

# The Impact of Outside Relations on IPO underpricing

An Empirical Study of Underpricing of Initial Public Offerings on The Nordic Market in a Contemporary Context

Master Thesis

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## Abstract

Motivated by an apparent gap in the literature on underpricing of initial public offerings (IPOs), this thesis sets out to investigate the relationship between outside relation and IPO underpricing on the Nordic market in a contemporary context. By analyzing a dataset of 322 IPOs from Denmark, Finland, Norway and Sweden from 2003 to 2022, the study finds that companies going public in the Nordic market are on average underpriced by 8.71%. Further, when studying the impact of financial sponsors on IPO underpricing, namely private equity and venture capital funds, the results imply a reducing effect, however the results are statistically insignificant. Furthermore, the thesis studies the effect of engaging with a prestigious underwriter as a certifier in order to reduce underpricing and finds no evidence that such a relation influences the Nordic IPO market. Instead, the model estimate indicate that the book-building method has a reducing effect on IPO underpricing, however this estimate is insignificant. Hence, this indicates that the pricing method applied by the underwriter might be more important than the reputation of the underwriter when seeking to minimize underpricing. Lastly, the thesis finds a positive relation between market sentiment and underpricing on the Nordic IPO market. The findings suggest that outside relations have an impact on IPO underpricing in the Nordics but further research in the field is encouraged to expand the relatively scarce existing literature.

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# 1. Introduction

The idea for the thesis arose while watching the Danish version of Shark Tank (in Danish: Løvens hule). Being a regular viewer of the show, I noticed a tendency among the entrepreneurs seeking funding that most of them have a bias towards the “shark” Jesper Buch. Jesper Buch gained much of his wealth and status in the Danish start-up industry from his involvement in ‘Just Eat’ and has since come to be known as somewhat of a “jet set” venture capitalist. This observed bias was puzzling as entrepreneurs opted to accept bids from Jesper Buch, even in instances of other sharks having noticeably more knowledge, experience, and competencies in the given entrepreneurs’ field of business. Of course, there is some marketing value in the involvement of a “shark” such as Jesper Buch but merely participating in the show is great marketing for the vast majority of entrepreneurs in the first place. So, it seemed that entrepreneurs simply just preferred Jesper Buch as an investor due to his name and the association with him. This led to the thought that a famous venture capitalist such as Jesper Buch provided some kind of certification of the product and the start-up company itself. This was a very interesting dynamic to examine in real world settings outside of the TV-show.

Watching the show further, another tendency was observed. Most of the time, all the sharks told entrepreneurs that their valuation of their company was too high and that they needed to lower their valuation in order to secure an investment. The consistency of this scenario led my line of thinking to the phenomenon of IPO (initial public offering) underpricing where the same dynamics come into play when selling shares to new investors. In order to create an incentive for investors to invest in a company, a share-selling company must make the offer economically attractive due to factors such as information asymmetries among others, regardless of being a small start-up company on a TV-show, or a larger company seeking to go public. Based on these observations from the TV-show, I had the idea of what to research, the certification role of outside relations, and my thought process was already on track towards IPO underpricing. The effect of outside relations on IPO underpricing unfolded as an interesting and important topic to research, further enhanced by a seeming lack of existing literature on the topic, particularly in the Nordic context.

Underpricing is defined as the difference between an offer price of a new issue and the closing price of the first day of trading and is categorized as a hidden cost of going public (Ljungqvist, 2007). This means that the issuing company misses out on a potentially large amount of money, an example hereof from the dataset for this thesis being the IPO of well-known Danish company Pandora in 2010.

Pandora went public on NASDAQ OMX Copenhagen in 2010, selling just shy of 48 million shares at the offer price of 210 DKK pr share which ended up raising almost 10 billion DKK of capital. However, the closing price on the first trading day of 263 DKK pr share showed that the issue was underpriced by approximately 25%, resulting in Pandora missing out on a further 2.5 billion DKK of capital that could have been raised from the IPO. This huge amount of capital could have been utilized to invest further into the company. Instead, it fell into the pockets of the investors. The Pandora example involves rather large figures relative to the mean of the dataset but is far from a stand-alone incident. The example shows that reducing underpricing by just a few percent can increase the capital raised by the issuing company significantly why it, from the issuing company's angle at least, is relevant to research ways of doing so.

The thesis sets out to research the relationships between outside relations and reduction of IPO underpricing - more specifically financial sponsors and underwriters - via an empirical study based on a dataset containing quantitative data on IPOs. The dataset covers IPOs on the main markets in the four Nordic countries; Denmark, Finland, Norway, and Sweden in the period from 2003 to 2022. By this, the thesis aims to contribute to bridge a gap in the existing literature by researching a relatively neglected geographical market, the Nordics, in a contemporary timeframe. To guide this research, a primary research question is formulated alongside a set of sub-questions which are presented in the following section.

## 1.1 Research Question

The primary question that this thesis aims to answer is:

***How do outside relations affect IPO underpricing in the Nordic market?***

To focus the research on this field and to help answer the research question, the following sub-questions have been formulated:

- How do financial sponsors impact IPO underpricing on the Nordic market?
- Are there differences in the impact of different financial sponsors on IPO underpricing on the Nordic market?
- How do underwriters impact IPO underpricing on the Nordic market?

- How does the offer method used by the underwriter impact IPO underpricing on the Nordic market?

## 1.2 Delimitations

The purpose of this thesis is to study the relationship between outside relations and IPO underpricing on the Nordic market between 2003 and 2022, thus within in a recent timeframe. By this, the thesis aims to contribute to the existing literature by applying an analysis to the Nordic market in a contemporary context. The thesis focuses on the outside relationships of the issuing company related to financial sponsor(s) and underwriter(s), including the pricing method of the underwriter inspired by the observations from the Danish Shark Tank. This means that other possible outside relations, such as accountants, are excluded from the study.

The study is delimited to only considering the Nordic countries of Denmark, Finland, Norway, and Sweden. This, alongside the 20-year timeframe, ensures a sufficient number of observations despite the relatively limited population size of the Nordic countries, as only focusing on one of the Nordic countries could have become problematic in terms of sample size. Thus, limiting the thesis to draw conclusions related to the Nordic market in a contemporary context, the thesis refrains from drawing conclusions beyond the Nordic borders or about previous or future timeframes. The cluster of data from the Nordic countries, and the validity of drawing general conclusions based on this, is enabled by an assumption of country homogeneity among the Nordic countries - an assumption that will be discussed in section 6.4. Furthermore, to ensure comparability, the thesis only focuses on issues on the Nordic main market, excluding smaller and more illiquid exchanges why the thesis' conclusions will not cover these either.

Further, the thesis is delimited to only focus on the initial returns, being the percentage difference between the offer price and the closing price on the first trading day. Thus, the thesis will only draw conclusions regarding underpricing on the first trading day and therefore not on performance beyond the issuing date. Lastly, the conclusions of the thesis are solely based on OLS regressions and quantitative data, why qualitative approaches or alternative regression models are not applied.

The delimitations described above are specified further throughout the thesis when deemed suiting. This includes delimitation and considerations related to data gathering.

## 1.3 Paper Outline

Following the introduction, research question, and delimitations, the thesis proceeds by building a theoretical foundation in the following section through a literature review of existing theory. First, the literature review explores the characteristics of going public, including motivations for doing so and costs involved in the process. Next, the literature review focuses on the theoretical dimension of underpricing which will be covered in four main parts: asymmetric information explanations, behavioral explanations, institutional explanations, and ownership and control explanations. Following this, the literature review concludes by focusing on the financial sponsor types, mainly private equity and venture capital, and their implication on IPO underpricing. The theoretical findings are then used to formulate six hypotheses that will be tested to answer the research question.

Then, the data foundation for the analysis will be presented, covering the collection of data, the considerations driving collection of data, and how the data is used to test the hypotheses. Subsequently, the analysis presents descriptive statistics. Following this, the methodology and empirical results from the testing of the hypotheses are analyzed on an individual basis for each hypothesis. Lastly, the findings of the analysis is discussed with a particular focus on potential weaknesses of the study and practical implications for issuing companies before concluding.

## 2. Past Theory

This section will outline existing theory within the field of IPO underpricing to create a thorough theoretical foundation to understand the phenomenon of IPO underpricing and how financial sponsors and underwriters impact it. The theory presented in this section will focus on three main topics. Firstly, the process of an IPO and the motivations for a company to go public, secondly, why underpricing of IPO's occur with offset in various theories, and, lastly, the role of financial sponsors and underwriters regarding certification.

### 2.1 Initial Public Offering

This section of the thesis outlines the process of an IPO and the parties involved as well as discusses the potential advantages and disadvantages a company faces by going public.



An IPO occurs when a private company (in the following, referred to as the issuing company) decides to raise additional equity capital by selling shares of the company on a public stock exchange. The amount of new equity raised is decided by the number of shares offered to the market times the chosen share price minus the costs of going public. Per definition, the term IPO solely refers to the listing of new securities and relates to the sale of equity securities in the primary market (Espinasse, 2022). This means that the sale of treasury shares, seasoned equity offerings or similar are not considered an IPO. In addition to the primary offering, it is also possible for an IPO to consist of a secondary offering where the existing shareholders (e.g. an investor such as a private equity fund or the founders) sell their shares in the company to new investors. In this case, the proceeds of the sale will be allocated to the seller and not the company as this can be seen as an opportunity for an investor to cash in on an investment.

Historically, the phenomenon of IPO underpricing has been observed when the offer price of the offered shares tends to be significantly lower than the market price of the shares at the end of the issuing day, leading to a significant initial first day return for the investors. The existence of this tendency has been covered plentifully in existing literature on IPO pricing, providing certainty of this phenomenon (Ibbotson, 1975), (Ljungqvist, 2007), (Loughran, Ritter, & Rydqvist, 1994).

IPO underpricing means “money left on the table” for the issuing company. More specifically, this is the difference between the accumulated amount investors have paid for the shares of the issuing company in the primary market, compared to the market value of the company in the secondary market which is priced by the investors (Brealey, Myers, & Allen, 2020). This money on the table represents a measurement of underpricing and can be seen as a pool of money the issuing company willingly and knowingly is missing out on when raising capital. Therefore, underpricing becomes a hidden cost for the issuing company, wanting to go public, as more capital could potentially have been raised in a counterfactual scenario. Instead, the money falls into the pockets of a few lucky investors who can collect a significant initial return on their investment (Benveniste & Spindt, 1989). Therefore, it is relevant to explore and understand the mechanisms that determine underpricing and the process of an IPO. This literature review will therefore consider the intraday changes on the issue date of the IPO and, thus, refrain from considering long-term performance of the IPOs beyond the issuing date.

### 2.1.1 The Process of an IPO

The process of an IPO is often complex and time-consuming and involves 3 main parties. First, the issuing company who is looking to raise capital in trade for ownership rights (shares). Second, the investors who will provide capital in return for ownership shares in the company. And last, the underwriter whose job it is to facilitate trade between the issuing company and the investors. Besides these main actors, other support functions such as legal advisors and accounts will also be part of the process (Ljungqvist, 2007).

Traditionally, the process initially begins with the issuing company locating an underwriter by engaging with different underwriters – typically investment banks – to collect proposals on their services, valuation, and IPO strategy in terms of share price, number of shares etc. Then, the issuing firm and the chosen underwriter work closely together to determine a proper valuation of the company which the public offering will be based on. On larger public offerings, it is not uncommon to have more than one underwriter involved, and in such a case, one underwriter will typically take on the role as leading underwriter while other underwriters in the syndicate are less involved. The following valuation typically consists of two pricing methods, the first being a discounted cash flow model, and the other being a peer group valuation where different financial metrics of similar companies is compared to the issuing company (Berk & DeMarzo, 2020).

One method that is often applied to further establish the best possible offer price is the book-building method. The method's principle is for the underwriter to gain knowledge about potential investors interest in the offering and to collect any knowledge the investors might have about the issuing company (Benveniste & Wilhelm Jr., 2005). This pricing method works due to a mutual 'contract' between the underwriter and the investors. As the financial market is an eternally repeated game, none of the actors have an interest in lying or withholding information as this could have strong, damaging consequences in the long run (Beatty & Ritter, 1986).

In the previous century, most European IPOs were based on the fixed price method where the offer price was determined without the inputs of the future investors. The preferred method for establishing offer prices has largely changed in recent decades as the majority of European IPOs uses book-budling to establish the best offer price (Abrahamson, Jenkinson, & Jones, 2011).

Before the issue is floated, the prospectus and necessary legal documents need to be approved by the financial authority in the given country, i.e. Finanstilsynet in Denmark, Finanssivalvonta in Finland, Finanstilsynet in Norway, and Finansinspektionen in Sweden. When approved, the final offer price is decided between the issuing company and the underwriter a few hours before the offering takes place (Brealey, Myers, & Allen, 2020). At this point, the underwriting risk occurs for the underwriter as they buy the shares from the issuing company (minus the fees for their services) before allocating the shares to the investors at the offer price.

There are two possible scenarios of the underwriter's distribution of the shares from the issuing company. First, if the issue is oversubscribed, the shares will be allocated through quantity rationing, meaning that the investors will not receive the requested number of shares as demand is greater than supply rather than increasing the offer price ex-post (Beatty & Ritter, 1986). In the other possible scenario, the demand for share issues might not match the supply, meaning that the issue will be undersubscribed. Thus, the underwriter will end up with unwanted stock in the issuing company. As the underwriter takes on significant risks by buying shares, the underwriter would seek to minimize the likelihood of the second scenario through underpricing and preselling activities like book-building to gauge the interest in the issue (Baron & Holmström, 1980), (Baron, 1982).

### 2.1.2 Motivations for going public

Throughout the literature on IPOs, several advantages of going public have been highlighted. This section sets off in the five main advantages mentioned by (Röell, 1996) in a descending order based in importance. Further, the costs of going public will be outlined in the following section 2.1.3.

The first and most important reason for a company to go public is the access to new financing which can have several important implications for the issuing company (Röell, 1996). An increase in capital and easier access to capital might open new growth opportunities for the issuing company post its introduction to the stock exchange. These growth opportunities are mainly split into two types of growth, one being organic growth and the other being growth by acquisition. An example of non-organic growth is the possibility for post-IPO M&A activity as the company will have easier access to cash shares which can be used to acquire a potential target (Bancel & Mittoo, 2009).

Furthermore, an IPO increases the equity of the company and, thus, decreases a potential debt overhang. New financing, alongside the enhanced reputation and reconnection of being a publicly traded company, might also make it easier to negotiate favorable loan terms on future credit agreements or raise additional capital. Echoing this, a 2009 study on European IPOs by Bancel & Mittoo showed that 80% of CEOs claim that an IPO improved the investor recognition of the company which is perceived to have lowered cost of capital when seeking financing and therefore ultimately increasing the value of the company (Bancel & Mittoo, 2009). In addition, increased equity and capital also results in the company being less risky from a bank's perspective which would further improve the creditworthiness of the company.

The second most important reason for going public according to (Röell, 1996) is enhanced company image and publicity. Combined with the previously mentioned increased financing, a company might be better off in regard to negotiating contracts with suppliers or banks due to enhanced awareness of the company associated with an IPO. The IPO poses as a kind of certification, meaning that suppliers might longer or larger trade credit due to the company being perceived as less risky. This argument is also applicable for employees that are looking for a stable job, potentially helping the company recruit more and better qualified talent (Röell, 1996). The idea that the publicity surrounding a public listing can have a lasting significant marketing benefit for the company is put forward. However, this idea is not backed by any market research studies (Röell, 1996).

Thirdly, motivating the company's management and its employees is suggested as a reason to go public (Röell, 1996). It is argued that the motivation of employees and management can be boosted through share participation schemes as this would leave employees able to cash in when desired. Furthermore, moral might also be boosted by the signal of growth intentions, potentially enabling the company to attract or retain highly qualified individuals through liquid stock equity participation.

The fourth reason to do an IPO put forward by (Röell, 1996) is that an IPO makes it easier for owners to cash in. This argument might seem a bit contradictory to the third reason mentioned above as signaling of growth and motivating the management and employees with lucrative share participation schemes would indicate that there is still a lot of money to be made from owning shares in the company. Furthermore, it would not be advisable to voice an intention to sell as this would have a negative signaling value in an IPO process. Nevertheless, there is a clear trend in the UK market and

other European markets that the pre-IPO owners tend to divest in the years following an IPO (Röell, 1996).

Lastly, (Röell, 1996) argues that the possibility to exploit the market's mispricing is the fifth reason to go public. Large empirical evidence suggests that managers time new issues in hot markets to exploit the overly optimistic investor sentiment which could lead to overpricing of the IPO (Röell, 1996). However, it is unclear whether this possibility to make the investors overpay outweighs the total costs associated with an IPO, thus making this reason somewhat more ambiguous and, thus, less important than the four aforementioned reasons.

Other benefits mentioned as a side effect of going public is closer working relation with professional advisors, clearly defined business strategy, improved management, and organizational and financial structure (Röell, 1996). This is in line with (Bancel & Mittoo, 2009) findings that large European firms find that the increased external monitoring is a great benefit post going public.

### 2.1.3 Costs of going public

In terms of costs of going public, underpricing of the new issues is of course one of the most pronounced costs, perhaps even exceeding all the other costs combined (Ljungqvist, 2007). Here, underpricing can be interpreted as a cost as it reduces the proceeds of the issue and, thus, will the issuing company have less capital to fund future growth strategies and it's like. If an issue was priced at the same price as the closing price on the issue date, the issuing company would gain proceeds equal to the true value of the company, but instead the "money left on the table" is earned by the investors, as established earlier (Benveniste & Spindt, 1989). The cost of underpricing can be characterized as a hidden cost – even though scholars and academia are aware of the phenomenon – as the cost is less tangible and not paid upfront unlike other costs of going public.

A significant direct cost of going public is the fees paid to the underwriter which can be of significant value due to the risks the underwriter takes on in relation to the issue. Studies from the United States show that the underwriter's fee amounted to 7%, also being dubbed the "7% rule" (Chen & Ritter, 2002). Additional studies however show that the "7% rule" is not present in the European market where underwriters charged European IPOs closer to 4%, which is still a significant cost for the issuing firm (Abrahamson, Jenkinson, & Jones, 2011). Interestingly, the same global underwriters

will charge different fees depending on which market (i.e., Europe or the United States) they operate in. For U.S., this means paying approximately USD 1 billion a year more in fees relative to their European counterparties, all else equal (Abrahamson, Jenkinson, & Jones, 2011).

Besides fees to the underwriter, the issuing company will also experience other direct costs related to legal advisors, accounting services, listing costs, and registration fees with financial authorities among others. Furthermore, the issuing company will experience some of these costs at yearly recurring rate, primarily related to accounting, financial reporting, and maintaining investor relations (Brealey, Myers, & Allen, 2020). However, it is worth noting that some of these stricter regulations and monitoring also create value for the issuing firm as described in the previous section, demonstrating that the real world often can be more nuanced than first presumed.

In addition, the issuing company might also incur a variety of long-term costs when going public. Firstly, there is the issue of diversifying investors which can make it more complicated to monitor management from an investor perspective due to different intentions among the increased number of investors compared to post-IPO (Berk & DeMarzo, 2020). Related to this issue is loss of control as outside investors freely can buy large numbers of shares and thus influence essential decisions. This can lead to “dividend pressure” which means that the company is forced to pay out dividend to investors as the company is committed to act in the best interest of the shareholders (Röell, 1996). The pressure for dividend payments indicated that management would focus more on short-term decisions, potentially conflicting with long-term optimal decisions and solutions. An example of this is the decrease of internal innovation after going public as R&D can often be costly and has long time horizons before the investment pays off. Therefore, companies are more likely to acquire external innovation which can be very expensive (Bernstein, 2015).

## 2.2 Underpricing theories

The phenomenon of IPO underpricing started to catch attention in the academic world in the 1970's even though it had been present in the stock market much earlier. Some of the most noticeable work studying IPO underpricing in the U.S. was carried by Ibbotson (1975) and Logue (1973), which has acted as the foundation for future research. Both scholars found evidence of underpricing in the U.S. market during the 1960s, concluding that initial first day returns were positive. Since then, the

academic research within the field has moved forward and theories on why the phenomenon of underpricing exists have been established and tested.

The theory on underpricing is commonly split up into 4 main categories as follows: asymmetric information, behavioral explanations, institutional explanations, and ownership and control explanations (Ljungqvist, 2007). This section of the literature review will examine these four theories in the stated order, starting with asymmetric information as this is argued to have a first-order effect on underpricing why this will be the primary focus of this section (Ljungqvist, 2007). It is worth noting that theories and studies presented below are not exclusive to the Nordic market. On the contrary, the findings are mainly from other markets, but the theories are likely to also be applicable to the Nordic market too. The main theories will be tested later in the thesis.

### 2.2.1 Asymmetric information explanations

In the financial world, asymmetric information occurs in relation to a deal or trade when one party of the trade has more information than the other part/parties of the trade. Probably the most notorious example of asymmetric information is Akerlof's article "The Market for Lemon" from 1970 where the market for used cars is used to demonstrate the problem. The problem of asymmetric information lies in the fact that the car seller possesses more information regarding the quality of cars for sale compared the buyers, implicating that buyers do not know whether they will be buying a bad car (a lemon) or a good car. Therefore, the buyer is only willing to pay the price of a bad car when approaching a trade.

In regard to IPOs, there are three main parties as established earlier: the issuing company, the underwriter, and the investors. The models on asymmetric information in IPO underpricing assumes that one of these parties possesses more knowledge than the other parties.

### 2.2.2 The Winner's Curse

One of the best regarded asymmetric information theories on IPO underpricing is the winner's curse by (Rock, 1986). The winner's curse builds on Akerlof's (1970) article on the lemon problem described above. Rock (1986) assumes that some investors know more than others and categorizes these as informed investors and uninformed investors, respectively. Informed investors are better

equipped to estimate the actual value of the stock offered on new IPOs, leading to informed investors only bidding for the attractive IPOs. Contrary, uninformed investors will bid on randomly selected IPOs. This will create the problem of the winner's curse as the uninformed investors will buy all the stock of the unattractively priced IPOs while they will be subject to quantity rationing on the attractive IPOs as the informed investors will crowd the market. In the end, the informed investors will get all the shares of the attractive IPOs, leaving the uninformed investors with all the unattractive IPOs. This will result in uninformed investors experiencing below-average initial returns on their investment and, in extreme cases, the uninformed investors will even experience negative returns (Ljungqvist, 2007).

When the expected return for uninformed investors is negative, they will at some point stop investing as a logical consequence of unfavorable returns. This would leave only the (assumed to be equally informed) informed investors and their capital on the market. Rock's (1986) model builds on the assumption that capital of both informed and uninformed investors is needed to match the supply of IPO shares on the market, meaning that participation of uninformed investors is necessary. However, if the expected return is negative, uninformed investors exit the market. Thus, IPOs need to be underpriced to engage all investors (and their capital) on the market by giving the uninformed investors an expectation of positive returns.

Rock's (1986) argument on the winner's curse creates a dilemma. As established in section 2.1.3, underpricing is a significant cost for the issuing company when going public, but, at the same time, it is necessary to engage the uninformed investors. This, however, creates incentive for the individual company to "free-ride" by underpricing too little and still engaging all investors due to the widely recognized assumption about underpricing on the IPO market (Ljungqvist, 2007). However, the investment banks acting as underwriters on the IPO market are actors in the repeated games, meaning that they have an interest in maintaining the market equilibrium (Beatty & Ritter, 1986). If underwriters underprice too little, it will damage their reputation which is important to maintain status as credible actors in repeated games. Insufficient underpricing will therefore result in underwriters losing their investors as their issues cannot be trusted. On the other hand, too much underpricing will mean that potential future issuers will shy away from the underwriter. Thus, underwriters have strong interests in maintaining the market equilibrium while issuing companies (who only participate in the



game once) are less credible in regard to abstaining from “free-riding” on the investors (Beatty & Ritter, 1986).

Related to the dynamic of asymmetric information, Benveniste & Spindt (1989) argue that underpricing occurs as a compensation to informed investors for revealing truthful information. As games are repeated, both the informed investor and the underwriter must follow some “unwritten rule” to ensure and signal their credibility to one another. The underwriter needs to maintain a credible threat of quantity rationing toward the investor in trade for credible information from the informed investor in order to gauge the interest in the IPO. Furthermore, an underwriters regular informed investors might be compensated through bundles offered by the underwriter (Benveniste & Spindt, 1989). Beside revealing information, informed investors might also participate on less attractive IPOs to secure future allotment of attractive IPOs.

Even though the pricing methodology of book-building has been criticized, it is still argued to be the most efficient pricing method (Benveniste & Wilhelm Jr., 2005). Further, book-building has become the most used method to determine the offer price in Europe, replacing the previously method of fixed price (Abrahamson, Jenkinson, & Jones, 2011). This makes the findings above particularly interesting. The two main differences between fixed price and book-building are essential to understand underpricing. Firstly, under fixed price, the offer price and number of shares is made public before the issue date and allocation follows different rules based on legislation and bid sizes (Benveniste & Wilhelm Jr., 1997). However, using the book-building method, the underwriter has control over allocation to the interested investors (Loughran & Ritter, 2002). This makes the credibility of the threat of quantity rationing stronger during the information revelation process, thus making book-building connected to less underpricing (Benveniste & Spindt, 1989).

Secondly, under fixed price, the rational informed investor would be incentivized to simply wait for the disclosure of the offer price and then only bid if the offer is considered attractive. In this case, the supply of new issued shares would not be matched which could be costly by not raising enough capital. Therefore, issuers want to engage with both informed and uninformed investors to secure both groups’ participation, and this can be achieved through book-building (Benveniste & Wilhelm Jr., 1990). Thus, if the money left on the table for the investors in compensation for their information revelation is below the potential costs of excess supply of newly issued shares, this creates an

economic incentive for the issuing company to engage in underpricing (Benveniste & Wilhelm Jr., 1997).

Based on the observations mentioned above, one would wonder if the underpricing could be reduced by removing the asymmetric information between the informed and uninformed investors. An often mentioned mean to reduce this asymmetry is to introduce a certifier for the IPO. A nearby solution could be the underwriter, but also the auditor or a financial sponsor (which we will elaborate on later) could be mentioned as a possible certifier.

The main idea of this certification hypothesis is that the certifying agent can certify the quality of the new issue simply by the agent's presence (Booth & Smith, 1986). The argument of this theory is based on the same groundwork as Beatty & Ritter (1986), in which the certifying agent is a repeated player in the market why the agent wants to maintain its reputational capital as this is valuable in the long-term. Therefore, a certifier will avoid unattractive issuing companies as this could tarnish certifiers reputation and thus lead to a reduction in future income. Furthermore, the issuing company can signal its attractivity to the investors by using a certifier when going public. Given that the marginal costs of a certifier – that could be higher fees to a prestigious underwriter – are lower than the marginal benefit of reducing underpricing, thus leaving less money on the table, the issuing company would have rational incentives to reduce information asymmetry.

Some of the most popular academic research on the matter of certification and underwriters are Carter & Manaster's study from 1990, testing the effects of choosing a prestigious underwriter when going public. The study finds that a prestigious underwriter reduces the degree of underpricing on initial offerings as it helps reduce the information asymmetry. The argument goes as follows; the need for underpricing in the IPO-market stems from a compensation for the possible dispersion of the value in the secondary market, e.g., the risk of the issue. As stated, the underpricing of an initial offering is money left on the table, why the issuing firm would desire to minimize the underpricing. Carter & Manaster (1990) find that low-risk issuing firms can do this by choosing a prestigious underwriter, as this will signal low risk to the investors. Since the underwriter wants to maintain their prestigious reputation, thus, will they only market low-risk IPOs.

As the topic of certification is a major focus in this study, it will be elaborated on later in the thesis in relation to financial sponsors in section 2.3.1. However, the presence of an agent (in the aforementioned case, a certifying agent) also raises some problems which the next section on principal agent theory will shed light on.

### 2.2.3 Principal agent theory

A classic principal-agent problem occurs when a principal and an agent have a conflict of interest and priorities. Such conflict is also present in the dynamic of IPO underpricing. As established earlier, the book-building method leaves the underwriter with significant control of the pricing and allocation of new IPO shares (Loughran & Ritter, 2002). The pricing method leaves the underwriter with more information relative to the issuing company regarding demand and willingness to buy the new shares among investors (Baron & Holmström, 1980). This makes the underwriter's threat of quantitative rationing more credible, as noted earlier, but simultaneously, it creates an agency problem between the underwriter and the issuing company (Loughran & Ritter, 2002).

As the money left on the table when underpricing an IPO is essentially wealth transferring from the issuing company to the investors, it may be optimal for the investors to secure high allocations of new shares through side payments to the underwriter. This is presented as the corruption hypothesis by Loughran & Ritter (2002). These side payments can be promises to the underwriter that the investors will hire the underwriter for their future IPO, thus promising future income through underwriting fees. Another example could be paying excessive commissions on trades unrelated to the wanted IPO shares. This principal-agent problem also relates to fee structure. Naturally, large proceeds from an IPO will imply larger fees to the underwriter why larger underpricing – all else equal – would result in lower fees to the underwriter. Despite this structure of fee payments, it might still be favorable for underwriters to underprice to their most favored investors and repeated customers. This applies if the value of future fees generated due to the reputational capital is higher than the present reduction in underwriting fees due to underpricing too much (Loughran & Ritter, 2002).

Furthermore, the underwriter incurs underwriting risks by buying issue before distributing it to the interested investors (Baron & Holmström, 1980). Thus, if demand turns out lower than expected, the underwriter will end up with unwanted shares. Therefore, it might be in the interest of the underwriter

to engage in shrinking behavior to reduce the underwriting risks. This is when an underwriter lowers the price of the IPO shares significantly to boost the probability of a successful sale to investors while securing itself through optionality with the issuer (Loughran & Ritter, 2002).

This means that the underwriter's interests do not necessarily align with the those of the issuing company. Therefore, for underwriters to have a certifying role, a clear alignment of incentives between the underwriter and the issuing company is necessary which needs to be reflected in a contract (Baron & Holmström, 1980). This will reduce the principal-agent problem. However, as companies only engages in a single IPO, these incentive aligning contracts are very complicated (Baron & Holmström, 1980). The argument of the principal-agent theory implies that the underwriter might not be the best certifying agent due to the potentially unforeseen costs. Thus, it is necessary to explore alternative avenues for the issuing company to signal the value of their issue. This will be further elaborated in the following section.

#### 2.2.4 Signaling theory

Signaling theories on IPO underpricing are based on the assumption that the issuing company possesses superior information regarding the true value of the company compared to investors. Therefore, the issuing company can use their IPO – namely by underpricing – to signal the true value of future cash flows (Connelly, Certo, Ireland, & Reutzel, 2010). That is, companies seeking to signal a high value of the company will underprice more (Ibbotson, 1975). This works by investors observing a price lower than their valuation, thus interpreting this as a signal that the management of the company holds information that will allow the company to make up for the cost of underpricing in the future.

Most famously, this theory on signaling was formalized by (Welch, 1989) in a two-period model which includes an IPO and a SEO (seasoned equity offering). The idea is that low-quality issuing companies can imitate high-quality companies, thus incurring the same expenses of underpricing but at the same time increasing demand for the IPO. However, this imitation is likely to be discovered by investors in the period before the SEO. Therefore, low-quality issues will be faced with a trade-off; either low-quality issues can incur the costs of imitation but also risk being discovered later on, resulting in loss of investment, or on the other hand, they can reveal their true value and avoid the expenses of imitation but will also miss out on the potentially higher proceeds from the SEO if the

imitation is not discovered in the period between IPO and SEO (Welch, 1989). Therefore, if high-quality companies signal through underpricing, low-quality companies will reveal their true value if the costs of imitation are too high. Thus, low-quality companies will not engage as much in underpricing as the costs of imitation are not covered by the proceeds from the SEO given the risk of detection (Welch, 1989).

However, it can be argued, that the rationale for high-quality issuing companies to signal through underpricing seems elusive. It is argued throughout the literature that the reasons for issuing companies to signal by underpricing seems unclear given the possibility of a certifier (Booth & Smith, 1986) (Carter & Manaster, 1990) (Michaely & Shaw, 1994) and (Titman & Trueman, 1986). Further studies within the field provides empirical evidence that cast significant doubts regarding the explanatory power of signaling theories.

### 2.2.5 Behavioral explanations

As established, asymmetric information has a first order effect on IPO underpricing, but the theories concerned with this problem do not explain all aspects of underpricing (Ljungqvist, 2007). Mainly, the changing degree of underpricing over time needs a closer look a behavioral theory to be explained. An example of this is Loughran & Ritter (2004) study of IPOs on the US market. The study finds drastically different levels of initial return throughout the studied period, starting with an average underpricing of 7% in the 1980s, increasing to an average of 15% in the period 1990-1998, before escalating to 65% in the years 1999-2000 prior to the dot-com bubble, and then returning to 12% in the following years. Such high variation can to some degree be explained by the following theories. The behavioral theories assume the presence of either irrational investors or issuers that are subject to behavioral biases (Ljungqvist, 2007).

### 2.2.6 Investor sentiment

The behavioral theories assume (at least some) irrational investors and are concerned on their effect on the stock prices in the market. This effect can be expected to be particularly visible in the market for IPOs as the companies doing an IPO, generally speaking, are young, have relatively scarce information, and no previous stock history (Ljungqvist, 2007). This is when some sentiment investors hold overly optimistic believes on an IPO company's future prospect which creates hot issues. A hot

issue is defined as a stock issue where the stock price increases from its initial offer price to a higher-than-average premium. This leads to hot issue markets where the average-first-month performance of the IPO is abnormally high compared to normal (Ibbotson & Jaffe, 1975). During these conditions, the objective for the issuing company is to capture as much of this surplus as possible. This is, however, not as straightforward as it sounds. If the market gets flooded with stock, the demand might be saturated, thus leading to the price decreasing.

Due to regulatory constraints, the issuing company is not able to price discriminate, withhold stock, and implement a strategy to avoid flooding the market. Instead, the optimal strategy observes the issuer allocate the stock to “regular” institutional investors. Following this, the regular investors can maintain a high stock price by controlling the supply (Ljungqvist, 2007). However, this involves a risk for the regular investor as the “hot issue” market can end without further notice, meaning that the regular investor will end up with unwanted IPO stock. To upset this, the regular investors want underpricing – even with the absence of asymmetric information – to make sure they have positive expected return. This is still in the interest of the issuing company as the stock price will be higher than the true value of the company due to the regular investors expectation of profit from trading the stock with sentiment investors, meaning that the issuing company benefits from this mechanism (Ljungqvist, 2007).

### 2.2.7 Information cascades

Information cascades can develop when different investors concerned with an IPO act sequentially (Welch, 1992). This opens up the possibility for some investors to act solely based on the actions of earlier investors without regard for their own information – thus, removing the winner’s curse explained in section 2.2.2. If the first investors have a positive approach to the IPO and invest heavily, the following investors consider this a sign that the initial investors have some information regarding the issuing company that they do not possess themselves and therefore follow their lead and invest too. In this case, a good initial sale to an IPO can create a snowball effect and result in high demand for the offered shares, and vice versa - if the IPO gets a bad start, it can likely turn into a failure.

This mechanism of cascades places high market power on early investors to demand underpricing in return for committing to the IPO, thus contributing with a positive signal to start a positive cascade (Ljungqvist, 2007). In this sense, cascades can be an explaining factor in IPO underpricing. However,

it is worth noting that cascades do not form when the pricing method of book-building is used by the underwriter (Ljungqvist, 2007). When building the book, the underwriter can more or less keep demand for the issue secret and furthermore increase the offer size if the demand turns out higher than first expected.

### 2.2.8 Irrational owners

The two previous sections have been concerned with the irrationality of investors, but behavioral theories also offer a view on the irrational owner behind an IPO. Loughran & Ritter (2002) find that behavioral biases among decision-makers of the issuing company might help explain IPO underpricing. This plays out when the pre-IPO owner does not get upset by leaving money on the table if they receive positive news regarding their wealth status simultaneously. The argument assumes that the pre-IPO owner holds on to some shares post-IPO that will increase in value as the initial return does the same, balancing out (or likely, more than that) the money left on the table (Ljungqvist, 2007). This implies some form of mental accounting for the pre-IPO owner where the good news of wealth gain overshadows the money that the company have missed out on due to underpricing.

The above theories assume that pre-IPO owners' initial beliefs on the valuation of the company is reflected in the mean of the price range reported in the issuing company's IPO registration statement. Then, the underwriter can engage in shrinking behavior to offer a better deal in terms of underpricing to their regular investors in line with the principal-agent problem covered in section 2.2.3. At the same time, pre-IPO owners will still be satisfied as they experience wealth gains due to the hot issue market despite the loss due to underpricing (Loughran & Ritter, 2002).

### 2.2.9 Institutional explanations

As was the case with behavioral explanations in the previous section, institutional explanations do not have a first-order degree in explaining IPO underpricing (Ljungqvist, 2007). Nevertheless, it is important to take a brief look at in order to paint the full picture and understand the complexity of the IPO underpricing phenomenon and why it occurs. Institutional explanations for IPO underpricing. can be reduced to three main reason; legal liabilities, price stabilization, and tax arguments

(Ljungqvist, 2007). However, it is worth noting that the explanations have some weaknesses when applied to the Nordics, which will be described alongside the explanations.

Firstly, the explanation of legal liabilities dates back to Louge (1973) and Ibbotson (1975) who both argue that companies willingly underprice in order to reduce the likelihood of a lawsuit following an IPO. A lawsuit following an IPO can be costly for the defendant, both in terms of direct costs such as legal fees and the managements time but also more indirectly on damages of the company's reputational capital. In line with this, studies in the US not only find that underpricing reduces the probability of a lawsuit, but also the probability of a ruling against the issuing company in case of a lawsuit, and further the amount of damages awarded in case of an adverse ruling decreases too (Hughes & Thakor, 1992). This explanation is mostly concerned with the US market and markets that are similar in terms of strict liability laws. The risk of being sued is not significant in Finland (Keloharju, 1993), Sweden (Rydqvist, 1994) and most likely not Denmark and Norway either, given these findings.

The second institutional explanation of price stabilization is based on the practice of price support (Ljungqvist, 2007). This is when the underwriter of the IPO purchases stocks in the after-market to stabilize the price of the stock by reducing supply in case of the price dropping after the initial offering. This will result in an elimination of the left-tail of the distribution of initial returns as the stabilizing bid from the underwriter will prevent the stocks of an IPO from being "overpriced" when they hit the after-market (Ruud, 1993). Further, using Ruud (1993), it can be argued that IPOs are not underpriced from a statistical point of view as Ruud (1993) estimates that the unobserved unconditional mean of the logged initial returns are very close to zero.

It is worth mentioning that price stabilization is very difficult to observe in the market why most academic work on the matter relies on indirect data evidence. Further, the studies mentioned throughout the literature are mainly focused on the US market and do not mention the Nordics which gives further cause for caution regarding this explanation - but also further motivates initial research with the Nordics as subject of investigation in regard to IPO underpricing.

The third, and last, institutional explanation on IPO underpricing is the tax argument. This explanation is based on the difference in taxation of income versus capital gains. When the taxation on capital



gains is lower compared to income, it is rational to compensate management and employees by allocation them shares in conjunction with an IPO (Ljungqvist, 2007). Due to the taxation laws in the US, senior management may have incentives to underprice their company's stocks when doing an IPO. However, the case is a bit different in Sweden as described by (Rydqvist, 1997). Prior to 1990, Swedish IPO underpricing averaged 41% but dropped to 8% following the tax authorities making underpricing-related income subject to the same tax percentage as income tax. The new adopted taxation is the same throughout the Nordic countries, why the tax argument should be treated with high caution.

### 2.2.10 Ownership and control explanations

The final category of explanations on IPO underpricing in this part of the literature review is ownership and control as an explaining factor (Ljungqvist, 2007). Similar to the behavioral and institutional explanations, ownership and control explanations are attributed less explanatory power. Thus, there will be placed less emphasis on this section. As a company goes public, one of the consequences is often separation of ownership and control. In some cases, this might even be one of the objectives. Separation of ownership and control can be important for a company as ownership might influence management incentives when it comes to operating the company and future investment, thus creating an agency problem (Jensen & Meckling, 1976). Instead of maximizing expected value for all shareholders, managers with ownership might have incentive to maximize their own private utility while sharing the costs and risks with all shareholders. In the following, two more or less contradicting rationalizations on this agency problem in relation to underpricing are presented.

First is the theory of underpricing as a mean to retain control by (Brennan & Franks, 1997). It argues that underpricing IPO shares give managers an opportunity to protect their private benefits by strategically allocating shares to avoid large stakes being placed to investors. The idea is that underpricing creates excess demand, thus allowing management to place shares with many different investors through quantity rationing and avoiding one investor owning a sizeable part of the shares. In avoiding a large investor, the management hopes to be able to carry out their non-value-seeking behavior without being prevented by extensive monitoring as this can be costly and therefore not nearly a task for smaller investors. Furthermore, a situation of no bigger shareholders also reduces the probability of a hostile takeover from the perspective of the incumbent management (Ljungqvist, 2007). The main benefit of underpricing in this case is the lack of outside monitoring.

On the contrary, (Stoughton & Zechner, 1998) argues that it may be value-creating for the issuing company to allocate shares to a large investor who is able to carry out monitoring on the management's actions. In this case, underpricing is used in order to make sure that a single investor is interested in taking on a large share of the issued stocks, even if investment-concerns such as diversification come into play. This underpricing might not even be an opportunity cost as it is likely that the issued stock would be traded at a lower price due to anticipation of agency costs in the market as a result of lack in monitoring (Ljungqvist, 2007).

The main difference in the two mentioned perspective is the perception of monitoring. In the argument by (Brennan & Franks, 1997) management want to avoid monitoring, thus underpricing to create a widespread demand, while (Stoughton & Zechner, 1998) argue that management underprices in order to attract one larger investor to carry out monitoring. This relates to the aforementioned work of Bancel & Mittoo (2009), see section 2.1.2, finding that external monitoring was being perceived differently in the US compared to Europe where European managers saw monitoring as a benefit of going public.

### 2.2.11 Sum Up

In the sections above, the phenomenon of IPO underpricing has been explored through a theoretical perspective. During this, four possible explanations on underpricing have been considered: asymmetric information, behavioral explanations, institutional explanations, and ownership and control related explanations. Asymmetric information was given the main focus as it is found to have first-order effect in explaining underpricing. Behavioral and institutional explanations have a lower degree of explanation but might be helpful in explaining variations over time and across countries. Finally, explanations regarding ownership and control seems to have minor relevance as they pose contradictory explanations to the underpricing phenomenon. Hence, the first three mentioned theories will have more relevance in answering the research question of this paper: *How does outside relation affect IPO underpricing in the Nordics?*

Furthermore, the above literature review has provided insight and empirical studies to understand the phenomenon of underpricing and further an important aspect: Even though underpricing might be intuitively undesirable, it can be an important tool in attracting (the right) investors. In the section

below, the paper will focus on the theoretical implications of financial sponsors as the final part of the literature review in order to lay out the theoretical framework for answering the research question.

## 2.3 Financial Sponsorship

When a company goes public, it welcomes the whole market to invest in the company. Whether the public desires to do so is affected by several factors, including trust in the company and its future performance. A potential factor in this situation is the pre-IPO ownership of the company and the role of any financial sponsors that may have been involved.

A financial sponsor is defined as a specific investor type who acquires equity in various companies with the main objective of realizing an economic profit in the future (Metrick & Yasuda, 2011). The term ‘private equity’ covers investments in private companies, typically with an ambition of upscaling the acquired companies in order to sell for a profit later on. This paper will distinguish between two types of private equity investors; venture capital funds and buyout funds (mostly described as private equity funds why this term will be applied throughout this thesis) (Sudarsanam, 2010).

The difference between these two types of investors is that private equity (PE) mainly focuses on buyout of more mature companies, while venture capital (VC) tends to focus more on early-stage investments (Sudarsanam, 2010). Besides this, the two types of financial sponsors are quite similar in terms of company structure and objective. Both private equity and venture capital funds are structured as limited liability partnerships, organized by general partners and funded by limited partners, such as institutional investors or very wealthy individuals. The limited partners provide the capital for investments and pay the general partners to generate a positive return on investments (Sudarsanam, 2010). Besides the structural similarities, both private equity and venture capital funds seek high returns on investments by acquiring companies and working actively with them by providing strategical advisory. Compared to other financial sponsors, both private equity and venture capital funds engage actively with the companies they invest in, attempting to influence decision-making in order to maximize returns on their investment (Metrick & Yasuda, 2011).

### 2.3.1 The Certification Hypothesis: Financial Sponsor and Underpricing

One of the purposes of this thesis is to investigate the relation between financial sponsors and underpricing on the Nordic market. As presented earlier, Booth & Smith (1986) put forward a certification hypothesis, stating that a certifier can reduce IPO underpricing by verifying the quality of the offering. This certifier is most commonly the underwriter (a factor this thesis also will explore) (Booth & Smith, 1986) or the auditors (Titman & Trueman, 1986), but other variable might also be potential certifiers of information, such as the management, board of directors, bank loans, or the presence of a financial sponsor (Megginson & Weiss, 1991) (Bergström, Nilsson, & Wahlberg, 2006). While some of these variables are quite difficult to assess objectively, information regarding any financial sponsors will be publicly available when the prospectus for the IPO is presented. Then, it will be possible for investors to identify the financial sponsor(s) and their pre-IPO activity within the firm.

The link between a certifier and their ability to reduce underpricing is through the importance of a certifier's reputational capital in the environment of repeated games, characterized by asymmetric information (Booth & Smith, 1986). Given that a certifier is able to generate returns based on its reputational capital, it will be unwilling to participate in, i.e., certifying, a low-quality issue as this could impair the certifier's ability to generate return in the future (Megginson & Weiss, 1991). Therefore, the nature of repeated games makes the certifier a more credible signal of the quality of the IPO as opposed to the issuing company itself which most likely will only conduct one single IPO in its lifespan, i.e., the issuing company only participates in one game (Beatty & Ritter, 1986).

In this regard, the financial sponsors engage in repeated games on the financial markets as they use their reputational capital to obtain funding for future investments and manage these funds to produce a positive return for their investors (Metrick & Yasuda, 2011). Given this, financial sponsors have a high degree of investment experience and competences alongside a record of accomplishment with acquiring, restructuring, improving, and selling companies. Therefore, investors can interpret the presence of a financial sponsor in the pre-IPO owner structure as a certification of the quality of the issue. Consequently, investors will have less incentive to produce information on the IPO which can be costly, and the uninformed investors will interpret the involvement of a financial sponsor as a sign of lower uncertainty ex-ante. In the end, the certifier helps reduce asymmetric information and, furthermore, also the winners curse by reducing underpricing as described in section 2.2.2.

For a third party to provide credible certification to external investors, three criteria must be fulfilled (Megginson & Weiss, 1991). First, the certifier must be reliant of some form of reputational capital which can suffer from providing false certification to external investors. Second, the potential financial gain or side transfer from providing false certification must be less than the present value of future returns attributable to the certifier's reputational capital. Last, the issuing company must bear an additional cost for the benefit of the reputational capital from the certifier as a mean to reduce asymmetric information. These three criteria ensure that external investors can trust the accuracy of the information provided by the certifier as the certifier will experience a negative impact on its reputational capital by providing false certification. All of the three criteria apply to financial sponsors (Megginson & Weiss, 1991).

Despite the described similarities, the role as certifier might also differ depending on the sponsor's engagement, resulting in one type of sponsor being less prone to underpricing than the other (Levis, 2011). The following sections will elaborate on these financial sponsors and their role as certifiers.

### 2.3.2 Private Equity Funds and Underpricing

Private equity funds concentrate on investing in more established companies that have untapped potential, providing opportunities for improvement and, consequently, profitability. These investment funds are generally closed-ended and operate for a period of 8-12 years during which investments must be executed, streamlined, and divested (Sudarsanam, 2010). To finance these acquisitions, significant amounts of debt are often utilized which incentivize a focus on financial discipline to generate cash flows for debt repayment (Jensen, 1986). Private equity firms typically secure a controlling stake in order to gain maximum influence over the company that is subject to investment. In the Nordic region, private equity firms typically invest in sectors such as industrials, consumer goods, and technology based on the number of deals made (Argentum, 2022). When divesting, private equity firms generally opt for either a secondary buyout, a sale to a company with strategic interest, or an IPO although this decision is highly dependent on market conditions and the state of the IPO market (hot/cold market) (Povay, 2007).

In order to gage the role of having a private equity fund as a financial sponsor, the thesis investigates previous literature on this matter. Both studies from Mogilevsky & Murgulov (2012), Levis (2011) and Bergström, Nilsson, & Wahlberg, (2006) find private equity funds to have a reducing effect on

IPO underpricing due to them having a certifying effect. Due to the nature of private equity firms, they are required to repeatedly perform successfully when acquiring and selling companies as this is their eligibility to retain investors, sustain their funding basis, and maintain their role in the financial market (Sudarsanam, 2010). As private equity firms often acquire a major stake position in their investment targets, compared to venture capital funds, this creates a greater incentive to engage more actively in optimizing the company in order to reduce IPO underpricing, thus increasing the financial returns of the investment. This increases the market's trust in the business model of the company since there is an expectation that the private equity fund has optimized all relevant aspects of the company on hand (Metrick & Yasuda, 2011).

Furthermore, in general, private equity funds are frequently involved in corporate acquisitions, sell-offs, and IPOs why it can be assumed that private equity funds have great experience and knowledge within this aspect of the financial markets (Wright & Robbie, 1998). Alongside this, private equity funds also frequently interact with investment banks/underwriters when taking companies public. This relation can have an influence on underpricing of IPO's. As the private equity funds and underwriters engage in repeated game, the underwriter is incentivized to reduce underpricing in order to cultivate the business relation and secure future underwriting tasks from the private equity fund (Mogilevsky & Murgolov, 2012).

The above paragraphs indicate the characteristics of private equity funds which enable them to command the role of a certifier. This makes private equity funds important to consider when studying the influence that financial sponsors may have on IPO underpricing. Furthermore, the previously referred to studies of Mogilevsky & Murgolov (2012) and Bergström, Nilsson, & Wahlberg (2006) claim that underpricing related to private equity sponsored IPOs has been neglected in academia relative to venture capital sponsored IPOs. Hence, there exist a gap in the literature that this thesis helps bridge by shedding light on *how outside relations affect IPO underpricing in the Nordic market*.

### 2.3.3 Venture Capital Funds and Underpricing

Venture capital funds have a more targeted focus on smaller and emerging companies compared to private equity funds. Although their investment cycle and lifespan are similar to that of private equity funds, venture capital funds investment strategies are significantly different. Typically, a venture capital fund specializes in a particular area which dictates its investment focus across three

dimensions: geography, industry, and stage (Da Rin & Hellmann, 2020). Venture capital funds generally take on minority stakes to secure a board seat and cooperate with the company subject to investment rather than carry out a complete restructuring. The investments are mainly targeting promising ideas and business plans and seek to scale them up to realize significant growth. This implies high level of risk associated with such investments compared to private equity funds, but it also presents a possibility of higher expected returns (Cochrane, 2005). In the Nordics, venture capital funds are mostly focused on industries such as information technology, healthcare and life science, fintech, and renewables (Argentum, 2022). Venture capital funds have the same exit options as private equity funds, but the higher level of risk implies that failure may be a more common outcome on investments. When considering an IPO most countries have different types of stock exchanges that may be more suitable for young and fast-growing firms due to less strict requirements. As a result, some venture capital sponsored IPOs may be better suited for these exchanges instead of the main market (Da Rin & Hellmann, 2020).

The role of venture capital sponsors came to attention with the studies of Barry, Muscarella, Peavy, & Vetsuypens (1990) and Megginson & Weiss (1991) who used the certification hypothesis to consider the venture capital funds' role as a certifier for IPOs. The studies found a conception between venture capital sponsored companies and reduced IPO underpricing compared to companies that were not sponsored by venture capital funds. In the first case, Barry, Muscarella, Peavy, & Vetsuypens (1990) explains this as a result of monitoring as the venture capital funds presence from an early-stage results in the improvement of the performance of the company. In the study carried out by Megginson & Weiss (1991), the venture capital fund acts as a certifier, confirming that the offer price reflects all relevant inside information regarding the issuing company. Furthermore, venture capital funds are highly reliant of their reputational capital in order to secure future fund raising. Thus, they mostly aim at taking high-quality companies public and might be willing to suffer the costs of underpricing in order to boost their reputational capital (Gompers, 1996).

Despite the research put forward so far, there is no unanimous agreement on venture capital funds' relation to certification and underpricing. An example of this is Lin & Smith (1998) who find a negative correlation between underpricing and venture capital sponsorship as a result of the venture capital funds' ambition of maintaining/gaining reputational capital to sustain their funding streams. Along those lines, Lee & Wahal (2004) find that venture capital funds are connected to increased

underpricing, although it is mostly pronounced for young venture capital funds to engage in underpricing in order to accumulate reputational capital which could lead to larger future cash flows into the venture capital fund. Furthermore, Elston & Yang (2010) do not find any significant links between venture capital sponsored IPOs and underpricing in Germany from 1996-2001. However, a critique of this could be that the venture capital industry was still fairly young at the time they conducted their study and that a lack of repeated games had not built sufficient reputational capital yet. This critique could even apply to most of the literature why it merits the studies carried out in this thesis as the market can be said to be more developed, and thus more mature for academic investigation in the current century.

#### 2.3.4 Non-sponsor types

Most studies on IPO underpricing in relation to pre-IPO ownership distinguish between financial sponsors - which is the two mentioned, private equity funds and venture capital funds - in contrast to a non-sponsored control group (Metrick & Yasuda, 2011). This will also be the approach in this thesis. However, it is worth noting that there might be some differences in the influence on underpricing which the non-sponsor pre-IPO ownership conveys, depending on the ownership type. These different types of non-sponsor ownerships include, but is not limited to, corporations, founders, governments, and industrial foundations. While these different type of non-sponsor ownerships and their effect on underpricing is somewhat scarcely examined in the literature, some short point on initial indications will be presented in order to provide a nuanced picture.

First, corporations may occasionally divest subsidiaries or business units by taking them public (Mair & Moschieri, 2011). As equity carve-outs can be defined as an IPO, the principals of underpricing do similarly apply. Here, it is found that underpricing of equity carve-outs are generally lower than the market average (Prezas, Tarimcilar, & Vasudevan, 2000). This is a product of available financial and operating information through the parent, and further, the possibility to estimate a value of the carve-out based on the market value of the parent. All this indicates that a corporate pre-IPO owner reduces information asymmetry, thus, reducing underpricing as argued in section 2.2.2.

Second, many companies going public are owned by the entrepreneurial founder(s) who might also have active roles in the daily operations as managers (Burton, Chahine, & Filatotchev, 2009). In order to maximize their personal wealth, founder owners will aim to reduce IPO underpricing by seeking



to build trust with the inclusion of experienced professionals on the board and/or in the management structure. However, this practice is found to have limited effects on reducing underpricing (Chahine, Filatotchev, & Zahra, 2011). As such, it seems that founder ownership does not have a reducing effect on IPO underpricing.

Third, in the Nordics, government-owned enterprises have a history of active ownership, particularly in response to market inefficiencies (Thomsen, 2014). Although privatization of several companies has occurred since the early 1990s, including IPOs as an exit strategy which is common in most countries, government-ownership has been found to have a positive effect on underpricing in China which can indicate less trust in government-owned companies (Xu & Zhao, 2014). However, the Nordics have higher levels of governmental trust, potentially leading to a different perception of government-owned IPOs (Anderasson, 2017).

Finally, the Nordic countries, especially Denmark and Sweden, are known for the influential role played by institutional foundations in the ownership of prominent corporations such as the IKEA Foundation, Novo Nordisk Fonden, and Carlsbergfondet. Institutional foundations are considered sovereign legal entities and operate according to their philanthropic agenda without any owners or members to answer to (Thomsen & Conyon, 2019). Companies owned by institutional foundations are often characterized by their long-term perspectives, high investments in research and development, and relatively low financial leverage. After going public, the foundations tend to maintain a majority stake, resulting in reduced short-termism both inside the company and on financial markets (Thomsen, Poulsen, Børsting, & Kuhn, 2018). Given the lack of industrial foundations outside the Nordic market, the literature on this owner type does not seem to be sufficiently researched to draw conclusions on its effect on underpricing.

## 2.4 Sum-up of theories

In order to sum up the literature review, table 1 provides a illustrative overview of the most important theories that form the basis for formulating hypothesis in the following sections of the thesis. The table contains the authors of the chosen theories in the previous literature, the name/distinction of the theories, the results found in the literature, and the markets where the theories were tested. The table is merely meant to provide a brief sum-up based on the previous sections and shows theories that will

be continually applied. It does not provide adequate explanations regarding the mentioned theories and the ideas behind them as all of the theories have been described in detail in the previous sections.

<b>Authors</b>	<b>Addressed Theory</b>	<b>Conclusion/Results</b>	<b>Market tested in</b>
Benveniste & Spindt (1989)	Information revelation	The pricing method book-building reduces IPO underpricing	U.S. market
Carter & Manaster (1990) Booth & Smith (1986)	Certification hypothesis (underwriter)	A prestigious underwriter will reduce IPO underpricing	U.S. market
Ibbotson & Jaffe (1975)	Investor sentiment	IPO issues are more underpriced in “hot” markets relative to “cold” markets	U.S. market
Megginson & Weiss (1991) Bergström, Nillson & Wahlberg (2006)	Certification hypothesis (financial sponsor)	Sponsor-backed IPOs are less underpriced compared to non- sponsor-backed IPOs	U.S. market and European market (London and Paris, respectively)
Mogilevsky & Murgolov (2012) Levis (2011)	PE-backed IPOs compared to VC-backed IPOs	PE-backed IPOs experience less underpricing relative to VC-backed IPOs	U.S market and the UK market, respectively

Table 1: Sum-up table of the main theories from the literature review which will be tested in the thesis.

### 3. Hypotheses

The above sections have outlined the phenomenon of IPO underpricing, the many variables that influence the phenomenon, and its changing nature across time and geography. Therefore, this thesis aims to provide relevant insights into the contemporary Nordic IPO market, as such, trying to bridge a gap in the existing literature. This is deemed important and interesting as the Nordic IPO market is

relatively small compared to other, more heavily researched markets, e.g., the U.S. or UK markets. The main aim of the thesis is to investigate the impact of outside relations on underpricing, an even further understudied part of the existing literature. Furthermore, an assumption of institutional homogeneity across the Nordic countries is central for the focus of this thesis as this is the reason for aggregating data from all Nordic countries instead of simply researching a single country which would yield too few observations, increasing the likelihood of insignificant results due to low statistical power. The assumption of institutional homogeneity will be revisited in section 6.4.

The following section will present the hypotheses subject to testing in the remainder of this thesis. The formed hypotheses are based on the theories covered in the sections above. Furthermore, all hypotheses are tested with data from one dataset which will be described in the subsequent section 4.

### 3.1 Hypothesis 1 – IPO Underpricing on The Nordic Market

To start of the analysis, the first hypothesis lays the foundation for the rest of the hypotheses that will be tested. The first hypothesis investigates whether there is evidence of IPO underpricing in the Nordic IPO listings. If underpricing cannot be shown in the data with significant statistical power, it would severely weaken the further analysis and hypotheses testing as this is the core assumption of the analysis.

*H1: IPO underpricing is present in the Nordic market from 2003 to 2022.*

### 3.2 Hypothesis 2 – Financial Sponsor

The second hypothesis is related to financial sponsors and the effect sponsors have on IPO underpricing. The hypothesis takes offset in Rock's (1986) theorem on the winner's curse where dynamics of asymmetric information result in informed investors only bidding for high-quality new issues whereas the uninformed investors bid on all issues without discrimination. This leads to negative returns for the uninformed investors why underpricing is needed to ensure their participation on the market (Ljungqvist, 2007). This relation between underpricing and lack of information is amplified by the high the uncertainty regarding the issuing company. However, as argued, the underpricing, albeit being a hidden cost, may exceed all the direct cost of going public why rational

issuing companies would seek to reduce underpricing if the marginal costs are lower than the benefit (Brealey, Myers, & Allen, 2020).

A mean to reduce underpricing is by engaging with a certifier which could be a prestigious underwriter (as will be elaborated later) or a financial sponsor (Booth & Smith, 1986). The core idea of this certifying agent is that the agent has valuable reputational capital which can generate future income, but it can also diminish and be difficult to reobtain why the certifier will refrain from certifying low-quality issues cf. section 2.2.2. The presence of a certifier will reduce uncertainty as this piece of information ensures investors of the quality of the issue which reduces the need for underpricing. Further, it also makes informed investors less incentivized to produce information which is costly and will need underpricing to compensate these costs. All this results in alleviating the winner's curse and, thus, reducing underpricing (Beatty & Ritter, 1986).

When considering financial sponsors, their power of certification lies in their engagement in the issuing company to improve operations and financial performance prior to going public. Further, financial sponsors are part of the repeated games on the financial market by acquiring, improving, and selling companies why they have reputational capital at stake when interacting with other actors on the financial market (Metrick & Yasuda, 2011). This leads to the following hypothesis:

*H2: IPOs backed by a financial sponsor experience reduced underpricing compared to non – sponsored IPOs.*

### 3.3 Hypothesis 3 – Private Equity vs Venture Capital

Following the hypothesis that financial sponsors reduce underpricing, the third hypothesis distinguishes between the two sponsor types; private equity funds and venture capital funds Sudarsanam (2010). While investigating the impact of financial sponsors on reducing underpricing, the literature causes basis for differences in the degree of impact from private equity and venture capital sponsors, respectively (Mogilevsky & Murgolov, 2012) (Levis, 2011). This can be hypothesized based on their different investment objectives and level of engagement.

As reviewed previously, private equity funds usually acquire a controlling stake in their investment subjects in order to maximize their influence in the acquired company. Through this, the private

equity fund actively engages in optimizing the issuing company prior to going public and, as a result of this, private equity funds are perceived as having great know-how and experience in this field of business (Wright & Robbie, 1998). Furthermore, private equity funds tend to focus on proven business models and more traditional industries, such as industrials and consumer goods (Argentum, 2022). The focus on stable industries is also influenced by private equity funds often-opted choice of debt financing, why less risk is desired. This minimization of risk should in turn also be a factor in underpricing, or rather the lack thereof.

On the other hand, venture capital funds mainly provide certification on the quality of an issue through the monitoring they perform throughout their ownership prior to going public and the assurance that all relevant information has been disclosed (Barry, Muscarella, Peavy III, & Vetsuypens, 1990). Venture capital funds tend to focus on younger investments with high growth potential, but this also implies greater risks relative to private equity investment (Cochrane, 2005). Thus, following the argument of Beatty & Ritter (1986), the higher ex-ante uncertainty should – all else equal – result in higher underpricing as compensation for the risk. This speaks for PE-backed IPOs being less underpriced than VC-backed IPOs. Further, Lee & Wahal's (2004) argument on grandstanding among young venture capital funds could further enhance this underpricing gap. Hence, the following hypothesis is put forward for testing:

*H3: Private equity sponsored IPOs experience less underpricing compared to venture capital sponsored IPOs.*

### 3.4 Hypothesis 4 – The Underwriter

After exploring financial sponsors' influence on underpricing, the fourth hypothesis stays on the topic of outside relations and investigates the relation between underwriter and underpricing. This hypothesis follows up on the principles of the certification hypothesis from Booth & Smith (1986) concerning the reduction in information asymmetries and thus alleviating the winner's curse by Rock (1986). Besides the financial sponsors, a prestigious underwriter can also act as a certifier for a new issue since the underwriter likewise will have reputational capital at stake when underwriting a new issue. This idea is presented in the study of Carter & Manaster (1990) who find that a prestigious underwriter can act as a certifier for the quality of the issue as the underwriter will only underwrite low risk offerings. Because the underwriter is a part of the repeated games on the financial market,

the underwriter risks being punished in terms of its reputational capital by underwriting a low-quality issue. This follows the theory of Beatty & Ritter (1986) as the uncertainty of the value of the issuing company in the aftermarket drops, so does underpricing.

Based on the above-mentioned literature and findings to further test the effect of outside relations on IPO underpricing on the Nordic market, the following is hypothesized:

*H4: A prestigious underwriter reduces the degree of IPO underpricing to a greater extent than non – prestigious underwriters.*

### 3.5 Hypothesis 5 – Pricing Method

In order to nuance the analysis, the fifth hypothesis concerns the relation between the pricing method that is used for the IPO and underpricing. The fourth hypothesis sets out to investigate the underwriter's effect on underpricing in relation to the underwriter's reputation. However, the fifth hypothesis aims to provide some insight into the pricing method to contribute to the later discussion regarding the underwriter's role in reducing underpricing.

The fifth hypothesis concerns book building and information revelation and their effect on IPO underpricing. As argued by Beneveniste & Spindt (1989), the pricing method of book building reduces IPO underpricing. This is the case because the underwriter extracts information from the informed investors during the book building process as the investors bid on the offering prematurely. These bids are a form of information revelation from the investors as they show interest in the offer, why the underwriter can calculate the most suitable price for the offer based on these bids. Furthermore, it is worth noting that the pricing method of book building also gives the underwriter control over the allocation of the shares (Loughran & Ritter, 2002). Thus, the investors have incentive to be truthful in their revelation of information in order to ensure allocation of issues in the future as investors and underwriters both take part in repeated games.

Thus, the literature shows that book building reduces underpricing why this is tested on the Nordic market in order to provide perspective on the role of the underwriter. Hence, the fifth hypothesis put forward is the following:

*H5: IPOs using the book building method are less underpriced compared to IPOs using the fixed price method.*

### 3.6 Hypothesis 6 – Market Sentiment

The sixth and last hypothesis of the thesis focuses on the IPO market in general which fluctuates significantly over time in terms of the number of new issues. Following the research of Ibbotson & Jaffe (1975), these periods in time with many new issues and high market sentiment is referred to as ‘hot issue markets’ and display more underpricing compared to times of lower market sentiment labeled as ‘cold issue markets’. The idea is that during times of high investor sentiments, investors are prone to behavioral biases such as too high optimism and overconfidence which can be exploited due to the uncertainty of pre-IPO valuations.

As overflowing the market might lead to the prices dropping, the issues need to get around this problem. That is done by allocating all the new shares to rational regular investors who can then gradually supply the market by reselling small chunks of shares at a time to keep the price high and, thus, capitalize on investors’ higher value perception of the issuing company. However, in turn for the risk that rational investors take on that the market might suddenly turn cold and that they will be left with unwanted shares, they are compensated with higher levels of underpricing than usually (Ljungqvist, Nanda, & Singh, 2006). Based on this, the last hypothesis put forward is the following:

*H6: IPO underpricing is greater in hot issue markets with high investor sentiment compared to IPO underpricing in cold issue markets.*

All of the six hypotheses put forward will be tested on the Nordic market as the thesis focuses its attention to this market. Furthermore, the time frame will be the 20-year period from 2003-2022, meaning that the dataset is the same for testing all the hypotheses. In the following section, the collection of the dataset and considerations concerning the collection of this is outlined.

## 4. Data

This section describes the dataset that is used for the analysis of IPO underpricing in the Nordics, and how it was collected and processed to make it eligible for this analysis. Furthermore, it describes the

chosen delimitations and explains the reasoning behind the included data points and excluded data points. Lastly, this section also covers how the dataset is applied to test the hypotheses put forward.

#### 4.1 Data collection and considerations

The analysis in this thesis is based on linear regression models as a means to test the hypotheses described in section 3. To do so, a unique dataset has been constructed as there were no available datasets containing all the necessary variables to carry out tests of hypotheses, in particular the data on pre-IPO ownership which is needed to investigate theories regarding financial sponsorship. In the following paragraphs, the data collection process is outlined in 3 steps: First, how the raw data on IPOs in the Nordics between 2003-2022 is collected and why. Second, how non-relevant observations are excluded and the reasons hereof. And lastly, how collection of supplementing data and cross-checking is carried out manually in order to complete the unique dataset. The raw data is collected from Bloomberg, and then further supplemented and cross-checked with data from Refinitiv Eikon and S&P Capital IQ databases.

First, the analysis is based on IPO data from the Nordic countries; Denmark, Finland, Norway and Sweden, from the period of January 1st, 2003, to December 31st, 2022, thus, a 20-year period. These markets are chosen as the majority of the existing literature focuses on the U.S. market and to some lesser extend the UK or Eurozone. The research for this thesis has revealed that only a few studies have been conducted on IPO underpricing in Scandinavia (Denmark, Norway, and Sweden) but none with the same focus on outside relations as this thesis. Therefore, the aim of this thesis is to gain insight into whether existing theories and previous findings from other markets also apply to the Nordic market, thus contributing to the literature by bridging a knowledge gap.

Furthermore, it is worth noting that Iceland has been excluded from the focus of this thesis as the IPO market on Iceland is nearly non-existing with very few observations in the initial dataset. Further, the manual collection of supplementary data for Icelandic IPOs proved to be very difficult and lacking why Iceland was excluded.

The chosen time frame of the data was the 20-year interval for two primary reasons. Firstly, it proved difficult to find continuous data without significant gaps and too many missing datapoints when tapping into Nordic IPO data from the previous century on Bloomberg's terminals. Going further back



in time could have led to a more unbalanced database with very few observations in the beginning of the time frame compared to later in the time frame. Secondly, companies listed more than 20 years ago likely had different structures and characteristics than modern companies. The same argument can be applied to the market participants who now-a-days have both easier access and more information due to the popularization and spread of the communication technology compared to the previous century which could also affect underpricing. Overall, the 20-year timeframe is considered to cover a relatively homogenous set of IPOs, suited for on average regression modelling.

It is also worth noting that the chosen time frame excludes the “dot com bubble” which saw great IPO underpricing as referred to in section 2.2.5. However, the time frame does include the financial crisis of 2007-2008. Thus, this 20-year time frame was chosen to ensure more valid and reliable results of the analysis and contributing by providing updated findings to the existing literature as most previous studies naturally focus on an older timeframe. The mentioned efforts yielded 1,049 observations in the collected dataset.

Second, the dataset is cleaned in order to exclude observations that was deemed irrelevant or outliers to the analysis. Seeking to collect a robust and comparable dataset, it was important to ensure that the dataset only contained IPOs of similar characteristics. Thus, IPOs from other exchanges than the countries respective main markets – being Nasdaq Copenhagen, Nasdaq Helsinki, Oslo Stock Exchange, and Nasdaq Stockholm - were excluded. As such, offerings listed on growth exchanges, such as Nasdaq First North or Euronext Growth, were excluded due to lower entry barriers on this type of exchange (Euronext, 2023). Both the regulatory and capital requirements on the growth exchanges tends to be less strict why companies listed there are likely to be less liquid and more immature which can affect the pricing consistency severely. Therefore, it might create difficulties for investors and underwriters to value the companies, resulting in significantly higher price fluctuations, potentially causing biased estimates. Hence, these observations are dropped.

Furthermore, the dataset is cleaned for listings that did not match the definition of being an initial public offering. This includes spin-offs or split-offs as, in these cases, the shares are not sold on the market - like an equity carve-out, rather, the shares are simply distributed to the existing shareholders (Picardo, 2021). Further, transfer listings have also been excluded from the dataset as these does not involve the primary market as is the case for the rest of the data sample. Lastly, corporations with

registration in other countries than the four Nordic countries were also excluded. These efforts brought the dataset down to 401 observations.

The last step of the data collection process is supplementing the dataset with information regarding pre-IPO ownership and lead underwriter being the main focus. These supplementing datapoints are partially obtained through Refinitiv Eikon and then merged with the above-described data from Bloomberg. In a further attempt to ensure as high data quality as possible, the information regarding pre-IPO ownership and lead underwriter is manually cross-referenced using S&P Capital IQ to find individual information on every single IPO in order to fill out missing datapoints and check for consistency with the rest of the data. In some cases, information was not available on Capital IQ. In these instances, further scrutiny was needed in order to research available prospectuses, press releases, or reliable news articles. For 75 IPOs, no data was available, neither through the used databases or from the manual investigations why these observations were excluded too. This resulted in a final dataset of 322 IPO conducted on the Nordic markets in the period from 2003-2022.

To sum up, from a methodological point of view, it can be argued that there is some form of selection bias in the data. Due to the nature of the manual collection process of the data, it cannot be rejected that there is some systematics in the observations, which have been discarded from the dataset due to lack of information regarding pre-IPO ownership or underwriter. Such systematics would cause biased estimates in the regression results in the following analysis. However, due to the lack of one database containing all the needed information to carry out this study, the manual scrutinizing of various data sources to build the dataset is deemed the best feasible method despite the highlighted possibility of selection bias. This has naturally been a consideration during the collection process why the above paragraphs have drawn much attention to the exclusion process of observations in order to increase replicability and transparency of the data collection and the delimitations. A simplified visualization of this process is shown in figure 1 below.

The data collection process resulted in a dataset of 322 observations, including all the variables of interest, for carrying out tests to answer the research question of this thesis. The number of observations is considered satisfying for further analysis, especially since it should be held up against the limited size of the Nordic countries.

In the following section, the use of the collected data to test the six hypotheses put forward is described. The same dataset is used to test all the hypotheses, but the variables will naturally vary depending on the hypothesis.

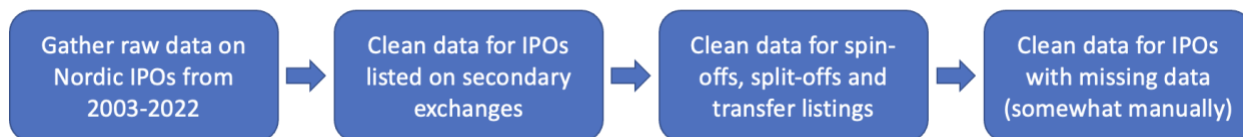


Figure 1: The steps of data collection.

## 4.2 Hypothesis 1 – IPO Underpricing on The Nordic Market

To test hypothesis 1 – that underpricing is present on the Nordic market – the offer price of the IPO and the closing price of the first trading day is used to calculate the first day initial return. The calculation of the initial return will be elaborated in section 5.3.1 regarding methodology and analysis of hypothesis 1. The data on both the offer price and the closing price of the first trading day was collected on Bloomberg and further cross-checked with data collected from Refinitiv Eikon in order to ensure reliability of the gathered prices. Furthermore, this cross-checking also fills out gaps of missing data. If gaps could not be filled with supplementing data collection, the observations were deleted to obtain a complete dataset.

## 4.3 Hypothesis 2 – Financial Sponsor

To test hypothesis 2 – that financial sponsors reduce IPO underpricing – the information on pre-IPO ownership is needed. This data was gathered from multiple sources and largely by manual efforts. Firstly, the data output from Bloomberg contained some information regarding pre-IPO ownership, but not sufficient, why it was supplemented by additional data from Refinitiv Eikon on pre-IPO ownership as well. The data output from these two sources was merged into one dataset in order to create a unique database for testing. Furthermore, ownership information on each individual observation was manually cross-checked, mainly using Capital IQ but also press releases, prospectuses, and news articles in order to ensure as high information credibility as possible.

## 4.4 Hypothesis 3 – Private Equity vs. Venture Capital

To test hypothesis 3 – that private equity reduces underpricing more as a financial sponsor compared to venture capital funds – the testing builds on the same data gathered for hypothesis 2. When

collection the information on pre-IPO ownership, it is necessary to distinguish between private equity funds or venture capital funds as financial sponsor in order to gather the needed data to test hypothesis 3.

#### 4.5 Hypothesis 4 – The Underwriter

To test hypothesis 4 – that a prestigious underwriter reduces underpricing – many of the same steps as for the previous two hypotheses were taken. The data output from Bloomberg did not contain information on lead underwriter but the data from Refinitiv Eikon did, and it was merged into the database as the information on pre-IPO ownership. Following this step, the information on lead underwriter was also manually cross-checked on Capital IQ and in prospectuses to ensure reliability and to fill out gaps in the observations. After this step, any observations without information regarding underwriter was removed. The distinction between prestigious underwriters and other underwriters will be elaborated in section 5.6.1 regarding the methodology and analysis of hypothesis 4.

#### 4.6 Hypothesis 5 – Pricing Method

To test hypothesis 5 – that the book building method reduces underpricing compared to fixed price method – information regarding the pricing method is needed. In Bloomberg, it was possible to extract information on when the book building process began. If such a date was given, it is assumed that the pricing method of book building was used in these cases of new issues. If the data output showed no information regarding a start date for the book building process, it is assumed that the book building method was not used. As the two main pricing methods of IPO's are book building and fixed prices, it implies that the pricing method for observations without a book building start date is fixed prices (Shengfeng, 2011). This assumption resulted in 245 observations where book building was used as the pricing method, corresponding to 75% of the observations which seems reasonable in relation to Abrahamson, Jenkinson & Jones' (2011) finding that book building has become the most used pricing method in Europe.

#### 4.7 Hypothesis 6 – Market Sentiment

To test the final hypothesis 6 – that underpricing is greater in hot issue market – it is necessary to define the periods in which the issue market is hot. To do so, the net volume of IPOs (from the gathered data) is used as a proxy for the sentiment on the IPO market as opposed to using the general

return of the stock market like Ibbotson & Jaffe (1975). How this proxy is calculated will be elaborated on in section 5.8.1 regarding the methodology and analysis of hypothesis 6.

## 5. Methodology, Analysis and Empirical Results

The following section starts off with the regression methodology which will be applied throughout the analysis, followed up by a review of the dataset using descriptive statistic to provide an extended understanding of the dataset used for testing. Then, each of the six hypotheses presented in section 3 are tested individually, starting with the methodology used for testing the specific hypothesis followed up by the analysis of the results. This approach is applied continuously to each of the hypotheses to provide a comprehensive overview for each individual hypothesis. The assumptions behind the regressions used for hypothesis testing will be tested at the end of the analysis with the aim of providing a better overview of the results and their interpretations.

### 5.1 Regression Methodology

A simple linear regression is a statistical model used to explain the relation between two variables based on a distribution of observations by a fitted straight line. In a simple linear regression model the expected value of the dependent value (Y) is predicted using the independent variable (X), thus, the value Y-variable is dependent of the value of the x-variable. This relation can also be described as an Ordinary Least Squares (OLS) model, as the model seeks to minimize the distance from the original observation to the predicted value by fitting a straight line as close to the given observations as possible, i.e. minimizing the residual sum of squares. This relation can be described as:

$$Y = \beta_0 + \beta_1 * X_1 + \epsilon$$

Where:

$\beta_0$  is the intercept

$\beta_1$  is the slope

$\epsilon$  is an error term

Following this, in a multiple linear regression the formula is extended to the following:

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \dots + \beta_i * X_i + \epsilon$$

Where the added betas are the coefficient for each of the specific independent variables influencing the dependent variable.

The OLS regression method will be used in the thesis' analysis as it is a commonly used model for estimating the relation between a dependent and independent variable (Hastie, Tibshirani, & Friedman, 2009). Furthermore, the OLS model is desirable to use due to the dependent and independent variables of this study in relation to the Gauss-Markow theorem and the best linear unbiased estimator (BLUE). Firstly, this study relies on binary variables as the independent variables which ensures linearity. Secondly, the nature of the dependent variable, being the first day return of an IPO, excludes the possibility of reverse causality – as the first day return cannot be a precursor to going public. Hence, the data structure ensures that the independent variables cause the change in the dependent variable and not the other way around. Questions regarding whether the OLS model is unbiased determinate by the underlying assumptions of the OLS model.

The OLS regression model is based on some general assumptions on the data input for the model. This thesis uses four common assumptions on linear regression to test the robustness of the regression (Hastie, Tibshirani, & Friedman, 2009) (Gauss-Markow theorem). These four assumptions are:

- Linearity
- Normality
- Independence
- Homoscedasticity

These four assumptions will be elaborated and tested in section 5.9.

## 5.2 Descriptive Statistics

The table below shows the summary statistics of the dataset used to test IPOs underpricing in the Nordics.

	First-day return
Observations (IPOs)	322
Mean	8.7112%
Standard deviation	17.94%
Minimum	-27.2%
Maximum	116.86%

Table 2: Descriptive statistics of the dataset.

As illustrated in table 2, the dataset of 322 observations displays mean for first day returns of 8.7% with a standard deviation of 17.9%. This is the first sign of underpricing of the observations in the dataset as the first-day return explains the difference between the offer price of the new issue when issued and the closing price on the same day. This is elaborated on in the section regarding the first hypothesis. Furthermore, table 2 shows a minimum first-day return of negative 27.2% while the maximum first-day return in the dataset is 116.9%. This could be a sign of a slightly negatively skewed distribution regarding the first-day returns.

	Denmark	Finland	Norway	Sweden	Total
Observations	24	33	140	125	322
Mean first-day return	12.08%	4.68%	5.91%	12.27%	8.71%
Standard deviation	24.88%	6.30%	16.68%	19.18%	17.94%

Table 3: Comparison of the Nordic countries in term of representation in the dataset and mean.

The table above shows the descriptive statistics of the four countries represented in the dataset which is examined in the analysis. Denmark is the country with fewest observations, shortly followed by Finland with 24 and 33 IPOs, respectively, in the given time frame. Contrary, Norway and Sweden have been the most active IPO markets in the period with 140 and 125 IPOs, respectively. This is somewhat expected as Norway and Sweden represent the biggest IPO market in the Nordics (Wass & Ahmad, 2021). Besides the big variation in observations per county, there is also a noticeable variation in the mean for the first day returns per county with Sweden yielding the highest mean return (12.27%) shortly followed by Denmark. There is a difference of 7.59 percentage points between the mean return of Sweden and Norway, showing the lowest mean return at 4.68%. It is interesting that the countries that are relatively close in terms of number of observations are far from each other in terms of mean returns. The same applies to Denmark and Finland who are quite similar in terms of

number observations but not mean return. The differences in observations and mean return the countries is further illustrated in figure 2 below.

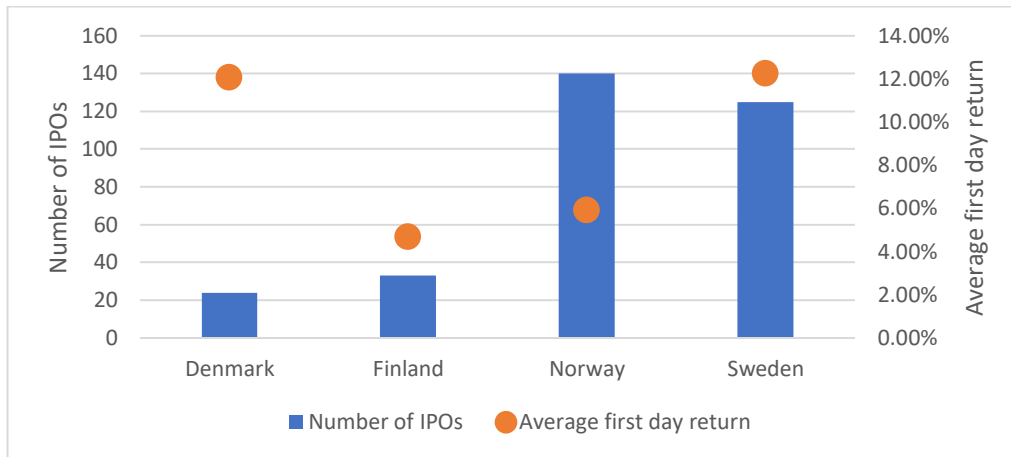


Figure 2: Number of IPOs and Average first day return across countries.

As outlined by table 3, figure 2 shows the differences in number of IPOs and the average first day return varies from country to country, but also as the number of observations changes. However, it is worth noting that all countries have positive first day returns, meaning that underpricing is present in all the countries in the data sample, despite the variance. Thus, providing initial support for the expectation that underpricing exists in the Nordics.

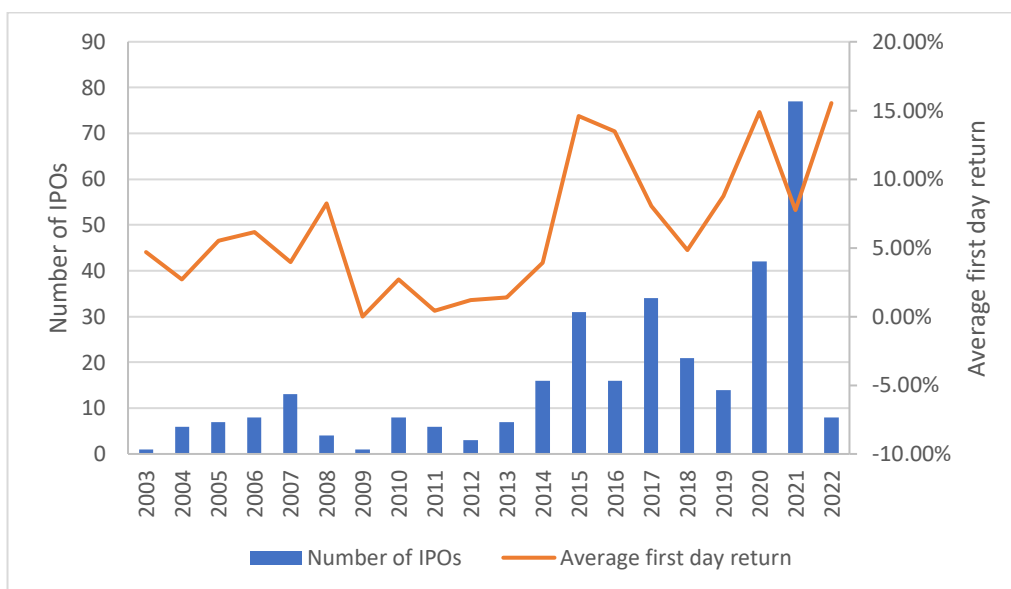


Figure 3: The number of IPOs and the average first day return over time.

Figure 3 shows the number of IPOs and the corresponding average first day returns for each year of the data's time frame. None of the averages are negative. However, it is zero in 2009 which is affected by that year having few observations (only one observation). This corresponds well with 2009 being



in one of the years following the financial crisis of 2008 why it is unsurprising that the market was less active in that time period. Furthermore, it is noticeable that there has been a recent surge in the number of IPOs with 2020 and 2021 being the two years with the highest number of IPOs before dropping of in 2022.

As the main focus of this thesis is the effect of outside relations on IPO underpricing, the relevant variables in this regard are also outlined in this section on descriptive statistics to create a preliminary understanding of the data before elaborating it further when testing the hypotheses. This is mainly related to data on financial sponsors and underwriters.

	PE	VC	PE+VC	No sponsor	Total
Observations	74	30	104	218	322
Mean first-day return	8.69%	4.51%	7.48%	9.30%	8.71%
Standard deviation	11.31%	10.20%	11.11%	20.40%	17.94%

Table 4: Comparison of the different sponsors in the dataset.

As table 4 shows, 74 of the IPOs in the dataset were sponsored by a private equity fund prior to going public, while 30 IPOs were sponsored by a venture capital fund. This totals to a number of 104 IPOs who had a financial sponsor at the time of going public while 218 IPO observations fall into the non-sponsored category. At a first glance, the mean for first-day return appears to be slightly lower for the sponsored group compared to the non-sponsored group. This, and potential causes, is further investigated in later sections.

Furthermore, a total of 49 different underwriters have underwritten the 322 IPOs in the dataset. These underwriters cannot be said to be evenly distributed with several underwriters only underwriting one IPO in the data sample. The bulk of the IPOs are underwritten by the same group of underwriters with one underwriter accounting for 81 new issues. Thus, it would not be suitable to provide the descriptive statistics on every single underwriter. Instead, the ranking and description of the underwriters is elaborated alongside the testing of the fourth hypothesis (that a prestigious underwriter reduces underpricing).

### 5.3 IPO Underpricing on the Nordic Market

The first hypothesis aims to prove whether IPO underpricing exist on the Nordic market or not, and thus lays the foundation for the further analysis. This section will solely establish underpricing (or absence thereof) in the dataset and not seek to provide any explanations on why/why not. Should underpricing exist, it gives reason to further test which variables have an impact on this and how it can be explained. In the case that underpricing is not found in the Nordic market, the analysis will focus on testing if any of the variables mentioned in hypothesis 2 through 6 can cause underpricing.

### 5.3.1 Methodology for testing Hypothesis 1

The first hypothesis, that IPO underpricing is present on the Nordic market in the test period of 2003-2022, is tested by using the first day returns of the observations. Some studies have tested the very same thing but adjusted the first day returns for the average market returns to get a market-adjusted return (Hogan et al, 2001). However, these adjustments have been shown to have a very limited effect due the differences of IPO initial returns and the market returns why these market-adjusted returns have very low impact (Ljungqvist, 2007). Given this, such adjustments are deemed unnecessary and perhaps cause of overcomplication of interpretations of results why this method is not chosen.

To test hypothesis 1, a one-sided t-test is performed. The aim of this test is to determine that the first day returns of IPOs in the Nordics from 2003-2022 are significantly above zero which would confirm the hypothesis. The first day return of an IPO is defined as follows:

$$FR_i = \frac{CP_{i,t} - OP_i}{-OP_i}$$

Where:

$FR_i$  is the first day return of asset  $i$ .

$CP_{i,t}$  is the first day closing price of asset  $i$  on the day of the IPO.

$OP_i$  is the offer price of the asset when going public.

Following this mathematical definition, any price movements after the first day will not have any influence for underpricing and, thus, not be considered. Hence, the analysis does not provide any insight into the long-term performance of the issuing companies, only the first day, and the underpricing detected here.

This leads to the formulation of null hypothesis in order to test the first hypothesis. The null hypothesis states that there is no difference between the  $FR_i$  (first day return) of the observed IPO and zero. Hence, the alternative hypothesis states that the mean of the first-day returns is above zero. This can be put as follows:

$$H_0 = FR_i = 0 \quad \text{or} \quad H_1 = FR_i > 0$$

This hypothesis will be tested using a t-test which follows that:

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

Where:

$\bar{X}$  is the mean of the sample. In this case, the mean of the first day return for the observed IPOs.

$\mu$  is the population mean.

$s$  is the standard deviation.

$n$  is the number of observations.

### 5.3.2 Analysis and Results for Hypothesis 1

To perform the t-test mentioned above, it is assumed that the first day returns follow a normal distribution. In the histogram below, the distribution of the first day returns is shown fitted against a normal distribution in order to conclude whether this assumption is met or not.

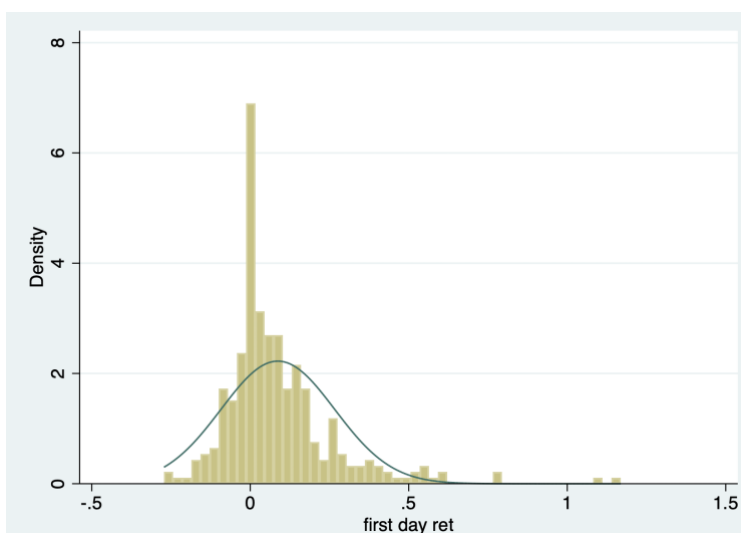


Figure 4: First day returns fitted against a normal distribution.

The histogram shows that the observations approximately follow the normal distribution, but it is not perfectly fitted. The observations are focused too much on the center, indicating too high kurtosis for

a true normal distribution, and the observations also seems to be skewed to the right. To further test this, a skewness and kurtosis test is performed in Stata to test the normality of the distribution.

	Observations	Pr(Skewness)	Pr(Kurtosis)	Prob > chi^2
First day return	322	0.000	0.000	0.000
Skewness	2.1294			
Kurtosis	10.8447			

Table 5: Results from testing the skewness and kurtosis of the first day returns.

The results illustrated in table 5 shows that the p-values for both skewness and kurtosis are 0.000 - i.e. below 0.01 – thus, indicating that the skewness and kurtosis from this distribution are significantly different from a normal distribution at a one-percent significance level. Furthermore, the p-value for the chi^2 test is also below 0.01, meaning that the null hypothesis that the first day returns are normal distributed can be rejected. However, despite this anomaly, the analysis continues as real-world data cannot necessarily be expected to be normal distributed. Also, looking at the distribution, it is deemed sufficient to continue the analysis. Yet, keeping the skewness and kurtosis of data in mind when interpreting the results.

For the one-sided t-test with 322 observations, thus 321 degrees of freedom, the critical value at the 99% significance level is 2.363. Performing the t-test on the observation of first day returns to test hypothesis 1 yields the following output:

Observations	Mean	Standard error	Standard deviation	99% confidence interval	T-value	P(T>t)
322	8.7119%	0.00997	17.9396%	(6.7451% : 10.6788%)	8.7141	0.0000

Table 6: Results of t-test from Stata for testing hypothesis 1.

Looking at the table, several results indicate rejection of the null hypothesis that the first day returns are equal to zero. Firstly, the T-value is well above the critical value at the 99% level, denoting that the null hypothesis can be rejected. Furthermore, both of the values in the 99% confidence interval are positive, meaning that the mean of the observation with 99% probability is between the values of 6.75% and 10.68%, further conforming that the mean is not equal to zero. The two-tailed p-value testing the alternative hypothesis that the mean is greater than zero has a value of 0.0000, also supporting that the null hypothesis can be rejected. Considering these finding, it is concluded that

underpricing exists on the Nordic market from 2003-2022, thus supporting hypothesis 1. It should however be noted that the first day returns are not normally distributed.

## 5.4 Financial Sponsor

The second hypothesis that is tested is whether having a financial sponsor prior to going public effects a reduction in IPO underpricing. The previous hypothesis proves that underpricing exists on the Nordic market why it is relevant to test the effect that variables such as financial sponsors have on underpricing. This section will focus on financial sponsors as a whole and thus not distinguish between private equity or venture capital sponsors.

### 5.4.1 Methodology for Hypothesis 2

To test the second hypothesis, that financial sponsors reduce IPO underpricing compared to IPOs without a financial sponsor, the focus lies on the pre-IPO ownership. As stated in section 4.1, the data regarding financial sponsors has been gathered on an individual level for each observation under the following criteria: If either a private equity or venture capital fund held a majority stake in the company (i.e. >50%), the pre-IPO ownership was classified accordingly. If a company had several financial sponsors, but none that held a majority stake, the sponsors were screened and the sorted so that the type of pre-IPO ownership was determined based on the largest group of stakeholders. For instance, if a company had no large private equity or venture capital fund owner but the aggregated stake of say multiple venture capital funds constituted the largest stakeholder group, the pre-IPO ownership was classified as venture capital funded. If neither private equity or venture capital funds accounted for the largest group of stakeholders, the company was classified in the no sponsor group, regardless of owner (founder, government, corporation or others as mentioned in section 2.3.4).

This classification of financial sponsors is used as the independent variable for testing hypothesis 2. To test hypothesis 2, the analysis distinguishes between sponsored IPOs and non-sponsored IPOs without focussing on the specific type of financial sponsor. This leads to the creation of a binary variable, a so-called dummy variable, as input for the regression analysis to test the hypothesis. Here, the dummy-variable takes the value of 1 if the observation is a sponsored IPO and 0 if it is a non-sponsored. This can be described as:

$$Sponsordummy_i = \begin{cases} Sponsor_i = PE \text{ or } VC = 1 \\ Sponsor_i \neq PE \text{ or } VC = 0 \end{cases}$$

This is then used to formulate the regression analysis for testing the second hypothesis after quantifying the financial sponsor variable as follows:

$$FR_i = \beta_0 + \beta_1 * Sponsordummy + \epsilon_i$$

Where:

$FR_i$  is the dependent variable, the first day return of asset  $i$ .

$\beta_0$  is the coefficient for the constant (i.e. the intercept)

$\beta_1$  is the coefficient for determining the average change in  $FR_i$  when the sponsor dummy variable is equal to 1.

$Sponsordummy$  is the previously defined dummy variable to define the pre-IPO ownership.

#### 5.4.2 Analysis and Results for Hypothesis 2

When following the above-mentioned methodology, the regression analysis yields the following results:

	Coefficient	Standard error	t-value	P-value	95% Confidence interval
Intercept	0.0930	0.0122	7.65	0.000	(0.0691 : 0.1169)
Sponsor dummy	-0.0181	0.0214	-0.85	0.397	(-0.0602 : 0.0239)
Prob > F	0.3972				
R <sup>2</sup>	0.0022				

Table 7: The regression output from Stata for testing hypothesis 2.

Firstly, from the table, it is observed that the intercept has a value of 0.0930 and the coefficient for  $Sponsordummy$  is -0.0181, indicating that the value for first day return of asset  $i$  is expected to decrease if the dummy variable is equal to 1. Thus, the model initially shows that financial sponsors have a reducing effect on underpricing. However, when looking further at the regression results, starting with p-values, it becomes apparent that the coefficient for  $Sponsordummy$  is not significant at the 0.05-level since the p-value is 0.397. Furthermore, the 95% confidence interval shows both positive and negative values, meaning that it cannot confidently be concluded that the  $Sponsordummy$  coefficient is negative. These regression results lead to the following model:

$$FR_i = 0.0930 - 0.0181 * Sponsordummy + \epsilon_i$$

Which gives the following for sponsored/non-sponsored IPOs:

Sponsored:

$$FR_i = 0.0930 - 0.0181 * 1 + \epsilon_i$$

Non-sponsored:

$$FR_i = 0.0930 - 0.0181 * 0 + \epsilon_i$$

As the models show, the average IPO can be expected to be underpriced by 9.3% in line with previous findings. If the IPO has a financial sponsor, the underpricing is expected to be reduced by 1.8 percentage-points. This indicates support for the hypothesis, but as the significance of these results are quite low, no statistically solid conclusions can be drawn from the models. Furthermore, the R<sup>2</sup> value is 0.0022, meaning that the model only explains 0.22% of the variance. Thus, it can be concluded that the regression has very low explanatory power, leaving more than 99% of the variation in first day return unexplained. Despite the insignificance of the regression results, the results shows that financial sponsors have tendency to reduce underpricing, which could indicate support for hypothesis 2.

## 5.5 Private Equity vs. Venture Capital

The third hypothesis that will be tested does also concern the pre-IPO ownership. The hypothesis, that private equity backed IPOs experience reduced IPO underpricing compared to venture capital backed IPOs, thus differentiates between the two identified financial sponsors as opposed to hypothesis 2. All though not being significant, the results from the previous hypothesis indicate that financial sponsors might have a reducing effect on underpricing.

### 5.5.1 Methodology for Hypothesis 3

To test the third hypothesis, largely the same methodology from hypothesis 2 is applied. However, for testing hypothesis 3, the analysis distinguishes between the type of financial sponsor i.e., private equity sponsored or venture capital sponsored. This results in two dummy variables, based on the same principles as the previous hypothesis. Here, the dummy variables – PE-dummy and VC-dummy

– will take the value of 1 if the observed IPO is backed by a private equity of venture capital fund, respectively. The two dummy variables are thus mutually exclusive. This can be described as follows:

$$PEdummy_i = \begin{cases} Sponsor_i = PE = 1 \\ Sponsor_i \neq PE = 0 \end{cases}$$

And:

$$VCdummy_i = \begin{cases} Sponsor_i = VC = 1 \\ Sponsor_i \neq VC = 0 \end{cases}$$

Which can be used to formulate the following regression analysis to test hypothesis 3:

$$FR_i = \beta_0 + \beta_1 * PEdummy + \beta_2 * VCdummy + \epsilon_i$$

Where:

$FR_i$  is the dependent variable, the first day return of asset  $i$ .

$\beta_0$  is the coefficient for the constant (i.e., the intercept)

$\beta_1$  is the coefficient for determining the average change in  $FR_i$  when the private equity dummy variable is equal to 1.

$PEdummy$  is the defined dummy variable to determine if the pre-IPO ownership was a private equity fund.

$\beta_2$  is the coefficient for determining the average change in  $FR_i$  when the venture capital dummy variable is equal to 1.

$VCdummy$  is the defined dummy variable to determine if the pre-IPO ownership was a venture capital fund.

### 5.5.2 Analysis and Results for Hypothesis 3

When following the above-mentioned methodology, the regression analysis yields the following results:



	Coefficient	Standard error	t-value	P-value	95% Confidence interval
Intercept	0.0930	0.0122	7.65	0.000	(0.0691 : 0.1169)
PE dummy	-0.0061	0.0241	-0.25	0.802	(-0.0536 : 0.0414)
VC dummy	-0.0479	0.0349	-1.37	0.171	(-0.1166 : 0.0209)
Prob > F	0.3920				
R <sup>2</sup>	0.0059				

Table 8: The regression output from Stata for testing hypothesis 3.

Table 7 shows that the intercept once again is 0.0930 with the two dummy variables, PEdummy and VCdummy, having coefficients of -0.0061 and -0.0479, respectively. This is the opposite result to what the hypothesis expected as the coefficients points to venture capital funds having a larger reducing effect on underpricing relative to private equity funds. However, when inspecting the results further, the p-values are 0.802 for the PEdummy and 0.171 for the VCdummy. Thus, it can be concluded that the PEdummy is not significant, being further backed up by the 95% confidence interval containing both positive and negative values. The regression analysis provides the following model:

$$FR_i = 0.0930 - 0.0061 * PEdummy - 0.0479 * VCdummy + \epsilon_i$$

Which gives the following for PE/VC-sponsored IPOs:

PE:

$$FR_i = 0.0930 - 0.0061 * 1 - 0.0479 * 0 + \epsilon_i$$

VC:

$$FR_i = 0.0930 - 0.0061 * 0 - 0.0479 * 1 + \epsilon_i$$

The model shows that the expected average underpricing is 9.3%, consistent with the previous findings from hypothesis 1. Further, IPOs backed by a private equity fund is estimated to experience an average reduction of 0.6 percentage-points in underpricing, while venture capital backed IPOs is estimated to experience a 4.8 percentage-point reduction in underpricing. The results indicate the opposite relation than what was expected in hypothesis 3. However, it should still be kept in mind that the values are insignificant, preventing statistically robust conclusions from these models. Furthermore, the R<sup>2</sup> value shows 0.0059, meaning that merely 0.59% of the variation in first day

return can be explained by this model, pointing to very low explanatory power of this model. Leaving aside the lack of significant values, the regression results points towards rejecting hypothesis 3.

## 5.6 The Underwriter

The fourth hypothesis slightly shifts the focus on outside relations from financial sponsor to the underwriter used when going public. The hypothesis states that a prestigious underwriter reduces the underpricing experienced by companies going public. So, to investigate this, the focus of the analysis is placed on the lead underwriter of the IPO. This hypothesis aims to provide additional knowledge on outside relations as a mean to reduce underpricing, complementary to the previous two hypothesis concerning financial sponsors.

### 5.6.1 Methodology for Hypothesis 4

To test this hypothesis, the analysis focuses on the lead underwriter of the IPO and their effect on underpricing. The data used for conducting this analysis was collected manually for each individual observation as described in section 4.1. This resulted in 49 different underwriters spread across the 322 observations why a dummy variable again is set up in order to get a quantifiable input to test the effect of having a prestigious underwriter. The classification of prestigious underwriters was conducted based on two criteria which will be described below.

First, the classification process looked at market share - in this case defined as number of IPOs underwriter - of the different underwriters as a mean to gauge the popularity and prestige of the underwriters. The 49 underwriters conducted a vastly different number of IPO each, ranging from several underwriters with just one IPO to Carnegie who conducted 81 of the IPOs in the sample. The table below shows the 10 most active underwriters from the dataset.

Underwriter	Number of IPOs
Carnegie	81
ABG	48
DNB	25
Nordea	19
SEB	18
Danske Bank	17
Pareto Securities	17
Arctic Securities	11
Sparebank 1	8
Handelsbanken	7

Table 9: The 10 most used underwriters in the dataset

Table 9 shows that Carnegie was the most used underwriter by a large margin, followed by ABG that also has a sizeable margin to the next underwriters on the list. Based on this, it is clear that Carnegie and ABG are the two most used underwriters, pointing to them being prestigious in terms of popularity.

The second criteria for the classification of underwriters are based on Kantar's Prospera annual ranking of Nordic underwriters. Kantar is a consulting firm that also provides annual rankings of several different actors across different industries, including financial advisors and underwriters in the Nordics (Kantar, 2023). These rankings are based on repeated interviews with industry experts in order to create the annual rankings that consists of a top 5 for each year. These rankings have been scrutinized and yield the following results for the last 10 year.

Year	Number 1	Number 2	Number 3	Number 4	Number 5	Number of IPOs
2003-2012	n/a	n/a	n/a	n/a	n/a	57
2013	Goldman Sachs	J.P. Morgan	SEB	Morgan Stanley	Carnegie	7
2014	Goldman Sachs	Morgan Stanley	Carnegie	SEB	Handelsbanken	16
2015	Morgan Stanley	Carnegie	SEB	Danske Bank	Handelsbanken	31
2016	Carnegie	ABG	Goldman Sachs	Morgan Stanley	Danske Bank	16
2017	Carnegie	Danske Bank	ABG	SEB	Nordea	34
2018	Carnegie	Danske Bank	ABG	SEB	Nordea	21
2019	Carnegie	ABG	SEB	Danske Bank	Nordea	14
2020	Carnegie	ABG	SEB	Danske Bank	Nordea	42
2021	Carnegie	ABG	SEB	Danske Bank	Nordea	77
2022	Carnegie	ABG	SEB	Danske Bank	Nordea	8

Table 10: The top 5 ranking underwriters from Kantar Prospera for the past 10 years.

Unfortunately, the table only shows top 5 ranking underwriters from the past 10 years due to lack of reports from before 2013. However, 57 IPOs which are not represented in this table only accounts for 17.7% of the total observations. Further, these observations have been influencing the first criteria why this slight lack of information is deemed acceptable for the classification of underwriters. As the table shows, both Carnegie and ABG are heavily represented in the top rankings for the past 10 years which further points to them being the top prestigious underwriters. In years accounting for 243 of the observations in the dataset, corresponding to 75.5%, Carnegie is placed among the top 3 underwriters in the Nordics. For ABG, this is 212 observations which is 65.8% of the observations in

the dataset. The closest other underwriter is SEB who is placed among the top 3 underwriters in year accounting for 179 observations (55.6%). However, this is without any placements as number 1 or 2 in the Kantar Prospera rankings as shown in table 10. Furthermore, Carnegie and ABG have conducted 4.5 and 2.7 times more IPOs than SEB, as shown in table 9.

Based on these criteria, both Carnegie and ABG are classified as prestigious underwriters which will be represented by the creation underwriter dummy variable. This can be described as follows:

$$Underwriterdummy_i = \begin{cases} Underwriter_i = Carnegie \text{ or } ABG = 1 \\ Underwriter_i \neq Carnegie \text{ or } ABG = 0 \end{cases}$$

Which can be used to formulate the following regression analysis to test hypothesis 4:

$$FR_i = \beta_0 + \beta_1 * Underwriterdummy + \epsilon_i$$

Where:

$FR_i$  is the dependent variable, the first day return of asset  $i$ .

$\beta_0$  is the coefficient for the constant (i.e., the intercept)

$\beta_1$  is the coefficient for determining the average change in  $FR_i$  when the underwriter dummy variable is equal to 1.

### 5.6.2 Analysis and Results for Hypothesis 4

The table below shows the regression results for testing hypothesis 4 when the above-mentioned methodology is applied:

	Coefficient	Standard error	t-value	P-value	95% Confidence interval
Intercept	0.0939	0.0129	6.99	0.000	(0.0650 : 0.1158)
Underwriter-dummy	-0.0082	0.0204	-0.40	0.689	(-0.0484 : 0.0320)
Prob > F	0.6893				
R <sup>2</sup>	0.0005				

Table 11: The regression results from Stata for testing hypothesis 4.

The results in table 11 show an intercept of 0.0939 and that the coefficient of the Underwriter-dummy is negative 0.0082. This is in line with hypothesis and the outlined theory, but the effect appears relatively small. Further, examination of the regression results also show a p-value of 0.689 for the Underwriter-dummy coefficient, deeming the results insignificant. Considering the 95% confidence interval, this contains both positive and negative values, implying that it cannot with certainty be concluded that a prestigious underwriter has a reducing effect on underpricing. The above regression results yield the following model:

$$FR_i = 0.0939 - 0.0082 * Underwriterdummy + \epsilon_i$$

Which gives the following for IPOs with prestigious/non-prestigious underwriters:

Prestigious:

$$FR_i = 0.0939 - 0.0082 * 1 + \epsilon_i$$

Non-prestigious:

$$FR_i = 0.0939 - 0.0082 * 0 + \epsilon_i$$

The model shows that the average expected underpricing of 9.4% is very similar to the previous models, and that having a prestigious underwriter will reduce underpricing by 0.8 percentage points. This shows a relatively small effect of having a prestigious underwriter, even though a 0.8% reduction can lead to a significant amount of discount depending on the economic value of the IPO. However, as mentioned, the result is not significant. Furthermore, the R<sup>2</sup> value of 0.0005 implies that the model explains less than 99.9% of the variation in first day returns. Thus, the model has very low explanatory power. These results do not provide support for hypothesis 4, why the numbers behind the underwriter's effect on underpricing reduction will be investigated further.

Underwriter	Average first day return
Carnegie	0.1041
ABG	0.0453
SEB	0.0330
Danske Bank	0.1136

Table 12: Average first day returns for selected underwriters from the dataset.

To further examine the effects of the chosen underwriter for the IPO, table 12 shows the average underpricing for each of the two underwriters classified as prestigious: Carnegie and ABG, and SEB and Danske Bank for comparability. As the table shows, Carnegie-underwritten IPOs experience underpricing of 10.4% which is even higher than the mean of the full dataset of 8.7% as shown in section 5.2. The average underpricing from ABG is significantly lower at 4.5% which seems to have been the driver for the negative coefficient in the above-described model.

However, these findings do not seem consistent with the classification of underwriters described in the methodology for hypothesis 4 as Carnegie is clearly shown to perform better, both in terms of the Kantar Prospera ranking and market share (measured in number of IPOs). Therefore, the average first day returns of SEB and Danske Bank is presented in table 12 to provide comparable values as these two underwriters also perform well in the Kanter Prospera rankings and are among the top underwriters for market share. This comparison does not help to clarify the effect of a prestigious underwriter as SEB experience the lowest degree of underwriting at 3.3% while Danske Bank have the highest degree of underpricing of the four comparisons at 11.4%, also being noticeably higher than the average of the full dataset.

Based on the findings from this analysis, it cannot unambiguously be concluded that a prestigious underwriter reduces IPO underpricing on the Nordic market. Thus, hypothesis 4 is rejected. This result is puzzling in the light of previous literature. The causes of these deviations will be discussed in section 6.2. The underlying assumption of the regression is still tested at the end of the analysis.

## 5.7 Pricing Method

As the previous hypothesis concerning the underwriter's effect on reducing underpricing did not yield the expected results, it is deemed suitable to focus on the approach of the underwriter instead, namely the applied offer method. The fifth hypothesis focuses on the effect of the pricing method book building on reducing underpricing. The aim of this hypothesis is to provide alternative information to nuance the debate on the underwriter's role in reduction of underpricing.

### 5.7.1 Methodology for Hypothesis 5

To test the fifth hypothesis that book building reduces underpricing, the focus of the analysis is placed on the offer method of the issue. Given the data described in section 4.6 the offer method for each observation is either book building or fixed price, captured by a dummy variable to test the effect of book building on underpricing. This implies the variable will take the value 1 if book building is used and 0 if book building is not used, i.e. fixed price is used. This can be described as follows:

$$BookBuildingdummy_i = \begin{cases} Offer\ method_i = Book\ Building = 1 \\ Offer\ method_i \neq Book\ Building = 0 \end{cases}$$

Which can be used to formulate the following regression analysis to test hypothesis 5:

$$FR_i = \beta_0 + \beta_1 * BookBuldingdummy + \epsilon_i$$

Where:

$FR_i$  is the dependent variable, the first day return of asset  $i$ .

$\beta_0$  is the coefficient for the constant (i.e. the intercept)

$\beta_1$  is the coefficient for determining the average change in  $FR_i$  when the book building dummy variable is equal to 1.

### 5.7.2 Analysis and Results for Hypothesis 5

The above-mentioned methodology yields the following regression results:

	Coefficient	Standard error	t-value	P-value	95% Confidence interval
Intercept	0.1113	0.0204	5.45	0.000	(0.0711 : 0.1515)
BookBuildingdummy	-0.0318	0.0234	-1.36	0.175	(-0.0778 : 0.0143)
Prob > F	0.1754				
R <sup>2</sup>	0.0026				

Table 13: The regression results from Stata for testing hypothesis 5.

Table 13 shows that the estimated value of the intercept is 0.1113 and the coefficient for the BookBuildingdummy is -0.0318. This result is in line with the existing literature and the hypothesis that the thesis aims to test. The p-value of the dummy coefficient is 0.175, indicating that the estimate is insignificant. Looking further at the regression results, the 95% confidence interval both contains



positive and negative values, why it cannot be concluded that the book building method has a reducing effect on underpricing. The regression results from table 13 leads to the following model:

$$FR_i = 0.1113 - 0.0318 * BookBuildingdummy + \epsilon_i$$

Which gives the following for IPOs with prestigious/non-prestigious underwriters:

Book building:

$$FR_i = 0.1113 - 0.0318 * 1 + \epsilon_i$$

Not book building (fixed price):

$$FR_i = 0.1113 - 0.0318 * 0 + \epsilon_i$$

The model shows that the average expected underpricing is 11.1%, and that using the book building method would reduce the underpricing by 3.2 percentage points. As mentioned, these results indicate that book building reduces IPO underpricing on the Nordic market, keeping in mind that the significance of these results is absent. Further investigating the regression results, the R<sup>2</sup> value is 0.0057, meaning that the model explains 0.6% of the variation in first day returns. The results are somewhat encouraging as they are in line with the hypothesis and previous findings in the literature on other markets; The model expresses a tendency where book building reduces underpricing. However, due to the insignificant estimate in the regression results, one cannot draw statistically robust conclusions about the relation, causing a rejection of hypothesis 5.

## 5.8 Market Sentiment

After focusing on the outside relations of the issuing company, the sixth and last hypothesis, changes the focus slightly to focus on the market sentiment and its effect on IPO underpricing. The aim of this hypothesis is once again to provide nuance on the phenomenon of underpricing and the many factors affecting it. Furthermore, it is in line with the thesis' overall focus on external factors rather than the issuing company itself.

### 5.8.1 Methodology for Hypothesis 6

To test the sixth hypothesis that underpricing is greater in hot issue markets, the analysis focuses on the market environment for IPOs. To define if the IPO market is hot or cold, the net volume of IPOs per year is used as a proxy for the market sentiment as opposed to using the stock markets general

return to define the state of the market. However, the IPO market shows big year-on-year variance in net volume of IPOs. The year with the fewest observations has one IPO whereas the year with the most observations have 77 new issues. Therefore, a logarithmic scale is applied to smoothen the observation into numerical proxies as a measure for market sentiment with higher logarithmic values signaling hotter markets. This calculation can be described as follows:

$$\text{Market sentiment} = \ln(1 + \text{net IPO volume})$$

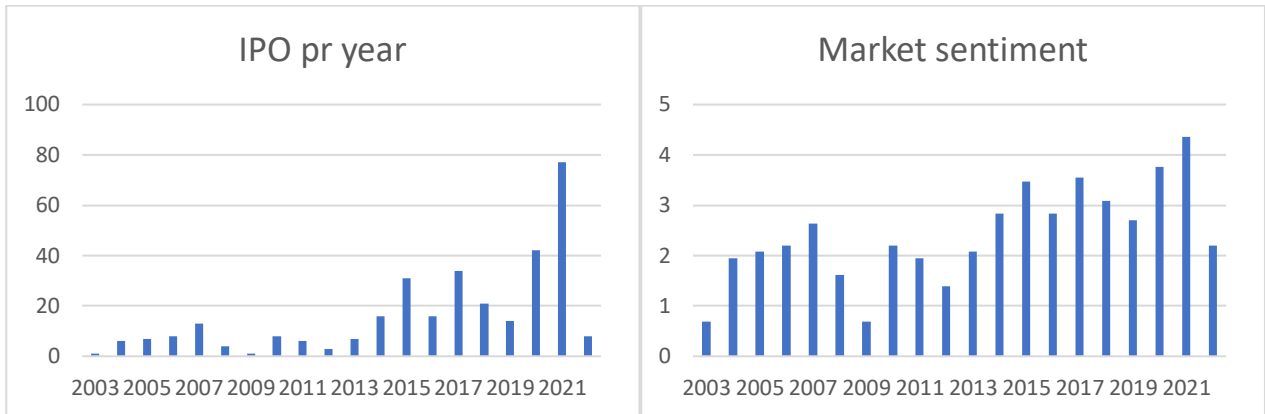


Figure 5: The number of IPOs per year and the market sentiment proxy.

Figure 5 shows the number of IPOs per year in their real values and the numerical proxies obtained by applying the logarithmic formula. Based on the logarithmic values, the years of observations is split into two categories, either hot or cold market, creating a dummy variable with this binary approach. The observation year is categorized as hot market if the calculated market sentiment is 3 or above. This is described as follows:

$$\text{Hotdummy}_i = \begin{cases} \ln(1 + \text{net IPO volume}) \geq 3 = 1 \\ \ln(1 + \text{net IPO volume}) < 3 = 0 \end{cases}$$

Which can be used to formulate the following regression analysis to test hypothesis 6:

$$FR_i = \beta_0 + \beta_1 * \text{Hotdummy} + \epsilon_i$$

Where:

$FR_i$  is the dependent variable, the first day return of asset  $i$ .

$\beta_0$  is the coefficient for the constant (also called the intercept)

$\beta_1$  is the coefficient for determining the average change in  $FR_i$  when the hot dummy variable is equal to 1 (from the 20-year research period 5 years have a logarithmic value above 3, as shown in figure 5 thus being categorized as “hot”).

### 5.8.2 Analysis and Results for Hypothesis 6

Applying the above-describe methodology gives the following regression results shown in table 14:

	Coefficient	Standard error	t-value	P-value	95% Confidence interval
Intercept	0.0645	0.0165	3.90	0.000	(0.0320 : 0.0971)
Hotdummy	0.0355	0.0207	1.71	0.088	(-0.0053 : 0.0762)
Prob > F	0.0881				
R <sup>2</sup>	0.0091				

Table 14: The regression results from Stata for testing hypothesis 6.

The table shows a value of 0.0645 for the intercept and a value of 0.0355 as the coefficient for the dummy variable which is within the consensus of the review literature and the expected findings for the tested hypothesis. The p-value of the coefficient is 0.088, meaning that it is significant at the 10% significance level which is somewhat satisfying regarding support for hypothesis 6. However, when looking at the 95% confidence interval, it is discouraging that it contains both positive and negative values. This implies that it cannot be concluded with 95% confidence that the market sentiment has an increasing effect on IPO underpricing. The regression results yield the following model:

$$FR_i = 0.0645 + 0.0355 * Hotdummy + \epsilon_i$$

Which gives the following for IPOs issues in hot/cold markets:

Hot market:

$$FR_i = 0.0645 + 0.0355 * 1 + \epsilon_i$$

Cold market:

$$FR_i = 0.0645 + 0.0355 * 0 + \epsilon_i$$

The model shows that the average expected underpricing is 6.5%, and when issued in a hot market the underpricing of an IPO is expected to increase by 3.6 percentage-points. As mentioned, these results indicates that hot markets have an increasing effect on IPO underpricing on the Nordic market,

keeping in mind that the significance of this result is not statistically robust at the 0.05-level . Further investigating the regression results, the  $R^2$  value is 0.0091, meaning that the model's explanatory power is below 1% of the total variation in first day returns. The results are somewhat encouraging as they are in line with the hypothesis and previous findings in the literature on other markets. The model expresses a trend where issues in hot markets are more underpriced compared to issues in cold markets. However, due to the insignificant estimates, one should still be careful to accept hypothesis 6 without any reservations. It can be argued that a significance level of 10% is somewhat acceptable, but looking at the 95% confidence interval, there is still a little doubt left concerning the effect of hot markets on underpricing.

## 5.9 Robustness tests

Following the above-described regression methodology results, the assumptions behind these regression models will be test in the following sections. Firstly, the four assumptions behind regression analysis will be outlined alongside the chosen method for testing these. Secondly, a sum-up table will provide an overview of the results of the assumption testing.

### 5.9.1 Assumptions

The four assumptions behind regression analysis are linearity, normality, independence, and homoscedasticity. In terms of hypothesis 1 these four assumptions do not apply as the first hypothesis was not test by regression. The t-test assumption of normal distribution was coved in the sections concerning the methodology and testing of the hypothesis. All tests of models assumptions are carried out in Stata.

Linearity is the first assumption of regression analysis, assuming that the OLS regression models a linear trajectory. Due to the nature of the applied simple regressions in this thesis, this assumption does not need testing as this assumption is always met when using a dummy variable as the dependent variable.

The second assumption is normality, i.e., that the residuals of the models follow a normal distribution. For testing this assumption, the Shapiro-Wilk test is used. It tests the null hypothesis that a sample comes from a normally distributed population. This means that the test will provide a p-value which

is used to assess whether the null hypothesis can be rejected or not. A p-value below the desired level of significance results in the null hypothesis being rejected, thus, providing evidence that the data is not normally distributed (Shapiro & Wilk, 1965).

The third assumption behind the regression analysis is independence. To test this assumption, the Durbin-Watson test is applied to test for autocorrelation in the residuals. The Durbin-Watson statistic will always provide a value ranging from 0 to 4 as an indication of the autocorrelation of the tested residuals of the OLS regression (Durbin & Watson, 1950). A test statistic of 2 indicates that there is no autocorrelation. The closer the test statistic is to either 0 or 4 indicates positive or negative autocorrelation, respectively. As a rule of thumb, test statistics between 1.5 and 2.5 are relatively normal and a sign of little to no autocorrelation (Kenton, 2021).

The fourth and last assumption that will be tested is homoscedasticity which tests if the variance in the model's variables is the same. This is tested by using the Breusch-Pagan test, presenting the null hypothesis that heteroscedasticity is present in the regression model. The test provides a p-value with the aim of rejecting the null hypothesis, proving that there is no heteroscedasticity present in the regression model, i.e. indicating homoscedasticity (Breusch & Pagan, 1979).

### 5.9.2 Sum-up table

The table below shows the results of the tested assumptions described in the previous section. All of the assumptions have been tested at a 0.05%-level, meaning that if the p-value is above 0.05 the null hypotheses cannot be rejected.

	<b>Normality</b>	<b>Independence</b>	<b>Homoscedasticity</b>	<b>Significance</b>
<b>Hypothesis 1</b>	n/a	n/a	n/a	Significant
<b>Hypothesis 2</b>	Does not hold	Holds	Does not hold	Not significant
<b>Hypothesis 3</b>	Does not hold	Holds	Does not hold	Not significant
<b>Hypothesis 4</b>	Does not hold	Holds	Holds	Not significant
<b>Hypothesis 5</b>	Does not hold	Holds	Holds	Not significant
<b>Hypothesis 6</b>	Does not hold	Holds	Does not hold*	Significant at 10%

Table 15: The results from testing the regression assumptions of the tested hypotheses.

\*The p-value is 0.002, too low for the assumption to hold.

Based on the results show in the table above, it is worth noting that it is unsurprising that the assumption of normality does not hold for any of the regression models. This was already suspected when testing the first hypothesis in section 5.3.1 due to the nature of the underpricing distribution. This is naturally somewhat worrying and should be considered when making conclusions based on the regression analysis.

Furthermore, the assumption of independence holds for all the regression models, while the assumption of homoscedasticity only holds in the cases of hypothesis 4 and 5. However, a cause of this assumption being violated is if one of the variables in the model is not normally distributed, which applies in the case of the used dataset, as the first day returns do not follow a normal distribution.

As a mean to bridge the transition from the analysis to the discussion part of this thesis, table 16 below shows an overview of the results from the regression analysis. These findings will be subject to discussion in the following sections. The results for hypothesis 1 will not be illustrated in the table as this hypothesis was an enabling test to lay the foundation for the analysis. Hypothesis 1 proved that underpricing on the Nordic market from 2003-2022 did occur.

<b>Authors</b>	<b>Addressed Theory</b>	<b>Conclusion/Results</b>	<b>Analysis results</b>
Megginson & Weiss (1991)	Certification hypothesis (financial sponsor)	Sponsor-backed IPOs are less underpriced	<b>Showed a tendency that financial sponsors reduce underpricing but insignificant</b>
Bergström, Nillson & Wahlberg (2006)		compared to non- sponsor-backed IPOs	
Mogilevsky & Murgolov (2012)	PE-backed IPOs compared to VC-backed IPOs	PE-backed IPOs experience less underpricing relative to VC-backed IPOs	<b>Showed the opposite relation between PE- and VC-backed IPOs but insignificant</b>
Levis (2011)			
Carter & Manaster (1990)	Certification hypothesis (underwriter)	A prestigious underwriter will reduce IPO underpricing	<b>Showed no relation between prestigious underwriters and reduction in underpricing</b>
Booth & Smith (1986)			
Benveniste & Spindt (1989)	Information revelation	The pricing method book-building reduces IPO underpricing	<b>Showed the expected relation between book building and underpricing but insignificant</b>
Ibbotson & Jaffe (1975)	Investor sentiment	IPO issues are more underpriced in “hot” markets relative to “cold” markets	<b>Showed the expected relation between “hot” markets and underpricing and was significant at the 10%- level</b>

Table 16: Sum-up table over the tested theories in the analysis and the findings.

## 6. Discussion

The discussion is offset in the findings of the analysis. Firstly, the discussion will focus on the findings and possible limitations of the tested theoretical relations. Following that is a discussion of the

assumption of country homogeneity across the Nordics and why these countries have been pooled together in the data gathering. Lastly, the discussion turns its attention to possible avenues of further research on the topic of IPO underpricing and the bridge to outside relations. The majority of the regressions did not yield statistically significant results at a 5%-level. This matter is somewhat overlooked for the sake of discussing the implications of the findings. The lack of significance should however be considered before applying any of the findings in real life.

## 6.1 Financial Sponsor

The analysis focused on two different hypotheses concerning the role of financial sponsors in relation to underpricing on the Nordic market. Hypothesis 2 focused on financial sponsors as a group while hypothesis 3 distinguished between private equity and venture capital sponsors. The findings of both these two hypotheses will be discussed in the following section.

Although not being significant, the regression results from hypothesis 2 point to a relation between financial sponsors and a reduction in underpricing on the Nordic market which is in line with the previously reviewed literature (Megginson & Weiss, 1991) (Bergström, Nilsson, & Wahlberg, 2006). Conversely, hypothesis 3 can be rejected even though the results were not significant, as the regression results point to venture capital sponsored IPOs being less underpriced compared to private equity sponsored IPOs. Based on the results from hypothesis 3 it is also shown that venture capital backed IPOs have driven the results from hypothesis 2. As shown in table 8 venture capital seems to reduce underpricing by 52% (-0.0479/0.0930). On the other hand, private equity only experiences a reduction of about 7% (-0.0061/0.0930). Albeit the regression results are not significant, this point towards a tendency.

This is contrary to the expected findings based on the previous literature that have found private equity sponsored IPOs to be less underpriced compared to venture capital sponsored (Mogilevsky & Murgolov, 2012). However, as the topic is scarcely researched, especially in a Nordic context, it is not discouraging that the findings point in a different direction than previous findings on other markets. There are several plausible explanations for this finding, with offset in the limitations of the conducted study.



A factor to consider is the rate of retained shares from the financial sponsor. A study on the Australian market from 1996-2007 found that venture capital-backed IPOs were less underpriced compared to private equity-backed IPOs, but when adjusted for the proportion of shares retained by the issuer, the private equity-backed IPOs were less underpriced (Vu, Worthington, & Laird, 2008). This implies that private equity funds retain a smaller fraction of shares in the issuing company post-IPO compared to venture capital funds. Due to the difficulty of retrieving this data, the information on retained shares by the financial sponsors is not a part of the dataset for this thesis as the collection of this information would be very time-consuming and should be scrutinized from various data sources. Yet one could suspect that the same dynamics might also occur on the Nordic market.

Furthermore, the dataset does not consider the reputation of the financial sponsors which could also influence the findings. As described, the certification from financial sponsors is derived from their reputation which is established through a never-ending cycle of repeated games (Booth & Smith, 1986). Another limitation to the study is that it is very difficult to assess and categorize the financial sponsors in order to test the effect of the sponsors reputation. It is also plausible that different financial sponsors engage in specific industries and therefore are affected by the general underpricing differences across different industries. To carry out this distinction, more information on the individual financial sponsor would also be required.

Lastly, it is also worth noting that private equity funds in general target bigger companies relative to venture capital funds as described in section 2.3. The study does not consider the size of the issuing companies. Hence, it is possible that the certification of venture capital funds is higher because they are related to more uncertain issues. The larger the company, the more information, and thus less uncertainty, which leads to less underpricing (Ljungqvist, 2007). If the private equity-backed issues on average are larger and have more available information, the need for certification might be lower, resulting in private equity funds having less of an effect on reduction of underpricing.

Overall, there are identified some limitations regarding the findings which should be considered, but the regression results show a tendency where financial sponsors reduce IPO underpricing. Based on this, it would be favorable for an issuing company to be influenced by the outside relationship of a financial sponsor if the marginal costs were lower than the benefit of reducing underpricing (Megginson & Weiss, 1991). However, it is worth noting that financial sponsors most likely are aware

of this dynamic. Hence, the issuing company must at some point pay for this certification, for example in form of a discount when the financial sponsors acquire shares in the company years prior to going public. Therefore, it is difficult to gauge the marginal cost of a financial sponsor if the sole aim is to reduce underpricing. Furthermore, for informed investors with a single day scope, the implications of these findings might suggest that the investor would be better off investing in a non-sponsored IPO. Doing so, the investor would be able to exploit the larger underpricing i.e., pocketing more of the money left on the table.

## 6.2 The Underwriter

The fourth hypothesis tested focused on the certification role of the underwriter, more specifically a prestigious underwriter, in reducing IPO underpricing on the Nordic market. The initial findings indicated a small effect on reducing underpricing (albeit not significant). Yet, when the data was scrutinized further, it seemed that there was not a clear relation between a prestigious underwriter and a reduction in underpricing.

Based on the previous finding and theories by Booth & Smith (1986) and Carter & Manaster (1990), one would have expected the prestigious underwriters to have a reducing effect on underpricing. This does not seem to be the case on the Nordic market why it is desirable to explore possible explanations for this result. The categorization of the underwriters is a natural point to start of the discussion on underwriters. The categorization of the underwriters is based on two approaches; the market share (based on number of IPOs), and the annual rankings from Kantar Prospera which both point to a similar conclusion regarding prestigious underwriters. The strength of this categorization is that it both relies on quantitative and qualitative measurement that largely agree in the categorization of the two designated prestigious underwriters. This agreement enhances the power of the categorization, why it is considered the best available way to distinguish between the most reputational underwriters from others.

Further, when scrutinizing the initial returns of the IPOs based on their underwriter, the average first day returns for the undoubted most reputational underwriter based on the categorization, Carnegie, was above the average first day return of the complete data population (10.4% > 8.71%). This is surely the opposite relation of what was to be expected and means that the slightly reducing effect shown in the regression model is likely driven by the low first day return of ABG's IPOs, proving

that there is big variation within the category of prestigious underwriters. The initial return of other underwriters who performed quite well in the categorization criteria but were not categorized as prestigious, SEB and Danske Bank, varies a lot too. This is shown in table 12 from section 5.6.2, indicating that there is no direct relation between underwriter reputation and reduction of underpricing on the Nordic market.

Some of the factors not considered in the testing of hypothesis 4 is the first day return variation between the Nordic countries, the possibility of variance in first day return across industries, and the size of the issuing company. All these factors could potentially influence the regression results. Firstly, the average first day return varies quite a lot across the Nordic countries, as shown in table 3 under descriptive statistics in section 5.2. Norway – where ABG are mostly active - has a low average first day return of 5.91% compared with the average in Sweden – where Carnegie is most active - of 12.27%. However, SEB also has a relatively low average first day return and they are most active on the Swedish market too. This still leaves a possibility of some form of country bias in the results which should be kept in mind when concluding on the findings.

Secondly, the possibility of variance across industries and size of the issuing company is not considered in the regression model either. As the valuation uncertainty increases, so does the underpricing why some industries in which valuation of the companies is more difficult would experience more underpricing (Ljungqvist, 2007). The same applies for bigger companies where there is usually more available information why the information asymmetries between informed and uninformed investors are often smaller, leading to bigger companies tending to be less underpriced (Beatty & Ritter, 1986). This means that if an underwriter mainly engages in specific industries, the average first day returns could be affected by the industry norm, thus, providing a different explanation for the underwriters average underpricing than their reputation. However, as the two prestigious underwriters in this study both have conducted a large number of IPOs, they have been involved in several different industries to a point where this concern should be eliminated.

Based on the results from hypothesis 4, the implications for the issuing company seems to point in a direction where a prestigious underwriter is not necessarily linked to a reduction in underpricing when going public on the Nordic market. Considering this finding, a company seeking to go public in the Nordics should be cautious when choosing a reputable underwriter if this means increased costs but

not a reduction in underpricing. Naturally, a part of the underwriting fee when engaging a reputable underwriter covers the cost of certification and reputational capital from the underwriter why reputable underwriters would generally be more expensive as they offer a reduction in underpricing in return (Carter & Manaster, 1990). If this dynamic is present on the Nordic market too, it might be in the interest of issuing companies not to engage with a reputable underwriter if the costs of underwriting is higher as the marginal benefit appears to be questionable, particularly so, in the case of the underwriter Carnegie.

Following the untraditional findings on the prestigious underwriters' effect on reducing underpricing, it was natural to test the effects of the applied pricing method instead. As the results of the testing of hypothesis 4 shows that the reputation of the underwriter has little to no effect, it still leaves the possibility that other factors concerning the underwriter, such as their pricing method, can influence underpricing. The regression results from testing hypothesis 5 shows a negative relation between book building and underpricing. The results from table 13 suggests that issues using the book building method are 29% (-0.0318/0.1113) less underpriced compared to issues priced using the fixed price method, although the regression results are not significant. These findings are in line with what was expected based on existing literature as the information revelation allows the underwriters to extract private information from investors and reduce information asymmetry (Benveniste & Spindt, 1989).

Based on the findings from hypothesis 5, the implications for an issuing company seems to be that the pricing method is more important in terms of reducing underpricing than the underwriter's reputation itself. It is possible that the underwriter's ability to extract information from investors and hold a credible threat in terms of sharing allocation is somewhat correlated with their reputation among investors. However, the findings in the analysis indicate that the issuing company should focus on the applied pricing method when choosing an underwriter for their IPO rather than the reputation of the underwriter. This might both reduce part of costs from underwriter's fee and parts of the hidden costs i.e., less underpricing of the new issue.

### 6.3 Market Sentiment

The sixth and last hypothesis focuses on the market sentiment and its relation to IPO underpricing. The regression results from table 14 points to accepting the hypothesis at a 10% significance level as the model shows an expected increase in underpricing of about 55% (0.0355/0.0645) in hot issue

markets. This result is in line with the expected results based on previous literature (Ibbotson & Jaffe, 1975) (Loughran & Ritter, 2002). The immediate implication of this finding appears to be that issuing companies are better off timing their IPO to hit a cold market in order to reduced underpricing. Such timing would result in fewer money left on the table in connection to the IPO, why the issuing company would gain a larger part of their value form the IPO. However, such conclusion is too simplified and lack nuance.

If one assumes that the issuing company is able to observe the current market sentiment and conduct their IPO in an instant fashion if deemed desirable. In such case, the issuing company would face a tradeoff between issuing in a hot or cold market. As found, an issue in a cold market is related to less underpricing, thus leaving less money on the table for the investors which naturally is an upside for the issuing company. On the other side, an issue in a hot market might be able to exploit the market sentiment in form of a higher offer price, thus leading to a larger sum of proceeds from the IPO (Ljungqvist, 2007). These proceeds would of course be affected by higher underpricing, but the marginal gains from the hot market issue might still excide those of a cold market issue. Therefore, it cannot undoubtably be concluded that a cold market issue is preferable for the issuing company as such issue would experience less underpricing. Furthermore, considering Loughran & Ritter (2002) perspective on the irrational owner, it is likely that the owner of an issuing company would find higher utility from the wealth gains of a hot market issue as the hidden cost of underpricing is neglected in the presence of sizeable wealth gains from the assumably higher offer price.

This thesis does not help to answer the dilemma raised above, due to the nature and focus of the research conducted in this study. To provide a qualified answer on the ideal timing for a new issue, future research should provide deeper insights between the relation of market sentiment and offer price of new issues. Furthermore, such study would also require a focus on the wealth of the pre-IPO owner beyond the issue date in order to gauge their wealth utility of the issue. This information would not be within the scope of this paper as the focus on outside relations effect on IPO underpricing deems any information subsequent to the issue date not to be considered. This increases the likelihood of causal explanation for the variables used in this study to predict an effect on IPO underpricing, as described earlier, but also prevents the study from drawing conclusions beyond the issuing date. Thus, it can be concluded that the market sentiment influences the underpricing of new issues, but the

analysis cannot provide a guide on the implications for issuing companies in regard to timing of when to go public.

## 6.4 Institutional homogeneity across countries

As mentioned throughout the thesis, the clustering of IPOs from the four different Nordic countries (excluding Iceland) stems from an assumption of institution homogeneity across the Nordics. This assumption is thus important to discuss as it is one of the pillars of the study as it allows for one single dataset to describe the entire Nordic market as one. This is necessary as the population of the individual countries are relatively small so clustering countries allows for a sufficiently sized dataset within a contemporary timeframe to conduct statistical analysis. Especially Denmark has a small population size when it comes to IPOs why one would have to apply a very long timeframe or include smaller exchanges, such as First North, to gather a sufficient pool of data which would lead to alternative complications and questions regarding homogeneity.

The assumption of homogeneity across the Nordics are largely based on similar institutional corporate governance structures, also called the Nordic corporate governance model. Corporate governance can be seen as the framework that a company is governed by in order to ensure that the company is run in the best interest of its owners (Lekvall, 2014). A corporate governance model is mainly determined through three systems: Statutory regulations, self-regulation, and informal norms and practices (Lekvall, 2014). Statutory regulations consist of laws from the government and other official authorities as well as company law. Self-regulation is defined and enforced by the business sector itself, including recommended code of conducts in terms of information to investors and shareholders to increase transparency. Such codes are mostly not mandatory but follow a “comply-or-explain” principle. Lastly, the informal norms and practices covers how corporate governance is carried out in practice and is especially strong across the Nordics. The Nordic region has relatively strong and consistent norms and values which is often enforced by a high degree of social control (Lekvall, 2014).

In support of the assumption of Nordic homogeneity and corporate governance model, these are also recognized globally with The Economist calling it “The next supermodel” in 2013. Further, claiming that the model had a strong say in the Nordic region avoiding the economic uncertainty of Southern Europe and the inequality of America. This backs up the assumption of this thesis as the similarities

in terms corporate governance and the security of the Nordic model is a strong argument for studying these markets together as one. The implications of being an investors or stakeholder across the Nordics countries are thus very similar due to the corporate governance. Based on this, it is considered fair to assume a strong degree of institutional homogeneity across the Nordics, supporting the study's clustering of the Nordic IPOs into one dataset.

## 6.5 Further Research

This final section of the discussion aims to put forward some possible extensions to this thesis regarding further research that could contribute to the literature. As this section serves to provide inspiration and point to interesting pathways for future research, the possible extensions will be described briefly and not cover all theoretical and methodical aspects of the proposed extensions.

Starting off by focusing on the financial sponsors, the analysis conducted in this thesis pointed towards a tendency that financial sponsors helped reduce IPO underpricing, especially venture capital funds. As mentioned in section 6.1, this study does not consider the retention rate of owners why this could be an interesting extension of the study. The focus on rate of retention might also provide additional information regarding the wealth gains of the pre-IPO owners, thus shedding more light on the question on whether to issue in a hot or cold market. Furthermore, an interesting extension to the thesis could be to expand the time horizon and research the effect of financial sponsors beyond the issue date. Such extension would focus on the long-term performance of sponsor backed IPOs as this would add knowledge to the effects of financial sponsors on the Nordic market. One suspicion could be that monitoring and streamlining of operations affected by the financial sponsor prior to the IPO would stick with the issuing company, making them better equipped for strong performance in the future. This theory matches with the findings of Levis (2011) who finds that private equity backed IPOs on the London Stock Exchange (from 1992-2005) perform better than other IPOs and the market as a whole in the three years following their public listing. A similar study on the Nordic market would contribute the scarce existing literature on financial sponsors.

Concerning the role of the underwriter, the results from the analysis did not yield the expected results regarding reputation of the underwriter but the results on pricing method was more encouraging. As mentioned, the study did not distinguish between size of issuing firms and industry differences why this is a nearby extension to nuance the research. An alternative research avenue for further research

on the topic of Nordic underwriters and their effect on underpricing would be to look at the underwriters' internal policies regarding underwriting new issues and underpricing. As the underwriters hold the risk of not being able to sell the shares of the new issue, the underwriter would want to ensure that they are not left with unwanted shares which can be avoided through significant underpricing of the shares. Furthermore, underwriters might also have policies on types of company, size, industries, etc., that the underwriters want to take public. Such policies can also influence underpricing. To conduct such an extension to the thesis, a more qualitative approach is suiting as such information should likely be retrieved through interviews with the given underwriters.

## 7. Conclusion

The aim of this thesis is to study the impact of outside relations on IPO underpricing on the Nordic market in a contemporary timeframe. To do this, the following research question was put forward: *How does outside relations affect IPO underpricing in the Nordic market?*

To answer this research question, existing literature was review in order to create a theoretical foundation on which 6 different hypothesis concerning underpricing in relation to financial sponsors, underwriters, and market sentiment was put forward. The dominating literature to form these hypotheses concerned asymmetric information and the reduction hereof alongside the certification hypothesis by Booth & Smith (1986). These hypotheses were mainly based on the certification role of financial sponsor(s) – in this study a private equity or venture capital fund – or a prestigious underwriter(s) could lower the underpricing of a new issue based on their expertise and reputational capital as repeated players on the financial market (Carter & Manaster, 1990) (Megginson & Weiss, 1991). The study was carried out based on a 322-observation unique dataset on Nordic IPOs from 2003-2022.

Firstly, as a foundation for the further analysis, the study found that the average underpricing of IPOs on the Nordic market from 2003-2022 was 8.71%. This number was statistically different from 0 at a 99%-level of significance, concluding that the phenomenon of IPO underpricing exists on the Nordic market in the 21<sup>st</sup> century. Furthermore, this thesis presents some evidence indicating the certification effect of financial sponsors, although the analysis results were in significant. Especially the venture capital backed IPOs are found to have a reduced degree of underpricing, but with lacking



significance. The implication of such results is that engaging with a financial sponsor might be favorable for issuing companies prior to going public, but such conclusion should be interpreted with cautious.

Further, the study finds no conclusive evidence for prestigious underwriters as a mean to reduce IPO underpricing with further analysis showing big differences in average underpricing among prestigious underwriters on the Nordic market. Further research of the underwriter and pricing method found that the book building method has an impact on reducing IPO underpricing. Thus, it seems that issuing company should spare the extra cost of engage with a prestigious underwriter as the marginal gains are questionable. Instead, the issuing company should focus on the pricing method that the underwriter intends to apply to the new issue.

Finally, the study finds that market sentiment has an influence on IPO underpricing with new issues in cold markets being less underpriced compared to issues in hot markets with a significance at the 10%-level. However, this does not implicate that an issuing company should postpone their IPO in anticipation for more favorable market sentiment as such a decision requires further information concerning the potential gains of a hot market issue which the thesis points out but do not test.

In sum, it can be concluded that outside relations have some impact on IPO underpricing in on the Nordic market in the 21<sup>st</sup> century. The analysis' results point toward an underprice reducing tendency among financial sponsors. While the impact of a prestigious underwriter appears absent, the underwriter matters in terms of pricing method as book building has a reducing effect on underpricing. Picking up on the introduction, the observed bias towards Jesper Buch in Shark Tank seems to mirror some of the same dynamics as on the IPO market. Naturally, several factors have an influence when distinguishing between the small start-up companies of the TV-show and more established companies considering an IPO, but the value of a strong certifier seems to be a common feature regardless of company size.

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