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Does private equity have effects on post-IPO stock performance?

Nordic evidence

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ABSTRACT:

The following study examines how private equity ("PE") ownership affects the stock performance of a company after the initial public offering ("IPO"). The data of the study is collected between 2009 and 2019 from three different Nordic countries, Denmark, Finland, and Sweden. The study focuses on two different time frames regarding the stock performance, the initial return of the IPO and a 36-month period, and compares the returns to a benchmark index in the long run. This research examines the differences ownership types have on the first-day returns and in the long term.

In this study, PE refers to all financial backing types of IPOs. Private equity funds generate returns by advising, developing, and financing companies with high growth potential. A non-backed IPO refers to an IPO that has not collected any financing from different kinds of private equity funds, such as buyouts, growth equity, and venture capital. Private equity funds use initial public offers as an exit strategy to gather their returns. IPO is only one of the exit strategies private equity funds use and only a small amount of the initial investments made by the funds end in an IPO to a stock exchange.

The data sample of this study is formed from 190 initial public offers made in Denmark, Finland, and Sweden between 2009 and 2019. 83 IPOs of the full sample are backed by a financial sponsor and 107 are non-backed. The underpricing of the IPOs is measured by calculating the first-day closing price compared to the offer price of the IPO. The long-run performance of the offerings is calculated with a buy-and-hold abnormal (BHAR) method. The designated time frame for the BHAR in this study is 36 months but also shorter holding periods are introduced. The abnormal returns are calculated by comparing the returns of the IPOs to OMX Nordic 120 index which included 120 companies from Denmark, Finland, and Sweden.

Despite the final data sample being relatively small, the study aims to generate useful results regarding the Nordic IPO market which is still developing. Even though IPOs and their underpricing and long-term performance are studied phenomena, the Nordic IPO market lacks academic research. The purpose of this study is to narrow the gap between the studied IPO markets, such as the US and the UK, and the Nordic markets.

The results of this study indicate that IPOs are on average underpriced and that different ownership types affect the underpricing of IPOs in the Nordic market. According to the findings of the empirical evidence, the financially sponsored IPOs are less underpriced than their non-backed peers in the Nordic market. The long-term performance of the IPOs is influenced by the ownership type. The non-backed IPOs tend to perform better than the private equity-backed IPOs during the long run both in equal- and value-weighted terms which is opposite to the previous academic literature.

KEYWORDS: Buy-and-hold abnormal return, initial public offer, private equity, underpricing

Tiivistelmä:

Tämä tutkimus pyrkii selvittämään, minkälaisia vaikutuksia pääomasijoittajat tuovat yritysten osaketuottoihin, jotka ovat tehneet listautumisannin vuosien 2009 ja 2019 välisenä aikana. Tarkastelussa on kolmen eri Pohjoismaan, Tanskan, Suomen ja Ruotsin osakemarkkinoille listautuneet yritykset. Tutkimus keskittyy listautumisannin ensimmäisen päivän tuottoihin sekä kolmen vuoden osaketuottoihin, jota verrataan vertailuindeksin tuottoon pitkällä aikavälillä. Tämä tutkimus keskittyy varsinkin selvittämään vaikuttaako ennen listautumista oleva pääomasijoitus yrityksen lyhyen- ja pitkänaikavälin tuottoihin.

Tässä tutkimuksessa pääomasijoituksella viitataan kaikkiin pääomasijoituksen kategorioihin. Pääomasijoitusyhtiöt generoivat tuottoja neuvonantamalla, kehittämällä ja rahoittamalla kasvuun kykeneviä kohdeyhtiöitänsä. Tutkimuksessa aineisto jaetaan kahteen omistustyyppiin. Sponsoroimaton listautumisanti ei ole olemassaolonsa aikana kerännyt lainkaan pääomasijoitukseen vertautuvia varoja ja sponsoroitu listautumisanti taas on kerännyt jossain vaiheessa ennen listautumisantia rahaa pääomasijoittajilta. Pääomasijoitusrahastot käyttävät listautumisanteja divestointi-tapana luodakseen rahastolleen tuottoa.

Tämän tutkimuksen aineisto on kerätty Tanskasta, Suomesta ja Ruotsista vuosien 2009 ja 2019 välillä. Lopullinen aineisto pitää sisällään 190 listautumisantia, joista 83 on kategorisoitu sponsoroiduksi ja 107 sponsoroimattomaksi. Listautumisantien alihinnoittelu on selvitetty laskemalla ensimmäisen päivän osaketuotto, joka muodostuu vertaamalla yrityksen osakkeen listautumishintaa ensimmäisen päivän päätöshintaan. Listautumisantien pitkän aikavälin osaketuotto on selvitetty laskemalla niin sanottu osta ja pidä epänormaalituotto 36 kuukauden ajalta (36-months buy-and hold abnormal return, BHAR36). Epänormaalituotto on saatu vertaamalla listautumisantien tuottoja OMX Nordic 120 osakeindeksiin, joka muodostuu 120 yrityksen osakkeiden tuotoista Tanskassa, Suomessa ja Ruotsissa.

Vaikka tämän tutkimuksen lopullinen aineisto on suhteellisen pieni, pyrkii tutkimus antamaan hyödyllistä tietoa edelleen kehittyvästä Pohjoismaiden listautumismarkkinasta. Listatumisantien alihinnoittelua ja pitkän aikavälin tuottoja on tutkittu historiassa, mutta Pohjoismaiden markkina on vielä heikosti akateemisesti tutkittu alue. Tämä tutkimus pyrkii pienentämään eroa enemmän tutkittujen listautumismarkkinoiden kuten Yhdistyneiden Kuningaskuntien ja Yhdysvaltojen markkinoiden ja vähemmän tutkittujen Pohjoismaiden markkinoiden välillä.

Tutkimuksen tulokset viittaavat siihen, että listautumisannit ovat keskimääräisesti alihinnoiteltuja. Tulokset näyttävät myös, että ennen listautumisantia oleva omistajuustyyppi vaikuttaa alihinnoittelun määrään Pohjoismaissa. Empiiriset löydökset osoittavat, että sponsoroidut listautumisannit ovat vähemmän alihinnoiteltuja kuin sponsoroimattomat. Omistajuustyyppi vaikuttaa myös listautumisantien pitkän aikavälin tuottoon. Tutkimuksen mukaan sponsoroimattomat listautumisannit tuottavat paremmin pitkällä aikavälillä kuin sponsoroidut. Löydökset pitkän aikavälin tuotoissa ovat päinvastaisia edeltävien akateemisten tutkimuksien tuloksiin.

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1 Introduction

Do different ownership types have effects on the post-IPO stock performance of companies, and can investors use the backing type of an IPO as an indication for different purposes? The IPOs backed by private equity companies have been studied over short and long period time samples in the past academic literature. This paper will follow a similar hypotheses construction approach to previous research and combine it with updated data. The sample of this paper is constructed of IPOs from three different Nordic countries, Finland, Denmark, and Sweden, from which they are investigated from 2009 until 2019.

An initial public offer is one of the key decisions a company facilitates during its existence. Still, at the same time, the process is unique since most companies do it only once during their lifespan. Yet, the initial public offer and the reasons to execute it are relatively poorly studied in the field of corporate finance (Pagano, Panetta, and, Zingales, 2002).

The following study will examine what kind of effects financial sponsoring (private equity/venture capital support) before the issuance of a public offering has on the stock performance after the IPO has been executed. The post-performance in the public stock market will be evaluated in different periods after the initial public offers. According to Swedish Private Equity & Venture Capital Association (2022), the private equity-backed companies that made their IPOs between 2013 and 2022 outperformed their sector's peers as well as the market index. Regarding the market index, the outperformance was at the highest level after 1 year and 3 years since the IPO, when 60 % and 59 % of the IPOs had an excess return of more than 5 %. When comparing the private equity-backed IPOs to sector indices, the findings were similar to the market index findings. In 1-year time 60 % of the IPOs had an excess return of more than 5 % compared to the sector indices. The amount of more than 5 % excess return performers of the total sample was 61 % in the 3-year period.

Also, the underpricing of IPOs will be researched since it is one of the key phenomena related to initial public offers. In the US, during the 1990s, IPOs were on average 20 % underpriced according to Ljungqvist (2007). Hahl, Vähämaa & Äijö (2014) concluded that the mean abnormal initial return of the IPOs between 1994 and 2006 mean is 15,6 % and the median return is 4,1 %. Pukthuanthong & Walker (2013) showcased results regarding the Nordic market. The study documented that the IPOs were underpriced on average by 7,5 % between 1995 and 2002. Boreiko & Lombardo (2011) found similar results in their Italian data sample between 1999 and 2008. They indicated that the underpricing of IPOs in the data sample was at a level of 12,5 %, on average. Also, a global study by Hahn et. al (2013) documented an underpricing of 27,8 % of the IPOs in their data sample between 1988 and 2009.

The IPOs in the US Stock Exchange were underpriced by 17,6 % between 1980 and 2016 (Ritter, 2017). The large data sample introduced by Ritter (2017) gives exceptional insight into the underpricing of IPOs in the US over a long period and argues that the IPOs are indeed underpriced during different market situations. The research on underpricing in IPOs will be made comparing companies with financial sponsors and non-backed IPOs. The studied data will focus on evidence found in the Nordic Markets.

The managed funds of private equity companies have seen astonishing growth during the past decades. According to the consulting giant, McKinsey (2022), the assets under management (AUM) of private equity funds reached an all-time high in 2021 of 6,3 trillion US dollars. The AUM of private equity has grown fast during the past twenty years. At the beginning of the 2000s private equity funds controlled approximately 10 times less capital than two decades later.

To conclude, this paper will study one of the current hottest topics in the field of finance. Private equity funds control more capital than ever, hence they have a greater impact on the financing of companies than before. Thus, they contribute to the economic world with a more significant role than ever. Additionally, the present decade has brought up

again the price of money in the form of rising interest rates, which were not present for the past 10 years. This factor can strengthen the role of private funding in the future.

1.1 Purpose of the study

The purpose of the study is to examine and further elaborate on what kind of effects private equity money will generate on a company when entering the public markets by utilizing refreshed data from the Nordic countries. The effects of prior-IPO ownership type on the post-performance of IPOs are less studied in the Nordics than in the more advanced capital regions. Markets such as the US, the UK, and France are more broadly studied based on IPOs and thus give a reason why this study is executed. The Nordic IPO market is still evolving and studies regarding it are needed.

The IPO market can be described as hot during the past years in the Nordic countries. For example, during the year of 2021 in Finland, 29 companies made IPOs. Comparing that to the years 2019 and 2020, when there were 7 IPOs in both years in the Finnish Stock Market. The current world situation will have an impact on the initial public offerings and can decrease the number of executed IPOs in the future. But the trend of finding financing and publicizing companies can carry further than the uncertain market situation, i.e., the debt money has a price, something it has not had for the past decade.

1.2 Structure of the study

The first section includes the introduction, purpose of the study, structure of the study part, and finally the hypotheses part. It will introduce the hypotheses this study will answer in the empirical part after the theoretical section. The theoretical part includes past academic literature and studies from the fields of private equity and initial public offers. This part will introduce the basics of both subjects and lead the reader to the empirical part of the study.

The empirical part will be covering the fourth and fifth sections of the study. It will introduce and showcase the data used in the regression models and the methodologies behind the regression models. After that, the fifth part will showcase the empirical results found in the fourth section with different tables to give context to the writing part. The sixth and final section concludes the study, introduces its restrictions, and leaves remarks for future studies.

1.3 Hypotheses

The construction of the hypotheses of this study follows an approach to the longitude of the holding period of the companies' stocks that have executed an IPO. The first hypotheses are then only focusing on the first-day returns, e.g., underpricing of the IPOs. Then the hypotheses construction moves to a longer holding period approach with a buy-and-hold abnormal return model of 36 months.

The first hypotheses of this study follow a similar approach as the past academic literature regarding the initial returns of IPOs. The underpricing of initial public offers is a widely studied phenomenon and the methodology has regularised since the phenomenon has been studied by Reilly (1973) and Ibbotson (1975). Since the past academic literature has widely agreed with the research method of the underpricing of the IPOs, this study will follow a similar approach regarding the model.

The past literature (Brav & Gombers, 1997; Ritter & Welch, 2002; Bergström et al., 2006; Belghitar & Dixon, 2011) findings suggest that the ownership factors before the initial public offer affects the level of underpricing. When taking the results of the past studies into account, also this study will assume similar results of the effects of pre-IPO ownership type. Finally, the Nordic region factor is introduced to the hypothesis's construction. The first hypothesis is formulated related to these past findings as followed:

H1: Pre-IPO ownership type will affect the underpricing level a company is experiencing when entering the stock exchange by initial public offering in the Nordic countries.

The second hypothesis is related to the long-run stock performances of the IPOs. This hypothesis is mainly supported by past academic literature of Ritter (1991), Loughran & Ritter (1995), Bergström et al. (2006), and Levis (2011). Part of the past academic literature indicates that IPOs are more likely to perform worse than the index they are compared to (Ritter, 1991; Loughran & Ritter, 1995).

According to Bergström et al. (2006) and Levis (2011) private equity-backed IPOs outperform not only their benchmark indexes but also the non-backed IPOs. According to the previous literature, this academic study assumes that the backed-IPOs outperform their non-backed peers. This study further focuses on a specific region and adds the Nordic factor to it. After these factors, the second hypothesis can be generated as follows:

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

2 Private equity

This chapter will be focusing on explaining the principles of private equity funds, their investment plans, and exit strategies. Past academic literature related to private equity is introduced and the sub-categories of private equity funds, buyouts, growth, and venture capital, are presented.

2.1 Private equity

The companies in the field of private equity and venture capital are generally formulated as limited liability or as partnership companies (Kaplan & Strömberg, 2009). They offer different funds for investors, who are in general institutional investors such as pension funds, family offices, and mutual funds. Private equity funds typically invest in private companies in the long run in exchange for an equity stake in the company the private equity company invests in.

Legally private equity funds are formed as a limited partnership, in which the general partner of the fund is the financial sponsor, and the institutional investors supply the additional capital needed for the fund. Generally, the capital provided by the institutional investors is locked into the fund for the whole lifetime of it. This means approximately 10 to 12 years (Kaplan & Schoar, 2005). The phases of the fund can be divided, in chronological order, into the investment period where the investments are made, and the holding and divestment period where the capital is returned to the fund.

According to Statista (2022), the private equity funds globally outperformed the reasonable comparison index, the S&P 500, between 2000 and 2017. The comparison was made with different periods from 1 year to 18 years during the research period. Figure 1 introduces the past returns of private equity funds globally and the S&P 500 during different periods until 2017. The smallest difference in the different years was in the time of 2017 and 2007 with the private equity funds generating a 0,7 % better annual

return compared to the S&P 500. The largest separation was the longest period of 18 years between 2000 and 2017. During the 5 years, from 2013 to 2017, the compounded annual return of the S&P 500 was 13,7 % and the private equity fund's annual return was 15,2 %. The annual return difference between the two indexes was over double during the sample period, respectively 11,4 % with the private equity funds and 5,4 % with the S&P 500 (Statista, 2022). According to the data, one could argue that private equity funds have been able to generate excess returns compared to the stock market in the 2000s. A hundred dollars invested at the beginning of 2000 to a global private equity index would have compounded to 305,2 dollars. Hundred-dollar investment to the S&P 500 index on the other hand would have compounded to 197,2 dollars, according to Statista (2022).

Characteristic	Private equity funds	S&P 500
18 year period	11.4 %	5.4 %
15 year period	13.4 %	9.9 %
10 year period	9.8 %	9.1 %
5 year period	15.2 %	13.7 %
3 year period	15 %	10.2 %
1 year period	20.5 %	13.6 %

Figure 1. Performance of private equity funds globally vs S&P 500 index 2017, by time period (Statista, 2022).

2.2 Structure of a Private Equity Fund

The general structure of a private equity fund includes the general partners and passive investors, also known as limited partners. Their target is to generate excess return beyond all the management fees, carried interest, and unsuccessful investment decisions.

The general partners receive up to about 20 % share of the excess return, this is shown in Figure 2 as a carried interest. It will not be paid before all the passive investors, i.e., limited partners will receive their invested capital back compounded with a hurdle rate. The figure showcases the management fee, that is paid annually to the management company. It will pay for example the salaries of the employees of the private equity fund. The management fee varies between funds, in the academic research by Kaplan & Strömberg (2009) made an example with an annual fee of 2 %.

The rest of the profits the fund will make will be paid to the limited partners, i.e., passive investors, of the private equity fund. The profits are divided between the limited partners and the general partners with an 80 % and 20 % split. The limited partners, passive investors in Figure 2, will receive 80 % of the profits and the general partners 20 % of the profits. The figure below provides the basic structure of a private equity fund.

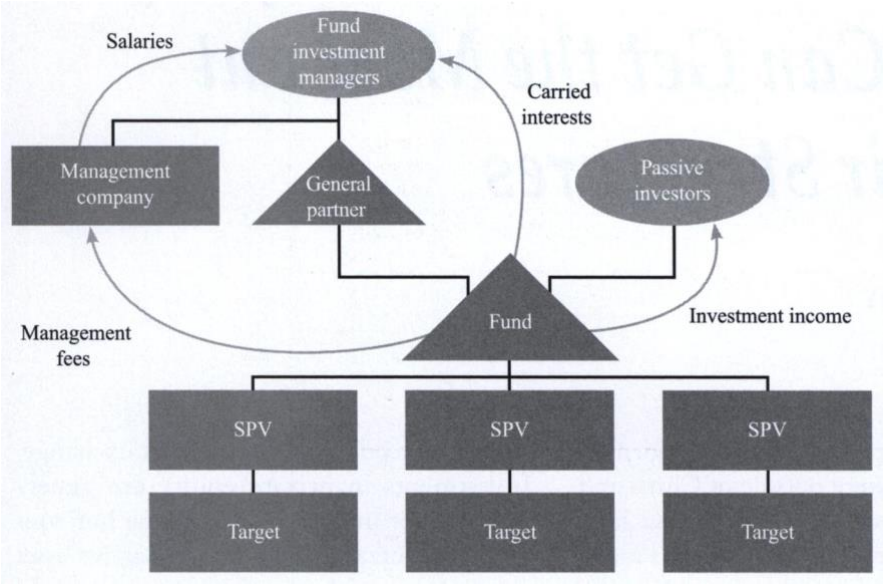

Figure 2. Typical Private Equity fund structure (Deloitte, 2015)

2.3 Sub-categories of Private Equity

There are three main sub-categories of private equity. The categories are buyout, growth capital, and venture capital. The other sub-categories of private equity are mezzanine funds that combine debt and equity financing, distressed funds which focus on companies that are in financial distress, and real estate private equity funds that finance the acquisition and development of real estate. This section will focus on the three main sub-categories of private equity, buyout, growth, and venture capital.

Buyout funds are a type of private equity fund that tend to buy a controlling or a majority stake from a target company. The buyout funds work in a long-term approach and tend to restructure the acquisition companies to increase the value and the performance of the target company. The companies are already more mature and have steady cash flows from their business. The investors can remain involved in the company for many years (Zeisberger, Prahl, & White, 2017). According to Kaplan & Strömberg (2009), buyout funds tend to use a large portion of debt in their acquisition which can lead to greater returns.

Growth equity can be described as a type of private equity fund that provides capital to companies that are already on a path for rapid growth. The investment stakes are smaller than in for example buyout funds and are seen as minority stakes. The funds provided by growth equity funds are generally used for different growth initiatives. Growth equity is closer to the next discussed form of private equity, venture capital, than the before mentioned buyout funds (Zeisberger et al., 2017).

Venture capital is a preface of private equity. The investments done by venture capital funds are seen as riskier than private equity since the target companies are usually younger and smaller. Venture capital targets to invest in the development and growth of start-up companies. Start-up companies give ownership from their company as payment from the capital provided by the venture capital fund. Hence, this can lead also

to a member of the venture capital company to enter the board of the company the fund has invested in.

The target companies that venture capital seek to invest in, have indicated that they have the potential for high growth but lack the resources to do so. Venture capital funds have most of the funded companies in their portfolio compared to growth equity funds which have more companies in their portfolio than buyout funds (Zeisberger et al., 2017). As venture capital companies make riskier investments, they tend to invest in a larger number of companies to reduce the risk of the whole fund. The funding of venture capital is made with different stages. The first fundraising round is called the seed stage funding round, after the seed stage, the rounds are marked with alphabets starting from A and continuing until the last issued round of financing (Andersin, 2021).

2.4 Private equity value creation

The value creation of private equity funds can be divided into two main methods. Firstly, the acquisition of undervalued and/or under-priced companies, i.e., financial engineering. After the acquisition, the private equity investor uses past experiences and capital to restructure the target company and increase its value. Secondly, the private equity company can acquire a target corporation to boost the operational functions, i.e., operational engineering, of the acquired company. Thirdly, private equity funds can invest in alternative commodities, such as real estate, to generate superior returns, but this method will not be covered in this section.

As a private equity fund uses its capital to acquire the main or a minority stake of an undervalued company, they are taking advantage of the fact that the market is not pricing the assets of the target company accurately (Acharya, Gottschalg, Hahn & Kehoe, 2013). The acquisition of the undervalued company can include different strategies to release the potential value of the company. Besides the given capital and guidance, the private equity fund can restructure the capital structure of the company and make

further mergers and acquisitions the target company would have not completed without the financial sponsor (Acharya et al, 2013).

Operational engineering can be seen as the main reason private equity funds have been able to generate such convincing returns (see Figure 1). The elements of generating superior operational models do not differ from the other companies, industries, or by the factor that is a company publicly listed or not. At least in the past two decades, private equity funds have been able to do it better than the main companies in the US, i.e., the S&P 500 companies. This indicates that the private equity funds, their resources, and their appearance in a company have led to better outcomes (Kaplan & Strömberg, 2009; Zeisberger et al. 2017).

2.5 Private equity divestment methods

Private equity firms will after all do a partial or a full divestment of their target company. The divestment is usually done when the fund will reach the end of its operating time. Hence, divestment is an inevitable act of a private equity fund, and therefore a crucial part of the career of the funds. The divestment is the last piece of the puzzle regarding the return of the private equity fund.

The divestment methods can be divided into seven primal ones which are management buy-back, public offering, repayment of preference shares or loans, sale to another private equity firm, sale to a financial institution, trade sale, and write-off (Invest Europe, 2022). This section will introduce the key elements of each divestment method used by private equity firms.

2.5.1 Management buy-back

When the divestment is arranged so that the buyer side will be the management team of the company, the exit method is regarded as management buy-back. This method is seen as a third-party sale. The method is typically used by the private equity fund to exit the investment completely and the managers will continue to operate and own the company fully (Povaly, 2006). In Finland, 181 of all private equity divestments between 2009 and 2019 were made with the management buy-back method. This equals approximately 17,7 % of all the divestments made in Finland during the period (Invest Europe, 2022).

2.5.2 Initial public offering

The private equity fund can divest the private company by listing it on the stock exchange. Then, the exit strategy is an initial public offer. The private equity fund will usually divest the whole investment when the exit from the company is done by an initial public offering. Usually, the IPO will generate the most lucrative returns from the divestment methods. The private equity company can gain a reputation, that is crucial in the field of private equity, for the future acquisition and marking of funds. The downside of the IPO is that it can fail and thus, generate questions about the future of the private equity company and cost without any returns from the listing process (Zeisberger et al., 2017).

According to Levis (2011), private equity funds might need to wait for the returns of an IPO, since financial sponsors of the IPO can have lock-up deals when divesting their investments through the listing. The divestment of the target company can be faster when selling the target company to another private equity fund or a trade buyer. Due to the lock-up periods, the capital raised in the IPO can land in the private equity fund for example a year after the IPO.

In Finland, between 2009 and 2019 private equity funds made 55 divestments by an initial public offering. Regarding the IPOs, the year 2016 was the most active, since 10 private equity-backed IPOs were made. 5,4 % of the divestments of private equity firms were conducted by the initial public offering between 2009 and 2019 (Invest Europe, 2022).

2.5.3 Repayment of loans or preference shares

The repayment of loans or preference shares provided by the private equity company at the point of investment, results in a decrease of the firm's financial stake in the company. It can thus be seen as a divestment when the exit is conducted with an amortization schedule. In practice, the financial claims of the private equity firm decrease over time when they receive the repayments of the loans or preference shares in the company. According to Invest Europe (2022), the association of Private Equity in Europe, 200 divestments were categorized as repayment of loans or preference shares between 2009 and 2019, which equals approximately 19,6 % of all divestments in Finland.

2.5.4 Sale to another private equity firm

A private equity firm can divest its investments by selling a company from its portfolio to another private equity company. The sale to another private equity firm is one of the methods of divestment by a full exit to a third party as described by Michala (2019). The sale to another private equity firm is hence described as a secondary buyout (Zeisberger et al., 2017).

As many as 91 exits were made by private equity companies between 2009 and 2019 in Finland with the method of selling to another private equity company. Thus, the selling

option equaled 8,9 % of all the divestments in Finland in the given time (Invest Europe, 2022).

2.5.5 Sale to a financial institution

The selling transaction of a portfolio company can formulate also between a private equity company and a financial institution. If a depositary, contractual, or investment institution, which will not be seen as a private equity firm, will be the buyer of a portfolio company, the method of divestment will be classified as a sale to a financial institution (Invest Europe, 2022).

Depositary companies include banks and other companies that can deposit and make loans, contractual institutions, i.e., insurance companies and pension funds, and investment institutions that can provide a domicile for the portfolio company. Only 12 divestments between 2009 and 2019 in Finland were classified as sales to financial institutions, with a marginal 1,2 % of all the divestments of private equity companies (Invest Europe, 2022).

2.5.6 Sale to trade buyers

The most numerous divestment method, 235 of 1023 divestment, i.e., 23 %, in Finland between 2009 and 2019 was a trade sale. The buyer in a trade sale is an industrial investor and thus can be seen as a merger inside a specific industry. They can be described as strategic buyers (Cummings & MacIntosh, 2003). Hence, it can indicate the consolidation of an industry. The buyer thus hopes that the strategic merger between the companies will lead to synergy advantages and that the sum of the parts is greater than the companies alone. The term trade sale can be seen as a reference to a business-to-business method of selling (Invest Europe, 2022).

Bienz and Leite (2004) explain that not all companies that have been financially sponsored end up on the stock exchange. Thus, only the most profitable and most lucrative ones will make an IPO, and companies with poorer financial performance can face a transaction with a trade sale (Bienz & Leite, 2004). This can explain, why between 2009 and 2019 the most common divestment method also in Finland was a trade sale.

2.5.7 Write-off

Not all the investments of private equity firms generate upside. If the acquisition of a company cannot generate a deal with any other divestment method, the investor might have to face a decision to eliminate the value of the investment (Cumming & MacIntosh, 2003). The return on the investment can be zero or even negative.

A large portion of the divestments of private equity firms in Finland between the given period of 2009 and 2019 facilitated a write-off. 208 of the divestments were marked as write-offs. Thus, more than 20,3 % of the divestments led to zero or negative returns between 2009 and 2019 in the Finnish private equity field (Invest Europe, 2022).

3 Initial public offerings

This section will cover the basics of the initial public offerings. It will deepen into the process of how the listing process will be done. After, the section will showcase the valuation process and continue to different anomalies regarding the valuation of the IPOs. The section will introduce past academic literature which has analyzed the performance of IPOs and IPOs with different financial sponsors. Moreover, this section will focus on the financial sponsors of private equity and venture capital and their effects on the post-performance of IPOs.

3.1 The decision to go public

One of the key decisions a company will make during its existence is the decision to go public. Still, according to Pagano, Panetta, and Zingales (2002), it can be seen as one of the questions in corporate finance that have been lacking in past academic research. Usually, a company goes public once in its history. The decision to initiate a public offering is historical for the company which leads to a long and precisely planned execution. Usually, the challenging project cannot be done without external consulting regarding the legal, and issuance aspects.

The reason behind making an initial public offer will vary depending on the company. One of the main reasons to go public is to gather equity to expand the business of the company. Also, private equity investors use initial public offers as an exit strategy from their investments in a company. At the same time, the IPO can be a solution for the initial owners of the company to increase their stake in the company. The company itself can buy back the portion that the financial sponsors have acquired in the past (Black & Gilson, 1998).

In the future, it can be easier to raise capital for different investments when the company has gone public. According to Brau & Fawcett (2006), the most important factor behind

the decision to go public is the further use of the public shares in the future for acquisitions. At the same time, the current or future cost of capital and the minimizing of it is not even among the three most important reasons for going public (Brau & Fawcett, 2006).

An alternative point of view provided by Subrahmanyam & Titman (1999) argues that one of the key elements behind the reason that a company wishes to go public is related to information advantages. Private finance is preferred in situations when relevant information regarding resource allocation is very costly to manage. Thus, public financing is preferable in situations where serendipitous information is important and needed for resource allocation. Hence, in situations where costly information is cheap to acquire, the advantages of being a publicly traded company are greater. At the same time, the size of the public markets matters in the decision of whether it is wise to enter the stock market or not. The larger and more liquid the market is, the smarter it is to enter it (Subrahmanyam & Titman, 1999).

3.2 Process after choosing to go public

When the company has decided to go public, the process of entering the stock exchange initiates. A part of the process of going public is limited by the law of the country in which the initial public offer is going to take place. Hence, the process also differs from one country to another. This paper will not focus on the aspects of, e.g., the US law and regulations of the United States Securities and Exchange Commission since the data sample used in the empirical part, in section 4, will focus on Nordic countries.

After the decision to enter the stock exchange is done, a group of insiders is formed by the main underwriters. The insiders include underwriters, advisors of the initial public offering, legal advisors, and brokers. They will conduct a preliminary prospectus which will be evaluated by the regulators of the designated market area. The prospectus will

develop into the final version of it and will then be given out to potential investors (Certo, Daily & Dalton, 2001).

One of the decisions regarding the insiders of the IPO that has been researched in the process of the IPO is the selection of the underwriters. Brau & Fawcett (2006) conducted empirical research regarding the initial public offers with the data provided by the Chief Finance Officers of the companies executing an IPO. They found that the selection of the underwriter of the offering was mainly based on three factors. The quality of the research department, industry insight, and the reputation of the underwriter were the main factors that guided the selection. Similar findings were introduced by Shaw & Womack (2001).

After the prospectus has been qualified, the soon-be-listed company will start to market its initial public offering with the support of the underwriters. This is called the roadshow, which refers to the real manners of how the marketing is done by the managers of the company. This phase will also introduce equity analysts who will conduct a valuation process where the price range of the IPO will be introduced (Certo et al., 2001). The success of the previous phases will end with the share subscription by investors. The roadshow will finish at the start of the trading of the new share in the exchange when the stocks of the new company have found a new owner and they start to change owners in the secondary market.

3.3 The valuation of the initial public offer

As the company has chosen to go public, one of the main pieces of the IPO process puzzle is to determine the issuance price. Investment bankers will be hired by the issuing company to execute a valuation of the firm (Roosenboom, 2014). As investment bankers facilitate initial public offers repeatedly, they possess cumulative knowledge of the issuance process (Ibbotson & Ritter, 1995).

The valuation of an initial public offering is typically executed with three different methods. First, the multiple valuation method is generally in use with the practice of comparing various multiples of the issuing company to counterparts on the stock exchange. Multiple valuations are commonly studied regarding the valuation of the initial public offering (Kim & Ritter, 1999; Purnanandam & Swaminathan, 2004). As many as 83,77 % of the underwriters used the price-earnings ratio in the sample of Roosenboom (2014) as a valuation technique, which is the highest percentage of used methods. The sample included 228 companies that made their IPO on the French stock exchange between the period of 1990 and 1999.

The second, discounted cash flow method (DCF) is widely in use in analyzing the companies entering the stock exchange but suffers from a lack of coverage in academic literature. Still, the DCF model provides at least as accurate results as multiple comparison methods on new issuances and is usually used in practice (Mills, 2005; Kaplan & Ruback, 1995; Roosenboom, 2014). DCF was the second most used technique by the underwriters to value the IPO with 59,21 % (Roosenboom, 2014). The academic literature regarding DCF is quite narrow due to the lack of evidence. Thus, the academic literature should be taken with caution regarding the DCF model. Investment banking, as an industry, is known for its complexity and is an industry with little or no data available to the public.

The dividend discount method is widely used when the company entering the stock exchange is relatively older and the industry the company is operating in is already mature (Roosenboom, 2014). According to the paper of Roosenboom (2014), the dividend discount model is the second most used valuation method in their sample. 52,91 percent of the underwriters of the sample used it as a valuation technique. It also had the highest explanatory power of all the valuation techniques from the sample of Roosenboom's (2014) study.

The combination of using multiple valuation methods and predicted earnings results will lead to more accurate valuations than by trusting multiples composed of historical figures (Kim & Ritter, 1999). According to Kim and Ritter (1999), by simply relying on enterprise value-to-sales, enterprise value-to-operating cash flow ratios, market-to-book, price-earnings (P/E), and price-to-sales multiples the valuing of the IPO is relatively poor. The most common error leading to the failure of the valuation is widespread of the multiples since the issuing firm is often relatively young (Kim & Ritter, 1999).

Investment bankers have a greater role in the process of valuing the IPO. According to Kim and Ritter (1999), investment bankers seem to have a superior understanding of the fundamental analysis, by calculating the firm value with the DCF method or equivalent and predicting the future market price of a new company entering the stock exchange. Hence, investment bankers can make the stock exchange more efficient by valuing the entering companies more precisely than by only relying on mechanical analysis of different firm multiples (Kim & Ritter, 1999).

3.4 Why a company does not initiate a public offer

A large portion of companies are privately owned. In 2020, according to Finnish Patent and Register Administration (2022), there were 642 619 companies in Finland. Only a fraction, 188, of companies were publicly listed companies in Finland in 2022 (Nasdaq Nordic, 2022). Brau & Fawcett (2006) elaborates on their study of the reasons behind the decision not to turn a company public. The three main reasons according to their study were the will to maintain decision-making control, avoidance of ownership dilution, and poor market or industry conditions.

The findings concern companies that could have a window of opportunity to make an initial public offering, but the reasons overall are more complex. Thus, the findings indicate that not all companies want to be publicly listed even if they could. 63,00

percent of the sample provided by Brau & Fawcett (2006) study did not conduct an IPO but remained privately owned.

3.5 Performance of initial public offers

Initial public offers are a studied matter in the field of finance. IPOs as well as anomalies related to the IPO itself such as underpricing, market timing of an IPO, and the long-term performance of the IPO have been noted in the past studies. This study will next introduce the above-mentioned anomalies and studies related to them.

3.5.1 Underpricing

The practice behind the underpricing of an initial public offering is based on pricing the initial public offering below its real value before entering the stock market with the offer price. If the price of the commodity rises and closes at a higher value after the first trading day, the initial public offering is considered underpriced (Ljungqvist, 2007). The underpricing of an IPO can be done purposely or accidentally.

The underpricing of an IPO has been a reviewed phenomenon during the past decades. According to the previous academic literature, the stock price of the company has traded at a substantiated higher price in the first intraday than the IPO price has been. This has been mostly explained, according to the previous literature, by information asymmetry (Reilly, 1973). Ritter (2017) examined the US IPO market between 1980 and 2016 and found that the IPOs were on average underpriced by 17,6 %.

The initial public offering market in the US during the 1990s was on average as much as 20 % underpriced according to Ljungqvist (2007). Also, Hahn et. al., (2013) documented that the IPOs in their data sample between 1988 and 2009 were on average underpricing by 27,8 %. Boreiko & Lombardo (2011) found similar results in their Italian data sample

between 1999 and 2008. The underpricing of the IPO was at a level of 12,5 % on average. Similar findings were found in the Finnish Stock Market between 1994 and 2006, where the mean abnormal return was 15,6 % and the median abnormal initial return was 4,1 % regarding the IPOs (Hahl, et al., 2014). In another study, Keloharju (1993) found that the IPOs of the Helsinki Stock Exchange were 8,7 % underpriced from 1984 to 1989. There is no arguably correct answer to the question that why the underpricing is happening. The boost of demand, accidental underpricing, and information asymmetry can all be explanting factors why the initial public offerings tend to be underpriced.

The underpricing anomaly has been explained by the lawsuit avoidance hypothesis (Tinic, 1988). According to the study, if the IPO is underpriced, the probability that the issuing company will face lawsuits will be lower. Thus, the underpricing would be explained by the mean of reducing the legal liabilities of the new publicly traded company. More recent studies have argued vice versa of the lawsuit avoidance hypothesis. First, Drake and Vetsuypens (1993) did not accept the hypothesis regarding lawsuit avoidance hence it did not meet the effectiveness of reducing the probability of lawsuits. Then, Lin, Pukthuanthong, and Walker (2013) accepted the hypothesis first introduced by Tinic (1988). The explanatory factor according to Lin et al. (2013) was that the higher risk of legal proceedings the IPO had, the greater the underpricing of the IPO was.

According to Loughran and Ritter (2004), the amount of analyst coverage was one of the main reasons for underpricing during the Dotcom bubble time at the beginning of the 2000s. Besides that, CEO compensation and the rise of venture capitalists made a bigger impact on the underpricing of initial public offerings than the next discussed winner´s curse problem.

Another information asymmetry theory assumes that there are two different kinds of investors during the IPO market. The investors can be separated into informed and uninformed ones thus the information asymmetry. The future cash flows of the issuing company are better understood by the informed investors, and they will attend to

underpriced IPOs whereas uninformed investors will be more likely to take part in overpriced IPOs. The offerors of the IPOs need to undervalue their company value so the uninformed investors will attend the IPO (Rock, 1986). This theory is referred to as the winner´s curse model.

The signaling theory proposes that firms use underpricing to signal their superior quality and fundamental value to the stock market (Allen & Faulhaber, 1989; Welch, 1989). By doing so, the companies create a perception among the less-informed investors that their company entering the stock exchange is a profitable investing opportunity. Thus, the demand for the shares will increase which leads to attracting more investors than it would without the underpricing. It should generate then better outcomes for all stakeholders related to the issuing company (Allen & Faulhaber, 1989; Welch, 1989). The theory has had criticism since it is simplifying the complex matter of initial public offerings.

The size of the issuance was also described as an explanatory factor. According to Beatty and Ritter (1986) the smaller the IPOs is in market size, the larger the underpricing is in the IPO. Beatty & Ritter (1986) explain the larger underpricing of smaller IPOs by the tendency of investors to speculate more on small IPOs. The efficacy of the market can be thus greater in the larger IPOs.

Different investors behind a company can affect the underpricing of an IPO. Papers by Megginson and Weiss (1991) as well as by Brav and Gombers (1997) showcased the effects venture capitalists can have on IPO underpricing. According to their studies, IPO which were backed by venture capitalists were less underpriced than the ones that did not have capital raised from the venture investors. Being backed by a venture capitalist gives a positive indication to the retail investors, thus can lead to more minor underpricing (Megginson & Weiss, 1991; Brav & Gombers, 1997).

3.5.2 Timing the market in initial public offers

The initial public offer is often divided into hot and cold markets (Helwege & Liang, 2004). The market can usually be said to be hot when there are numerous initial public offers, there is clear underpricing, and the offerings are over-subscripted. On the other hand, the cold market situation has fewer initial public offerings, the listings are less overpriced, and not so many IPOs are over subscripted.

In the Helsinki Stock Exchange during the 2000 century, two years spike as clear hot market years, 2000 and 2021. There were 20 initial public offers in 2000, and 29 in 2021 according to Nasdaq Helsinki (2022). On average, in the Helsinki Stock Exchange between 2000 and 2021. There have been approximately 7,3 listings in a year. So, in 2021 there were four times more listings than on average, and in 2000 almost three times more than on average.

According to Ritter (1991), when the initial public offering has been made in a cold market or bear market, the post-performance of the stock is stronger than on those initial public offers that have been made in hot market or bull market times. This can be seen because of underpricing of IPOs. It can be seen also due to a market bubble that has caused the valuations to increase from the fundamental valuations of the whole market, private or public.

The findings of Cornelli, Goldreich & Ljungqvist (2006) indicate that one of the key elements, especially for retail investors, in bull markets is that the institutional investors can benefit from the market sentiment. The smaller investors tend to be too optimistic towards the IPOs made in hot markets and institutional investors can take advantage of this situation.

IPOs tend to accumulate during periods when the window of an IPO is open (Baker & Wurgler, 2000). After the window closes, the IPO market cools off and fewer companies enter the stock exchange. Hence, the market-timing theory indicates that equity is issued

when the valuations are higher and repurchased at times of lower valuations. These windows are referred to as IPO windows (Baker & Wurgler, 2000).

3.5.3 Post-performance of initial public offers

The stock performance after the initial public offer is a well-studied phenomenon in the field of finance. There seem to be robust findings regarding the performance of the stocks after the IPO, in the short-term as well as in the long run.

In the short run, past empirical studies have ended up with contrary results (Logue, 1973; Ibbotson 1975; Ritter 1984). The anomaly of the first intraday, IPO underpricing, is appearing to allow investors a free lunch. In other words, companies that are making an IPO could raise more capital in their way of going public. The winner´s curse model (Rock, 1986) explains the anomaly by asymmetric information, which is explained in section 3.4.1.

The long-term post-performance of IPOs has been historically inferior to the benchmark index according to previous studies (Ritter 1991; Lewis 1993; Loughran & Ritter 1995; Chen et al. 2013). Thus, there does not seem to be an anomaly to investing in IPOs with a buy-and-hold abnormal strategy (BHAR). The studies indicate that the benchmark indexes outperform the average returns of IPOs in the periods of 36 months and 60 months. There are some opposite findings on the long-term post-performance of IPOs. Studies by Brav & Gompers (1997) and Gompers & Lerner (2003) indicate that benchmark indexes did not outperform the post-performance IPOs in the long run.

3.6 Performance of initial public offers with financial sponsors

The next part will focus on the past literature and evidence related to initial public offers with financial sponsors. Past academic studies have mixed results regarding whether

private equity-backing has had a positive impact on post-IPO stock performance or not. This paper will focus on two different time frames of the post-performance of the IPO. The first is short-term, the underpricing of the IPO, which is the first-day return of the IPO on public markets. The second time frame is the long-term post-performance of 36 months after the IPO.

Most of the studies related to private equity backing of IPOs have been covering the US and the largest economies of Europe. The past literature from the Nordic countries is limited regarding the studied matter. Due to also the different markets, the results are not fully comparable since the markets have distinctive partings from one to another.

3.6.1 Short-term performance of initial public offers with financial sponsors

The private equity-backed IPOs left on average only 7,3 million pounds on the table after the first day of trading on the London Stock Exchange between 1992 and 2005 (Levis, 2011). During the same period, the non-backed IPOs left on average 12,4 million pounds on the table. Levis (2011) concluded that the average equal-weighted return on non-backed IPOs was 21,1 % after the first day of trading. The underpricing of private equity-backed IPOs was under half of that, at 9,1 %. Levis (2011) argued that the key reasons for the smaller underpricing of a private equity-backed IPO were a combination of smaller risk, higher valuation of the IPO, and the status of the private equity investment.

Similar findings to Levis (2011) were documented by Bergström, Nilsson & Wahlberg (2006). Bergström et al. (2006) studied the London and Paris Stock Exchanges between 1994 and 2004. The sample size of the study was over 1500 IPOs and about 10 % of the sample was backed with private equity. The average underpricing of private equity-backed IPOs between 1994 and 2004 was 9,33 %. At the same time, the first-day returns of a non-private-equity-backed IPO were 12,87 %.

Belghitar & Dixon (2011); Ferretti & Meles (2011) and Mogilevesky & Murgulov (2012) discovered mutual findings than the ones mentioned above. The findings regarding the matter of the underpricing of IPOs with or without private equity backing are united, at least within the time spread from 1990 to 2010 in the large economies of Europe and the US. Table 1 below summarizes the key outcomes of the research mentioned in this chapter.

Table 1 Summary of the academic literature regarding on underpricing of private equity-backed IPOs

Researcher(s)	Market	Time	PE-backed underpricing	Non-backed underpricing
Bergström et al.	UK & France	1994 - 2004	9,33 %	12,87 %
Belghitar & Dixon	UK	1992 - 1996	13,48 %	15,53 %
Ferretti & Meles	Italy	1998 - 2008	1,92 %	6,57 %
Levis	UK	1992 - 2005	9,10 %	21,10 %
Mogilevsky & Murgulov	US	2000 - 2009	7,00 %	14,30 %

Throughout the academic literature, the results follow a similar path. The underpricing of an IPO is greater in non-backed IPOs than in private equity-backed IPOs (Belghitar & Dixon, 2011; Bergström et al., 2006; Ferretti & Meles, 2011; Levis, 2008; Mogilevsky & Murgulov, 2012). The main reasons are best described to be the smaller risk private investors have as they attend an IPO in which a private equity fund has already participated. Moreover, the higher valuation of an IPO can influence the relatively smaller underpricing of private equity-backed IPOs (Levis, 2011). Professionally managed funds, the private equity funds, that have the target to exit a company for example by an IPO, will have the incentives to evaluate the exit company to a higher valuation than key investors who will be anchored to the public company.

3.6.2 Long-term performance of initial public offers with financial sponsors

The previous studies regarding the long-term stock performance of initial public offers with financial sponsors have followed a mutual road. The private equity-backed IPOs have outperformed the non-backed peers in a 12 to 36 months period according to Bergström, Nilsson & Wahlberg (2006); Levis (2008); Levis (2011); Minardi, Ferrari & Tavares (2013), and Ritter (2015). Most of the studies were made with a buy-and-hold return method (BHAR), and the chosen time was with a 36-month holding period. This study will lean on a similar methodology (Levis, 2008; Ritter, 2015; Buchner et al., 2019).

Table 2 introduces the main outcomes of the above-mentioned papers. As well as in the underpricing section, the long-term performance is mainly studied in the largest economies of Europe e.g., the UK and France, and in the large economies of America e.g., the US and Brazil. The study provided by Ritter (2015) has the widest sample size when it comes to the timeframe of the IPOs of the studies mentioned in the summary table, from 1980 to 2012. The paper concluded that the private equity-backed IPOs (buyout) had on average a 33,5 % return on a three-year buy-and-hold return compared to a non-financial sponsored return of 17,5 %. The market-adjusted return was 2,7 % on the buyout-backed and - 29,6 % on the non-financial sponsored IPOs (Ritter, 2015).

Similar findings are provided by the researcher concluded by Bergström et al. (2006); Levis (2011); Minardi et al. (2013), and Levis (2008), in which all the private equity-backed IPOs outperformed the non-backed IPOs in the long run. The study provided by Buchner et al. (2019) is the only summary in which the evidence gathered regarding the IPO of different financial sponsors reports that VC-backed IPOs outperformed PE-backed IPOs. The studies by Levis (2008); Levis (2011), and Ritter (2015) report findings that the private equity-backed IPOs outperformed not only the non-backed IPOs but also the venture capital-backed IPOs in the long run.

Table 2 summarizes that there is empirical evidence behind the outperformance of PE-backed IPOs compared to other financial backing solutions when a company is on the

road to the public stock exchange. Still, the recordings and findings of the studies should not be taken without consideration because of the similar timeframes, markets, and possible maturity of the companies.

Table 2 Summary of academic literature regarding long-term post-performance of private equity-backed IPOs

Researcher(s)	Market	Time	PE-backed longrun	VC-backed longrun	Non-backed longrun	Method
Bergström et al. (2006)	UK & France	1994 - 2004	-28,61 %	n/a	-72,94 %	CAR36
Buchner et al. (2019)	US	2000 - 2014	20,40 %	27,10 %	n/a	BHR36
Levis (2011)	UK	1992 - 2005	13,84 %	-3,92 %	-20,20 %	BHAR36
Minardi, Ferrari & Tavares (2013)	Brazil	2004 - 2006	13,72 %	n/a	3,23 %	CAR12
Levis (2008)	UK	1995 - 2006	20,00 %	-7,20 %	11,00 %	BHAR12
Ritter (2015)	US	1980 - 2012	33,50 %	20,20 %	17,50 %	BHAR36

4 Data and Methodology

This section introduces the data and the methodology regarding the. The hypothesis related to underpricing in Nordic countries is that the private equity backing of an IPO will reduce the underpricing. Regarding the long run, the hypothesis assumes that the private equity backing will affect the performance of the IPO positively when comparing IPOs with private equity-backing to non-backed IPOs.

4.1 Data

The data for the following study is collected from Thomson Reuters, Refinitiv, and Bloomberg Terminal databases as well as from the companies' materials regarding their IPOs. The data sample ultimately consists of 190 IPOs made in Denmark, Finland, and Sweden between 2009 and 2019. The relatively low number of IPOs in the data sample is due to the data restrictions regarding e.g., the initial offer price, the financials of the company, or the certainty regarding the financial backing of the company. Norway is fully excluded from the data sample since the data regarding the backing type of the IPOs was not fully transparent. Iceland was also excluded due to data restrictions. After Norway and Iceland were excluded, the benchmark index chosen was the OMX Nordic 120 which follows the Danish, Finnish, and Swedish stock markets' 120 most actively traded companies.

Even though the data sample is small, the risk of errors is alive since the data regarding IPOs in Nordic countries is limited. The data needed to be gathered from different data sources to even have a data sample of this size. The combining of different data sources needed to be done manually, and thus leaves an error marginal to the sample. The combining of different data sources can lead to errors in data due to different accounting standards. The data was cross-checked from different data sources to prevent this.

The final data sample is a ten-year period after the burst of the financial crisis of 2008. The IPOs of this research were done between 2009 and 2019, and the holding period of three years ultimately extended the total sample period to 2022. In the beginning, the motivation for this sample period was to find a ten-year period that would hold only a few uncertain economic situations inside of it but would ultimately contain the burst of not only the pandemic but also the attacking war of Russia against Ukraine in Europe.

Table 3 provides more insight information about the initial public offers by distributing them by the year and market they have been executed. The financial crisis and the following Euro crisis can be seen as decreasing elements regarding the IPOs executed in the Nordic countries. The listing processes had a resurge in 2014 and kept on increasing towards the end of 2017 and remained strong during 2018. Sweden has been the most active country regarding the number of IPOs with 127 listings in the final data sample, holding a nearly 64 % share in the sample. Finland comes in second with 42 IPOs (22 %) followed by Denmark's 27 IPOs (14 %).

Table 3 Distribution of IPOs by year and country

Year	Denmark	Finland	Sweden	Total
2009	1	0	0	1
2010	3	0	4	7
2011	1	0	7	8
2012	0	1	0	1
2013	1	2	1	4
2014	1	5	12	18
2015	1	8	21	30
2016	5	5	25	35
2017	4	9	35	48
2018	9	9	13	31
2019	1	3	3	7
Total	**27**	**42**	**121**	**190**

The annual underpricing of the IPOs inside the data sample is provided in the Table 4 below. This study refers to hot periods when the average underpricing of all IPOs is higher than the average underpricing of the whole sample, 9,33 %. Usually, the number of IPOs during the year is also considered when analyzing the hot periods but, in this study, also the year 2019 is referred to as a hot period since the average underpricing of the year is over twice the average. The other years referred to as hot periods are 2015 and 2017.

Table 4 Average underpricing of IPOs distributed by year

Year	Underpricing	IPO amount
2009	-7,49 %	1
2010	3,49 %	7
2011	0,20 %	8
2012	10,50 %	1
2013	4,99 %	4
2014	6,94 %	18
2015	10,64 %	31
2016	8,46 %	34
2017	13,64 %	48
2018	6,45 %	31
2019	18,17 %	7
Average	**9,33 %**	**17,3**

A major part of the data sample's companies' IPOs does not have any kind of financial backing when they executed their IPO which can be seen in Table 5. Out of the 190 companies, 83 were backed by financial sponsors. Still, the more recent the researched year was, the more the IPO has had some sort of backing. Between 2009 and 2014 only 13 companies had a private equity company backing in their IPO, while on the latter side of the sample, 70 companies were backed by financial sponsors. Hence, indicating that the popularity of private equity financing was grown over the years.

Table 5 IPOs by ownership type distributed by year

Year	PE	NB	Total
2009	0	1	1
2010	4	3	7
2011	2	6	8
2012	0	1	1
2013	1	3	4
2014	6	12	18
2015	20	10	30
2016	14	21	35
2017	21	27	48
2018	12	19	31
2019	3	4	7
Total	**83**	**107**	**190**

The most common industry of the companies issuing an initial offer in the data sample is healthcare together with technology. The two industries were in accounted for almost half of the IPOs in the final data sample. Industrials, consumer cyclical, financials, and real estate followed the main industries close, and together these accounted for almost the whole sample. The distribution of the IPOs by industry is documented in Table 6 below.

Financial sponsors are interested in the most active industries since regarding technology, healthcare, and industrials, the backing had a high percentage. Consumer cyclical was still the most backed industry in the data sample with 21 financially backed IPOs, surpassing the level of non-backed IPOs. To conclude, the most active industries regarding IPOs are the same both financial sponsors backed as well as non-backed. An exception can be found in the data sample since both academic & educational service IPOs were financially backed even though there are more non-backed IPOs.

Table 6 IPO industry distribution by ownership

Industry	PE	NB	All
Technology	16	32	48
Healthcare	17	30	47
Industrials	16	14	30
Consumer Cyclicals	21	8	29
Financials	4	6	10
Real Estate	1	8	9
Consumer Non-Cyclicals	4	3	7
Utilities	1	2	3
Basic Materials	1	1	2
Energy	0	2	2
Academic & Educational Services	2	0	2
Government Activity	0	1	1
Total	**83**	**107**	**190**

Table 7, regarding the data, is a summary of statistical factors regarding the companies divided into sponsored, non-sponsored, and all the IPOs of the sample. The first variable, total assets, showcases a clear difference between the backed and non-backed companies. Hence, we can state that when measuring the size of a company by its total assets, the financially sponsored companies are on average substantially larger. Their average total assets are nearly 200 million USD compared to non-backed with slightly over 30 million USD. The size comparison is clear also in the earnings before interest, taxes, depreciation, and amortization as well as in the actual issue size which refers to the amount of newly listed stocks the company is issuing to the markets.

The leverage level, calculated by dividing the total debt by the total capital to which the total debt has been added, of the non-backed companies is substantially lower at 11 %. The backed companies are over three times more levered than the before mentioned. The asset turnover is slightly lower amongst non-backed companies.

Table 7 Descriptive statistics of the IPOs

		PE	**NB**	**ALL**	
Variable	Measure	83	107	190	Unit
Total assets	Median	198,35	32,93	91,17	M USD
Price to Book	Median	2,71	3,33	2,99	
Asset turnover	Median	0,78	0,44	0,65	
EBITDA	Median	20,59	0,81	6,36	M USD
Leverage	Median	35,52 %	11,11 %	22,92 %	%
Issue size	Median	113,63	19,53	51,99	M USD

4.2 Methodology

The main focus of this study is to examine the effects of prior private equity ownership of the companies entering the public markets by executing an initial public offer. Thus, this factor is evaluated by the following methodology with the data described earlier in section 4.1.

The level of IPO underpricing, also known as initial return, is studied by comparing the offer price and the first-day return. This method is applied to all data sample companies. The long-term performance of the data sample's IPOs is evaluated with the buy-and-hold-abnormal return of different holding periods. The multivariate regression model regarding the BHAR is formulated by following the previous research, most notably by Levis (2011), where the study evaluated private equity-backed IPOs. Westerholm (2006) used a similar BHAR methodology to assess the excess returns of IPOs in the Nordic markets. Besides this, the same paper used an initial return equation to find the underpricing of the IPOs.

4.2.1 Underpricing

The underpricing of the initial public offerings is calculated by the following equation 1. The first-day closing price is compared to the offer price set up by the company after the decision of the company entering the stock market is made. Also, the formula indicates how much money the company leaves on the table, thus by how much the company underprices itself in the IPO. There are several other factors, as introduced in the underpricing section, that interpret the reasons why a company can be underpriced at the IPO. The formula itself is widely used in the academic literature (Ritter, 1991; Purnanandam et al., 2004; Álvarez et al., 2005; Ljungqvist, 2007) when exanimating the return of initial public offers. The method is calculated as follows:

(1) $Initial\ return_i = \frac{First\ Day\ Closing\ Price_{i,t+1} - Offer\ Price_{i,t}}{Offer\ Price_{i,t}}$

, where the offer price is subtracted from the first-day closing price and then divided by the initial public offer's price.

4.2.2 The long-run performance of the IPOs

As the returns of the IPOs will be researched in a broader way than the first-day return, a methodology related to researching the long-run performance is introduced. In the latest academic research, two different models have been consolidated when referring to the methodology applied to the studies of the long-term returns of an initial public offering.

The buy-and-hold abnormal return methodology as well as the cumulative abnormal return methodology are widely used in the past academic literature (Ritter, 1991; Bergström et al. 2006). As mentioned before, the study by Levis (2011) has widely motivated to conduct this study and thus, the decision of excluding the CAR and focusing on BHAR is made. Also, lately academic studies regarding the long-run performance of the IPOs have been conducted with the BHAR method (Ritter, 2015; Buchner et al., 2019). The formula is formed as follows:

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

, where r_{it} is the raw return for one IPO and r_{bt} is the raw return for the benchmark index used at the event month t.

The benchmark index used is the OMX Nordic 120 index which follows the average return of the stock markets of the three Nordic countries from which the data of this study is gathered, Denmark, Finland, and Sweden.

4.2.3 Variables

The data sample is divided into two different categories by the key factor in the ownership structure with a dummy variable. Companies that have had some financial backing, i.e., private equity financing, before the initial public offering, are marked with a dummy variable of 1. Vice versa, the remaining companies are marked with a zero. The diverging is made only to two different ownership categories since the data sample is relatively small.

Another dummy variable is introduced in the multivariate regression model. The data sample is also divided into two different market sentiments of hot and cold sentiment. The parameter of the variable identification is the average underpricing of the data sample IPO during a specific year compared to the average initial returns of the whole sample.

The underpricing of the initial public offering is used as a variable in the multivariate regression since the initial performance in the stock market can indicate something about the future performance of the company. Purnanandam & Swaminathan (2004) found the relationship in their study that the more undervalued the company's IPO is, i.e., the higher the first-day return is, the poorer the long-term performance is.

The size of the company issuing the public offer is controlled by the logarithm of total assets. By introducing this factor, the comparison of small and big companies is more accurate inside the sample. Few large IPOs can dominate the results of the research if the size has not been taken into concern, hence the logarithmic value of total assets (Brav & Gompers, 1997; Bergström et al., 2000).

Following the above-mentioned, price to book value is introduced as a variable. It indicates the valuation of the company, thus is a value or a growth stock, and can provide needed information for the investors. Also, earlier studies have used price to book as a variable in the IPOs long-term performance studies (Bergström et al., 2006; Levis, 2011).

Asset turnover is introduced to demonstrate the financial efficiency of a company entering the stock exchange. It is calculated by dividing the revenue the company is generating by the assets it possesses. Levis (2011) introduced the same variable in his study.

Leverage of the company is introduced to obtain a look if the financial balance of the company has effects on the long-term performance of the company. The leverage level is calculated by dividing total debt by total debt and capital. Levis (2011) concluded that leverage has a positive effect on the shareholders of the company due to that the company can generate higher earnings. Cao & Lerner (2009) came to the opposite result by stating that higher leverage ratios lead to weaker post-IPO stock returns.

Earnings before interest, taxes, depreciation, and amortization are presented as the last variable in the multi-regression model to better understand the financial performance of the company. EBITDA is used due to the concern that some of the issuing companies would mathematically have an infinitely negative EBITDA-% since the growth companies can enter the stock market without any revenue.

4.3 Regression models

The regression models are introduced to provide insight into the long-run performance of an IPO as well as the effects of the ownership structure generates before the IPO. The multivariate regression model is formulated for the analysis of different variables related to the IPO which are introduced above. The model is mainly driven and followed by the multivariate regression of Levis (2011).

The dependent variable of the model is the BHAR of 36 months in all the regressions. It is formed by calculating the 36 months of abnormal returns of the IPOs when compared to the benchmark index, OMX Nordic 120. Dummy variables of ownership and market

sentiment are used in all the regression models. As well as the first-day return, the logarithmic value of total assets, and price to book ratio.

(3) $$BHAR = \alpha + \beta_1 PEall + \beta_2 Hot/Cold + \beta_3 First\ day\ return + \beta_4 \log(total\ assets) + \beta_5 Price\ to\ Book + \varepsilon$$

The second regression (4) introduces asset turnover to better include the efficiency factor of the company in the regression. The other variables are intact.

(4) $$BHAR = \alpha + \beta_1 PEall + \beta_2 Hot/Cold + \beta_3 First\ day\ return + \beta_4 \log(total\ assets) + \beta_5 Price\ to\ Book + \beta_5 Asset\ turnover + \varepsilon$$

The third regression (5) contains the leverage variable in addition to analyzing its controversial effects of it in academic literature. The other variables are intact.

(5) $$BHAR = \alpha + \beta_1 PEall + \beta_2 Hot/Cold + \beta_3 First\ day\ return + \beta_4 \log(total\ assets) + \beta_5 Price\ to\ Book + \beta_5 Asset\ turnover + \beta_6 Leverage + \varepsilon$$

The fourth and the last regression (6) increment the regression by the EBITDA variable. It is only used in the closing regression since it could produce misleading results if used in all the regressions due to the high volatility of EBITDA inside the data sample. The other variables are intact.

(6) $$BHAR = \alpha + \beta_1 PEall + \beta_2 Hot/Cold + \beta_3 First\ day\ return + \beta_4 \log(total\ assets) + \beta_5 Price\ to\ Book + \beta_5 Asset\ turnover + \beta_6 Leverage + \beta_7 EBITDA + \varepsilon$$

5 Results

The following section presents the results of the empirical study regarding the post-IPO stock performance after the first trading day as well as in the long run. The chapter introduces first the results of the underpricing regarding IPOs in different market sentiments, different weightings, and with different financial backing styles. The section will then continue to showcase the results of the buy-and-hold abnormal return in different periods as well as with an f-test, both tested with different ownership backing factors. Lastly, the results of the OLS regression regarding the 36-month BHAR are presented.

5.1 Underpricing

Table 8 documents the results regarding the underpricing of IPOs after entering the stock exchange. The underpricing of IPOs is a visible parameter regarding the IPOs. The average IPO, in the data sample described earlier, is underpriced by 9,33 % in equal-weighted terms and by 2,03 % in value-weighted terms with a statistical significance level of 1 %. The private equity-backed IPOs tend to be less underpriced in both equal- and value-weighted terms when compared to non-backed IPOs. IPOs with financial sponsors are on average 7,37 % underpriced in equally-weighted terms and 1,30 % in value-weighted terms. The non-backed IPOs experience an underpricing level of 10,86 % on equal-weighted terms and 2,60 % on value-weighted terms. Both findings are statistically significant at the level of 1 %. The results follow a similar path to previous academic literature (Belghitar & Dixon, 2001; Bergström et al., 2006).

According to the past literature, during the hot period, the IPOs tend to be more underpriced than on average (Ibbotson & Jaffe, 1975; Ritter, 1991). Similar findings are found in this empirical study. In equal-weighted terms, all the IPOs despite the ownership profile are more underpriced than in the entire period. Similar findings are related to

value-weighted averages. The average initial return of IPOs is at 12,88 % in value- and 2,91 % in equal-weighted terms, with a statistical significance level of 1 %.
On the contrary, during the cold periods, IPOs experience on average less underpricing. IPOs issued during the cold period are 6,41 % underpriced in equal-weighted average and 1,31 % in value weighted-average. Regarding the equal-weighted average, the results are statistically significant at level 1 % and the value-weighted average at level 5 %.

The hot and cold period method specially lowered the underpricing of non-backed IPOs in equal-weighted terms. As the non-backed IPOs are underpriced during the entire period by 10,86 %, the underpricing during the hot period was as high as 18,33 %, and during the cold period only 6,04 %. The results are statistically significant at level 1 % concerning the entire period, and the hot period but at 10 % during the cold period. The results of underpricing of private equity-backed IPOs remain closer to the results of the whole sample in hot and cold periods. During the hot period private equity-backed IPOs experience on average an underpricing of 7,67 % and 7,02 % during cold periods.

To conclude the results, financial sponsoring affects the underpricing of IPOs in the data sample provided. Thus, H1 regarding the significance of pre-IPO ownership can be accepted since the results of the underpricing do not follow a similar line when the data sample is divided by the backing type of the company entering the stock exchange.

Table 8 Underpricing of IPOs

The data sample consists of IPOs between 2009 and 2019 in Denmark, Finland, and Sweden. 190 IPOs were examined, from which 83 IPOs are financially backed, and 107 are non-backed. * refers to statistical significance at 10 % level, ** at the 5 % level, and *** at the 1 % level. T-statistics are given in the parentheses.

Underpricing	**ALL**	**PE**	**NB**
		Panel A. Entire Period	
Equally-weighted average	9,33%***	7,37%***	10,86%***
	(5,22)	(4,72)	(3,70)
Value-weighted average	2,03%***	1,30%***	2,60%***
	(4,33)	(3,92)	(3,29)
N	190	87	103
		Panel B. Hot Period	
Equally-weighted average	12,88%***	7,67%***	18,33%***
	(4,49)	(3,27)	(3,50)
Value-weighted average	2,91%***	1,40%**	4,49%***
	(3,77)	(2,69)	(3,09)
N	86	44	42
		Panel C. Cold Period	
Equally-weighted average	6,41%***	7,02%***	6,04%*
	(2,89)	(3,45)	(1,80)
Value-weighted average	1,31%**	1,18%***	1,39 %
	(2,30)	(2,97)	(1,57)
N	104	39	65

5.2 Post-IPO long-run stock performance

The next section introduces the findings regarding the post-IPO stock performance in the medium to long run. The method used to estimate the returns of IPOs in this study is the BHAR, and the index used to research the abnormal return is the OMX Nordic 120.

The BHAR calculations with different holding periods are introduced in the Table 9. All the holding periods have positive averages regardless of the backing type or the weighting type. Westerholm (2006) reported a similar outcome when examining the Nordic stock markets. The smallest average abnormal returns are carried by the IPOs that have had financial sponsoring before entering the Nordic Stock Exchange.

The value-weighted return is substantially smaller than with equal-weighting, hence indicating that the larger IPOs perform better than the smaller IPOs and thus generate large parts of the abnormal returns of the IPOs. The results of equal- and value-weighted regarding the whole data sample are statistically significant at level 1 %. The indication of higher returns of equal weighting is similar to the past academic literature (Brav & Gompers, 1997; Bergström et al., 2000).

In all holding periods and with both weighting methods, the non-backed IPOs outperform both all private equity-backed IPOs and the whole sample's BHARs. The results regarding the non-backed IPOs are statistically significant at the level of 1 % in all the averages except in the BHAR36 where the level is at 5 %. The average difference between all the IPOs and the non-backed IPOs varies from under 1 % to over 10 %. The private equity-backed IPOs underperform on average the comparable of the non-backed IPOs from a couple of percent to over 20 %. Not all the results regarding the post-IPO performance are statistically significant.

The abnormal returns increase over time as the largest abnormal returns are experienced in the BHAR36 method at 51,12 %, 44,09 % for private equity-backed, and 56,58 % for non-backed in the equal-weighted averages. The results follow a similar path in both equal-weighted and value-weighted terms as the later ones are at 10,96 % for the total sample, 8,68 % for the private equity-backed, and 12,73 % for the non-backed. All the results are statistically significant at the level of 1 % except the value-weighted average for non-backed at 5 %.

Following the findings presented in the Table 9, the H2 can be overruled. The non-backed IPOs outperformed the private equity-backed IPOs in equal- and value-weighted terms. This is contrary to the existing academic literature (Bergström et al., 2006; Levis, 2008; Levis, 2011; Minardi et al., 2013; Ritter, 2015).

Table 9 BHARs calculated with 1-, 12-, 24-, and 36-months holding periods

Buy-and-hold abnormal returns in the Nordic countries with four different holding periods. The data sample consists of IPOs between 2009 and 2019 in Denmark, Finland, and Sweden. 190 IPOs were examined, from which 83 IPOs are financially backed, and 107 are non-backed. The benchmark index, OMX Nordic 120, is used to calculate the BHARs. * refers to statistical significance at 10 % level, ** at the 5 % level, and *** at the 1 % level. T-statistics are given in the parentheses.

Months	**Equal-weighted average**			**Value-weighted average**		
	All IPOs	PE	NB	All IPOs	PE	NB
N	190	83	107	190	83	107
1M	8,72%***	5,19%**	11,46%***	1,88%***	0,78%*	2,74%***
	(4,03)	(2,54)	(1,86)	(3,52)	(1,86)	(3,09)
12M	23,13%***	10,18%**	33,17%***	4,87%***	1,53 %	7,47%***
	(4,16)	(2,11)	(3,67)	(3,74)	(1,51)	(3,47)
24M	37,01%***	25,89%***	45,64%***	7,63%***	4,61%**	9,97%***
	(4,23)	(2,71)	(3,34)	(3,92)	(2,47)	(3,19)
36M	51,12%***	44,09%***	56,58%***	10,96%***	8,68%***	12,73%**

(4,01)	(3,69)	(3,47)	(2,77)	(3,26)	(2,62)

The confidence level in rejecting the second hypothesis increases when the F-test, regarding the BHAR36, is executed. The varied testing approach supports the rejection of H2. Table 10 introduces the results of the test, which indicates that non-backed IPOs outperform the backed IPOs when examining the abnormal returns in the long run. The statistical significance level of the results is 1 %.

Table 10 F-test of the buy-and-hold abnormal return of 36 months

* refers to statistical significance at 10 % level, ** at the 5 % level, and *** at the 1 % level.

	PE		NB
Mean	44 %		57 %
Listings	83		107
F		3,327***	
p-value		0,00	

5.3 Multivariate regression model

Next, multivariate regression is introduced following Levis's (2011) research methods. Multivariate regression is used in this study to better interpret the results of the BHAR methodology. The outcomes of the four different regression models are collected in the Table 11.

Regression 1 uses a similar approach to Levis (2011) to find evidence between the variables of the prior-IPO ownership, market sentiment, underpricing of the initial public offering, and the logarithmic value of the assets. The price-to-book ratio is added to the second regression to better interpret the financial efficiency of the companies. Then, the

leverage ratio is added to the third regression to take the capital structure of the company into account. Finally, the fourth regression model introduces the earnings before interest, depreciation, and amortization. This variable is only used in the last regression model due to the high volatility between the EBITDA amounts between the data sample companies.

The first-day returns have a statistically significant coefficient at the level of 5 % to the dependent variable of buy-and-hold abnormal returns of 36 months in each regression model. The coefficiency ranges between 1,146 and 1,236. The findings regarding the positive relationship between the first-day returns and the long-run performance of the IPO are opposite to the previous literature (Purnanandam & Swaminathan, 2004; Levis, 2011).

Another statistically significant variable is the price to book at the level of 1 %. The positive finding suggests a relatively small increase in the price to book value BHAR36. The finding is strong in all four regressions and the coefficient is approximately at the level of 0,09. Hence, underpricing and price-to-book variables are the only statistically significant ones in the regression analysis and might interpret the results that the private equity-backed underperform against the non-backed IPOs. As the underpricing of non-backed IPOs is at a higher level than in the backed ones, the explanatory power can potentially transfer the same effect over a longer period. Thus, lead to higher long-run abnormal returns of non-backed IPOs. As earlier mentioned, these findings contradict the previous academic literature's results.

Both dummy variables, the private equity and market sentiment have a negative coefficiency to the dependent variable but are statistically insignificant at the regressions. In the two last regressions, the leverage ratio has also a negative coefficiency but is statistically insignificant. Cao & Lerner (2009) found a similar negative relationship between long-run performance and leverage. Levis (2011) found a contradicting result about the leverage variable, so the academic literature does not support a single

outcome on the effects leverage has on buy-and-hold abnormal returns on post-IPO stock performance in the long-run.

The logarithmic total asset value, asset turnover, and earnings before interest, taxes, depreciation, and amortization variables have a positive coefficiency to the dependent variable but lack statistical significance. Hence, they do not have explanatory power to the abnormal post-IPO stock returns in the long-run.

Table 11 Multivariate regression model on BHAR36.

The data sample consists of IPOs between 2009 and 2019 in Denmark, Finland, and Sweden. 190 IPOs were examined, from which 83 IPOs are financially backed, and 107 are non-backed. The dependent variable is BHAR36. The benchmark index, OMX Nordic 120, is used to calculate the BHAR36. * refers to statistical significance at 10 % level, ** at the 5 % level, and *** at the 1 % level. T-statistics are given in the parentheses.

Variable	Regression 1	Regression 2	Regression 3	Regression 4
Intercept	-0,265	-0,274	-0,790	-0,684
	(-0,318)	(-0,328)	(-0,878)	(-0,719)
PE All	-0,018	-0,023	-0,002	-0,002
	(-0,065)	(-0,080)	(-0,006)	(-0,008)
Hot/Cold	-0,048	-0,053	-0,059	-0,051
	(-0,188)	(-0,206)	(-0,230)	(-0,199)
First-day return	1,236**	1,235**	1,146**	1,142**
	(2,362)	(2,354)	(2,180)	(2,167)
Log_total assets	0,066	0,064	0,219	0,194
	(0,410)	(0,394)	(1,144)	(0,950)
Price to book	0,089***	0,088***	0,090***	0,089***
	(2,741)	(2,703)	(2,758)	(2,723)

Asset turnover		0,034	0,036	0,039
		(0,204)	(0,220)	(0,237)
Leverage			-1,011	-0,997
			(-1,525)	(-1,498)
EBITDA				0,000
				(0,344)
R2	0,09	0,09	0,10	0,10
Observations	190	190	190	190

6 Conclusions

This research focuses on providing an understanding of what kind of effects different types of ownership have on the post-performance of IPOs. The two different ownership styles this paper studies are private equity-backed, which refers to venture capital, buyout, and growth equity backing, and non-backed. The ownership of a company is examined before the process of entering the public exchange has been initiated. The post-performance of the companies' stocks is evaluated in the short and long run. Additionally, a multivariate regression model is introduced to study other factors regarding the post-performance of the IPOs. The companies studied in this paper have all entered one of the Nordic Stock Exchanges, Danish, Finnish, or Swedish public markets, between 2009 and 2019. The final data sample consists of 190 IPOs from which 83 offerings are private equity-backed and 107 are not backed by any financial sponsors.

The first hypothesis of this research indicates that financial sponsoring affects the short-run performance of an IPO. The short-run post-performance of an IPO is also referred to as underpricing. The results regarding the underpricing are statistically significant when the entire period is examined. In equal-weighted terms, the average underpricing of the sample IPO is 9,33 %. The non-backed IPOs are on average underpriced by 10,86 % and the financially backed IPOs by 7,37 %. On value-weighted terms, the average IPO of the sample faces an underpricing of 2,03 %. When dividing the sample into backed and non-backed IPOs, the average underpricing is at 1,30 % for backed IPOs and 2,60 % for non-backed ones. With these results, the first hypothesis is proven to be correct and accepted.

The backing type of an IPO has effects on the average underpricing in this specific data sample collected from three Nordic countries between 2009 and 2019. The results of this study follow a similar path to the past academic literature by Bergström et al. (2006), Belghitar & Dixon (2011), Ferretti & Meles (2011), Levis (2008), and Mogilevsky & Murgulov (2012) in different stock exchange markets such as France, the UK, Italy, and the US.

The results from the hot period are additionally statistically significant. In equal-weighted terms, an IPO of the data sample is on average underpriced by 12,88 %, and in value-weighted terms 2,91 %. Regarding the financially backed IPOs, the underpricing is at 7,67 % on average in equal-weighted terms and 1,40 % in value-weighted terms. The non-backed IPOs are on average underpriced at 18,33 % in equal-weighted terms and 4,49 % in value-weighted terms. All the results are statistically significant. The results regarding the cold period are not statistically significant but have similar kind of findings to the hypotheses that the ownership style affects the underpricing of an IPO.

The long-run performance of the IPOs with different backing is examined with the second hypothesis. The hypothesis assumes that the private equity-backed IPOs will outperform the non-backed IPOs in the long-run when it comes to stock price returns. The methodology of the second hypothesis relies on buy-and-hold abnormal returns calculations. The index to which the IPOs are benchmarked is the OMX Nordic 120. It includes companies exchanged in Denmark, Finland, and Sweden. The BHARs of the IPOs are calculated in 1 month period as well as in 12-, 24-, and 36-month periods. The BHAR36 is additionally used in the F-test as well as in the multivariate regression model.

The results of the empirical studies indicate that the non-backed IPOs outperform the financially backed IPOs in the medium- to long-run both in equal- and value-weighted terms. The results are statistically significant in both weightings and in different holding periods. The non-backed IPOs have higher average returns compared to the backed IPOs in BHAR36 in equal-weighted terms with 56,58 % while the backed IPOs have a BHAR36 of 44,09 %. The total sample has a BHAR36 of 51,12 %. In value-weighted terms the whole data sample generated on average a BHAR36 of 10,96 %. When dividing the data sample into backed and non-backed, the average BHAR36s are 8,68 % and 12,73 % respectively. With the findings of the buy-and-hold abnormal return method, the second hypothesis is not backed by data and can be therefore rejected.

The result of the F-test is statistically significant and supports the mean returns of 44 % of the financially backed IPOs and 57 % of the non-backed returns which results that the H2 can be rejected. The average abnormal return levels in all holding periods are significantly smaller in the value-weighted terms which indicates that the size of the company affects the returns. The equal-weighted average returns are multiple times bigger than the value-weighted ones and can impart that the large returns are generated by small companies.

The multivariate regression methods delve into the findings of the BHAR36 method and evaluate the causes of the abnormal returns. The regression model indicates that the price-to-book ratio has explanatory power at a statistically significant level in all four different regression models. Also, the first-day return or underpricing of the IPOs is statistically significant in all the regression models constructed. Both variables have a positive effect on the long-run abnormal returns of the IPOs.

The restrictions of this study are related to the sample size and the data gathering. With only 190 IPOs in the final data sample, the results can be driven by only a handful of companies and thus not be accurate enough to interpret the whole Nordic IPO returns when comparing the ownership styles. This factor does not automatically reverse the empirical results found and concluded in the study. The direction of the results can be seen as accurate, but the exact numerical results should be taken with a grain of salt.

The Nordic IPO market itself is relatively small and unmatured which leads to smaller sample sizes than in large markets such as the UK and the US. Still, not all the IPOs are documented in the data sample between 2009 and 2019. Hence, this study does not give full coverage on what kind of the effects different backing types generate on the post-IPO stock performance of the initial public offerings in the short and long run.

For future research, this study gives direction and several improvement points. The upcoming research regarding the effects of prior-IPO ownership type in the Nordics can

further advance in the sample size, holding period over past special economical environment (e.g., Covid, the attacking war of Russia to Ukraine), and the even more accelerating popularity of private equity funding. The rising interest rates and inflation can grow the size of private equity funds in the future together with increasing challenges to collect assets from banks.

The financial sector faces again problems after the 2008 financial crisis in the threshold regulations as well as from the new ESG metrics from Article 9. Not all companies, especially in the EU, can fit into new regulations which can lead to the increasing popularity of private equity funding. Thus, the growth of private equity funds will ultimately lead to more private equity-backed IPOs in the future.

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Appendices

Appendix 1. The data sample of initial public offers between 2009 and 2019.

27.11.2009	Cimber Sterling Group A/S	Industrials
23.3.2010	Arise Windpower AB	Utilities
1.6.2010	Byggmax Group AB	Consumer Cyclicals
3.6.2010	Chr Hansen Holding A/S	Consumer Non-Cyclicals
17.6.2010	MQ Holding AB	Consumer Cyclicals
29.9.2010	Episurf Medical AB	Healthcare
5.10.2010	PANDORA A/S	Consumer Cyclicals
22.11.2010	Zealand Pharma A/S	Healthcare
31.1.2011	Kancera AB	Healthcare
12.4.2011	AroCell AB	Healthcare
13.4.2011	Karolinska Development AB	Healthcare
18.5.2011	Moberg Derma AB	Healthcare
20.5.2011	FinnvedenBulten AB / Bulten	Consumer Cyclicals
27.5.2011	Transmode Holding AB	Technology
16.6.2011	Boule Diagnostics AB	Healthcare
27.6.2011	Danske Andelskassers Bank A/S	Financials
15.10.2012	Siili Solutions Oyj	Technology
28.6.2013	Matas A/S	Consumer Cyclicals
14.10.2013	Orava Asuinkiinteistorahasto Oyj	Real Estate
28.11.2013	Platzer Fastigheter AB	Real Estate
28.11.2013	Restamax Oyj	Consumer Cyclicals
20.2.2014	Bufab AB	Industrials

12.3.2014	ISS A/S	Industrials
19.3.2014	Hemfosa Fastigheter AB	Real Estate
2.4.2014	Recipharm AB	Healthcare
4.4.2014	Verkkokauppa.com Oyj	Consumer Cyclicals
30.5.2014	Herantis Pharma Oyj	Healthcare
11.6.2014	Besqab AB	Industrials
16.6.2014	Com Hem Holding AB	Technology
18.6.2014	Bactiguard Holding AB	Healthcare
26.6.2014	Scandi Standard AB	Consumer Non-Cyclicals
25.9.2014	Inwido AB	Consumer Cyclicals
9.10.2014	Granges AB	Basic Materials
3.11.2014	Nexstim Oyj	Healthcare
11.11.2014	United Bankers Oy	Financials
20.11.2014	Lifco AB	Healthcare
25.11.2014	Thule Group AB	Consumer Cyclicals
2.12.2014	NP3 Fastigheter AB	Real Estate
4.12.2014	Nixu Oyj	Technology
5.2.2015	Eltel AB	Industrials
12.2.2015	Dustin Group AB	Consumer Cyclicals
25.2.2015	Piippo Oyj	Consumer Cyclicals
5.3.2015	NNIT A/S	Technology
11.3.2015	Savo-Solar Oy	Technology
13.3.2015	Detection Technology Oy	Healthcare
19.3.2015	Evolution Gaming Group AB	Technology
24.3.2015	Hoist Finance AB	Financials
26.3.2015	Troax Group AB	Industrials
26.3.2015	Asiakastieto Group Oyj	Industrials
22.4.2015	Tobii AB	Technology

20.5.2015	Robit Oyj	Industrials
27.5.2015	SciBase Holding AB	Healthcare
4.6.2015	Pihlajalinna Oy	Healthcare
4.6.2015	Magnolia Bostad AB	Real Estate
16.6.2015	Nordax Group AB	Financials
16.6.2015	Alimak Group AB	Industrials
16.6.2015	Coor Service Management Holding AB	Industrials
17.6.2015	Nobina AB	Industrials
18.6.2015	Pandox AB	Real Estate
29.6.2015	Capio AB	Healthcare
1.7.2015	Kotipizza Group Oyj	Consumer Cyclicals
7.10.2015	CLX Communications AB / Sinch	Technology
15.10.2015	Bravida Holding AB	Industrials
23.11.2015	Dometic Group AB	Consumer Cyclicals
27.11.2015	Attendo AB	Consumer Non-Cyclicals
1.12.2015	Scandic Hotels Group AB	Consumer Cyclicals
2.12.2015	Camurus AB	Healthcare
3.12.2015	Stillfront Group AB	Technology
10.12.2015	Consti Yhtiot Oy	Industrials
10.2.2016	Scandinavian Tobacco Group A/S	Consumer Non-Cyclicals
15.3.2016	Garo AB	Industrials
16.3.2016	LeoVegas AB	Technology
18.3.2016	Suomen Hoivatilat Oyj	Industrials
21.3.2016	Humana AB	Healthcare
25.4.2016	Lehto Group Oyj	Industrials
25.4.2016	Nepa AB	Technology
28.4.2016	Resurs Holding AB	Consumer Cyclicals
29.4.2016	Tokmanni Group Oy	Consumer Cyclicals

24.5.2016	Paradox Interactive AB	Technology
1.6.2016	GomSpace Group AB	Technology
9.6.2016	Nordic Waterproofing Holding A/S	Consumer Cyclicals
9.6.2016	DONG Energy A/S	Utilities
10.6.2016	B3IT Management AB	Technology
13.6.2016	TF Bank AB	Financials
14.6.2016	AcadeMedia AB	Academic & Educational Services
21.6.2016	Maha Energy AB	Energy
21.6.2016	Lauritz.com Group A/S	Technology
22.6.2016	ExpreS2ion Biotech Holding AB	Healthcare
23.9.2016	Nets A/S	Technology
27.9.2016	InDex Pharmaceuticals Holding AB	Healthcare
28.9.2016	Internationella Engelska Skolan i Sverige Holdings II AB	Academic & Educational Services
28.10.2016	Tobin Properties AB	Consumer Cyclicals
4.11.2016	Heeros Oyj	Technology
18.11.2016	THQ Nordic AB	Technology
22.11.2016	SERNEKE Group AB	Consumer Cyclicals
22.11.2016	Alligator Bioscience AB	Healthcare
29.11.2016	Smart Eye AB	Technology
29.11.2016	DNA Oyj	Technology
30.11.2016	Volati AB	Financials
30.11.2016	Bygg Partner i Dalarna Holding AB	Industrials
7.12.2016	Acarix AB	Healthcare
7.12.2016	SeaTwirl AB	Industrials
8.12.2016	Aino Health AB	Technology
8.12.2016	Edgeware AB	Technology

10.2.2017	IRLAB Therapeutics AB	Healthcare
22.2.2017	Oncopeptides AB	Healthcare
16.3.2017	Biovica International AB	Healthcare
22.3.2017	Next Games Oy	Technology
23.3.2017	MIPS AB	Consumer Cyclicals
24.3.2017	Fondia Oy	Government Activity
31.3.2017	Ambea AB	Healthcare
3.4.2017	Isofol Medical AB	Healthcare
6.4.2017	SSM Holding AB	Real Estate
6.4.2017	Actic Group AB	Consumer Cyclicals
7.4.2017	FM Mattsson Mora Group AB	Consumer Cyclicals
25.4.2017	Bambuser AB	Technology
5.5.2017	Ayima Group AB	Technology
9.5.2017	Integrum AB	Healthcare
11.5.2017	Instalco Intressenter AB	Industrials
11.5.2017	Kamux Oyj	Consumer Cyclicals
18.5.2017	TerraNet Holding AB	Technology
19.5.2017	Munters Group AB	Industrials
23.5.2017	Medicover AB	Healthcare
26.5.2017	Nitro Games Oyj	Technology
31.5.2017	Boozt AB	Consumer Cyclicals
8.6.2017	Silmaasema Oyj	Consumer Cyclicals
15.6.2017	Green Mobility A/S	Industrials
19.6.2017	Sedana Medical AB	Healthcare
20.6.2017	Bonesupport Holding AB	Healthcare
20.6.2017	Fastighets AB Trianon	Real Estate
21.6.2017	Conferize A/S	Technology
14.9.2017	SenzaGen AB	Healthcare

28.9.2017	Rovio Entertainment Oy	Technology
2.10.2017	WeAreQiiwi Interactive AB	Technology
5.10.2017	Balco Group AB	Basic Materials
9.10.2017	Handicare Group AB	Healthcare
10.10.2017	Terveystalo Oy	Healthcare
11.10.2017	Global Gaming 555 AB	Technology
11.10.2017	Climeon AB (publ)	Energy
12.10.2017	BioArctic AB	Healthcare
13.10.2017	Seafire AB	Financials
27.10.2017	2cureX AB	Healthcare
13.11.2017	Gofore Oyj	Technology
15.11.2017	Orphazyme A/S	Healthcare
21.11.2017	IRRAS AB	Healthcare
23.11.2017	TCM Group A/S	Consumer Cyclicals
24.11.2017	Acconeer AB	Technology
30.11.2017	DevPort AB	Industrials
5.12.2017	Tempest Security AB	Industrials
7.12.2017	Efecte Oyj	Technology
8.12.2017	Mag Interactive AB	Technology
11.12.2017	Lyko Group AB	Technology
19.1.2018	NPinvestor.com A/S	Technology
1.2.2018	Admicom Oyj	Technology
18.2.2018	BBS Bioactive Bone Substitutes Oy	Healthcare
5.3.2018	Zutec Holding Ab / Builddata Group	Technology
21.3.2018	Harvia Oyj	Industrials
22.3.2018	Altia Oyj (Anora Oyj	Consumer Non-Cyclicals
22.3.2018	Green Landscaping Holding AB	Consumer Non-Cyclicals
26.3.2018	Iconovo AB	Healthcare

27.3.2018	Bygghemma Group First AB	Consumer Cyclicals
29.3.2018	Fluicell AB	Healthcare
16.4.2018	Enersense International Oy	Industrials
23.4.2018	Happy Helper A/S	Industrials
17.5.2018	Ovzon AB	Technology
5.6.2018	NCAB Group AB	Technology
7.6.2018	NetCo Group A/S	Technology
8.6.2018	Better Collective A/S	Technology
14.6.2018	Kojamo Oyj	Real Estate
18.6.2018	VMP Oyj	Industrials
19.6.2018	Projektengagemang Sweden AB	Industrials
20.6.2018	ViroGates A/S	Healthcare
25.6.2018	Odico A/S	Industrials
28.6.2018	Calliditas Therapeutics AB(WAS 71724F)	Healthcare
28.8.2018	Hypefactors A/S	Consumer Cyclicals
4.10.2018	Fellow Finance Oyj	Financials
12.10.2018	StenoCare A/S	Healthcare
21.11.2018	Scape Technologies A/S	Technology
29.11.2018	Oma Saastopankki Oy	Financials
4.12.2018	Jetpak Top Holding AB	Industrials
5.12.2018	Azelio AB	Utilities
6.12.2018	Q-Linea AB	Healthcare
6.12.2018	Lime Technologies AB	Technology
5.3.2019	Ascelia Pharma AB	Healthcare
11.4.2019	Karnov Group AB	Technology
6.5.2019	Konsolidator A/S	Technology
24.9.2019	EQT AB	Financials
15.10.2019	Relais Group Oy	Consumer Cyclicals

19.11.2019	Fodelia Oyj	Consumer Non-Cyclicals
4.12.2019	Optomed Oyj	Healthcare