.
Lastly, a more alternative approach is to compare the returns of IPO firms with the expected returns predicted by an asset pricing model, such as the capital asset pricing model, Fama-French three-factor model (1993), or Carhart four-factor model (1997). The estimation of these models provides an "alpha," which represents the risk-adjusted performance of IPO firms. Using asset pricing models eliminates the need for size and book-to-market information or a matching mechanism. However, the drawback is that this approach simultaneously tests the abnormality of returns and the validity of the model, known as the “joint hypothesis problem” (Fama & French, 1993).

Based on a thoroughly evaluation of the discussed alternatives, our research will be conducted using multiple benchmarks. Specifically, we will utilize the MSCI Nordic Country Index as a broad equity market index to monitor the overall performance

of the Nordic countries. Additionally, we will employ country-specific indices, such as HEX, KAX, OSEAX, and SAX, to account for the unique characteristics of each individual country. Furthermore, to capture the distinct risk profiles associated with each IPO firm, we will incorporate ten industry-specific indices. By adopting this multi-index framework, we aim to capture a nuanced understanding of the long-run performance of IPOs in the Nordic region.

6.2.5 Statistical Tests for Long-Run Performance

In our choice of a statistical test we acknowledge the non-normal distribution of the data and account for the skewness caused by the asymmetric nature of stock returns. For that reason, we chose to test our hypotheses using non-parametric tests that do not assume normality. More specifically, we use the Wilcoxon signed-rank test to check if the median difference for both BHAR and CAR is significantly different from zero and Wilcoxon-Mann-Whitney test to test whether sponsorship status between the three subgroups has a significant effect on long-run performance differences.
Our choice is in line with the argumentation by Barber and Lyon (1997), that these non-parametric tests is superior in datasets dealing with extreme outliers, which is further is further supported by prior literature (Veld & Veld-Merkoulova, 2004; Schöber, 2008; Cao & Lerner, 2009).

6.2.6 Multivariate Regression Model for Robustness Checking

The inclusion of a multivariate regression model in our analysis serves as a valuable complement to the individual statistical tests. While the individual tests allow us to examine specific relationships and differences between variables, the multivariate regression model offers a more holistic approach to understanding the complex relationship among multiple factors influencing the long-run performance of IPO firms as mentioned in Chapter 2.
To account for various factors and provide a comprehensive analysis, we conduct several Ordinary Least Squares (OLS) regressions. Our chosen dependent variables are the BHARs and CARs based on 12 and 24 months, where the abnormal returns are systematically calculated using country and industry-specific indices. To address potential "hot market" effects, we introduce a dummy variable (HMA DUMMY) that takes the value of 1 if the listing occurred during a high market activity period and 0

otherwise.

Additionally, we examine differences in long-run aftermarket performance between sponsorship status by including dummy variables for private equity (PE DUMMY) and venture capital (VC DUMMY) backing at the time of the IPO. To capture potential asymmetrical information issues, our model incorporates the number of underwriters in each transaction (UNDERWRITERS), as well as the reputation of the lead underwriter (RANK). Moreover, we include a continuous variable (SOLD) representing the size of the equity stake sold in the IPO, applicable to both venture capital and private equity cases. To further enhance our analysis, the model includes dummy variables (INDUSTRY) for each of the 11 industries in the FTSE Russell ICB category. By including these control variables, we aim to isolate the impact of the IPO itself from the broader industry trends or conditions that could potentially affect the performance of IPO firms, in line with the approach employed by Ritter (1991).

We will also use heteroscedastic-consistent standard errors to account for the possibility of unequal variability or heteroscedasticity in our data. This ensures that our statistical analysis is robust and accurate, even if there are differences in the variances of the error terms across different observations.

The model will be the following:

$$\begin{aligned} \textit{Abnormal return}_i = \beta_0 &+ \beta_1 * \text{PE DUMMY}_i + \beta_2 * \text{VC DUMMY}_i \\ &+ \beta_3 * \text{HMA DUMMY}_i + \beta_4 * \text{RANK}_i \\ &+ \beta_5 * \text{SYNDICATE}_i + \beta_6 * \text{SOLD}_i \\ &+ \beta_{7-17} * \text{INDUSTRY}_i \end{aligned} \tag{6.7}$$

Where INDUSTRY will comprise a dummy variable for each of the 11 industries. The Industry Basic Materials is included in the intercept.

Furthermore, we include the variable UNDERPRICING in our model to examine the relationship between underpricing and long-run performance, which is widely studied in the IPO literature (Ritter, 1991; Teoh et al., 1998; Miller, 1977; Chemmanur & Fulghieri, 1994).

$$\begin{aligned} \textit{Abnormal return}_i = \beta_0 &+ \beta_1 * \text{PE DUMMY}_i + \beta_2 * \text{VC DUMMY}_i \\ &+ \beta_3 * \text{HMA DUMMY}_i + \beta_4 * \text{RANK}_i \\ &+ \beta_5 * \text{SYNDICATE}_i + \beta_6 * \text{SOLD}_i \\ &+ \beta_{7-17} * \text{INDUSTRY}_i + \beta_{18} * \text{UNDERPRICING}_i \end{aligned} \tag{6.8}$$

Finally, we run two additional models for long-run performance where we exclude the variable (SOLD). The decision is based on similar reasoning as the underpricing model, as the SOLD variable has a limited number of observations in this dataset, specifically 281 out of the total 664 observations.
The alternative models, excluding SOLD variable, is as follows:

$$\begin{aligned} \textit{Abnormal return}_i = \beta_0 &+ \beta_1 * \text{PE DUMMY}_i + \beta_2 * \text{VC DUMMY}_i + \\ &\beta_3 * \text{HMA DUMMY}_i + \beta_4 * \text{RANK}_i + \\ &\beta_5 * \text{SYNDICATE}_i + \beta_{6-16} * \text{INDUSTRIES}_i \end{aligned} \tag{6.9}$$

$$\begin{aligned} \textit{Abnormal return}_i = \beta_0 &+ \beta_1 * \text{PE DUMMY}_i + \beta_2 * \text{VC DUMMY}_i + \\ &\beta_3 * \text{HMA DUMMY}_i + \beta_4 * \text{RANK}_i + \\ &\beta_5 * \text{SYNDICATE}_i + \beta_{6-16} * \text{INDUSTRIES}_i + \beta 17 * \text{UNDERPRICING}_i \end{aligned} \tag{6.10}$$

7 Results and Analysis

The results and analysis section of this thesis is divided into two main sections: underpricing and long-run performance. Each section comprises several subsections that focus on specific aspects of the analysis. In the underpricing section, we explore the distributional properties of the underpricing data, analyze the returns, investigate result differences based on sponsorship status, and examine the presence of IPO cyclicality. In the long-run performance section, we delve into the distributional properties of the long-run performance data, analyze the returns, assess industry performance, and conduct a robustness check using a multivariate regression model

7.1 Underpricing Results

7.1.1 Distributional Properties of First-Day Returns

Table 7.1 displays the distribution of initial returns for each main subgroup. The analysis reveals that the first-day returns exhibit a kurtosis of 177.56, indicating a highly peaked distribution with heavy tails. The skewness value is 10.13, indicating a significant departure from symmetry. Moreover, the mean initial return is recorded as 9.91%, while the median stands at 3.00%. This discrepancy indicates a right-skewed distribution, with a higher mean compared to the median.

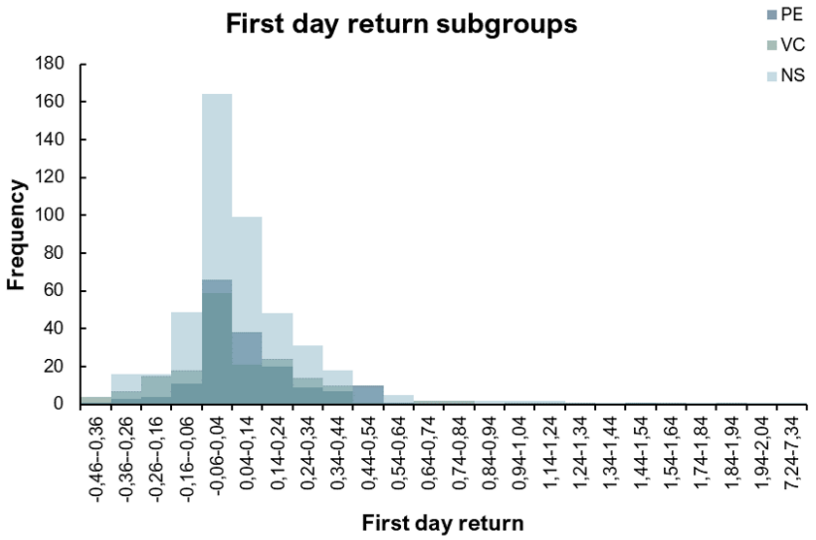
To assess the departure from normality, we conducted both a Jarque-Bera test and a Shapiro-Wilk test where both indicate a significant deviation from normality, reinforcing the non-normal nature of the distribution. An important consideration is the presence of extreme positive values in the dataset, which can potentially distort the average initial returns. One possible approach to mitigate this effect is to use median returns instead. However, in line with the majority of prior studies, we have chosen to focus on average returns to ensure comparability and relevance with the existing literature.

We also aim to provide insights from an investor's perspective so by including these outliers in our analysis, we aim to capture the full range of returns experienced by holders of the IPO portfolio. Within our sample, we have

observed notable instances of high underpricing in certain PE and VC-backed IPOs. Specifically, around 4.7% of the PE-backed companies have exhibited first-day returns exceeding 50%. These findings suggest that the involvement of a financial sponsor does not necessarily remove the possibility of money being left on the table for the issuing company.

Table 7.1: Distribution of first-day returns

The dataset comprises 825 IPOs, where the initial return for each firm is defined as the percentage difference between the offer price and the closing price on the first day of trading. Table 7.1 presents various statistical measures characterizing the distribution of these initial returns for each main subgroup.



	Mean	Median	Minimum	Maximum	Standard Deviation	Skewness	Kurtosis
All	9,91%	3,00%	-45,45%	730,00%	36,99%	10,13	177,56
PE	8,92%	2,92%	-45,45%	147,33%	22,48%	1,99	8,14
VC	8,35%	2,95%	-41,74%	161,29%	23,55%	2,29	9,91
NS	10,87%	3,05%	-38,89%	730,00%	36,92%	10,21	179,37

7.1.2 First-Day Returns

Table 7.2 provides a comprehensive overview of the first day returns, examining both average equal-weighted and median returns for all three subgroups. To gain deeper insights, the results are further categorized based on market activity, enabling us to explore the influence of IPO cyclicality. The statistical significance of the average returns was assessed using a t-test to determine their deviation from zero.

In our analysis, we observed notable findings in terms of average equal-weighted

returns. For all firms, the average return stood at 10%, while PE-backed IPOs recorded an average return of 9%. Similarly, VC-backed IPOs and NS IPOs exhibited average returns of 8% and 11% respectively. Importantly, all of these average returns were found to be statistically significant at the 1% level. Examining the median returns, we found consistent patterns. The median return for all firms was 3%, while PE-backed IPOs showed a median return of 4%, VC-backed IPOs demonstrated 1%, and NS IPOs exhibited a median return of 3%. These results align with our expectations as outlined in hypothesis 1 as well as previous literature summarized section 2.2.5.

Further examination across different IPO market activity periods reveals noteworthy insights. Specifically, IPOs launched during HMA periods exhibit higher levels of underpricing compared to those launched during LMA periods. When considering equal-weighted returns, all subgroups during the HMA period demonstrate statistically significant results at the 1% level. However, during the LMA period, we observe significant results at the 10% level only when examining all firms collectively. These findings align with prior research and supports our hypothesis 2, which posits that all IPOs will experience a greater degree of underpricing in HMA periods.

Table 7.2: First Day Returns by subgroup and IPO Cyclicality

The dataset consists of a total of 825 initial public offerings (IPOs) from the period 2001 to 2022. This includes 171 IPOs backed by private equity (PE), 182 IPOs backed by venture capital (VC), and 472 non-sponsored (NS) IPOs. The sample encompasses IPOs from the Nordic countries, including Iceland. To analyze the data, equal-weighted averages are calculated, and a two-sided t-test is conducted to assess whether these averages significantly differ from zero.

	All	**PE**	**VC**	**NS**
Entire Time Period				
Average equal-weighted (%)	10***	9***	8***	11***
	(0,0000)	*(0,0000)*	*(0,0003)*	*(0,0000)*
Median (%)	3	4	1	3
Number of observations	825	171	182	472
High Market Activity				
Average equal-weighted (%)	11***	10***	9***	12***
	(0,0000)	*(0,0000)*	*(0,0002)*	*(0,0000)*
Median (%)	4	5	3	4
Number of observations	693	149	154	391
Low Market Activity				
Average equal-weighted (%)	3*	3	3	4
	(0,0969)	*(0,2819)*	*(0,5735)*	*(0,1507)*
Median (%)	0	1	0	0
Number of observations	132	22	29	81

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Information asymmetry has been widely recognized as a significant factor contributing to the underpricing of IPOs. Akerlof's seminal work in 1970 on information asymmetry between insiders and outsiders, as outlined in our literature review, laid the foundation for understanding how incomplete information can lead to mispricing. Our findings align with this theory, as we observed significant underpricing across all subgroups of IPOs, including PE-backed, VC-backed, and NS IPOs.

Costly information acquisition is another theory explored in the literature as a possible explanation for underpricing. Booth and Chua (1996) argue that high information-gathering costs for investors may lead to underpricing as a means to compensate for these expenses. Our findings support this perspective, as we observed average equal-weighted returns of 10% for all firms, suggesting a potential adjustment for the costs incurred in gathering information. This

observation could be attributed to the significant presence of industrial, health care, and technology companies, which all have emerging and untested business models in the market. However, it is important to note that our dataset does not directly measure information acquisition costs, so we cannot directly test this hypothesis.

Additionally, our findings highlight the potential presence of information asymmetry between the underwriter and the issuer, as discussed in the literature. Benveniste and Spindt (1989) propose that underwriters, who possess valuable market knowledge, may intentionally underprice IPOs to allocate shares to their preferred clients, resulting in a "successful" IPO with positive first-day returns. Although our study does not directly measure the impact of underwriters' motivations on underpricing, the consistent underpricing patterns observed in all subgroups of IPOs support the notion that this practice may be prevalent in the Nordic region as well.

Further, comparing IPOs with financial sponsors against non-sponsored, we observe that PE- and VC-backed companies experience lower degree of underpricing than NS, with returns significantly different from zero. This is in line with the studies of Bergström et al. (2006) and Levis (2011) who suggest that PE-backed IPOs tend to be underpriced to a lesser extent than NS IPOs. Therefore, our results indicate that private equity firms, which actively manage their portfolio companies, may possess better pricing abilities, leading to IPOs that are closer to their fundamental value.

7.1.3 Underpricing Differences in Subgroups and IPO Cyclicality

Our findings, as presented in Table 7.2, reveal similar patterns of underpricing across all subgroups of IPOs. However, notable differences emerge in the levels of underpricing among them. Specifically, VC-backed IPOs exhibit the lowest level of underpricing at 8%, followed by PE-backed IPOs at 9%, and NS IPOs at the highest level of 11%. To assess the significance of these first-day returns, we conducted a two-sided t-tests, comparing each subgroup's returns against zero, as outlined in Hypothesis 1a. Table 7.3 summarizes the results of our t-test analysis. Interestingly, none of the returns for the subgroups are statistically

significant when compared to each other at any accepted significance levels. Despite this lack of statistical support, it is worth mentioning that the observed 2% difference in underpricing between PE-backed and NS IPOs goes in the right direction of hypothesis 1a, but do not statistical confirmation in our research. Our findings contradicts the studies conducted by Bergström et al. (2006) and Levis (2011), which highlight significant lower levels of underpricing in IPOs backed by financial sponsors. As we find that there is no difference in underperformance across the subgroups our findings is different from the theoretical and empirical support in the literature, suggesting that PE-backed IPOs tend to exhibit comparatively lower underpricing.

Table 7.3: Difference in Equal-Weighted First-Day Returns Across Subgroups

The total sample includes 825 IPOs comprising of 171 PE, 182 VC and 472 NS. The table present the results from testing if the first-day returns across all three subgroups are significantly different from zero. The test is conducted using a two sided t-test.

Subgroups	**PE**	**NS**	**PE**	**VC**	**NS**	**VC**
Mean (%)	9	11	9	8	11	8
P-Value		0,57		0,47		0,84

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Further, our analysis delved into the impact of hot versus cold markets on IPO underpricing, and the results are summarized in table 7.4. Notably, we found statistically significant differences in returns when considering all companies together and NS IPOs. The differences were significant at the 5% and 10% level respectively, supporting the existing literature that highlights the influence of market conditions on IPO underpricing, as discussed by Ibbotson and Jaffe (1975) and Ritter (1994). This also supports our hypothesis 2, which posits that all IPOs will experience higher levels of underpricing during hot market periods. Conversely, when examining the difference in returns for PE-backed and VC-backed IPOs during hot market periods versus cold market periods, we did not observe statistically significant differences between the two periods. These findings align with our hypothesis 2a and are consistent with the observations made by Levis (2011), who suggested that PE-backed IPOs are less affected by market cyclicality compared to non-sponsor-backed IPOs.

Table 7.4: Difference in Equal-Weighted First-Day Returns Between IPO Cycles

The total sample includes 825 IPOs comprising of 171 PE, 182 VC and 472 NS. The table present the results from testing if the first-day returns across all three subgroups are significantly different from zero. The test is conducted using a two sided t-test.

Subgroups	**HMA All**	**LMA All**	**HMA PE**	**LMA PE**	**HMA VC**	**LMA VC**	**HMA NS**	**LMA NS**
Mean (%)	11	3	10	3	9	4	12	4
P-Value	0,028		0,1232		0,3499		0,0976	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

7.1.4 OLS Regression for Robustness Checking of First-Day Returns

The results obtained from our multivariate regression models 6.3 and 6.4 is summarized in table 7.5. It is noteworthy that both models demonstrate weak explanatory power, as indicated by the adjusted R-squared values of 4.7% and 2.3% respectively. Despite the low adjusted R-squared values, both models exhibit statistical significance at the 1% level, with coefficients of 2.05 and 2.29 respectively.

Upon examining each individual variable, we observe that the PE and VC DUMMY variables have negative coefficients of -8.7% and -4.1% respectively in model 6.3, and -1.1% and 1.7% respectively in model 6.4. These findings align with studies from Bergström et al. (2006) and Levis (2011) as well as our expectations reflected in hypothesis 2a. However, these variables are not statistically significant, leading us to fail in rejecting the null hypothesis based on our data. As for the LMA DUMMY variable, we observe negative coefficients in both models, with model 6.4 also yielding significant results at the 10% level. This further supports our hypothesis 2 and previous literature, suggesting that IPOs listed during high market activity periods experience higher levels of underpricing compared to those listed during low market activity periods Ibbotson & Jaffe, 1975; Ritter, 1984; Loughran & Ritter, 2004).

Additionally, our models analyze the impact of underwriter reputation and syndicate size on underpricing. The underwriter rank exhibits slightly negative coefficients in both models, but they are not statistically significant. Therefore,

our model estimates the coefficients in line with previous studies from Carter and Manaster (1990) but it lacks statistical support to accept hypothesis 4, that issues with high ranked underwriters exhibit lower underpricing.

Regarding syndicate size, we observe differing results between model 6.3 and 6.4. The former shows a positive coefficient of 0.3%, while the latter shows a negative coefficient of -0.6%. However, neither of these coefficients attains statistical significance at an acceptable level. Consequently, our models present divided results compared to previous studies conducted by Corwin and Schultz (2005), which indicated a negative relationship between underpricing and the number of underwriters. As a result, our research does not provide sufficient explanatory power to accept hypothesis 5.

Furthermore, our models investigate the impact of each industry on underpricing, with BASIC MATERIALS serving as the reference industry included in the intercept. The results demonstrate strong statistical significance at the 1% level in both models, except for the FINANCIALS industry, which exhibits significance at the 5% level in model 6.4. Therefore, our models suggest that underpricing is highly dependent on the industry to which a company belongs. In our sample, BASIC MATERIALS exhibit the highest level of underpricing, as interpreted by the highly negative coefficients for the other industries.

Lastly, we investigate SOLD in model 6.3 to analyze the relationship between fraction of shares sold in line with "Realignment of Incentives" hypothesis covered by (Ljungqvist & Wilhelm, 2003; Loughran & Ritter, 2004). Our model estimates that for each 1% increase in the fraction of shares sold, there is a 4.6% decrease in underpricing. This direction of the coefficient supports prior literature. However, the result is not statistically significant at any accepted level, likely due to the limited number of observations for IPOs with selling shareholder information in our dataset (343 out of 825 IPOs).

Table 7.5: OLS regression with first-day returns as dependent variable

The table reports the results from the OLS regression of first day returns with 16 explanatory variables. PE, VC, LMA and each ICB industry are dummy variables, taking the value 1 the IPO is matching the characteristics. RANK, SYNDICATE, and SOLD are continous variables.

	First-Day Returns		
Variables	**(1)**	**(2)**	**(3)**
Constant	0,17097***	0,43442***	0,87611***
	(0,0000)	*(0,0000)*	*(0,0000)*
PE DUMMY	-0,01311	-0,01136	-0,08738
	(0,7002)	*(0,7437)*	*(0,1923)*
VC DUMMY	-0,02975	-0,01701	-0,04091
	(0,3579)	*(0,6126)*	*(0,5710)*
LMA DUMMY	-0,07834**	-0,08564**	-0,12810
	(0,0266)	*(0,0152)*	*(0,1020)*
RANK	-0,00613	-0,00616	-0,01801
	(0,2976)	*(0,3030)*	*(0,1406)*
SYNDICATE	-0,00605	-0,00568	0,00369
	(0,5259)	*(0,5504)*	*(0,8286)*
CONSUMER DISCRETIONARY		-0,27989***	-0,58547***
		(0,0001)	*(0,0001)*
CONSUMER STAPLES		-0,33635***	-0,64547***
		(0,0000)	*(0,0007)*
ENERGY		-0,30426***	-0,68524***
		(0,0000)	*(0,0000)*
FINANCIALS		-0,24461***	-0,55199***
		(0,0017)	*(0,0007)*
HEALTCH CARE		-0,30018***	-0,68538***
		(0,0000)	*(0,0000)*
INDUSTRIALS		-0,27000***	-0,60804***
		(0,0001)	*(0,0000)*
REAL ESTATE		-0,29702***	-0,62192***
		(0,0004)	*(0,0006)*
TECHNOLOGY		-0,26510***	-0,55927***
		(0,0002)	*(0,0002)*
TELECOM		-0,22004**	-0,45901**
		(0,0354)	*(0,0197)*
UTILITIES		-0,12713	-0,70863***
		(0,2229)	*(0,0049)*
SOLD			-0,04643
			(0,7637)
Adjusted R Squared	0,0035	0,023	0,04719
Observations	825	825	343
P-Value	0,165	0,00348	0,01001

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

7.2 Long-Run Performance Results

The following section presents the results using the event time approach. The analysis begins by examining the distributional characteristics of the abnormal returns, considering both BHAR and CAR. This is followed by a comprehensive analysis of abnormal returns. Finally, the section concludes with a brief comparison of our findings with those of similar studies and a discussion on the validity and reliability of our results.

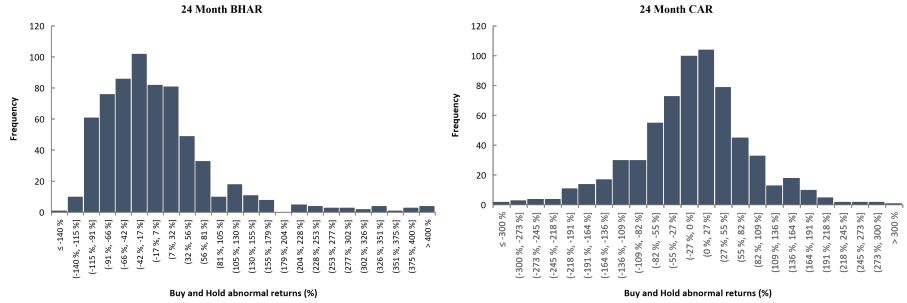
7.2.1 Distributional Properties of Abnormal Returns

Table 7.6 presents the distribution of 24-month BHARs and CARs. Examining the distribution of 24-month BHARs (on the left), we observe that they are truncated on the left-hand side, displaying a pronounced fat right-hand tail and a significant positive skewness. This is evidenced by a reported kurtosis of 13.06 and skewness of 2.73. In contrast, the distribution of 24-month CARs (on the right) does not exhibit the same positive skewness. Instead, it shows fat left-hand tails and a moderately negative skewness, with a kurtosis of 1.45 and a skewness of -0.11.

To evaluate the normality of the distributions, we employed both the Shapiro-Wilk and Jarque-Bera tests. The results indicate that the null hypothesis of normality was rejected for both samples at a 1% significance level. Thus, we can conclude that both the distributions of 24-month BHARs and CARs deviate from the normal distribution.

Table 7.6: Distribution of first-day returns

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.



The observed properties of the two abnormal return methods are in line with previous literature on the topic (Bergström et al., 2006; J. R. Ritter, 1991; Schöber, 2008). BHARs exhibit truncation on the left-hand side because the minimum unadjusted buy-and-hold return is -100%. This truncation arises from the finite return of benchmark indices over a two-year period, necessitating a minimum value for abnormal buy-and-hold return. As evident from Table 7.6, the mean BHAR is significantly influenced by a few stocks with exceptionally positive performance. This influence is exacerbated by the truncation on the left side of the BHAR distribution. Schöber (2008) cautions against interpreting mean BHARs, especially over longer holding periods, as they tend to be biased upward due to the presence of these few extremely positive values.

To address this issue, the analysis focuses on medians rather than means. One potential approach to handle extreme values is through winsorizing, which involves replacing extreme values in the dataset with values within a specified range. However, it's important to note that winsorizing can potentially distort the original data and its underlying characteristics. Alternatively, using medians allows for the retention of the original values, providing and less sensitive to extreme values. Therefore, by employing medians we can avoid subjectivity bias and better preserve the integrity of the data. Testing using medians also have some shortcomings. Relying solely on medians disregards valuable information

about the complete distribution and leads to under utilization of the overall data when using median tests. With the arguments presented considered, the analysis emphasizes the use of medians instead of means, as it allows for a more robust assessment of IPO performance while retaining the original values. This approach avoids potential distortions introduced by winsorizing and minimizes subjectivity bias in the analysis.

7.2.2 Abnormal Returns

The share price performance of IPO firms in event time is ambiguous, and the conclusions drawn from the results presented below depend on the choice of abnormal return metrics, the benchmark used, and the specific holding periods examined.

On the one hand, the median values of BHARs after two years of trading range from -20% to -12% compared to the country-specific indices and the MSCI Nordic Countries Index, indicating underperformance of IPO firms in the long run. Table 7.7 reports the median and equal-weighted average buy-and-hold abnormal return (BHAR) in event time for 12 and 24-month holding periods for IPOs listed in the Nordic region during the time period from January 2001 to May 2021. Additionally, it presents the findings for three subgroups within our sample, namely listings that were either private equity (PE)-backed, venture capital (VC)-backed, or non-sponsored IPOs. Our results, which examine country-specific underpricing, provide strong evidence of long-run underperformance for all new listings. According to Wilcoxon signed-rank tests, the long-run underperformance is statistically significant at a 1% level. The long-run underperformance is also evident for all three subgroups, with statistical significance at 5% or lower. However, when considering the MCSI Nordic Index, the subgroups do not show statistically significant long-run underperformance. In general, these subgroups report higher medians, with only non-sponsored IPOs showing statistically significant underperformance at a 10% level.

Table 7.7: Buy and Hold abnormal return (%) in event time

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

	Median (%)				**Equal-weighted average (%)**			
Months	**All firms**	**PE**	**VC**	**NS**	**All firms**	**PE**	**VC**	**NS**
Panel A. MSCI Country Total Return indices								
12 months	-9,8***	-3,7	-26,9***	-7,5***	-0,7	-3,4	2,4	-0,9
24 months	-20,0***	-14,7**	-30,0**	-16,9***	-0,7	-2,4	9,5	-3,9
Panel B: MSCI Nordic Total Return Index								
12 months	-6,7**	-2,6	-23,4**	-5,8*	3,3	-0,2	5,5	3,9
24 months	-11,9**	-5,8	-25,6	-10,9*	6,8	4,8	16,1	4,1

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

However, when considering the median cumulative abnormal returns (CARs) of IPO firms across various benchmarks, a more nuanced picture emerges. Panel A reveals clear evidence of long-run underperformance for all firms, with statistical significance at the 5% level. On the other hand, the findings in Panel B suggest that IPO firms demonstrate a tendency to outperform the stock market. Nevertheless, the results from the Wilcoxon signed-rank tests do not provide substantial evidence of long-run outperformance.

Table 7.8: Cumulative abnormal return (%) in event time

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median CAR significantly deviates from zero.

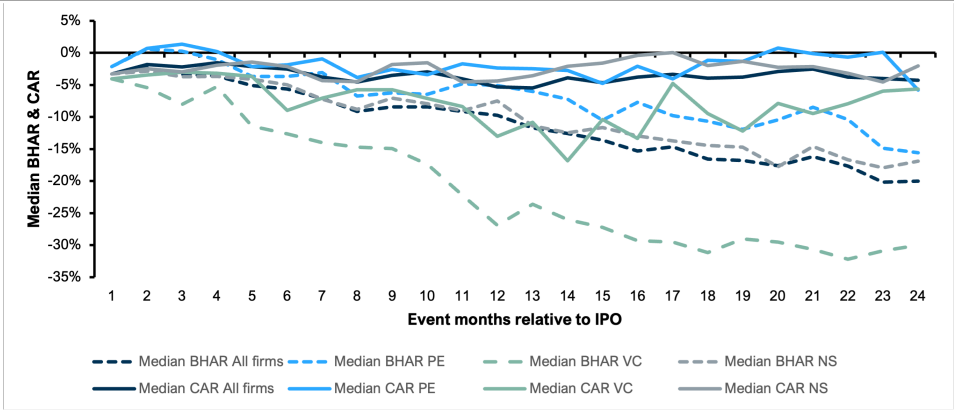
	Median (%)				**Equal-weighted average (%)**			
Months	**All firms**	**PE**	**VC**	**NS**	**All firms**	**PE**	**VC**	**NS**
Panel A. MSCI Country Total Return indices								
12 months	-5,3***	-1,9	-13,4	-4,4**	-4,9*	-6,6	-4,3	-4,5
24 months	-4,3**	-5,3	-6,1	-2,0	-9,1**	-14,1**	-6,6	-8,1*
Panel B: MSCI Nordic Total Return Index								
12 months	-1,4	0,7	-8,9	0,1	-1,0	-3,5	-1,4	0,0
24 months	4,3	2,3	-0,2	5,8	-2,4	-7,2	-0,8	-1,2

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and *** Represents significant at the 1% level*

Looking at the striking differences, Figure 7.8 shows the median BHAR and the median CAR with respect to the country specific indices for the holding periods from one to 24 months after the IPO. The graph shows the medians for both metrics for all firms and the three subgroups. The observed downward drift in CARs aligns with the findings reported by Ritter (1991) in his sample dataset.

Figure 7.1: Median abnormal returns vs. MSCI Country Total Return indices

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.



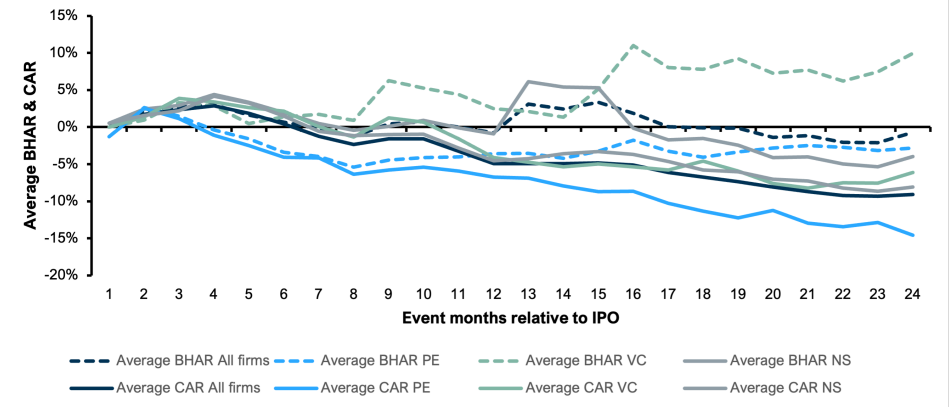
When examining the performance of IPO firms over a 24-month period, both the Buy and Hold Abnormal Returns (BHARs) and Cumulative Abnormal Returns (CARs) provide valuable insights. The Medians for both metrics consistently indicate a tendency towards underperformance. In contrast, the averages for both metrics present a mix of positive and negative values, suggesting periods of both outperformance and underperformance. These findings highlight the divergence between central tendency (median) and the influence of individual observations (average) in assessing the performance of IPO firms. However, it is worth noting that the notable difference between the equal-weighted average and medians can be primarily attributed to a limited number of firms, particularly those listed on multilateral trading facilities (MTFs) and classified as micro-caps. These stocks, often referred to as penny stocks by Schöber (2008), are known to display exceptional long-run performance. Given the potential bias introduced by these micro-cap stocks, we will prioritize the use of medians instead of equal-weighted averages for our analysis. By using medians, we can mitigate the impact of extreme outliers and obtain a more representative measure of the central tendency of the data.

This approach aligns with previous research supporting the use of medians in analyzing IPO performance, as it provides a more robust and reliable estimate of the typical performance experienced by IPO firms, while mitigating the

influence of extreme values that can distort the overall picture (Schöber, 2008).

Figure 7.2: Average abnormal returns vs. MSCI Country Total Return indices

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.



Our findings of the long-run underperformance of IPO firms are consistent with a wide range of prior research (Ritter 2001; Bergström, 2006; Levis, 2011). As discussed in Section 2.2.5, previous literature typically examines a 3-year holding period, so we anticipate some deviations when comparing our results. For instance, Levis (2011) documented negative 36-month equal-weighted average buy-and-hold abnormal returns (BHARs) for IPOs listed on the London Stock Exchange between January 1992 and September 2005, using four different benchmarks. However, on a 24-month basis, the equal-weighted returns relative to the Financial Times All-Share Index (FTA) showed an outperformance of 13.4%. Similarly, Ritter (1991) found a median 36-month return of -16.67%, contrasting with a matching firm's return of 38.54%, resulting in a BHAR of -55.21%. Although this difference is more significant in absolute terms, both samples indicate long-run underperformance, with Ritter utilizing a longer event window. Consistent with these findings, Brav et al. (2000) reported median BHARs of -30.4% over a 3-year period, demonstrating significant underperformance against the S&P 500 index. Our own median BHARs reported in Table 7.7 align with these results.

Moreover, Ritter (2001) and Bergström et al. (2006) documented significant long-run underperformance when examining equal-weighted cumulative

abnormal returns (CARs). This aligns with our findings in Table 7.8, where we observe -5.3% underperformance using country-specific indices as benchmarks. The relatively lower level of underpricing can be attributed to the shorter time period analyzed. Ritter (2001) reported 12.25% less underpricing when comparing 24 months to 36 months. Furthermore, our observation that the CARs exhibit less negative median values compared to BHARs is consistent with the findings of Schöber (2008).

In summary, the overall underperformance observed in our sample supports hypothesis 6, which states that all IPO firms underperform relative to broader equity indices in the. As mentioned in section 6.2.1, this thesis will emphasis the most on BHARs. Thus, we find support for hypothesis 6 in the sample.

7.2.3 Performance Differences

Upon examining the differences in abnormal returns among PE-backed, NS, and VC-backed IPOs, our analysis does not provide evidence supporting the notion that PE-backed IPOs exhibit lesser underperformance when compared to the other two groups. This conclusion is based on the results of the Wilcoxon-Mann-Whitney test, which indicates a lack of statistical significance between these subgroups. Table 7.9 illustrates these findings, showing the absence of significance for both benchmarks in Panel A and Panel B, respectively. Consequently, these findings fail to support hypothesis 6a, indicating a lack of substantial evidence to suggest that PE-backed IPOs consistently outperform other listings in the aftermarket.

These findings diverge from the findings of Jensen (1986; 1997), Bergström et al. (2006), and Levis (2011), who observed evidence that buyout-backed IPOs yield less negative abnormal returns in comparison to NS IPOs. Conversely, Viviani et al. (2008) presented contradictory results in their study of 168 IPOs in Italy between 1995 and 2005, demonstrating a negative correlation between PE-backed IPOs and long-run outcomes. While our sample does not allow us to draw definitive conclusions, we observe that PE-backed IPOs exhibit a lower degree of underperformance, although the difference is not statistically significant compared to the other subgroups. While our findings do not reach statistical significance, they align with our initial expectations that PE-backed

IPOs would exhibit higher BHARs compared to NS and VC-backed IPOs.

Table 7.9: Wilcoxon-Mann-Whitney test of differences of 24-month BHARs between listing groups

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index. Panel A and Panel B test the hypothesis that the distributions of 24-month BHARs in the two groups do not differ using a Wilcoxon-Mann-Whitney test and reports the corresponding p-values.

Subgroups	**PE**	**NS**	**PE**	**VC**	**NS**	**VC**
Panel A. MSCI Country Total Return indices						
Number of listings	146	375	146	143	375	143
Median	-14,7	-16,9	-14,7	-30,0	-16,9	-30,0
P-value	0,4911		0,1008		0,2584	
Panel B: MSCI Nordic Total Return Index						
Number of listings	146	375	146	143	375	143
Median	-5,8	-10,9	-5,8	-25,6	-10,9	-25,6
P-value	0,4969		0,1206		0,2307	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Similarly, our examination of 24-month CARs fails to yield statistically significant evidence supporting hypothesis 6a. These results, which are presented in Table 7.10, indicate that the p-values obtained from the Wilcoxon-Mann-Whitney test are larger when compared to those obtained for BHARs.

Table 7.10: Wilcoxon-Mann-Whitney test of differences of 24-month CARs between listing groups

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index. Panel A and Panel B test the hypothesis that the distributions of 24-month CARs in the two groups do not differ using a Wilcoxon-Mann-Whitney test and reports the corresponding p-values.

Subgroups	**PE**	**NS**	**PE**	**VC**	**NS**	**VC**
Panel A. MSCI Country Total Return indices						
Number of listings	146	375	146	143	375	143
Median	-5,3	-2,0	-5,3	-6,1	-2,0	-6,1
P-value	0,6536		0,8333		0,9712	
Panel B: MSCI Nordic Total Return Index						
Number of listings	146	375	146	143	375	143
Median	2,3	-0,2	2,3	-25,6	-0,2	-25,6
P-value	0,6438		0,7875		0,9492	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Considering the findings from Table 7.9 and 7.10, we observe no significant differences in the long-run performance between PE-backed IPOs and the other subgroups, irrespective of the choice of benchmark and abnormal return metrics. Consequently, our data does not provide support for hypothesis 6a.

7.2.4 Industry Performance

Table 7.11 provides an overview of the median 12 and 24-month industry BHARs where the industry-specific indices associated with the respective IPO listings are utilized as benchmarks for calculating abnormal returns. By transitioning to an industry-specific benchmark, we can explore whether initial public offerings (IPOs) demonstrate superior performance compared to their corresponding industries. More specifically, we aim to determine if private equity-backed IPOs outperform their industry peers.

Looking at Panel A, it becomes apparent that, out of the 11 industries examined, 8 industries display underperformance by IPO firms relative to their corresponding benchmarks over a 2-year period. However, statistical significance is only observed for the Consumer Staples and Health Care sectors, which exhibit significant underperformance at the 5% and 1% levels, respectively. Turning to Panel B, we find that PE-backed IPOs do not exhibit significant outperformance compared to their respective industry indices. It is worth noting that a substantial majority of PE-backed IPOs, approximately 72% of them, are concentrated within the Consumer Discretionary, Health Care, Industrials, and Technology sectors, as highlighted in section 5.2.3. Within these sectors, our analysis reveals no statistically significant evidence of outperformance. Moreover, our investigation indicates that PE-backed IPOs do not consistently outperform NS IPOs. Similarly, when comparing PE-backed IPOs to VC-backed IPOs, we observe a comparable lack of systematic outperformance.

Consequently, the findings derived from our data fail to provide statistical or economic support for hypothesis 9. These results deviate from our initial expectations, as documented by Levis (2011), wherein it was anticipated that PE-backed IPOs would exhibit outperformance in relation to their industry-specific index, as well as VC-backed and non-sponsored IPOs.

An analysis of the 24-month CARs reveals a distinct pattern that differs from the observations above. Notably, among the 11 industries examined, PE-backed IPOs show positive median CARs in 6 industries. However, despite this positive trend, PE-backed IPOs do not demonstrate a consistent outperformance compared to NS and VC-backed IPOs within their respective industries. It is important to highlight that only the Health Care sector exhibits statistical significance at a 10% level for PE-backed IPOs, with a negative coefficient. For a comprehensive summary of the CARs please refer to Appendix A2.

Table 7.11: Industry specific Buy and Hold abnormal return (BHAR)

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. The abnormal returns are calculated using 10 industry specific indices, where the IPO classification follows FTSE Russel ICB standards.The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

Equal-weighted median (%)											
Months	**Basic Materials**	**Consumer Discretionary**	**Consumer Staples**	**Energy**	**Financials**	**Health Care**	**Industrials**	**Real Estate**	**Technology**	**Tele communications**	**Utilities**
Panel A. All firm IPOs											
12 months	11,0	7,0	0,2	0,7	3,8	-16,0	-2,5	3,9	7,1	-24,8	-35,7**
24 months	-20,2	-1,94	-22,1**	-25,3	-2,05	-37,5***	-8,73	3,609	2,518	17,77	-26,7*
Panel B. Private equity-backed IPOs											
12 months	-0,4	8,4	16,8	-77,8	2,5	-14,8	11,4*	-17,5	2,4	44,6	-35,4
24 months	-17,2	-1,94	12,76	-48,5	-0,56	-19,4	5,321	8,913	-5,30	17,77	-63,9
Panel C. Venture Capital-backed IPOs											
12 months	49,4	7,0	-2,9	-21,9	26,9	-19,0	-21,3	-15,2	10,0	-24,8	1,7
24 months	-22,8	-30,8	-30,3	-37,8	44,31	-45,7*	-49,0*	14,94	3,235	36,90	-2,81
Panel D. Non-sponsored IPOs											
12 months	11,0	6,4	-4,5	6,2	3,5	-16,0	-5,9	7,4	7,1	-50,3*	-39,1**
24 months	-21,6	-0,23	-41,8***	-11,6	-3,07	-33,4**	-7,37	2,466	17,07	-47,1	-25,3

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

7.2.5 IPO Cyclicality

In Table 7.11, we present the results of our analysis on cyclicality by examining the BHARs. When considering all firms, regardless of the activity period, we observe a consistent trend of underperformance. Specifically, in the high market period, BHAR is -18.4%, while in the low market period, it is -22.1%. Both of these results are statistically significant at the 1% and 5% levels respectively, indicating a strong association between market conditions and negative abnormal returns when looking at all firms.
Nevertheless, when examining the subgroups, we uncover a more nuanced perspective. NS IPOs show a higher level of underperformance in the high market activity (HMA) period compared to the low market activity (LMA) period. In the HMA period, NS IPOs reported a -17.4% median 24-month BHAR, whereas in the LMA period, it was -12.7%. However, these results are only statistically significant in the high market activity period at a 1% significance level.

On the contrary, PE- and VC-backed IPOs exhibit less underperformance during HMA periods compared to LMA periods. PE-backed IPOs report a 24-month median BHAR of -11.3% in HMA, compared to -25.8% in LMA, while VC-backed IPOs report a -29.7% median BHAR in HMA, as opposed to -37.5% in LMA. However, it is worth noting that these findings are only statistically significant for the HMA period at a 10% significance level for both subgroups.

Table 7.12: Buy and Hold abnormal return (%) in event time

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country) and MSCI Nordic total return index.The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

	Median (%)				**Equal-weighted average (%)**			
Months	**All firms**	**PE**	**VC**	**NS**	**All firms**	**PE**	**VC**	**NS**
Panel A. High Market acitivy								
12 months	-8,9***	-7,1	-21,6**	-6,9***	0,0	-5,3	4,5	0,5
24 months	-18,4***	-11,3*	-29,7*	-17,4***	-1,33	-2,39	10,57	-5,48
Panel B. Low Market Activity								
12 months	-16,7***	-0,3	-29,6*	-13,7**	-5,4	9,5	-9,9	-8,4
24 months	-22,1**	-25,8	-37,5	-12,7	2,872	-2,21	3,086	4,373

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Additionally, as illustrated in Table 7.13, all IPOs perform worse in the long run when listed in the HMA period compared to the LMA period. This pattern holds true for the different subgroups, except for PE-backed IPOs, which perform better when floated in the HMA period. Looking at the medians, PE-backed IPOs report a -2.3 median CAR in the HMA period, whereas it is -17.0% in the LMA period. In contrast, VC-backed and NS IPOs report a -5.5% and -3%.1 24-month CAR in the HMA period, against -5.4% and 5.1% median CAR in the LMA period, respectively. However, it is important to note that none of these results are significantly different from zero, implying that the estimates do not provide sufficient evidence to conclude that there is a significant effect or relationship.

Table 7.13: Cummulative abnormal return (%) in event time

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country). The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median CAR significantly deviates from zero.

	Median (%)				**Equal-weighted average (%)**			
Months	**All firms**	**PE**	**VC**	**NS**	**All firms**	**PE**	**VC**	**NS**
Panel A. High Market acitivy								
12 months	-4,4**	-2,4	-11,7	-2,4	-4,5	-7,3*	-1,7	4,4
24 months	-3,8*	-2,3	-5,5	-3,1	-9,9**	-14,2*	-6,6	-9,5*
Panel B. Low Market Activity								
12 months	-10,9**	2,8	-22,9*	-9,9	-7,7	-1,9	-19,2	-5,3
24 months	-7,6	-17,0	-5,4	5,1	-4,4	-14,0	6,8	-0,5

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

The previous literature presents mixed findings when investigating the impact of market conditions on the long-run performance of IPOs. Ritter (1991) finds that firms going public in HMA periods perform significantly worse in the aftermarket compared to IPOs listed in LMA years. On the other hand, Schuster (2003) finds that IPOs issued during HMA periods tend to outperform the benchmark, while those in LMA periods underperform in the long run. These differences arise from variations in the regions studied, with Ritter (1991) focusing on the US and Schuster (2003) examining Europe, as well as differences in the definitions of HMA/LMA periods. Considering that our findings reveal higher first-day returns for all IPOs in HMA periods, which aligns with Miller's (1977) argument on potential over optimism, one would expect a subsequent decline in the aftermarket due to decreased variance in investor opinions and convergence toward the mean valuation by the marginal investor. However, in our results, this pattern is only observed for NS IPOs, while PE-backed and VC-backed IPOs demonstrate the opposite looking at BHARs.

It is important to emphasize that the divergent performance patterns between our analysis and previous research may be attributed to differences in the scope of HMA periods and demographic factors. The methods used to define high

and low market activity also contribute to these discrepancies. Loughran and Ritter (1995) define these markets based on the number of issuances, while Ritter (1984) and Ibbotson and Jaffe (1975) define IPO markets based on the level of underpricing, allowing for variations in the activity periods considered. Thus, high activity periods in the Nordic context might exhibit a distinct underperformance pattern compared to low activity periods, as suggested by our results.

To test whether firms listed in high market activity periods perform differently from those listed during low market activity periods, we conducted a Wilcoxon-Mann-Whitney test, as depicted in Table 7.13. We find that the differences in 24-month BHAR between the subgroups are not statistically significant at any acceptable significance level. Therefore, our sample does not provide support for hypothesis 8.

Table 7.14: Wilcoxon-Mann-Whitney test of differences of 24-month BHARs between high activity periods vs low activity periods

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country).The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

Subgroups	**HMA All**	**LMA All**	**HMA PE**	**LMA PE**	**HMA VC**	**LMA VC**	**HMA NS**	**LMA NS**
Panel A. High activity period versus low activity period								
Number of listings	567	97	128	18	122	21	317	58
Median	-18,4	-22,1	-11,3	-25,8	-29,7	-37,5	-17,4	-12,7
P-value	0,7878		0,4843		0,8262		0,5173	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

Furthermore, our findings on the performance of PE-backed IPOs during hot market activity compared to VC-backed and NS IPOs somewhat align with previous studies. Katz (2009) and Bergström et al. (2006) indicate that firms with majority ownership by PE sponsors experience better long-run performance. Table 7.14 tests for any statistical differences in 24-month BHAR among the different subgroups. As the table illustrates, we find no significant difference in 24-month BHAR between PE-backed IPOs and VC-backed or NS IPOs. Consequently, our results do not provide support for hypothesis 8a.

Table 7.15: Wilcoxon-Mann-Whitney test of differences of 24-month BHARs between listing groups in high activty period

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country). The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

Subgroups	**HMA PE**	**HMA NS**	**HMA PE**	**HMA VC**	**HMA NS**	**HMA VC**
Panel A. MSCI Country Total Return indices						
Number of listings	128	317	128	122	317	122
Median	-11,3	-17,4	-17,4	-29,7	-16,9	-29,7
P-value	0,3551		0,1127		0,3754	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

7.2.6 OLS Regression for Robustness Checking of Long-Run Performance

Table 7.15 provides a summary of the results obtained from our multivariate regression models (6.7) - (6.10). However, it is important to highlight that these models exhibit limited explanatory power, as indicated by the negative adjusted R-squared values. This suggests that the selected independent variables do not have significant explanatory power for the dependent variable. In other words, the models do not fit the data well and cannot effectively explain the variation observed in the dependent variable, specifically the cross-sectional variation in 24-month BHARs among IPO firms in the Nordics. Additionally, the F-test results indicate that none of the models are statistically significant at any acceptable significance level.

Considering these limitations, we will focus our analysis on the regression outputs from models (3) and (4). Overall, the results do not provide statistical support for our main hypothesis regarding aftermarket performance, as described in previous literature. However, we will examine each variable in our model to determine if they align with expectations from prior studies.

Firstly, we observe that the PE dummy variable has a negative coefficient in all four models, contradicting the abnormal returns observed in the analysis on PE-backed long-run performance compared to other subgroups. Conversely, the VC dummy variable reports a highly positive coefficient, indicating that

VC-backed firms are expected to perform better in the aftermarket compared to the other two subgroups. However, both coefficients have high p-values, suggesting that there is no significant difference in the long-run aftermarket performance among the subgroups. These findings support the analysis on performance differences discussed earlier in this chapter.

Similarly, we find high p-values for the HMA dummy variable in all four models, supporting our analysis on IPO cyclicality in event time. This confirms our conclusion that there is a significant difference between firms listed during high market activity periods and those listed during low market activity periods for the total sample.

Lastly, the industry variables exhibit negative coefficients, aligning with our industry performance analysis, which suggests that IPO firms do not outperform their respective industries. Although the industry coefficients, in general, are not statistically significant, we do find that the coefficients for Consumer Stables and Utilities are significant at the 10% and 5% levels, respectively. This provides some support for the industry performance analysis.

Among the other control variables included in the analysis, the underwriter rank variable is found to be significant at the 10% level in model (4). The positive coefficient estimate suggests that IPOs underwritten by higher-ranked or more prestigious underwriters exhibit less long-run underperformance. This finding is consistent with previous literature (Carter & Manaster, 1990; Corwin & Schultz, 2005), which indicates that IPOs brought to the market by reputable underwriters tend to have less negative long-run market-adjusted returns on average. This supports the notion that the reputation and expertise of underwriters play a significant role in the long-run performance of IPO firms. Engaging prestigious underwriters can provide IPO companies with valuable networks, instill investor confidence, and enhance market visibility.

Consequently, these factors contribute to relatively better long-run performance compared to IPOs underwritten by less reputable firms. However, it is important to note that the remaining control variables included in the models are found to be statistically insignificant, implying that they do not have a significant impact on the long-run performance of IPO firms, at least within the scope of our analysis.

Table 7.16: OLS regression with 24-month BHARs and CARs as dependent variable

Long-run aftermarket performance								
	24-month BHARs				**24-month CARs**			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0,10720	0,21702	-0,00157	-0,02853	0,02721	0,15111	-0,02695	-0,01425
	(0,7209)	*(0,4947)*	*(0,9941)*	*(0,8958)*	(0,9253)	(0,6226)	(0,8920)	(0,9446)
PE DUMMY	-0,04716	-0,05491	-0,03144	-0,03152	-0,06496	-0,07370	-0,11206	-0,11202
	(0,7168)	*(0,6732)*	*(0,7617)*	*(0,7612)*	(0,6054)	(0,5581)	(0,2505)	(0,2510)
VC DUMMY	-0,04431	-0,05258	0,12830	0,12893	-0,05499	-0,06432	-0,04484	-0,04514
	(0,7672)	*(0,7257)*	*(0,2190)*	*(0,2170)*	(0,7040)	(0,6570)	(0,6476)	(0,6457)
LMA DUMMY	0,05288	0,04192	0,03946	0,04400	0,11966	0,10730	0,03685	0,03471
	(0,7487)	*(0,7998)*	*(0,7213)*	*(0,6919)*	(0,4537)	(0,5020)	(0,7232)	(0,7397)
RANK	0,00352	0,00042	0,03023	0,03085*	0,00016	-0,00334	0,00676	0,00647
	(0,8879)	*(0,9867)*	*(0,1029)*	*(0,0969)*	(0,9948)	(0,8906)	(0,6977)	(0,7109)
SYNDICATE	0,05275	0,05290	0,00005	0,00054	0,03712	0,03728	0,02498	0,02475
	(0,1421)	*(0,1409)*	*(0,9986)*	*(0,9861)*	(0,2850)	(0,2824)	(0,3892)	(0,3941)
CONSUMER DISCRETIONARY	-0,25260	-0,32154	-0,14303	-0,12617	-0,26078	-0,33856	-0,17898	-0,18692
	(0,3548)	*(0,2522)*	*(0,4907)*	*(0,5486)*	(0,3233)	(0,2123)	(0,3591)	(0,3447)
CONSUMER STAPLES	-0,35195	-0,42514	-0,46974*	-0,45097*	-0,12692	-0,20950	-0,30188	-0,31072
	(0,3272)	*(0,2453)*	*(0,0585)*	*(0,0726)*	(0,7146)	(0,5532)	(0,1956)	(0,1881)
ENERGY	-0,19862	-0,27872	-0,30553	-0,28660	-0,15345	-0,24381	-0,17309	-0,18201
	(0,5145)	*(0,3749)*	*(0,1597)*	*(0,1939)*	(0,6025)	(0,4218)	(0,3967)	(0,3802)
FINANCIALS	-0,21351	-0,28005	-0,21658	-0,20166	-0,16788	-0,24295	-0,17419	-0,18122
	(0,4773)	*(0,3618)*	*(0,3510)*	*(0,3892)*	(0,5634)	(0,4129)	(0,4249)	(0,4106)
HEALTH CARE	-0,00290	-0,07930	-0,16673	-0,14770	0,20724	0,12104	0,04191	0,03294
	(0,9916)	*(0,7799)*	*(0,4230)*	*(0,4852)*	(0,4350)	(0,6589)	(0,8304)	(0,8685)
INDUSTRIALS	-0,17601	-0,24600	-0,19416	-0,17846	-0,07047	-0,14944	-0,06835	-0,07575
	(0,5051)	*(0,3665)*	*(0,3392)*	*(0,3855)*	(0,7826)	(0,5700)	(0,7204)	(0,6952)
REAL ESTATE	-0,07005	-0,14753	-0,16702	-0,14792	-0,08708	-0,17450	-0,21592	-0,22492
	(0,8336)	*(0,6657)*	*(0,5051)*	*(0,5596)*	(0,7872)	(0,5970)	(0,3595)	(0,3456)
TECHNOLOGY	-0,25378	-0,31031	-0,23107	-0,21654	-0,20723	-0,27101	-0,05966	-0,06651
	(0,3799)	*(0,2912)*	*(0,2847)*	*(0,3206)*	(0,4584)	(0,3401)	(0,7688)	(0,7456)
TELECOM	-0,25568	-0,33032	-0,48834	-0,46930	-0,21109	-0,29530	-0,40725	-0,41622
	(0,5072)	*(0,3995)*	*(0,1236)*	*(0,1419)*	(0,5713)	(0,4357)	(0,1719)	(0,1660)
UTILITIES	-0,92883*	-1,00881**	-0,65103**	-0,64389**	-0,81485*	-0,90508*	-0,81873***	-0,82209***
	(0,0567)	*(0,0409)*	*(0,0359)*	*(0,0383)*	(0,0836)	(0,0575)	(0,0051)	(0,0050)
% SOLD	-0,01523	-0,02627			0,03403	0,02157		
	(0,9587)	*(0,9289)*			(0,9048)	(0,9396)		
UNDERPRICING		-0,10943		0,05186		-0,12347		-0,02444
		(0,2931)		*(0,6141)*		(0,2199)		(0,8005)
Adjusted R-Squared	-0,02191	-0,02148	-0,00237	-0,00353	-0,00393	-0,00198	0,00382	0,00238
Observations	282	282	664	664	282	282	664	664
F-statistic	0,6248	0,6536	0,8957	0,8547	0,9315	0,9674	1,169	1,098

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

8 Conclusion

In general, the findings of this thesis indicate that private equity-backed IPOs in the Nordics demonstrate a lower degree of underpricing when compared to non-PE-backed IPOs, addressing our first research question. However, we cannot draw a definitive conclusion regarding whether PE-backed IPOs in the Nordics outperform non-private equity-backed IPOs in the long run, as the results lack statistical significance. Furthermore, our analysis reveals that PE-backed IPOs tend to exhibit underperformance relative to the market over a 24-month period.

The thesis' final sample consists of 825 initial public offerings listed on the stock exchanges in Denmark, Finland, Iceland, Norway, Sweden from January 2001 to February 2023. Regarding first-day returns, we observed statistically significant average returns for all firms, with PE-backed IPOs exhibiting slightly lower returns compared to the overall average. This aligns with our research question and is consistent with previous literature. Additionally, IPOs launched during high IPO market activity periods demonstrated higher levels of underpricing, supporting our hypothesis and corroborating existing research. When comparing underpricing differences among subgroups, we found that VC-backed IPOs exhibited the lowest level of underpricing, followed by PE-backed IPOs and non-sponsored IPOs. The direction of the 2% disparity between PE-backed and non-sponsored IPOs is in right direction of our expectations and hypothesis but the results are not significant. These findings have important implications for various stakeholders. Investors and financial institutions involved in IPOs can gain insights into underpricing patterns and adjust their investment strategies accordingly. Moreover, the insights from our findings can serve as valuable information for policymakers and regulators. Specifically, they can utilize these findings to gain a better understanding of market dynamics, particularly in relation to IPOs on emerging multilateral trading facilities. This understanding can potentially inform and enhance the development of IPO regulations to ensure a more efficient and effective market environment.

In relation to the literature, our results are generally consistent with previous research, highlighting the persistent presence of underpricing in IPOs. However,

our findings also contribute by providing updated evidence in the context of the recent IPO market and the specific Nordic region. While there may be some contrasting evidence in terms of the statistical significance of certain differences, the economic implications of the observed trends remain significant.

In terms of long-run performance, our analysis reveals that all firms generally exhibit underperformance compared to their respective country total return indices, which aligns with previous literature. Specifically, PE-backed firms demonstrate a median -20.0% 24-months buy-and-hold abnormal return, indicating significant underperformance relative to the market. Surprisingly, we did not find statistical evidence supporting the expectation that PE-backed firms would outperform non-sponsored and venture capital-backed IPOs in the aftermarket, contradicting previous findings. Additionally, our analysis fails to provide conclusive evidence regarding whether PE-backed firms outperform their industry peers. Furthermore, we were unable to establish a clear relationship between IPOs listed in hot markets versus cold markets and long-run underperformance, as documented in previous studies. Moreover, our analysis indicates that firms listed using prestigious underwriters tend to outperform other IPOs in the long run, although this result is only significant at a 10% significance level. This finding aligns with our earlier observations, suggesting that PE-backed IPOs, which often engage more prestigious underwriters, tend to exhibit better performance compared to other listings.

While the findings of this thesis align with existing literature on IPO performance, it is crucial to note that the analysis does not specifically delve into the operational performance of companies pre- and post-listing. This aspect presents an intriguing opportunity for future research to explore whether improvements in operational performance can shed light on the observed variations in stock price performance between private equity-owned and non-private equity-owned firms. By examining the post-listing operating performance, potentially utilizing equity analyst estimates as a reliable proxy, researchers can gain a more comprehensive understanding of the long-run returns and under

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Appendices

A Tables

A.1 Benchmarks

Table A.1 presents the annual year-over-year returns of the five main MSCI country indices, along with the MSCI Nordic index. Utilizing total return indices offers the advantage of capturing both the capital gains of the stock groups over time and assuming reinvestment of any cash distributions, such as dividends, back into the index. As discussed in Section 5.1, this thesis places primary emphasis on the Nordic country-specific MSCI total return indices. We argue that benchmarking against these indices provides the most accurate representation of the market return to align with the long-run returns of the IPO portfolios in the Nordic market.

By utilizing the MSCI total return indices and adopting this benchmarking approach, we aim to ensure a robust and accurate assessment of the performance of IPO portfolios in the Nordic region. This methodology allows for a comprehensive analysis of the long-run returns and facilitates meaningful comparisons within the unique characteristics of the Nordic stock exchanges.

In order to account for the industry-specific characteristics and performance of the IPOs, we employed FTSE Russell's Industry Classification Benchmark (ICB). A comprehensive outline of the industry classification can be found in Section 5.3.3. To calculate abnormal returns, we utilized the MSCI Nordic Industry Indices corresponding to each industry (e.g., the MSCI Nordic Basic Material Index), as presented in table A.2.

The implementation of the FTSE Russell's ICB and the utilization of the MSCI Nordic Industry Indices allow for a more nuanced analysis of the IPO performance within specific industries. By incorporating industry-level data, we can assess the relative performance and identify any industry-specific trends or patterns that may influence the IPO outcomes in the Nordic region.

Table A.1: Nordic Countries Indices

Year	**Nordic**	**Country**				
		Denmark	Finland	Iceland	Norway	Sweden
2001	144.15	211.84	8805.01	1180.75	160.92	239.06
2002	89.41	166.56	5775.37	1436.22	120.33	149.57
2003	104.31	216.588	6031.92	2075.22	178.042	194.17
2004	121	263.32	6228.11	3173.91	247.569	228.41
2005	157.72	367.5	8166.9	5107.49	376.782	302.91
2006	192.44	423.43	9625.37	5857.5	502.381	374.47
2007	206.17	446.69	11598.42	5803.35	569.972	351.84
2008	98.07	227.98	5403.52	581.76	270.2	204.22
2009	136.28	301.258	6456.13	496.48	420.092	299.5
2010	178.54	395.201	7661.9	569.19	486.48	368.54
2011	147.97	325.192	5355.06	580.73	442.46	307.04
2012	172.85	403.89	5801.29	678.15	490.52	343.94
2013	201.72	516.85	7336.98	864.93	602.8	423.66
2014	210.86	607.634	7758.51	956.44	619.74	473.89
2015	234.9	785.506	8596.07	1319.96	648.96	505.13
2016	225.69	723.459	8901.53	1232.09	764.66	534.56
2017	243.13	836.345	9471.56	1289.95	906.98	568.8
2018	218.75	751.537	8709.58	1217.58	902.3	525.16
2019	260.52	945.967	9874.66	1516.42	1032.24	680.81
2020	298.68	1215.665	10872.05	1885.57	1047.59	768.38
2021	375.83	1480.619	12862.42	2642.82	1307.69	1037.14
2022	322.9	1392.184	10807.78	2199.39	1362.68	781.86
2023	332.29	1506.128	10176.63	1939.55	1407.45	840.31

Table A.2: Industry Indices

Year	Industry										
	Basic Materials	Energy	Technology	Utilities	Tele-communications	Industrials	Financials	Health Care	Consumer Discretionary	Real Estate	Consumer Staples
2001	166,12	133,97	174,27	85,59	70,26	141,09	126,48	216,31	112,96	94,12	115,44
2002	138,48	121,94	74,77	93,29	48,56	102,15	91,13	160,37	88,41	85,42	109,33
2003	148,29	149,53	79,4	117,19	64,69	130,75	119,11	179,12	101,76	112,51	119,03
2004	163,19	207,58	82,97	195,13	67,38	152,46	147,71	242,15	125,02	147,87	152,2
2005	178,47	331,88	106,68	305,66	83,89	223,59	182,29	303,97	151,73	164,75	208,37
2006	228,08	406,61	109,29	416,04	121,06	293,69	228,88	394,09	190,81	224,78	274,09
2007	201,78	440,21	132,28	594,53	136,74	330,66	204,86	462,84	194,19	207,5	268,99
2008	95,99	195,91	61,55	293,89	59,87	150,21	87,49	346,8	110,58	104,02	131,12
2009	135,54	310,39	56,19	366,06	96,27	224,03	145,63	436,46	173,63	132,91	203,84
2010	179,54	337,79	58,76	434,76	120,82	336,15	179,86	744,16	225,38	155,5	294,29
2011	134,52	338,65	39,6	318,2	120,36	259,6	142,73	794,44	188,93	140,07	265,13
2012	149,93	353,03	37,39	273,05	121,79	317,43	185,07	1102,08	208,05	174,95	319,81
2013	163,74	332,69	52,59	320,9	137,82	338,52	254,37	1191,79	250,87	174,98	359,86
2014	189,88	225,29	59,09	346,76	129,94	352,71	268,93	1462,54	262,88	194,45	316,74
2015	213,08	203,77	58,52	268,61	120,65	391,56	280,85	2111,02	288,72	189,83	424,33
2016	234,73	280,23	40,74	285,59	106,61	443,16	296,19	1498,52	260,94	190,09	435,74
2017	293,32	305,62	38,92	339,95	121,87	501,33	299,4	1795,79	208,79	212,19	471,9
2018	235,1	332,01	49,02	417,13	128,55	423,92	244,53	1663,13	138,04	193,19	456,26
2019	270,35	374,88	43,5	581,78	132,09	585,6	253	2156,63	172,03	231,35	610,75
2020	296,52	425,27	52,85	860,24	112,28	730,7	263,32	2543,27	216,83	214,02	592,44
2021	353,64	468,4	66,74	707,95	114,03	913,93	359,48	3740,07	263,37	269,46	682,81
2022	315,73	563,37	43,26	489,11	73,03	684,07	313,74	4256,07	164,89	196,44	613,8
2023	276,72	475,32	42,52	476,96	70,07	736,8	305,69	4728,05	201,55	196,43	627,8

A.2 Industry specific CARs

Table A.3: Industry specific Cumulative abnormal return (CAR)

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. The abnormal returns are calculated using 10 industry specific indices, where the IPO classification follows FTSE Russel ICB standards.The 12-month and 24-month median CARs are assessed using a Wilcoxon signed-rank test to determine if the median CAR significantly deviates from zero.

Equal-weighted median (%)

Months	Basic Materials	Consumer Discretionary	Consumer Staples	Energy	Financials	Health Care	Industrials	Real Estate	Technology	Telecommunications	Utilities
Panel A. All firm IPOs											
12 months	-4,3	4,4	-9,5	-3,7	-0,9	-22,6**	-6,9*	3,8	-1,6	-29,8	-33,9**
24 months	-17,6	5,6	0,1	4,0	3,0	-19,5	8,0	7,0	18,9	22,5	-44,1
Panel B. Private equity-backed IPOs											
12 months	-3,1	6,8	19,3	-65,0	-1,9	-21,7	7,2	-20,2	-5,2	34,5	-21,7
24 months	-16,6	3,8	15,0	-37,2*	3,0	-2,8	13,7	19,7	-2,7	22,5	-183,0
Panel C. Venture Capital-backed IPOs											
12 months	14,6	-1,1	-5,8	-35,7**	16,5	-32,8*	-25,6*	-10,4	1,9	-29,8	-26,9
24 months	22,5	-7,2	-36,9	34,4	60,9	-19,6	-15,1	20,7	17,7	39,4	28,7
Panel D. Non-sponsored IPOs											
12 months	-4,3	4,4	-16,8	0,7	-1,0	-21,2	-8,7*	8,2	2,7	-47,9*	-38,6**
24 months	-19,3	15,2	-19,1	6,3	1,5	-19,9	11,2	6,5	31,1**	-116,7	-27,1

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

A.3 Differences of 24-month CARs between activity periods

Table A.4: Wilcoxon-Mann-Whitney test of differences of 24-month BHARs between listing groups in high activty period

The table includes 664 IPOs from January 2001 to May 2021 on the Danish, Finnish, Icelandic, Norwegian, and Swedish stock exchanges. It consists of 375 non-sponsored (NS), 146 private equity-backed (PE), and 143 venture capital-backed (VC) IPOs. Abnormal returns are calculated using two benchmarks: MSCI country total return index (specific to the listing country). The 12-month and 24-month median BHARs are assessed using a Wilcoxon signed-rank test to determine if the median BHAR significantly deviates from zero.

Subgroups	**HMA PE**	**HMA NS**	**HMA PE**	**HMA VC**	**HMA NS**	**HMA VC**
Panel A. MSCI Country Total Return indices						
Number of listings	128	317	128	122	317	122
Median	-11,3	-17,4	-17,4	-29,7	-16,9	-29,7
P-value	0,3551		0,1127		0,3754	

*Note: *Represents signifciant at the 10% level, **represents significant at the 5% level, and ***Represents significant at the 1% level*

A.4 Underwriter rank

Table A.5: Underwriter ran

Underwriters	**Third party**	**Global Reach**	**Deal volume**	**Lead**	**Deal Value**	**Total Score**
ABGSUN	8	5	9	8,5	8,5	7,8
ABNAMRO	5,2	7	1	4,5	8	5,14
ABUDHABI	1,2	1	1	1	1	1,04
AJANTA	1,2	1	1	1	1	1,04
AKTIABANK	1,4	1	1	1	2	1,28
AKTIE	5,6	1	1	1	2	2,12
ALFREDBERG	7	5	1	7	5	5
AMUDOVA	1,4	1	1	1	2	1,28
ANDELCNTRL	1,2	1	1	1	1	1,04
AQURAT	2	1	1	1	1	1,2
ARCTIC	7,5	5	5	6,5	7	6,2
ARCTICAFIN	1,2	1	1	1	1	1,04
AUGMENT	2,6	1	1	1	1	1,32
AVANZA	6	1	3	7	6,5	4,7
BARCLAYS	7	9	1	2	8	5,4
BERENBERG	4,6	5	1	4,5	1	3,22

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Table A.5 – continued from previous page

Underwriters	Third party	Global Reach	Deal volume	Lead	Deal Value	Total Score
BG&C	1,2	3	1	1	2	1,64
BMO	4	7	1	2	7	4,2
BNP	3,8	9	1	4,5	7,5	5,16
BoA	5,8	9	1	4,5	9	5,86
BRYANGARNER	5,2	3	1	1	3	2,64
BTGPactual	3	5	1	1	2	2,4
CALYON	1,2	1	1	1	6	2,04
CAPITALPARTNERS	1,4	1	1	1	2	1,28
CAR	1,8	1	1	4,5	1	1,86
CARASA	1,4	1	1	2	2	1,48
CARLSQUARE	1,4	1	1	2	2	1,48
CARNEGIE	8	7	9	9	8,5	8,3
CASTREN&SNELLMANN	1,2	1	1	1	2	1,24
CATELLA	2,6	1	1	4,5	3	2,42
CAZENOVE	1,4	1	1	2	5	2,08
CIBC	6,2	7	1	2	3	3,84
CITI	7	9	3	7	9	7
CLARKSONSPLATOU	6	7	3	5	6	5,4
CLSA	1,2	1	1	2	2	1,44
CORPURA	3	1	1	2	2	1,8
CRB	2,8	1	1	2	1	1,56
CREDITSUISSE	4,4	9	1	4,5	8,5	5,48
DANSKE	8	5	7	8	8	7,2
DEUTSCHE	7	9	3	4,5	9	6,5
DNB	8	5	9	8,5	8	7,7
EFGBANK	1,2	1	1	2	4	1,84
EIK	2,4	1	1	2	4	2,08
EMINOVA	3	1	3	6,5	1	2,9
ENSKIL	5,2	3	1	3	3	3,04
EOHMAN	6,4	5	1	4,5	2	3,78
EPENSER	3,2	1	3	7,5	3	3,54
EVLI	6	1	3	6,5	3	3,9
EY	6,2	7	1	3	4	4,24
FEARNLEY	1	5	5	7	5	4,6
FIM	5,6	1	1	6,5	2	3,22
FIRSTSEC	7,5	3	3	6	5	4,9
FNSCASWED	1,4	1	1	2	2	1,48

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Table A.5 – continued from previous page

Underwriters	Third party	Global Reach	Deal volume	Lead	Deal Value	Total Score
FÓLA	1,4	1	1	2	1	1,28
FONDSFINANS	4,4	1	1	4,5	1	2,38
FORMUE	1,8	1	1	2	2	1,56
FOROYA	2	1	1	2	3	1,8
FOSSAR	1,4	1	1	2	2	1,48
G&W	1	1	3	2	1	1,6
GCA	1,2	1	1	2	1	1,24
GEMSTONE	1,6	1	1	2	1	1,32
GOTEBORGCORP	1,2	1	1	2	2	1,44
GRANTTHORNTON	2,4	3	1	2	2	2,08
GS	9	9	5	8	9	8
GUDME	6,2	1	1	4,5	2	2,94
GULLEVSZPIRT	1,2	1	1	2	1	1,24
HAGBERGANEBORN	3,2	1	1	2	1	1,64
HANDELSBANKEN	7	5	5	8,5	8	6,7
HCM	1,2	1	1	3	3	1,84
HDR	1,8	1	1	2	3	1,76
HQBANK	6	7	1	7	4	5
HSBC	3,8	7	1	4	7	4,56
INDERES	1,2	1	1	2	2	1,44
ING	1,2	1	1	2	4,5	1,94
INVESDOR	1,4	1	1	2	1	1,28
IRPARTNERS	1,2	1	1	2	1	1,24
ISLAND	4,6	1	1	2	2	2,12
ISLENSKIRFJA	1,2	1	1	2	2	1,44
ISLENSKVERD	1,2	1	1	2	2	1,44
ItauSEC	2	1	1	2	2	1,6
JEFFERIES	7	7	3	4,5	8,5	6
JPM	9	9	5	7,5	9	7,9
JYSKEBANK	1,4	1	1	2	1	1,28
KAPITALPARTNER	1,6	1	1	2	1	1,32
KAUP	6	3	1	6,5	3,5	4
KBW	3,4	1	1	4	3,5	2,58
KEMPEN	2	1	1	2	6,5	2,5
KESWICK	1,4	1	1	3	2	1,68
KVIKA	1,2	1	1	2	1	1,24
LAGEJO	1,2	1	1	2	1	1,24

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Table A.5 – continued from previous page

Underwriters	Third party	Global Reach	Deal volume	Lead	Deal Value	Total Score
LANDSBANKIISLAND	1,2	1	1	2	2	1,44
LANDSBANKINN	1,2	1	1	2	3	1,64
LEHMANBRO	8,5	9	1	6,5	8,5	6,7
MANDATUM	6,2	1	1	2	2	2,44
MANGOLD	6	1	3	8,5	2	4,1
MAZANTIPARTNERS	1,4	1	1	2	1	1,28
MORGSTAN	9	9	5	8	9	8
N/A	0	0	0	-	-	0
NAVENTUS	1,6	1	1	2	1	1,32
NNBSS	1,8	1	1	2	1	1,36
NOMURA	6,6	1	1	2	3	2,72
NORDEA	8	5	7	8	8,5	7,3
NORDENCEF	1,6	1	1	2	1	1,32
NORDICISSUING	1,4	1	1	2	1	1,28
NORDNET	3	1	1	3	2	2
NORNE	4,6	1	1	7	3	3,32
NotUnderwritten	0	0	0	-	-	0
NRP	1,2	1	1	2	1	1,24
NUMIS	1,4	1	1	2	1	1,28
OAKLINS	1,6	3	1	3	2	2,12
ODDOFIN	1,2	1	1	2	1	1,24
OKOBANK	1,6	1	1	4,5	3,5	2,32
OPSTOCK	1,6	1	1	2	6	2,32
OPY	2	3	1	3	2	2,2
ORION	1,6	1	1	4,5	1	1,82
ORKLA	7,5	5	1	5	5	4,7
PARTNERFOND	3	1	3	2	1	2
PFRNK	1,6	1	1	2	2	1,52
POHJOLA	6	3	1	6,5	6	4,5
PSEC	8	5	9	8,5	8	7,7
RBC	4,4	7	1	5	7	4,88
REDEYE	4	1	3	7,5	2	3,5
REMIUM	1	1	1	6,5	1	2,1
RJA	4	7	1	3	1	3,2
SB1M	8	5	5	6	8	6,4
SEB	8,5	7	9	8,5	9	8,4
SEDERMERA	2,6	5	5	7,5	2	4,42

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Table A.5 – continued from previous page

Underwriters	Third party	Global Reach	Deal volume	Lead	Deal Value	Total Score
SINGER	1,2	1	1	2	4	1,84
SISU	1,2	1	1	2	1	1,24
SKANDI	1,2	3	1	4	3	2,44
SKILLS	1,8	1	1	2	1	1,36
SPAREBANKENNN	3,4	1	1	2	1	1,68
SPARNOR	1,4	1	1	2	1	1,28
STIFEL	1	1	1	2	1	1,2
STOCKHOLMCORP	3	1	1	6,5	2	2,7
SUMMA	2,8	1	1	4,5	2	2,26
SWEDBANK	8	5	5	8	7,5	6,7
SYDBANK	6,2	1	1	3	2	2,64
TERRA	5	3	1	6,5	5,5	4,2
TERRAIN	2,6	1	1	3	1	1,72
THENBERG	1,8	1	1	6,5	1	2,26
TOFTE	1	1	1	3	1	1,4
UBS	4,8	9	5	7,5	8,5	6,96
UBSEC	5	1	1	6,5	2	3,1
UNICREDIT	1,2	1	1	2	1	1,24
VASTRAHAMNEN	5,8	1	1	7	3	3,56
VATOR	2	3	1	4,5	2	2,5
VELLENOVA	1,8	1	1	2	1	1,36
AALTO	1,4	1	1	3	1	1,48
ARIONB						3,12

A.5 IPO Sample

Table A.6: IPO sample

Company	Country	Ownership	Date
Nordic Iron Ore AB	Sweden	NS	27.06.2018
Aker Carbon Capture ASA	Norway	NS	26.08.2020
Hydract A/S	Denmark	NS	15.04.2021
Safello Group AB	Sweden	NS	30.04.2021
Impero A/S	Denmark	NS	13.04.2021
INIFY Laboratories AB	Norway	NS	20.06.2022
CoinShares International Ltd	Sweden	NS	02.03.2021

Continued on next page

Table A.6 – continued from previous page

Company	Country	Ownership	Date
Fom Technologies A/S	Denmark	NS	19.06.2020
Triboron International AB	Sweden	NS	08.04.2019
Penneo A/S	Denmark	NS	25.05.2020
CTEK AB (publ)	Sweden	NS	23.09.2021
Idun Industrier AB (publ)	Sweden	NS	23.03.2021
Vistin Pharma ASA	Norway	NS	05.06.2015
Streamify AB	Sweden	NS	25.01.2021
SOZAP AB (publ)	Sweden	NS	01.06.2021
Modulight Oyj	Finland	NS	28.09.2021
Hynion AS	Norway	NS	16.04.2021
Abera Bioscience AB	Sweden	NS	24.02.2021
Engcon AB	Sweden	NS	17.06.2022
Hamlet Pharma AB	Sweden	NS	23.10.2015
K-Fast Holding AB	Sweden	NS	29.11.2019
Odico A/S	Denmark	NS	25.06.2018
Swedish Logistic Property AB	Sweden	NS	23.03.2022
Teqnion AB	Sweden	NS	04.04.2019
Salmon Evolution ASA	Norway	NS	04.09.2020
Bergen Carbon Solutions AS	Norway	NS	19.04.2021
Hexagon Purus ASA	Norway	NS	03.12.2020
Nanoform Finland Oyj	Finland	NS	03.06.2020
Diagonal Bio AB	Sweden	NS	16.07.2021
Pryme NV	Norway	NS	16.02.2021
Relesys A/S	Denmark	NS	01.12.2021
Nortel AS	Norway	NS	18.11.2020
Simtronics ASA	Norway	NS	05.02.2007
Aegirbio AB	Sweden	NS	26.06.2020
Thunderful Group AB	Sweden	NS	04.12.2020
Garo AB	Sweden	NS	16.03.2016
Netum Group Oyj	Finland	NS	02.06.2021
Pexip Holding ASA	Norway	NS	12.05.2020
Kempower Oyj	Finland	NS	13.12.2021
Mentice AB	Sweden	NS	14.06.2019
Gant Co AB	Sweden	NS	27.03.2006
Genetic Analysis AS	Sweden	NS	20.09.2021
MPC Energy Solutions NV	Norway	NS	22.01.2021
Cloudberry Clean Energy ASA	Norway	NS	02.04.2020
THQ Nordic AB	Sweden	NS	18.11.2016

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Table A.6 – continued from previous page

Company	Country	Ownership	Date
Hemply Balance Holding AB (publ)	Sweden	NS	06.05.2021
Aallon Group Oyj	Finland	NS	08.04.2019
Recyctec Holding AB	Sweden	NS	02.01.2013
Dolphin Drilling AS	Norway	NS	28.10.2022
Internationella Engelska Skolan i Sverige Holdings II AB	Sweden	NS	28.09.2016
Lifco AB	Sweden	NS	20.11.2014
Lemonsoft Oyj	Finland	NS	16.11.2021
Nimbus Group AB (publ)	Sweden	NS	08.02.2021
SignUp Software AB	Sweden	NS	24.11.2021
RAK Petroleum PLC	Norway	NS	06.11.2014
Storskogen Group AB (publ)	Sweden	NS	06.10.2021
S2Medical AB (publ)	Sweden	NS	28.11.2018
Atlantic Sapphire ASA	Norway	NS	15.05.2018
Odinwell AB	Sweden	NS	09.06.2021
Seabird Exploration PLC	Norway	NS	11.04.2006
Clean Motion AB	Sweden	NS	26.05.2016
Trifork Holding AG	Denmark	NS	27.05.2021
Huddly AS	Norway	NS	16.02.2021
Nordic Halibut AS	Norway	NS	26.04.2021
Fondia Oyj	Finland	NS	24.03.2017
Fasadgruppen Group AB (publ)	Sweden	NS	08.12.2020
Profoto Holding AB (publ)	Sweden	NS	01.07.2021
Kone Oyj	Finland	NS	01.06.2005
Fantasma Games AB (publ)	Sweden	NS	12.03.2021
Sikri Group ASA	Norway	NS	15.07.2020
Alexandria Pankkiiriliike Oyj	Finland	NS	05.05.2021
Hexpol AB	Sweden	NS	09.06.2008
NNIT A/S	Denmark	NS	05.03.2015
Nordic Unmanned ASA	Norway	NS	15.12.2020
Gregoire ASA	Norway	NS	01.10.2007
Hofseth Biocare ASA	Norway	NS	30.11.2011
Yara International ASA	Norway	NS	24.03.2004
Duell Oyj	Finland	NS	19.11.2021
Fellow Pankki Oyj	Finland	NS	23.11.2015
REC Silicon ASA	Norway	NS	21.04.2006
Volvo Car AB	Sweden	NS	29.10.2021
Case Group AB	Sweden	NS	16.12.2021

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Table A.6 – continued from previous page

Company	Country	Ownership	Date
Odi Pharma AB (publ)	Sweden	NS	23.01.2020
BankNordik P/F	Denmark	NS	20.06.2007
Toivo Group Oyj	Finland	NS	09.06.2021
OW Bunker A/S	Denmark	NS	26.03.2014
Wavefield Inseis ASA	Norway	NS	09.11.2006
I-Tech AB	Sweden	NS	28.05.2018
Munters Group AB	Sweden	NS	19.05.2017
NoHo Partners Oyj	Finland	NS	21.11.2013
Aker Horizons ASA	Norway	NS	28.01.2021
Titania Holding AB (publ)	Sweden	NS	10.12.2021
Islandsbanki hf	Iceland	NS	15.06.2021
SaveLend Group AB	Sweden	NS	28.05.2021
Humana AB	Sweden	NS	21.03.2016
Hemtex AB	Sweden	NS	06.10.2005
Multiconsult ASA	Norway	NS	21.05.2015
Waste Plastic Upcycling A/S	Norway	NS	20.04.2022
Csam Health Group AS	Norway	NS	09.10.2020
Remedy Entertainment Oyj	Finland	NS	29.05.2017
Arion banki hf	Iceland	NS	13.06.2018
Gymgrossisten Nordic AB	Sweden	NS	09.12.2006
Optomed Oyj	Finland	NS	04.12.2019
Exploration Resources ASA	Norway	NS	25.02.2005
Momentum Software Group AB	Sweden	NS	08.12.2021
Medicover AB	Sweden	NS	23.05.2017
ChargePanel AB (publ)	Sweden	NS	09.12.2021
Ework Group AB	Sweden	NS	22.05.2008
Advanced Production & Loading AS	Norway	NS	04.03.2005
Bewi ASA	Norway	NS	26.08.2020
Vatryggingafelag Islands hf	Iceland	NS	24.04.2013
Besqab AB (publ)	Sweden	NS	11.06.2014
Lehto Group Oyj	Finland	NS	25.04.2016
Collector AB	Sweden	NS	09.06.2015
Envirologic AB (publ)	Sweden	NS	22.04.2014
M Vest Water AS	Norway	NS	28.05.2021
Volati AB	Sweden	NS	30.11.2016
Train Alliance Sweden AB (publ)	Sweden	NS	12.02.2020
Suomen Hoivatilat Oyj	Finland	NS	18.03.2016
LINK Mobility Group ASA	Norway	NS	20.10.2020

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Table A.6 – continued from previous page

Company	Country	Ownership	Date
Proximar Seafood AS	Norway	NS	25.01.2021
Viva Wine Group AB	Sweden	NS	14.12.2021
LapWall Oyj	Finland	NS	01.04.2022
Adevinta ASA	Norway	NS	09.04.2019
Elon AB (publ)	Sweden	NS	05.04.2006
Lumi Gruppen AS	Norway	NS	12.02.2021
Sleep Cycle AB (publ)	Sweden	NS	07.06.2021
Hoist Finance AB (publ)	Sweden	NS	24.03.2015
DIBS A/S	Sweden	NS	15.05.2007
John Mattson Fastighetsforetagen publ AB	Sweden	NS	05.06.2019
Akobo Minerals AB (publ)	Norway	NS	28.01.2021
Titanium Oyj	Finland	NS	09.10.2017
Tobin Properties AB	Sweden	NS	28.10.2016
24Storage AB	Sweden	NS	09.12.2019
Indutrade AB	Sweden	NS	05.10.2005
NP3 Fastigheter AB	Sweden	NS	02.12.2014
Integrum AB	Sweden	NS	09.05.2017
Otovo ASA	Norway	NS	19.02.2021
Scandinavian Medical Solutions A/S	Denmark	NS	03.11.2021
Aker BP ASA	Norway	NS	14.12.2006
DynaPel Systems Inc	Norway	NS	27.01.2005
Nivika Fastigheter AB (publ)	Sweden	NS	03.12.2021
Evolution AB (publ)	Sweden	NS	20.03.2015
Statt Torsk ASA	Norway	NS	23.04.2021
Block Watne AS	Norway	NS	16.03.2006
Solwers Oyj	Finland	NS	15.06.2021
Devyser Diagnostics AB	Sweden	NS	10.12.2021
Ahlstrom Paper Group Oy	Finland	NS	13.03.2006
Eidesvik Offshore ASA	Norway	NS	27.06.2005
P/F Bakkafrost	Norway	NS	23.03.2010
Tryg A/S	Denmark	NS	14.10.2005
Swedol AB	Sweden	NS	01.06.2006
Wastbygg Gruppen AB (publ)	Sweden	NS	12.10.2020
TF Bank AB	Sweden	NS	13.06.2016
Ice Fish Farm AS	Norway	NS	28.05.2020
Silmaasema Oyj	Finland	NS	08.06.2017
SRV Yhtiot Oyj	Finland	NS	11.06.2007

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Company	Country	Ownership	Date
Infront ASA	Norway	NS	27.09.2017
Pallas Group AB	Sweden	NS	28.05.2010
Recipharm AB	Sweden	NS	02.04.2014
Orsted A/S	Denmark	NS	09.06.2016
Noram Drilling AS	Norway	NS	23.09.2022
Oriflame Cosmetics SA	Sweden	NS	23.03.2004
Com Hem Holding AB	Sweden	NS	16.06.2014
Norbit ASA	Norway	NS	18.06.2019
Nordic Shipholding A/S	Denmark	NS	12.06.2007
Eastern Drilling ASA	Norway	NS	01.06.2005
CS medica A/S	Sweden	NS	14.09.2021
Kraft Bank ASA	Norway	NS	08.12.2020
Dimension AB	Sweden	NS	13.02.2001
Fastighetsbolaget Emilshus AB	Sweden	NS	01.10.2021
Purefun Group AB (publ)	Sweden	NS	11.02.2022
Robit Plc	Finland	NS	20.05.2015
Medistim ASA	Norway	NS	28.05.2004
New Bubbleroom Sweden AB	Sweden	NS	18.11.2021
Lauritz.com Group A/S	Sweden	NS	21.06.2016
Norwegian Property AS	Norway	NS	14.11.2006
Neste Oil Corporation	Finland	NS	15.04.2005
Avega AB	Sweden	NS	26.10.2007
Pertra ASA	Norway	NS	10.10.2006
Ferronordic AB	Sweden	NS	27.10.2017
Hugo Games A/S	Norway	NS	16.06.2015
5Th Planet Games A/S	Norway	NS	26.06.2015
Christian Berner Tech Trade AB	Sweden	NS	20.10.2014
Protector Forsikring ASA	Norway	NS	15.05.2007
Varyag Resources AB	Sweden	NS	01.08.2006
Cambi ASA	Norway	NS	04.02.2021
Swiss Properties Invest A/S	Denmark	NS	14.07.2022
Vimian Group AB	Sweden	NS	18.06.2021
Allianse ASA	Norway	NS	20.05.2005
ScanArc ASA	Norway	NS	08.05.2007
TROPHY GAMES Development A/S	Denmark	NS	20.04.2021
Scorpion Offshore Ltd	Norway	NS	21.12.2005
International Petroleum Corp	Sweden	NS	24.04.2017

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Company	Country	Ownership	Date
FIM Group Corp	Finland	NS	12.04.2006
Modelon AB (publ)	Sweden	NS	23.04.2021
Mosaic Fashions Ltd	Iceland	NS	10.06.2005
London Mining PLC	Norway	NS	09.10.2007
Hakon Invest AB	Sweden	NS	06.12.2005
Koskisen Oy	Finland	NS	30.11.2022
Fortinova Fastigheter AB (publ)	Sweden	NS	18.11.2020
Norway Royal Salmon ASA	Norway	NS	25.03.2011
Advanced SolTech Sweden AB (publ)	Sweden	NS	28.10.2021
United Bankers Oyj	Finland	NS	11.11.2014
Melker Schorling AB	Sweden	NS	05.09.2006
Philly Shipyard ASA	Norway	NS	04.12.2007
Platzer Fastigheter Holding AB (publ)	Sweden	NS	28.11.2013
Eastern Echo Holding PLC	Norway	NS	29.10.2007
Norsk Solar AS	Norway	NS	19.04.2021
Samesystem A/S	Denmark	NS	22.06.2021
BW LPG Ltd	Norway	NS	20.11.2013
Hemfosa Fastigheter AB	Sweden	NS	19.03.2014
Vestum AB (publ)	Sweden	NS	19.05.2008
Aker Drilling ASA	Norway	NS	24.02.2011
Gram Car Carriers ASA	Norway	NS	14.01.2022
Norwegian Air Shuttle ASA	Norway	NS	17.12.2003
Norway Energy and Marine Insurance ASA	Norway	NS	06.06.2005
Eezy Plc	Finland	NS	18.06.2018
Arlandastad Group AB (publ)	Sweden	NS	13.09.2021
Kemira GrowHow OYJ	Finland	NS	12.10.2004
B2holding ASA	Norway	NS	07.06.2016
Lime Technologies AB (publ)	Sweden	NS	06.12.2018
Scanworld Travelpartner AB	Sweden	NS	27.06.2007
eEducation Albert AB	Sweden	NS	30.09.2021
Copenhagen Capital A/S	Denmark	NS	25.10.2007
Danske Andelskassers Bank A/S	Denmark	NS	27.06.2011
Statoil Fuel & Retail ASA	Norway	NS	22.10.2010
LMK Group AB (publ)	Sweden	NS	24.03.2021
FX International AB	Sweden	NS	15.04.2011

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Company	Country	Ownership	Date
Wallenius Wilhelmsen ASA	Norway	NS	24.06.2010
Embellence Group AB (publ)	Sweden	NS	23.03.2021
Deep Sea Supply ASA	Norway	NS	15.09.2005
Polymer Factory Sweden AB	Sweden	NS	07.04.2021
Entra ASA	Norway	NS	16.10.2014
Saniona AB	Sweden	NS	18.03.2014
Lyko Group AB (publ)	Sweden	NS	11.12.2017
Metso Outotec Corp	Finland	NS	09.10.2006
Anora Group Oyj	Finland	NS	22.03.2018
Ocean Yield AS	Norway	NS	27.06.2013
Candles Scandinavia AB	Sweden	NS	01.11.2021
Granges AB	Sweden	NS	09.10.2014
Sonetel AB (publ)	Sweden	NS	12.04.2017
Icelandair Group hf	Iceland	NS	04.12.2006
Spectrumone AB (publ)	Sweden	NS	09.06.2015
Fellow Finance Oyj	Finland	NS	04.10.2018
Shelf Drilling Ltd	Norway	NS	22.06.2018
Komplett Bank ASA	Norway	NS	10.11.2017
Oma Saastopankki Oyj	Finland	NS	29.11.2018
Austevoll Seafood ASA	Norway	NS	11.10.2006
Arcticzymes Technologies ASA	Norway	NS	03.11.2005
Edda Wind ASA	Norway	NS	24.11.2021
Oslo Areal AS	Norway	NS	03.05.2005
Seajacks International Ltd	Norway	NS	08.10.2007
Flex LNG Ltd	Norway	NS	29.10.2009
Northern Logistics Property ASA	Norway	NS	15.06.2007
Suomen Terveystalo Oyj	Finland	NS	02.04.2007
PetroJack ASA	Norway	NS	23.02.2005
Amsc ASA	Norway	NS	11.07.2005
Nexus Floating Production Ltd	Norway	NS	26.03.2007
Insplanet AB	Sweden	NS	07.06.2006
BW Offshore Limited	Norway	NS	27.04.2006
Dockwise Ltd	Norway	NS	31.01.2007
North Energy ASA	Norway	NS	03.02.2010
MilDef Group AB	Sweden	NS	03.06.2021
Pandox AB	Sweden	NS	18.06.2015
Cibus Nordic Real Estate AB (publ)	Sweden	NS	09.03.2018
Nitro Games Oyj	Sweden	NS	26.05.2017

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Company	Country	Ownership	Date
Stenhus Fastigheter I Norden AB (publ)	Sweden	NS	11.11.2020
Qlife Holding AB	Sweden	NS	02.03.2020
Nordic Waterproofing Holding A/S	Sweden	NS	09.06.2016
NCAB Group AB	Sweden	NS	05.06.2018
Spits ASA	Norway	NS	12.12.2006
Orphazyme A/S	Denmark	NS	17.11.2017
Kojamo Oyj	Finland	NS	14.06.2018
Nordic Flanges Group AB (publ)	Sweden	NS	11.10.2007
Nanologica AB (publ)	Sweden	NS	30.10.2015
Purmo Group Oyj	Finland	NS	24.06.2021
Recreate ASA	Norway	NS	09.06.2021
ByggPartner Gruppen AB (publ)	Sweden	NS	30.11.2016
Sitowise Group Oyj	Finland	NS	24.03.2021
tbd30 AB	Sweden	NS	23.06.2021
Projektengagemang Sweden AB	Sweden	NS	19.06.2018
Equinor ASA	Norway	NS	18.06.2001
Aker ASA	Norway	NS	08.09.2004
Awilco AS	Norway	NS	03.05.2005
Cargotec Corp	Finland	NS	01.06.2005
Norgani Hotels ASA	Norway	NS	14.11.2005
Dannemora Mineral AB	Sweden	NS	08.05.2007
SalMar ASA	Norway	NS	08.05.2007
Bouvet ASA	Norway	NS	15.05.2007
Grieg Seafood ASA	Norway	NS	21.05.2007
Cecon ASA	Norway	NS	26.06.2007
German High Street Properties A/S	Denmark	NS	20.08.2007
Systemair AB	Sweden	NS	12.10.2007
Hafslund Infratek ASA	Norway	NS	30.11.2007
Solvtrans Holding ASA	Norway	NS	26.03.2010
Karolinska Development AB	Sweden	NS	13.04.2011
Serodus ASA	Norway	NS	25.03.2013
Orava Asuinkiinteistorahasto Oyj	Finland	NS	04.10.2013
Tokmanni Group Oyj	Finland	NS	29.04.2016
SERNEKE Group AB (publ)	Sweden	NS	22.11.2016
Elmera Group ASA	Norway	NS	20.03.2018
Polight ASA	Norway	NS	01.10.2018
Norske Skog ASA	Norway	NS	16.10.2019

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Company	Country	Ownership	Date
Kollect on Demand Holding AB (publ)	Sweden	NS	10.12.2019
Offentliga Hus i Norden AB	Sweden	NS	22.10.2020
Cadeler A/S	Norway	NS	26.11.2020
Meltwater NV	Norway	NS	02.12.2020
Ecit AS	Norway	NS	12.05.2021
AROS Bostadsutveckling AB	Sweden	NS	16.06.2021
Nordisk Bergteknik AB (publ)	Sweden	NS	11.10.2021
Haypp Group AB (publ)	Sweden	NS	12.10.2021
Lamor Corporation Oyj	Finland	NS	07.12.2021
Nordic Lights Group Oyj	Finland	NS	04.07.2022
Seacrest Petroleo Bermuda Ltd	Norway	NS	22.02.2023
Orn Software Holding AS	Norway	NS	25.03.2021
Netel Holding AB (publ)	Sweden	NS	14.10.2021
Reitir fasteignafelag hf	Iceland	NS	09.04.2015
Tanker Investments Ltd	Norway	NS	19.03.2014
Aker Seafoods ASA	Norway	NS	12.05.2005
Gjensidige Forsikring ASA	Norway	NS	09.12.2010
Ainax AB	Sweden	NS	08.06.2004
Everfuel A/S	Norway	NS	21.10.2020
Scatec ASA	Norway	NS	01.10.2014
Bluewater	Norway	NS	12.10.2005
Relais Group Oyj	Finland	NS	15.10.2019
NAXS AB (publ)	Sweden	NS	05.04.2007
cXense AS	Norway	NS	11.06.2014
Smartoptics Group AS	Norway	NS	28.05.2021
SSM Holding AB	Sweden	NS	06.04.2017
Firstfarms A/S	Denmark	NS	12.12.2006
Deltaq A/S	Denmark	NS	27.09.2007
EAM Solar ASA	Norway	NS	19.03.2013
Hafnia Ltd	Norway	NS	08.11.2019
Moberg Derma AB	Sweden	NS	18.05.2011
SPACtva AB	Sweden	NS	30.11.2022
Qleanair AB	Sweden	NS	12.12.2019
Administer Oy	Finland	NS	16.12.2021
Creaspac AB	Sweden	NS	22.06.2021
Polimoon ASA	Norway	NS	22.04.2005
Borregaard ASA	Norway	NS	18.10.2012

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Company	Country	Ownership	Date
Eqva ASA	Norway	NS	24.06.2014
iZafe Group AB	Sweden	NS	04.04.2011
Western Bulk ASA	Norway	NS	21.10.2013
Eitzen Chemical ASA	Norway	NS	29.09.2006
EOS Russia AB	Sweden	NS	15.06.2007
EnergyO Solutions Invest AB	Sweden	NS	25.06.2007
Norcod AS	Norway	NS	05.10.2020
Tekna Holding ASA	Norway	NS	24.03.2021
Eik fasteignafelag hf	Iceland	NS	29.04.2015
Floatel International Ltd	Norway	NS	18.11.2010
Arise AB	Sweden	NS	23.03.2010
Nordic Paper Holding AB	Sweden	NS	21.10.2020
Cedergrenska AB	Sweden	NS	21.05.2021
CombinedX AB (publ)	Sweden	NS	21.03.2022
Akastor ASA	Norway	NS	01.04.2004
Nustay A/S	Sweden	NS	05.03.2019
Self Storage Group ASA	Norway	NS	25.10.2017
Zaptec ASA	Norway	NS	30.09.2020
Questback Group AS	Norway	NS	23.08.2021
Horisont Energi AS	Norway	NS	27.01.2021
Volue ASA	Norway	NS	07.10.2020
Odfjell Drilling Ltd	Norway	NS	26.09.2013
Okea ASA	Norway	NS	14.06.2019
Aqua Bio Technology ASA	Norway	NS	21.12.2007
Nixu Oyj	Finland	NS	04.12.2014
Faktor Eiendom ASA	Norway	NS	27.11.2006
Norsk Titanium AS	Norway	NS	06.05.2021
Komplett ASA	Norway	NS	17.06.2021
BTS Group AB	Sweden	NS	29.05.2001
Kid ASA	Norway	NS	29.10.2015
Godsinlosen Nordic AB	Sweden	NS	07.07.2021
RomReal Ltd	Norway	NS	24.05.2007
Elkem ASA	Norway	NS	22.03.2018
Pagero Group AB (publ)	Sweden	NS	22.10.2021
Icelandic Salmon AS	Norway	NS	27.10.2020
Digital Workforce Services Oyj	Finland	NS	01.12.2021
Media & Research Group ASA	Norway	NS	23.09.2005
Petrojarl ASA	Norway	NS	30.06.2006

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Company	Country	Ownership	Date
Cool Company Ltd	Norway	NS	27.01.2022
Pyrum Innovations AG	Norway	NS	16.09.2021
Selvaag Bolig ASA	Norway	NS	11.06.2012
Endomines Finland Oyj	Finland	NS	13.12.2022
NunaMinerals A/S	Denmark	NS	18.06.2008
Risma Systems A/S	Denmark	NS	15.03.2021
Skandiabanken ASA	Norway	NS	30.10.2015
Bergesen Worlwide Gas ASA	Norway	NS	25.10.2005
Seamless Distribution Systems AB	Sweden	NS	14.07.2017
Viafin Service Oyj	Finland	NS	20.11.2018
Jetpak Top Holding AB (publ)	Sweden	NS	04.12.2018
Rezidor Hotel Group	Sweden	NS	27.11.2006
Isofol Medical AB (publ)	Sweden	NS	03.04.2017
EcoUp Oyj	Finland	NS	17.09.2021
Hyon AS	Norway	NS	21.01.2022
Quartiers Properties AB (publ)	Sweden	NS	06.07.2016
Dios Fastigheter AB	Sweden	NS	11.05.2006
Polarcus DMCC	Norway	NS	25.09.2009
Talenom Oyj	Finland	NS	11.06.2015
NattoPharma ASA	Norway	NS	04.01.2008
Note AB (publ)	Sweden	NS	01.06.2004
EcoOnline Holding AS	Norway	NS	19.03.2021
Deep Value Driller AS	Norway	NS	18.03.2021
Fred Olsen Production ASA	Norway	NS	12.02.2007
MPU Offshore Lift ASA	Norway	NS	10.01.2007
Integrated Wind Solutions ASA	Norway	NS	22.03.2021
WindowMaster International A/S	Denmark	NS	19.10.2020
Hoegh LNG Holdings Ltd	Norway	NS	24.06.2011
Tempest Security AB	Sweden	NS	05.12.2017
Aino Health AB (publ)	Sweden	NS	08.12.2016
House of Control Group AS	Norway	NS	06.10.2020
Aker Biomarine ASA	Norway	NS	24.06.2020
EVRY ASA	Norway	NS	21.06.2017
Havila Kystruten AS	Norway	NS	03.08.2021
Patientsky Group AS	Norway	NS	19.10.2020
Sensor Alarm Norden AB	Sweden	NS	23.04.2021
PCI Biotech Holding ASA	Norway	NS	10.06.2008
Morpol ASA	Norway	NS	29.06.2010

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Company	Country	Ownership	Date
Litium AB	Sweden	NS	31.05.2016
NOSIUM AB (publ)	Sweden	NS	02.02.2018
Zenergy AB	Sweden	NS	07.12.2015
Witted Megacorp Oyj	Finland	NS	06.05.2022
Tethys Oil AB	Sweden	NS	06.04.2004
XP Chemistries AB	Sweden	NS	29.10.2021
Cimber Sterling Group A/S	Denmark	NS	27.11.2009
Tilgin AB	Sweden	NS	14.12.2006
24SevenOffice Group AB	Sweden	NS	06.12.2017
Eagle Filters Group Oyj	Finland	NS	12.06.2014
Norva24 Group AB (publ)	Sweden	NS	09.12.2021
Nordic Asia Investment Group 1987 AB	Sweden	NS	07.12.2021
Infrea AB	Sweden	NS	20.04.2018
Biofish Holding AS	Norway	NS	23.07.2021
Qbrick AB (publ)	Sweden	NS	16.06.2021
Ocean Geoloop AS	Norway	NS	08.03.2022
Hav Group ASA	Norway	NS	18.02.2021
Lifa Air Oyj	Finland	NS	20.04.2022
Play Magnus AS	Norway	NS	28.09.2020
Aker Clean Hydrogen AS	Norway	NS	08.03.2021
Vow ASA	Norway	NS	07.04.2014
Vardia Insurance Group ASA	Norway	NS	27.03.2014
OssDsign AB	Sweden	NS	24.05.2019
Ocean Sun AS	Norway	NS	16.10.2020
Bactiguard Holding AB	Sweden	NS	18.06.2014
Serendex Pharmaceuticals A/S	Norway	NS	02.07.2014
Trainimal AB	Sweden	NS	16.04.2021
Mintra Holding AS	Norway	NS	25.09.2020
Coala-Life Group AB (publ)	Sweden	NS	26.06.2001
Hypefactors A/S	Denmark	NS	28.08.2018
AlzeCure Pharma AB	Sweden	NS	28.11.2018
RedBet Holding AB	Sweden	NS	05.07.2006
Arctic Blue Beverages AB	Sweden	NS	04.05.2022
Safeture AB	Sweden	NS	15.10.2014
Ranplan Group AB	Sweden	NS	28.06.2018
Elicera Therapeutics AB	Sweden	NS	11.06.2021
Trifork A/S	Denmark	NS	19.12.2007

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Company	Country	Ownership	Date
Simris Alg AB	Sweden	NS	22.04.2016
Topright Nordic AB (publ)	Sweden	NS	15.12.2017
Kyoto Group AS	Norway	NS	17.03.2021
Ekobot AB (publ)	Sweden	NS	02.03.2021
Sound Dimension AB	Sweden	NS	06.10.2021
Donkeyrepublic Holding A/S	Denmark	NS	18.05.2021
Scanfil Oyj	Finland	NS	30.12.2011
Rebelle AB	Sweden	NS	23.02.2022
Studentbostader I Norden AB (publ)	Sweden	NS	12.06.2015
Redwood Pharma AB	Sweden	NS	15.06.2016
MOBA Network AB	Sweden	NS	12.12.2019
Sevan Drilling ASA	Norway	NS	05.04.2011
Neodynamics AB (publ)	Sweden	NS	07.12.2018
NextCell Pharma AB	Sweden	NS	13.07.2017
Loyal Solutions A/S	Sweden	NS	03.06.2021
Pharmiva AB (publ)	Sweden	NS	31.03.2021
Respiratorius AB (publ)	Sweden	NS	05.07.2012
Natural ASA	Norway	NS	09.11.2006
Crunchfish AB	Sweden	PE	11.11.2016
Hydrogenpro ASA	Norway	PE	30.09.2020
BibbInstruments AB	Sweden	PE	05.10.2017
Risk Intelligence A/S	Sweden	PE	31.07.2018
Hemnet Group AB (publ)	Sweden	PE	26.04.2021
Exact Therapeutics AS	Norway	PE	14.07.2020
ReNewCell AB	Sweden	PE	25.11.2020
Erria A/S	Denmark	PE	30.11.2007
Fractal Gaming Group AB	Sweden	PE	10.02.2021
Implantica AG	Sweden	PE	16.09.2020
AcadeMedia AB	Sweden	PE	14.06.2016
Scan Geophysical AS	Norway	PE	11.05.2007
KlaraBo Sverige AB	Sweden	PE	02.12.2021
Attendo AB (publ)	Sweden	PE	27.11.2015
Pierce Group AB (publ)	Sweden	PE	26.03.2021
FM Mattsson AB (publ)	Sweden	PE	10.04.2017
Western Bulk Chartering AS	Norway	PE	01.06.2017
Cinis Fertilizer AB	Sweden	PE	20.10.2022
EQT AB	Sweden	PE	24.09.2019
Rana Gruber ASA	Norway	PE	15.02.2021

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Company	Country	Ownership	Date
Kreate Group Oyj	Finland	PE	18.02.2021
Netcompany Group A/S	Denmark	PE	07.06.2018
Kjell Group AB (publ)	Sweden	PE	15.09.2021
Sinch AB	Sweden	PE	07.10.2015
Linc AB	Sweden	PE	27.05.2021
Smartcraft ASA	Norway	PE	22.06.2021
Pandora A/S	Denmark	PE	05.10.2010
Musti Group Oyj	Finland	PE	12.02.2020
Desenio Group AB (publ)	Sweden	PE	25.02.2021
Cary Group Holding AB	Sweden	PE	22.09.2021
Aspire Global Plc	Sweden	PE	06.07.2017
Ahlsell AB	Sweden	PE	28.10.2016
Elektroimportoren AS	Norway	PE	14.12.2020
Pihlajalinna Oyj	Finland	PE	04.06.2015
Troax Group AB (publ)	Sweden	PE	26.03.2015
Instalco Intressenter AB	Sweden	PE	11.05.2017
Instalco AB	Sweden	PE	11.05.2017
Scandi Standard AB (publ)	Sweden	PE	26.06.2014
RVRC Holding AB	Sweden	PE	15.06.2021
Dustin Group AB	Sweden	PE	12.02.2015
Flyr AS	Norway	PE	15.02.2021
Balco Group AB	Sweden	PE	05.10.2017
Hovding Sverige AB	Sweden	PE	09.06.2015
Camurus AB	Sweden	PE	02.12.2015
Dometic Group AB (publ)	Sweden	PE	23.11.2015
Magnora ASA	Norway	PE	29.11.2004
Puuilo Oyj	Finland	PE	23.06.2021
ISS A/S	Denmark	PE	13.03.2014
Swedish Orphan Biovitrum AB (publ)	Sweden	PE	14.09.2006
Thule Group AB	Sweden	PE	25.11.2014
Ovzon AB (publ)	Sweden	PE	17.05.2018
Vertiseit AB (publ)	Sweden	PE	28.05.2019
Maven Wireless Sweden AB	Sweden	PE	26.05.2021
Webstep ASA	Norway	PE	09.10.2017
Readly International AB (publ)	Sweden	PE	16.09.2020
Ambea AB (publ)	Sweden	PE	31.03.2017
Handicare Group AB	Sweden	PE	09.10.2017

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Company	Country	Ownership	Date
Nederman Holding AB	Sweden	PE	16.05.2007
Nordnet AB (publ)	Sweden	PE	24.11.2020
Alimak Group AB (publ)	Sweden	PE	16.06.2015
Orthex Oyj	Finland	PE	24.03.2021
Zalaris ASA	Norway	PE	18.06.2014
Circa Group AS	Norway	PE	19.02.2021
Metacon AB (publ)	Sweden	PE	25.09.2022
Synsam AB (publ)	Sweden	PE	28.10.2021
Permascand Top Holding AB	Sweden	PE	03.06.2021
Electromagnetic Geoservices ASA	Norway	PE	29.03.2007
Bravida Holding AB	Sweden	PE	15.10.2015
Eltel AB	Sweden	PE	05.02.2015
Gofore Oyj	Finland	PE	13.11.2017
Klaveness Combination Carriers ASA	Norway	PE	22.05.2019
Bufab AB (publ)	Sweden	PE	20.02.2014
Intrum AB	Sweden	PE	06.06.2002
Sanitec Oy	Sweden	PE	09.12.2013
4C Group AB	Sweden	PE	23.05.2022
Chr Hansen Holding A/S	Denmark	PE	03.06.2010
Norse Atlantic ASA	Norway	PE	26.03.2021
Byggmax Group AB	Sweden	PE	01.06.2010
XXL ASA	Norway	PE	03.10.2014
OrganoClick AB	Sweden	PE	16.02.2015
Kamux Oyj	Finland	PE	11.05.2017
KappAhl AB	Sweden	PE	22.02.2006
BE Group AB	Sweden	PE	23.11.2006
Revus Energy ASA	Norway	PE	24.06.2005
Hexicon AB	Sweden	PE	17.06.2021
Calliditas Therapeutics AB	Sweden	PE	28.06.2018
Kotipizza Group Oyj	Finland	PE	01.07.2015
Pronova BioPharma ASA	Norway	PE	11.10.2007
Matas A/S	Denmark	PE	28.06.2013
Enento Group Oyj	Finland	PE	26.03.2015
Kongsberg Automotive ASA	Norway	PE	24.06.2005
AutoStore Holdings Ltd	Norway	PE	20.10.2021
Consti Oyj	Finland	PE	10.12.2015
Karnov Group AB (publ)	Sweden	PE	11.04.2019

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Company	Country	Ownership	Date
FDT System Holding AB	Sweden	PE	21.06.2012
Lindab International AB	Sweden	PE	01.12.2006
FormueEvolution II A/S	Denmark	PE	13.03.2008
Terveystalo Oyj	Finland	PE	10.10.2017
ACQ Bure AB	Sweden	PE	24.03.2021
Edgeware AB	Sweden	PE	08.12.2016
Footway Group AB	Sweden	PE	13.07.2015
Actic Group AB	Sweden	PE	06.04.2017
HusCompagniet A/S	Denmark	PE	18.11.2020
Cermaq ASA	Norway	PE	21.10.2005
Resurs Holding AB (publ)	Sweden	PE	28.04.2016
Wilson Therapeutics AB	Sweden	PE	11.05.2016
Arcus ASA	Norway	PE	29.11.2016
Saferoad Holding ASA	Norway	PE	24.05.2017
Findexa AS	Norway	PE	24.05.2004
TradeDoubler AB	Sweden	PE	07.11.2005
Akva Group ASA	Norway	PE	08.11.2006
InvivoSense ASA	Norway	PE	05.06.2007
Duni AB	Sweden	PE	13.11.2007
Bulten AB	Sweden	PE	20.05.2011
Multiclient Geophysical ASA	Norway	PE	29.04.2013
Nilorngruppen AB	Sweden	PE	12.06.2015
Coor Service Management Holding AB	Sweden	PE	16.06.2015
Capio AB	Sweden	PE	29.06.2015
Harvia Oyj	Finland	PE	21.03.2018
Rugvista Group AB (publ)	Sweden	PE	18.03.2021
Elopak ASA	Norway	PE	17.06.2021
Hoegh Autoliners ASA	Norway	PE	24.11.2021
Salcomp Oy	Finland	PE	10.03.2006
Skandia Greenpower AS	Norway	PE	10.02.2021
Danware Data A/S	Denmark	PE	18.06.2001
TCM Group A/S	Denmark	PE	23.11.2017
Green Landscaping Group AB (publ)	Sweden	PE	22.03.2018
MQ Holding AB	Sweden	PE	17.06.2010
DNA Oyj	Finland	PE	29.11.2016
Var Energi ASA	Norway	PE	15.02.2022
HMS Networks AB	Sweden	PE	19.10.2007

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Company	Country	Ownership	Date
HMS Industrial Networks AB	Sweden	PE	18.10.2007
Aligro Planet Acquisition Company AB	Sweden	PE	25.05.2021
Marine Farms ASA	Norway	PE	26.09.2006
VIA Travel Group AS	Norway	PE	01.06.2005
Ability Group ASA	Norway	PE	29.06.2006
Nordax Group AB	Sweden	PE	16.06.2015
Detection Technology Oyj	Finland	PE	13.03.2015
RenoNorden AS	Norway	PE	12.12.2014
NEAS ASA	Norway	PE	21.03.2007
Nets A/S	Denmark	PE	23.09.2016
Boule Diagnostics AB	Sweden	PE	23.06.2011
Europris ASA	Norway	PE	19.06.2015
Crayon Group Holding ASA	Norway	PE	06.11.2017
Scandic Hotels Group AB	Sweden	PE	01.12.2015
Raketech Group Holding PLC	Sweden	PE	29.06.2018
Medfield Diagnostics AB	Sweden	PE	02.05.2012
Inwido AB (publ)	Sweden	PE	25.09.2014
Byggfakta Group Nordic HoldCo AB	Sweden	PE	14.10.2021
Nexcom A/S	Denmark	PE	26.01.2021
Nobina AB	Sweden	PE	17.06.2015
Efecte Oyj	Finland	PE	07.12.2017
ViroGates A/S	Denmark	PE	20.06.2018
Algeta ASA	Norway	PE	26.03.2007
Iconovo AB	Sweden	PE	26.03.2018
Arctic Fish Holding AS	Norway	PE	15.02.2021
Sats ASA	Norway	PE	23.10.2019
OX2 AB (publ)	Sweden	PE	22.06.2021
Nobia AB	Sweden	PE	18.06.2002
BHG Group AB	Sweden	PE	27.03.2018
Plexian AB	Sweden	PE	31.03.2021
Skipti hf	Iceland	PE	14.03.2008
Happy Helper A/S	Denmark	PE	23.04.2018
Irras AB	Sweden	PE	21.11.2017
First Venture Sweden Private AB	Sweden	PE	29.06.2021
Bridge Energy ASA	Norway	PE	12.05.2010
Ectin Research AB	Sweden	PE	18.08.2021
Dancann Pharma A/S	Sweden	PE	12.11.2020

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Company	Country	Ownership	Date
Ngenic AB (publ)	Sweden	PE	21.05.2021
Seafire AB (publ)	Sweden	PE	13.10.2017
Colabitoil Sweden AB	Sweden	PE	16.11.2017
Astrocast SA	Norway	VC	25.08.2021
Checkin.com Group AB	Sweden	VC	12.05.2021
Ecomb AB (publ)	Sweden	VC	02.02.2011
Bimobject AB	Sweden	VC	13.01.2014
Flat Capital AB	Sweden	VC	13.10.2021
Agilyx ASA	Norway	VC	30.09.2020
Stillfront Group AB	Sweden	VC	03.12.2015
PharmaLundensis AB	Sweden	VC	09.06.2010
Bioextrax AB publ	Sweden	VC	28.04.2020
Climeon AB (publ)	Sweden	VC	11.10.2017
XSpray Pharma AB (publ)	Sweden	VC	28.09.2017
Midsummer AB	Sweden	VC	21.06.2018
Cint Group AB (publ)	Sweden	VC	19.02.2021
Monsenso A/S	Denmark	VC	29.05.2020
FM Mattsson Mora Group AB	Sweden	VC	07.04.2017
Tobii AB	Sweden	VC	22.04.2015
Fly Play hf	Iceland	VC	09.07.2021
Decideact A/S	Denmark	VC	09.12.2020
Desert Control AS	Norway	VC	14.04.2021
Paradox Interactive AB (publ)	Sweden	VC	24.05.2016
Xplora Technologies AS	Norway	VC	18.11.2020
OmniCar Holding AB	Sweden	VC	22.06.2017
Ayfie Group AS	Norway	VC	07.07.2020
Ellwee AB (publ)	Sweden	VC	11.01.2021
Swedencare AB (publ)	Sweden	VC	14.06.2016
Kindred Group PLC	Sweden	VC	08.06.2004
Sinch AB (publ)	Sweden	VC	08.10.2015
Aresa A/S	Denmark	VC	14.02.2006
Arla Plast AB	Sweden	VC	24.05.2021
Energeia AS	Norway	VC	06.12.2022
Better Collective A/S	Sweden	VC	08.06.2018
Boozt AB	Sweden	VC	31.05.2017
Spinnova Oyj	Finland	VC	23.06.2021
Kingfish Company NV	Norway	VC	10.11.2020
Toleranzia AB	Sweden	VC	16.12.2015

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Company	Country	Ownership	Date
Sedana Medical AB	Sweden	VC	19.06.2017
Sedana Medical AB (publ)	Sweden	VC	21.06.2017
Catena Media PLC	Sweden	VC	10.02.2016
Merus Power Oyj	Finland	VC	08.06.2021
BioArctic AB	Sweden	VC	12.10.2017
Next Games Oy	Finland	VC	22.03.2017
Green Hydrogen Systems A/S	Denmark	VC	15.06.2021
Carbiotix AB (publ)	Sweden	VC	18.10.2019
Alternus Energy Group PLC	Norway	VC	11.01.2021
Canopy Holdings AS	Norway	VC	18.12.2020
Ferroamp AB (publ)	Sweden	VC	28.02.2019
Zaplox AB	Sweden	VC	08.06.2017
Alligator Bioscience AB	Sweden	VC	22.11.2016
TopoTarget A/S	Denmark	VC	10.06.2005
LumenRadio AB	Sweden	VC	08.12.2022
LED iBond International AS	Denmark	VC	09.06.2020
Physitrack PLC	Sweden	VC	17.06.2021
Argeo AS	Norway	VC	20.04.2021
Kontakt East Holding AB	Sweden	VC	26.11.2006
Masoval AS	Norway	VC	15.06.2021
LeoVegas AB	Sweden	VC	16.03.2016
Betolar Oyj	Finland	VC	08.12.2021
Otello Corporation ASA	Norway	VC	11.03.2004
MBRS Group AB	Sweden	VC	22.12.2020
Fluicell AB	Sweden	VC	29.03.2018
Exiqon AS	Denmark	VC	25.05.2007
Mips AB	Sweden	VC	23.03.2017
Nordic Nanovector ASA	Norway	VC	23.03.2015
TrollTech ASA	Norway	VC	05.07.2006
Jondetech Sensors AB (publ)	Sweden	VC	25.05.2018
Alfa Laval AB	Sweden	VC	16.05.2002
Fastighets AB Trianon	Sweden	VC	21.06.2017
LifeCycle Pharma A/S	Denmark	VC	10.11.2006
Ability Drilling ASA	Norway	VC	27.09.2007
Curalogic AS	Denmark	VC	01.06.2006
ZignSec AB (publ)	Sweden	VC	21.10.2019
XMReality AB (publ)	Sweden	VC	26.04.2017
Hunter Group ASA	Norway	VC	12.06.2007

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Company	Country	Ownership	Date
Duearity AB	Sweden	VC	27.04.2021
Lifeline SPAC I Oyj	Finland	VC	14.10.2021
Pioneer Property Group ASA	Norway	VC	19.06.2015
ODIM ASA	Norway	VC	17.11.2005
Konsolidator A/S	Denmark	VC	06.05.2019
Q-Free ASA	Norway	VC	03.04.2002
Lytix Biopharma AS	Norway	VC	07.06.2021
Leaddesk Oyj	Finland	VC	15.02.2019
Bonesupport Holding AB	Sweden	VC	20.06.2017
2cureX AB	Sweden	VC	27.10.2017
Digizuite A/S	Denmark	VC	29.04.2021
Episurf Medical AB	Sweden	VC	29.09.2010
Transmode Holding AB	Sweden	VC	27.05.2011
Gigante Salmon AS	Norway	VC	25.06.2021
Clavis Pharma ASA	Norway	VC	03.07.2006
Elliptic Laboratories ASA	Norway	VC	16.10.2020
Global Health Partner AB	Sweden	VC	03.10.2008
Promimic AB	Sweden	VC	26.04.2022
Remedial Offshore	Norway	VC	23.11.2006
Mantex AB	Sweden	VC	05.05.2017
Herantis Pharma Oyj	Finland	VC	30.05.2014
Calmark Sweden AB	Sweden	VC	06.07.2018
Eastnine AB (publ)	Sweden	VC	06.11.2007
Probi AB	Sweden	VC	08.11.2004
Zesec of Sweden AB (publ)	Sweden	VC	28.05.2021
Oneflow AB	Sweden	VC	07.04.2022
AffectoGenimap Oyj	Finland	VC	26.05.2005
Orexo AB	Sweden	VC	09.11.2005
Funcom A/S	Norway	VC	12.12.2005
FPSOcean	Norway	VC	21.12.2006
Arrow Seismic ASA	Norway	VC	24.05.2007
Black Earth Farming Ltd	Sweden	VC	19.12.2007
Scandinavian Tobacco Group A/S	Denmark	VC	10.02.2016
Bergenbio ASA	Norway	VC	06.04.2017
Rovio Entertainment Oyj	Finland	VC	28.09.2017
Rush Factory Oyj	Finland	VC	16.11.2018
Luxbright AB	Sweden	VC	06.11.2020
Froy ASA	Norway	VC	26.03.2021

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Company	Country	Ownership	Date
Nilar International AB	Sweden	VC	29.04.2021
Smart Wires Technology Ltd	Sweden	VC	12.05.2021
Solid Clouds hf	Iceland	VC	12.07.2021
Barramundi Group Ltd	Norway	VC	11.08.2021
Truecaller AB	Sweden	VC	08.10.2021
Verkkokauppa.com Oyj	Finland	VC	04.04.2014
Napatech A/S	Norway	VC	04.12.2013
Ascelia Pharma AB	Sweden	VC	05.03.2019
Catch Communications ASA	Norway	VC	26.03.2004
Vadsbo SwitchTech Group AB	Sweden	VC	03.05.2016
Teco 2030 ASA	Norway	VC	30.09.2020
Acast AB (publ)	Sweden	VC	16.06.2021
Ultimovacs ASA	Norway	VC	29.05.2019
Q linea AB	Sweden	VC	06.12.2018
BW Energy Ltd	Norway	VC	17.02.2020
Re-Match As	Denmark	VC	14.12.2021
Re-Match Holding A/S	Denmark	VC	23.12.2021
BW Ideol AS	Norway	VC	12.03.2021
Nexstim Oyj	Finland	VC	14.11.2014
Linkfire A/S	Sweden	VC	24.06.2021
Mamut ASA	Norway	VC	07.05.2004
Asetek A/S	Norway	VC	18.03.2013
Scandinavian Biogas Fuels International AB	Sweden	VC	14.12.2020
CAG Group AB	Sweden	VC	12.12.2018
Spherio Group AB (publ)	Sweden	VC	09.03.2021
SciBase Holding AB (publ)	Sweden	VC	27.05.2015
MAG Interactive AB (publ)	Sweden	VC	08.12.2017
Oncopeptides AB	Sweden	VC	22.02.2017
Acarix AB	Sweden	VC	07.12.2016
Zwipe AS	Norway	VC	21.01.2019
Aquaporin A/S	Denmark	VC	28.06.2021
Zealand Pharma A/S	Denmark	VC	22.11.2010
Isconova AB	Sweden	VC	02.11.2010
Eevia Health Abp	Sweden	VC	29.06.2021
Nordhealth AS	Norway	VC	25.05.2021
Bodyflight Sweden AB	Sweden	VC	24.05.2018
Safe At Sea AB	Sweden	VC	09.01.2008

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Company	Country	Ownership	Date
Vitrolife AB	Sweden	VC	19.06.2001
Enersense International Oyj	Finland	VC	16.04.2018
Lipigon Pharmaceuticals AB	Sweden	VC	01.03.2021
CodeMill AB (publ)	Sweden	VC	15.06.2021
Arctic Bioscience AS	Norway	VC	19.02.2021
Aiforia Technologies Oyj	Finland	VC	09.12.2021
Smoltek Nanotech Holding AB	Sweden	VC	26.02.2018
Cyviz AS	Norway	VC	11.12.2020
BioInvent International AB	Sweden	VC	06.06.2001
Cereno Scientific AB	Sweden	VC	22.06.2016
SeaTwirl AB (publ)	Sweden	VC	07.12.2016
Bioservo Technologies AB	Sweden	VC	22.05.2017
Stayble Therapeutics AB	Sweden	VC	09.03.2020
BBS-Bioactive Bone Substitutes Oyj	Finland	VC	18.02.2018
Brain+ A/S	Denmark	VC	30.09.2021
Sweden BuyersClub AB	Sweden	VC	09.06.2022
Cellcura ASA	Norway	VC	27.09.2010
Nightingale Health Oyj	Finland	VC	18.03.2021
Nuevolution AB	Sweden	VC	04.12.2015
FIFAX Abp	Finland	VC	13.10.2021
Move About Group AB	Sweden	VC	17.02.2022
Hubbster Group AB (publ)	Sweden	VC	24.02.2022
Airthings ASA	Norway	VC	23.10.2020
Lyckegard Group AB	Sweden	VC	08.02.2022
Prostatype Genomics AB	Sweden	VC	03.11.2020
Lipum AB (publ)	Sweden	VC	22.04.2021
Azelio AB	Sweden	VC	05.12.2018
QPR Software Plc	Finland	VC	07.03.2002
Dlaboratory Sweden AB	Sweden	VC	21.04.2021
Bambuser AB	Sweden	VC	25.04.2017
Twiik AB	Sweden	VC	19.05.2021
OptiMobile AB (publ)	Sweden	VC	28.02.2018
Intellego Technologies AB	Sweden	VC	14.06.2021
Bluelake Mineral AB (publ)	Sweden	VC	16.12.2016