Does Board Structure impact IPO Underpricing?

Evidence from Sweden

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Abstract

This paper applies a mixed research method and signaling theory to study the effect of certain board characteristics on IPO underpricing in Sweden. By examining 316 IPOs and 1,678 board members between 2014 and 2018 through various regressions, the analysis demonstrates that board size, board diversity, and education as a proxy for competence, are not correlated with underpricing. Contrary to expectations, board independence is significantly and positively correlated with underpricing. The quantitative results are complemented with a qualitative study, by conducting 14 interviews with board members and investors. These lead to two distinct theoretical models which further illuminate the quantitative findings. First, the authors theorize that the lack of correlation between underpricing and three of the board characteristics indicate that Swedish investors view boards as a hygiene factor. Second, interviews with board members suggest that firms do not try to avoid underpricing, but rather actively discount their IPOs.

Keywords: Initial Public Offering, Underpricing, Corporate Governance, Board Characteristics, Independence, Diversity, Education, Board Size

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1. Introduction

Going public is one of the most important milestones in a firm's lifetime. By offering shares on the market, a firm can access more capital, increase the liquidity of the shares, and attract new investors. Because the Initial Public Offering (IPO) is of great importance to firms and investors alike, understanding the mechanisms affecting the outcome of an IPO is crucial. This has led researchers to study how IPOs impact companies' short and long-term performance, and why some IPOs generate substantial price increases during their first day of trading.

As of late, there has been a record amount of IPOs on the global market (EY, 2018), and the Swedish market is no exception (Rothstein, 2017). In fact, Sweden stands out in Europe, where three of the largest Swedish marketplaces claimed top five positions in IPO activity during 2017 (Segerstrom, 2018). Whilst the number of IPOs increases worldwide, to this day, there are still many mysteries and contradicting arguments in the IPO research. A main part of the overarching mystery is the consistent share price increase during IPOs, commonly called underpricing. This phenomenon is generally defined as the difference between the first day closing price and subscription price, which will be the focal point of this study.

IPO underpricing varies considerably between different nations and years. During the last 25 years, China has experienced average underpricing as high as 145%, while Sweden's level during the last 35 years has been at 25.9% (Loughran, Ritter, & Rydqvist, 1994). Scholars disagree as to whether underpricing is good or bad for certain stakeholders. For instance, early-stage investors lose money when the price increases during the first trading day. Underwriters, on the other hand, might aim for underpricing as it simplifies the marketing of the IPO and leads to a higher subscription rate.

"The contribution of the investment bank (underwriter) is to set the introduction price as low as possible, whereas the company has a different view, that is to maintain a good relationship with the existing investors." - Chairperson during a recent IPO.

Scholars are still in disagreement about what causes the price to increase during an IPO. Moreover, most of the underpricing research uses theories on asymmetric information and signaling theory to explain the phenomena (e.g., R. B. Carter & Manaster, 1990; Rock, 1986). According to Certo, Daily, & Dalton (2001) firms that go public can be categorized as either high- or low-quality firms. Whilst it can be argued that the management team is aware of their firm's quality, the outside investors do not have the same insights. This implies that there is an inherent information asymmetry between investors and the firm. To compensate the investors for the risk

that this asymmetry implies, an IPO firm prices its shares at below market value, i.e. underprice to compensate for the risk premium. In most financial research, the common perception is that firms ideally prefer to avoid underpricing because of the economic loss it entails to pre-IPO owners. Thus, high quality firms will aim at bridging the information gap, which can be done by signaling superior quality to the investors. The theory states that if the firm manages to signal its superior quality to investors, it can underprice less.

For a signal of quality to be credible to investors it needs to be in place prior to the IPO. Additionally, it needs to be costly for the firm, and hard to imitate (Certo, Daily, *et al.*, 2001). The two most commonly mentioned signals to mitigate the information gap are information releases, such as the IPO prospectus (Daily, Trevis Certo, Dalton, & Roengpitya, 2008) and the firm's corporate governance systems illustrated by the board of directors (e.g., Chahine & Filatotchev, 2008).

This study investigates the hypothesis that having an effective board will act as a signal of superior quality and affect the extent to which Swedish companies underprice. More specifically, the study focuses on four board characteristics. By drawing on theory, the authors explore if a *smaller board, more independent directors, higher diversity and a higher educational level* will result in less underpricing.

To understand all perspectives on how underpricing and board composition might relate, the study applies a mixed research method. Firstly, by completing a multivariate regression of 316 Swedish IPOs and 1,678 board members from 2014 to 2018 on three of Sweden's main marketplaces, Nasdaq (main market and First North) and Spotlight. Secondly, by interviewing a total of 14 board members and investors. This study finds that there is no statistically significant correlation coefficient between *board size, diversity, educational level* and *underpricing* in a Swedish context. This implies that these board characteristics do not affect the price development of an IPO. Further, the study finds that there is a significantly positive correlation between board independence and underpricing. By combining the results from the interviews with theory, the study develops two explanations to further understand the outcome of the model. The main conclusion is that having an effective board is no longer a credible signal to Swedish investors, but rather it is viewed as a hygiene factor. This finding contributes to further research on underpricing and signaling theory by understanding the dynamics at place on the Swedish market.

To conclude, the study aims at bridging the research gap in how different board characteristics impact underpricing in a Swedish context. Despite years of research, the effect of board structure on underpricing is still not entirely understood by scholars, and to date no previous study has investigated the relationship on the Swedish market. Additionally, very few researchers

have specifically considered how board size, independence, diversity and the educational level of board members affect underpricing. At the same time, researchers argue that corporate governance systems, such as the board, largely differ across countries. Scholars have found that this difference also impact the extent of underpricing (e.g., Aguilera & Jackson, 2003; Shleifer & Vishny, 1997). Furthermore, because Sweden has recently experienced a record amount of IPO activity (Rothstein, 2017), it is especially interesting to understand the country level dynamics in place. In conclusion, the study aims at contributing to research by explaining the influence of board structure in the context of IPO underpricing in Sweden.

2. Theoretical Foundation and Previous Literature

This section explores the existing theories on board structure and underpricing. First, the general IPO process is briefly explained, followed by an exploration of the most common theories in underpricing, information asymmetry and signaling theory. Following this, previous research on board structure is summarized, and how board structure might influence IPO underpricing. Based on the previous literature and existing underpricing theories, five hypotheses are formed that are tested in a quantitative model and qualitative interviews.

2.1 The IPO Process

An IPO is a process through which a company that previously has been privately held, is transformed into a public company (Dalton, Certo, & Daily, 2003). Public companies are typically listed on a stock exchange, where anyone can buy or sell equity in the company. Whilst the reasons for deciding to go public are plentiful, the main motivations are to raise capital for the company to finance growth, improve its leverage ratio, or because private sources of financing are exhausted (Ritter & Welch, 2002; Röell, 1996). Many companies also wish to access a more liquid market for their stock, where shareholders can trade their equity more easily. Other motivations for going public include enhancing company image and publicity, and to increase motivation amongst management and employees (Röell, 1996).

Going public is a process where much value is at stake, and it can take several months due to extended negotiations. However, there are several main steps which are similar in most IPO processes, summarized in *figure 1*.

Figure 1 – The IPO process

This figure shows the typical IPO process (Daily *et al.*, 2008; Dalton *et al.*, 2003; Ellis, Michaely, & O'Hara, 1999).

Decision to go public → Secure underwriter → Prospectus and road show → Setting of price and amount of shares offered → First day of trading
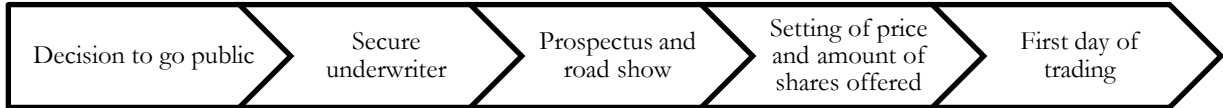
Once the firm has decided to go public, the second step is to acquire the services of an underwriter, usually an investment bank, who will coordinate the IPO process for the firm (Daily *et al.*, 2008; Dalton *et al.*, 2003; Ellis *et al.*, 1999), as they typically have more information about the market conditions (e.g., Carter & Manaster, 1990). The underwriter then drafts a letter of intent, detailing the basis of the relationship with the company (the issuer). Amongst others, these details

include fees, the obligations of the issuer in case of withdrawal from the IPO process, and an agreement for the issuer to cooperate in the due diligence[1] (Daily *et al.*, 2008; Dalton *et al.*, 2003; Ellis *et al.*, 1999).

After the due diligence of the firm is completed, a prospectus is prepared. The prospectus contains a detailed description of the issuer (such as its operations, strategy and board structure) and the securities that will be offered during the IPO (Dalton *et al.*, 2003). What follows is a so-called "*road show*", where the underwriter and the issuer's managers and/or the board of directors market the IPO to potential investors. The road show includes presentations in major cities, meetings with institutional investors, and other marketing activities intended to increase the subscription rate for the IPO (Daily *et al.*, 2008; Ellis *et al.*, 1999).

The final step of the IPO process typically consists of setting the price and determining the amount of shares to be sold (Dalton *et al.*, 2003). The price is usually set by the underwriter together with the management team and the board, using a valuation derived from the due diligence and the future prospects of the firm. Oftentimes, a possible price range or even the final offer price (if it has been set at an earlier time) is already included in the prospectus. This final offer price forms the basis upon which what is commonly called "*underpricing*" is derived, as is discussed in the following section. Finally, at the listing date, the shares are offered at the stock exchange.

2.2 The Underpricing Phenomena

On average, the stock price tends to increase considerably right after it starts trading. Thus, there is a systematic initial return on IPOs that is higher than would be expected. This can be explained by either issuers failing to predict the correct demand for the shares, or it suggests that firms tend to not offer their shares at their fair price, but rather at a discount (R. B. Carter & Manaster, 1990). This phenomenon is called "*underpricing*" (Ibbotson, 1975; Logue, 1973) and has intrigued scholars for many years. Whilst some researchers use the stock return of the first week or even longer time horizons, the most common definition of underpricing is the first-day return. This thesis follows the latter approach, defining IPO underpricing, as the percentage difference between the historical closing price (P_{close}) of the first trading day and the subscription price (P_{offer}) of the IPO (Daily *et al.*, 2008).

$$Underpricing = \frac{P_{close} - P_{offer}}{P_{offer}} * 100$$

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[1] *Due diligence*, in a financial context, is the "*detailed examination of a company and its financial records*" (Cambridge University Press, 2018)

Underpricing has been consistently present whenever companies offer their shares (R. B. Carter & Manaster, 1990). There are, however, considerable differences in underpricing in different regions of the world and across different years (Habib & Ljungqvist, 2001; Loughran & Ritter, 2004). For instance, summarizing several international studies over an extensive period of time, Loughran, Ritter, & Rydqvist (1994) find inter-country differences in average underpricing to be substantial. More specifically, while companies in Austria, Canada, and Chile have an average underpricing between 6% and 8%, Australia, Ireland, and Singapore experience an underpricing above 20%. In China, the average underpricing in the last 25 years has been as high as 145%. In Sweden, the underpricing during the last 35 years has also been substantial, with an average of 25.9%. This is especially interesting compared with the underpricing of its neighbors Denmark and Norway, who had a substantially lower average underpricing in about the same time period (7.4% and 8.1%, respectively). In contrast to these figures, Boulton, Smart, & Zutter (2010) investigated IPO underpricing in several countries in the period between 2000 and 2004. During that time, Sweden experienced an average underpricing of below 6%, whilst the underpricing in Denmark was as high as 14.3%. This illustrates the vast differences in underpricing not only between countries but also during different time periods.

Investing in an IPO is inherently risky. However, Carter & Manaster (1990) claim that the difference between the offer price and the closing price of the first day of an IPO is greater than what can be assumed a "*reasonable*" risk premium would require (i.e., the underpricing is higher than would reflect the risk of the issuer's operations and strategy). Offering shares to the public at less than their objective value essentially transfers pre-IPO shareholder wealth to post-IPO shareholders[2]. Between 1999 and 2000 alone, at the height of the dot-com bubble, the money "*left on the table*"[3] through underpricing amounted to a total of $68 billion in the United States (Loughran & Ritter, 2004). Assuming that this would not be in existing shareholders' immediate economic interest, there have to be other explanations for this widespread phenomenon. A great deal of research on the topic of IPO underpricing has been focused on trying to explain the reasons behind it.

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[2] *Pre-IPO shareholders* can include founders, early investors such as Venture Capitalists or angel investors, members of the management team/board with shares in the company. Furthermore, post-IPO shareholders are new investors, who acquire shares in the company through the IPO.

[3] *"Leaving money on the table"* is an expression commonly used in Finance to describe the underpricing, i.e. "*the difference between the market value of the offering in the aftermarket and the gross proceeds received*" (Ritter, 1984). If the shares of a company are priced correctly, the company receives the entire amount of capital it is supposed to. In the case of underpricing, the company misses out on some of that capital, leaving it "*on the table*".

2.3 Theoretical Foundation: Information Asymmetry and Signaling in the Context of Underpricing

Whilst there have been many theories and attempts to explain the precise source and reason for underpricing, as of yet there is no definite agreement between researchers. A multitude of factors seems to be at play that influence the first-day price increase during an IPO. However, most researchers believe that information asymmetry and in extension signaling theory play a major role in underpricing (Baron, 1982; R. B. Carter & Manaster, 1990; Certo, Daily, *et al.*, 2001; Daily *et al.*, 2008; Rock, 1986).

2.3.1 Information Asymmetry

Information asymmetry in the context of IPO underpricing has been studied almost as long as underpricing itself (Baron, 1982). It occurs when information is private and not entirely available to the public, which leads to different people knowing different things (B. L. Connelly, Certo, Ireland, & Reutzel, 2011). In the context of this study, it refers to how differently informed the issuer, the underwriter, various investors, and other players during an IPO are. For instance, the issuers themselves typically know most about their own firm and future growth potential, whilst the underwriter has the most information about the market and the price the issuer can expect to achieve for their shares. At the same time, the post-IPO investor can be assumed to be the least informed.

There are many different sources of information asymmetry, illustrated in *figure 2*, which can all impact underpricing. Amongst others, researchers have looked at the information asymmetry between the issuer and the underwriter, between the issuer and investors, and between different types of investors (Allen & Faulhaber, 1989; Rock, 1986; Welch, 1989). The main focus of this thesis is the information asymmetry between the issuer and investors.

Figure 2 – Types of information asymmetry

This figure shows the different types of information asymmetry, completed by the authors.
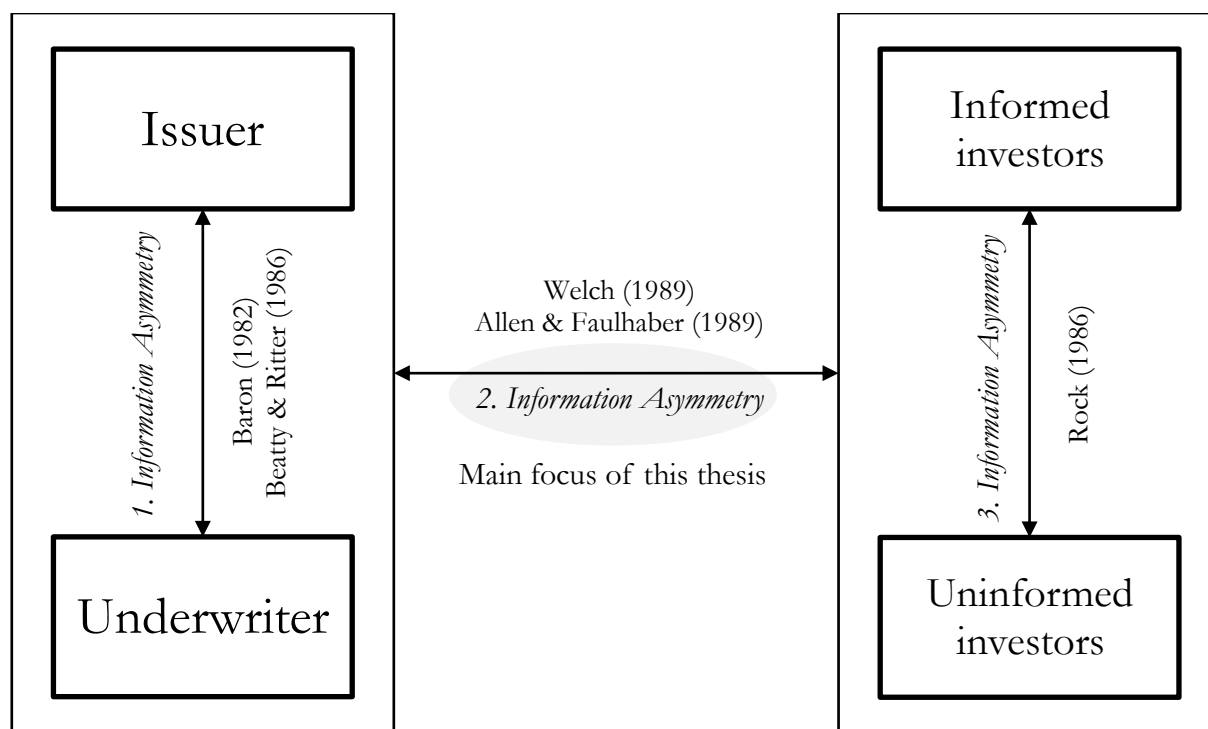
2.3.2 Signaling Theory

Extending the theory on information asymmetry, a considerable amount of researchers have used signaling theory to further study IPO underpricing (e.g., Certo *et al.*, 2001; Daily *et al.*, 2008). In essence, these researchers argue that firms use "*signals*" in order to mitigate information asymmetry and to signal the true quality of a firm to investors (Chahine & Filatotchev, 2008; B. L. Connelly *et al.*, 2011). According to Certo *et al.* (2001) and the general signaling theory, for signals to be effective, they need to be observable by investors and sent prior to the IPO, so that investors can act upon them. Additionally, signaling the quality is supposed to be costly for firms, i.e. hard to replicate, so firms of low quality cannot afford to produce it (Certo, Daily, *et al.*, 2001). According to Daily et al. (2008), the primary mechanism for managers to signal quality during the IPO process is through the prospectus. However, since most firms offer extensive prospectuses today, other researchers have pointed to alternative signals, such as corporate governance structures and mechanisms (Chahine & Filatotchev, 2008). In this paper, the main focus is on the corporate governance system and more specifically, the board structure.

Following Certo *et al.* (2001), *figure 3* summarizes the signaling theory in the context of board structure and IPO underpricing. A firm going public could be either high-quality or low-quality. As the firm itself is aware of its quality, it will try to signal its quality to investors to reduce

the need for underpricing. This perspective, using the board as a positive signal to avoid underpricing, is used when formulating the hypotheses throughout section 2.4.

Figure 3 – Signaling theory as applied in the study

This figure shows how signaling theory affects underpricing during an IPO, summarized theory of Certo *et al.* (2001).

1. A firm plans an IPO. The firm could be either high-quality or low-quality.

2. The firm is aware of its quality, but investors are not. This results in *information asymmetry*, increasing investor risk.

3. To compensate for the risk, the firm is required to offer its shares at a lower price, i.e. to underprice

4. High-quality firms disclose more information or create a good board structure to *signal* their value to investors.

5. The *information asymmetry* for high-quality firms is decreased, reducing the need for underpricing.

Another example of a signal potentially affecting underpricing is the reputation of the IPO underwriter. Citing Carter & Manaster (1990, p. 1045), "*prestigious underwriters are associated with lower risk offerings*", or "*good*" IPOs. In the U.S., they find a significant negative relation between underwriter prestige and underpricing, meaning that more prestige leads to less underpricing. "*Good*" firms want to reveal their quality (the fact that they are a low-risk investment) to the market and thus hire prestigious underwriters. For those prestigious underwriters to maintain their prestige, they only market IPOs of low-risk firms. As a result, underwriter prestige is another positive signal to the market (step four in *figure 3*) whereby using a high-prestige underwriter is a way to decrease information asymmetry. Consequently, the issuer has to price their IPO at less than the fair value, leading to lower underpricing. Carter, Dark, & Singh (1998), amongst others, confirm that prestigious underwriters are associated with less underpricing. Additionally, they find that companies which went public with prestigious underwriters performed better in the long run.

Contradicting some of the earlier mentioned theories, Welch (1989) and Allen & Faulhaber (1989) believe that only "*good*" firms can afford to underprice, leading to higher underpricing in these IPOs. They still focus primarily on the information asymmetry between the issuer/underwriter and the potential investors, and the resulting need for high-quality firms to signal their quality. However, they see the underpricing itself as a signal and base their reasoning

on the long-term view of firms. "*Good*" firms knowingly "*leave money on the table*" in order to signal to investors that they are high-quality and "*leave a good taste in their mouths*" for subsequent seasoned equity offerings (SEOs). As soon as firms are public, the information asymmetry is resolved. This is due to the fact that all future and vital information is required to be communicated to all investors, i.e. through financial reports and press releases, which makes it possible for the market to know a company's true quality. The "*good*" firms can then recuperate the "*money left on the table*" in later SEOs. "*Bad*" firms, however, cannot afford to underprice as much, as their quality will be found out after the IPO and they have no way of recuperating the "*money left on the table*". Welch (1989) even goes as far as suggesting that "*bad*" firms might try to imitate "*good*" firms and underprice. However, they risk being discovered and forego the rewards of the costly imitation, i.e. recuperating the "*money left on the table*" in later SEOs. In summary, "*good*" firms underprice to signal their quality to the market, because low-quality firm cannot afford it and thus voluntarily reveal their (low) quality.

In conclusion, a multitude of different factors affect IPO underpricing and there are many theories which try to explain it. Indeed, it is not even clear in the research community whether underpricing is desirable in the IPO process or not (Dalton *et al.*, 2003; Ritter & Welch, 2002). Daily *et al.* (2008) give the example of pre-IPO shareholders, who arguably might be the least interested in underpricing, as it represents "*money left on the table*" (as mentioned above). However, there might be a rational reason to underprice, even for those initial shareholders[4].

2.4 Previous Research: IPO Underpricing and Board Structure

During the end of the 1990s, researchers extended their exploration of underpricing and began investigating how corporate governance structures might affect IPOs (e.g., Dalton, Daily, Ellstrand, & Johnson, 1998; Finkle, 1998). Some researchers claim that the IPO, through its first-day performance, provides a unique context to understand the relationship between a company's performance and its corporate governance structures (Certo, Daily, *et al.*, 2001; Filatotchev & Bishop, 2002).

Corporate governance is generally defined as the system by which companies are *controlled* and *directed* (Cadbury, 1992). Thus, it is the tool by which a corporation's different stakeholders exercise control over corporate insiders so that their interests are protected. It is intended to ensure

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[4] One example of a rational reason to underprice for initial shareholders is legal liability. The company and initial shareholders are legally liable for any mistakes in their pre-IPO reporting. If, based on possible mistakes, new investors lose money through the IPO, they might sue the company and its initial owners. An underpriced stock, however, guarantees that new investors do not lose money but rather have an initial return on their investment. Eliminating the basis for damages for new investors, underpricing serves as a type of insurance against legal liability (Daily et al., 2008).

that the firm is run in a way that is as *"sustainable, responsible and as effective as possible"* (Kollegiet för svensk bolagsstyrning, 2016, p. 2). Public companies strive for a better corporate governance system to mitigate what is called the agency dilemma, firstly formulated by Jensen & Meckling (1976). The concept describes that because of the ownership structure in public companies, top management (*"the agents"*) are incentivized to act according to self-interests and make wasteful investments. For this reason, the owners (*"the principals"*) need some formal corporate governance structure that monitors the managers and prevents reckless behavior (Jensen & Meckling, 1976). This is where one of the most visible and studied parts of corporate governance comes into play: the board of directors.

Bertoni, Meoli, & Vismara (2014) describe the role of the board as dual. Firstly, to protect stakeholders from the risk that management will make wasteful and excessive investments with firm money. Secondly, the board of directors might give the company a competitive advantage by providing a network of contacts, strategic guidance and a better reputation (Bertoni *et al.*, 2014). In addition, the board of directors have the mandate to hire, fire and compensate senior management and to solve conflicts of interests (Baysinger & Butler, 1985). In Sweden, a firm is recommended not to have more than one person on the board who is also part of the top management of the firm or its subsidiaries. Finally, it is suggested that a majority of the board members should be independent towards both the company and its largest owners (Kollegiet för svensk bolagsstyrning, 2016).

To conclude, an effective corporate governance structure can lead to better control and sense of strategic direction for the company, decreasing the agency problem. The board has primarily two different roles; to protect shareholders' interests and to provide strategic guidance. The following sections will discuss how corporate governance systems differ across nations.

2.4.1 National Differences in Corporate Governance Systems

Lately, researchers have begun to acknowledge that corporate governance systems differ across nations, because of differences in the legal structure and economic systems (e.g., Aguilera & Jackson, 2003; Shleifer & Vishny, 1997). These wide international differences in corporate governance systems also affect underpricing. For instance, Boulton *et al.* (2010) examine IPOs across 29 countries and find underpricing to be higher in countries with corporate governance systems that favor the position of investors relative to company insiders. Their conclusion was that firms in countries that give investors more influence tend to underprice more to create an excess demand for the offer. With an excess demand, the ownership gets more diluted. Moreover, with more outside owners, each investor has a relatively lower ownership stake which decreases the investors' incentives to monitor the behavior of company insiders. Boulton *et al.* (2010, p. 1)

describe it as: *"underpricing is the cost that insiders pay to maintain control in countries with legal systems designed to empower outsiders".* Another example of how country-level differences in corporate governance affect the performance of an IPO are Bell, Moore, & Filatotchev (2012) who researched foreign IPOs, i.e., firms that make their IPO outside of their home market. Their result indicates that foreign IPOs perform better when they originate from home countries that provide stronger protections to minority investors, such as Central Europe. Moreover, they find that the capital markets in the U.K. emphasize the importance of home country legal protection and board independence more than U.S. capital markets do.

Lubatkin, Lane, Collin, & Very (2005) compare the corporate governance systems in Sweden, France, and the U.S., and claim that the Swedish society is highly permeated by a culture that emphasizes *"lower power distance, collective responsibility, cooperation, and egalitarianism"* (p. 875). They argue that the U.S. culture on the other hand maintains individualism, where typical U.S. managers enter organizations to act according to self-interest, because *"they see themselves, and not their place of employment, as ultimately being responsible for their own security, advancement, and wealth"* (Lubatkin *et al.*, 2005, p. 875). In Sweden, organizations are more based on values, emphasizing the collective efforts and cooperation. Lubatkin *et al.* (2005) argue that with managers acting less in self-interest the need for monitoring and enforced compliance decreases (Lubatkin *et al.*, 2005). This is visible through Sweden's long tradition of self-regulation of the corporate governance system, which is different to the stricter rules applied in the U.S. (Lekvall, 2009).

In conclusion, the historical difference in culture, economic and legal systems implies that countries put different emphasis on corporate governance regulation. There is still a notable diversity in governance practices across countries. Most importantly, the differences have been found to affect the underpricing phenomena. This supports the importance of understanding the implications of specific governance systems (*such as the board*) in particular countries (*such as Sweden*) have on the IPO's performance measured by underpricing. According to the World Corporate Governance Index, Sweden is amongst one of the 22 highest ranking countries in terms of governance (WCGI, 2018), which makes Sweden an especially interesting country to base the study on. Moreover, since the board of directors is the most visual corporate governance structure, it is the factor that can most easily be used to signal superior quality towards investors.

2.4.2 IPO Underpricing as a Proxy for Firm Performance

A few researchers have attempted to explore the relationship between board composition and performance. As this has shown inconsistent results, researchers have instead tried to investigate the relationship through the use of more specific contexts as proxies for firm performance, like

executive turnover, CEO compensation or the IPO process (Certo *et al.*, 2001; extending on Core, Holthausen, & Larcker, 1999; Weisbach, 1988).

In the following sections, four board characteristics that prior researchers have found to impact firm performance[5] will be presented. Given the information asymmetry and signaling theory, when a board characteristic is found to have a positive effect on firm performance, it can be seen as a positive signal towards investors, and can, therefore, be hypothesized to reduce underpricing. As an example, if smaller boards lead to higher performance (negative correlation), smaller boards send a positive signal to investors about the firm's value and thus imply less IPO underpricing (positive correlation), as illustrated in *figure 4*.

Figure 4 – Firm performance as a proxy for underpricing.

This figure illustrates how firm performance as a proxy for underpricing is for instance related to board size.

Positive correlation between board size and underpricing
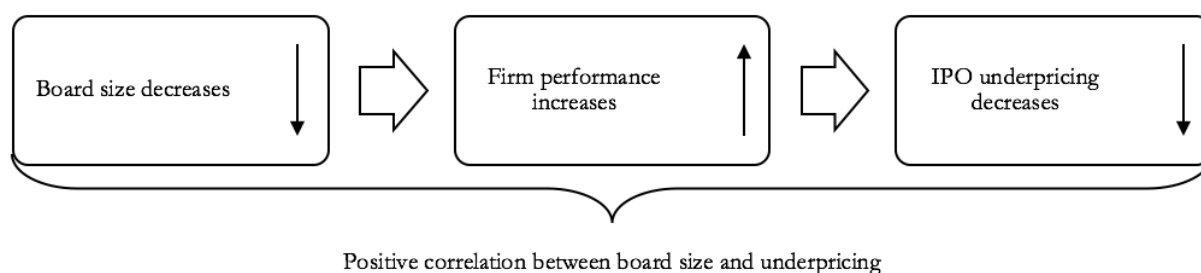
The following sections look at *board size*, *the percentage of independent directors*, *board diversity* and *the educational level* and formulate hypotheses regarding underpricing. Wherever possible, board characteristics will be directly linked to underpricing in accordance with prior research. In other cases, previous research on the link between board characteristics and firm performance will be used as a proxy-connection to underpricing, following the signaling theory.

2.4.3 Board Size

Desender (2009) claims that board size is one of the most important factors affecting an optimal board composition. However, scholars do not agree on which size is ideal for firm performance or board effectiveness. Some researchers, for instance, claim that an optimal board consists of a maximum of seven to eight board members (Lipton & Lorsch, 1992). Jensen (1993) claims that keeping a small board will increase board performance and the quality of decision making. The

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[5] Where performance has been measured using traditional measurement methodologies, such as ROA and Tobin's Q. Where *ROA* refers to Return on Assets, defined as Net Income/Total assets (Brealey, Myers, & Marcus, 1995). Furthermore, *Tobins Q,* is often described as the ratio between Assets market value/Assets replacement value (Hayashi, 1982).

average board size differs, both across industries and countries. The Swedish Companies Registration Office ("*Bolagsverket*") does not make any general recommendations on board size but states that in public companies, the board must consist of at least three board members (Bolagsverket, 2018). Looking at the top 150 largest companies in Sweden, the average board consists of 9.7 directors. In contrast, boards of the largest companies in France have an average size of 14 members, and in Germany, the average is 16 (Spencer Stuart, 2015). However, firms raising money through an IPO have an average board size that is smaller than that of the 150 largest companies. In Swedish mid-cap companies, the average number of board members is 6.5 (PwC, 2016).

According to traditional agency theory, having larger boards might imply a better monitoring effect as there are more eyes on the management. For instance, Gales & Kesner (1994) researched firms in bankruptcy and find that these on average had a smaller board size compared to other firms, both before and after the bankruptcy. Moreover, Alexander, Fennell, & Halpern (1993) find that in general, larger boards were more effective. This is supported by Dalton, Daily, Johnson, & Ellstrand (1999), finding that larger boards were positively associated with firm performance. However, some scholars fail to find a link between firm performance and board size altogether (J. T. Connelly & Limpaphayom, 2004).

However, in general, most researchers find smaller boards to be more effective, contradicting the agency theory. Lipton & Lorsch (1992) argue that a board of more than ten directors pose a threat to the effectiveness of the firm's decision-making. For instance, because of the time constraint boards are often faced with, directors in too large boards are not always given enough space to express their opinions. In Finland, Eisenberg, Sundgren, & Wells (1998) find that a smaller board size is correlated with a higher firm performance. Alongside with Lipton & Lorsch (1992), they argue that larger boards have significant coordination issues which ultimately affects company performance. Yermack (1996) confirms this, concluding that a smaller board size is related to a higher firm value. In addition, Conyon & Peck (1998) prove that this empirical relationship holds across boards in the U.K., France, Netherlands, Denmark, and Italy.

Dolvin & Kirby (2016) explore the effect board size has on underpricing in the U.S. and fail to find a significant correlation, similarly to Yatim (2011). This is in contrast with Certo *et al.'s* (2001) finding that smaller boards increases the underpricing in a sample from the 1990s.

To summarize, most research seems to support that a smaller board size has a positive effect on performance. However, the research linking board size to underpricing is mixed. Arguing alongside signaling theory, firms with smaller boards should be perceived as higher-quality firms and be more effective in decision-making and coordination. Thus, a firm might actively aim for a

smaller board size to decrease the need for underpricing. Thus, it is hypothesized that a smaller board size should imply less underpricing, meaning that board size is positively correlated with underpricing.

H1: *Board size is positively correlated with underpricing.*

2.4.4 Board Independence

The concept of board independence has been widely discussed since the famous Cadbury report was released in 1992. In the report, an independent director is defined as someone who is *"free from any business or other relationship which could materially interfere with the exercise of their independent judgment"* (Cadbury, 1992, p. 57). Thus, a truly independent board member is someone that is free from ties to the company, both financial and operational.

However, because of country-specific legislation and codes of conducts, no true universal definition of board independence exists. Baum (2016) presents a list of factors used to define independence (*table 1*) and argues that in some countries these criteria are more important than in others. It is rare that a country includes all these criteria in their independence definition. In the U.S., the conventional view is that board independence through its monitoring benefit is a way to solve the agency problem. Because of this, independence is often defined as directors being independent of the top management team. In contrast, in Central and Northern Europe, and Asia, the emphasis is often to protect the minority shareholders against block holders. Hence, countries in these areas usually emphasizes independence from the majority owners (Baum, 2016).

Table 1 – Independence criteria

This table shows the criteria of independence, completed based on Baum (2016).

Independence criteria	Explanation
Independent of the CEO	Independent of the CEO and their immediate family, extended family and/or friends.
Independent of the company itself	Independent of the company and its parent company, subsidiary companies or companies that are part of its corporate group.
Independent of the controlling shareholder	Independent of the majority shareholder, and or of a significant shareholder.
Independent of other corporate stakeholders	Independence of other corporate stakeholders such as creditors, suppliers and employees.
Independent of a specific corporate transaction	Independence of a specific corporate transaction in which the director has an interest.

In Sweden, the largest marketplace is Nasdaq OMX followed by Spotlight (former "*Aktietorget*"). On Nasdaq, the main rule is that at least one of the board members should be

independent towards both the company and the largest owners. In addition, not more than half of the board can be comprised of top management (Nasdaq, 2018). All firms going public on Nasdaq need to disclose information about the board members status as either independent or dependent in the IPO prospectus. A board member is defined as independent if they are *independent of top management and the company itself* and *independent towards the firm's largest owners.* To be independent of the company means to not have been employed by the firm during the last three years, to not have accepted any non-board-compensation from the company[6], and to not have a family relationship with someone that is or has been the CEO of the company during the last three years[7]. The second independence criterium requires *the board member to be independent of the firm's largest owners*, defined as owners with an equity stake of more than 10%. Henceforth, this is the definition of independence that will be used throughout the paper.

Outside board directors are believed to generate better firm performance, unbiased monitoring (Dalton *et al.*, 1998), and valuable outside expertise (Du Plessis, Hargovan, & Bagaric, 2005). In fact, many claim that a board with more independent directors is something to strive for (Dalton *et al.*, 1998). This has led to an increase in the number of independent board members worldwide. In 2015, Swedish listed companies had an average of 62.0% independent members on the board of directors, compared to 84.0% in the U.S. and 60.5% in the U.K. Sweden is the country with the lowest percentage of independent directors on boards across Scandinavia, for more independence statistics see *table 2* (Spencer Stuart, 2015).

Table 2 - Percentage of independent directors across countries

This table shows the percentage of independent directors across some countries (Spencer Stuart, 2015).

Country	BE	IT	FR	DE	SE	DK	NO	FI	CH
Percentage of independent directors on public boards	43.3%	49.2%	58.0%	60.0%	62.0%	76.0%	80.0%	84.0%	88.3%

Despite the increase in the number of independent board directors and the advocacy for independence in the business sphere, the results from studies examining how board independence affects firm performance are mixed. For instance, some research indicates that boards with less independent directors are more effective. For instance, Yammeesri & Kanthi Herath (2010) find

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[6] Other than the following: i) compensation for board or board committee service; ii) compensation paid to a Family Member who is an employee (other than an executive officer) of the company; or iii) benefits under a tax-qualified retirement plan, or non-discretionary compensation.

[7] For a more complete list of the requirements, see Appendix 11.1: Nasdaq marketplace Rule 4200(a)(15) – "*Definition of independent director*"

that having more inside board members increase firm value. Moreover, Agrawal & Knoeber (1996) argue that board composition in itself does not affect firm performance. Hermalin & Weisbach (1988) do not find any correlation between firm performance and the percentage of outside directors, which is confirmed in an extensive study by Bhagat & Black (1998).

On the other hand, there are a number of studies finding a positive correlation between board independence and company performance (Baysinger & Butler, 1985; Ezzamel & Watson, 1993; Rosenstein & Wyatt, 1990; Schellenger, Wood, & Tashakori, 1989). For instance, Ezzamel & Watson (1993) find that more independent directors increased firm performance in the U.K. Furthermore, Rosenstein & Wyatt (1990) researched the stock markets reactions to independent board member appointments and find a significant positive share price reaction. Moreover, Bhojraj & Sengupta (2003) find that having more independent board directors increases the firm's credit rating of 2098 sample firms.

In 2008, Chahine & Filatotchev made an effort to understand what might mitigate the information asymmetry during an IPO, and thereby reduce the underpricing. By researching IPOs in France, they looked at which signals firms could use to illustrate the firms' true value to the outside and to the uninformed investor. Both a certain degree of information disclosure (e.g., in the form of press releases and the prospectus) and an independent board is found to decrease the information asymmetry during an IPO, which implies less underpricing (Chahine & Filatotchev, 2008).

In addition, Filatotchev & Bishop (2002) find that having a board with more independent directors reduced the initial return of an IPO. The researchers argue that this might be because of the outside directors' extensive networks outside of the organization, which strategically benefits the firm in attracting necessary financial backing during the IPO. This is in line with (Gulati & Higgins, 2003), concluding that the larger of a professional network a board has, the stronger the firm might signal higher firm quality, and the easier it is to attract a more reputable investor. Along the same line, Gupta & Fields (2009) studied the importance of board independence from the viewpoint of an investor by analyzing the market's reaction when a board member resigns. They find that investors react more negatively when an independent director resigns than when an inside director does.

On the contrary, Certo *et al.* (2001) examined over 700 IPOs in the U.S. and find that having more independent directors on the board is positively associated with IPO underpricing. Thus having more independent directors increased the underpricing. This is explained by arguing that

growth-oriented firms[8], such as most firms undergoing an IPO, are better strategically led by inside directors that have a superior understanding of the firm and potential growth opportunities. Other studies finding a positive relationship between board independence and underpricing include Darmadi & Gunawan (2013), looking at IPOs in Indonesia, and Hearn (2012), exploring IPOs in South Africa. There have also been studies showing no correlation between underpricing and board independence, such as Yatim (2011).

Some scholars have tried explaining the puzzling differences in research by claiming that the importance of independent directors differs depending on company age and maturity. For example, Geletkanycz & Hambrick (1997) suggest that independent directors might increase the exchange of information between younger IPO firms and the more established players. Bertoni *et al.* (2014) confirm this when looking at independent boards in France, Germany, and Italy and exploring how independent directors affect the firm's valuation during an IPO. One of their key conclusions is that the effect of independent directors on firm value is U-shaped[9] with age.

Despite the interest from scholars and the business sphere, few studies have examined how board independence affects IPO underpricing. Moreover, because the definition of independence differs across countries, it is important to assess the effect on a country level. Arguing alongside signaling theory, having a more independent board should signal that the firm has access to a larger external network, and have less biased monitoring. Thus, a more independent board should reduce the information asymmetry of the firm's true quality to outside investors during an IPO, and therefore reduce the underpricing (e.g., Chahine & Filatotchev, 2008; Fama & Jensen, 1983).

H2a: *The percentage of board directors independent of company management will be negatively associated with IPO underpricing.*

H2b: *The percentage of board directors independent of largest owners will be negatively associated with IPO underpricing.*

2.4.5 Demographic Diversity in Boards

The importance of diversity is an intensely discussed topic in Swedish media. With gender-neutral teaching in schools, relative equal parental leave and increased female representation on boards and in leading positions, Sweden is often regarded as one of the most equal countries in the world (SCB, 2018). For instance, in 2017 Sweden was awarded the title as the most equal country in the

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[8] In this context a *growth-oriented* firm is defined as a firm that has an increasing growth in revenues above the industry average. Usually this is younger firms that operates in a blooming market.

[9] A *U-shaped* distribution means that the extremes behave similarly to each other meanwhile the values close to the center behave differently.

EU, scoring 82.6 out of 100, with the average being 66.2 (European Institute for Gender Equality, 2017). In 2017, 33% of all board members in Swedish publicly traded companies were women, which is high in international comparison (Allbright, 2017). Besides gender equality, the Swedish population has recently experienced a considerable increase in foreign citizens (Dagens Nyheter, 2018), which augments the importance of understanding how national diversity on boards might affect firm value.

Given that diversity permeates the Swedish society, it is especially interesting to understand how investors on the Swedish marketplaces view companies with more diverse boards going public. Furthermore, with more women and minorities taking place on boards and top management positions, it is increasingly interesting to understand how board members and investors perceive diversity.

Diversity is generally divided into two parts; *demographic* and *cognitive diversity*. Demographic diversity, also referred to as observable diversity, is often described as age, race, gender, and ethnicity (Erhardt, Werbel, & Shrader, 2003). Cognitive diversity, on the other hand, is, for instance, education, perceptions, knowledge, and values (Erhardt et al., 2003; Maznevski, 1994). Most studies focus on demographic diversity as it is easier to measure and involves less bias (Erhardt *et al.*, 2003). Moreover, according to Ruigrok, Peck, & Tacheva (2007), to find a relationship it is important to consider several diversity dimension simultaneously (Ruigrok *et al.*, 2007). For this reason, the study focuses on three forms of observable diversity: age, nationality, and gender. Furthermore, nationality is used as a proxy for ethnicity as the former is more observable and suitable for a quantitative analysis. These three factors are included in a *diversity variable* described more in section 4.1.2.2.

According to social theory, people have a tendency to group themselves with others exhibiting similar traits and characteristics (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Some researchers claim that groups of people demonstrating more similarities usually express fewer conflicts and a greater overall performance (Timmerman, 2000). Having more conflicts can affect performance which was proved by Maznevski (1994) confirming that diverse decision-making groups perform less well than homogeneous ones do. However, there can be different kinds of conflicts in work-related groups. For instance, Pelled, Eisenhardt, & Xin (1999) find that group diversity in professional environments might affect performance through two kinds of conflicts; *task conflict* and *emotional conflict*. A task conflict is when the group members disagree on task issues, such as the budget, future strategy, or internal processes. In contrast, emotional conflicts are characterized by relational conflicts, often including frustration and anger (Pelled *et al.*, 1999). Most times emotional conflicts lead to hostile environments and thus negatively affect performance

(Turner *et al.*, 1987). Pelled *et al.* (1999) argue that task conflicts can affect performance positively, as it is valuable to discuss budgets, strategy, goals and alike to find optimal solutions. Thus, this illustrates when diversity can be valuable and constructive. On the other hand, emotional conflict always affects performance negatively (Pelled *et al.*, 1999).

Although diversity in work groups can evidently prove both rewarding and challenging, it is often regarded as a means for innovation and as an important source of a greater knowledge base, ultimately leading to more creative and competitive firms (Watson, Johnson, & Merritt, 1998). Furthermore, it is a way to improve organizational value and performance (Kang, Cheng, & Gray, 2007). Several extensive studies have looked at the relationship between board diversity and firm performance, such as Erhardt *et al.* (2003). By analyzing 127 large companies in the U.S. from 1993 to 1998 they find that boards with more diverse members, in terms of gender and minority representation, were linked to higher firm performance. The result is explained by suggesting that diversity within a board of directors might impact the group dynamics positively and hence improve decision making. In addition to increased innovation and creativity (D. A. Carter, Simkins, & Simpson, 2003), greater diversity in the boardroom has been found to promote more global relationships and increase the number of independent board directors (Kang *et al.*, 2007). Furthermore, Bernardi, Bean, & Weippert (2002) argue that gender diversity on boards might improve the corporate governance of the company, and lead to a competitive advantage.

2.4.5.1 Gender Diversity

In 1900, history was made when the first woman was appointed as a board member in the U.S. (Larcker & Tayan, 2013). Since then, female board directors have increased in numbers, but are still in minority in most board constellations (Daily, Certo, & Dalton, 1999). Bilimoria (2000) argues that the reason for this slow increase might be that women as minority board members are at risk of sexual biases, tokenism[10] and stereotyping. In the late eighties, Heilman, Block, Martell, & Simon (1989) explored how women are perceived as leaders compared to their male counterparts, drawing from work by Schein (1973) and Basil (1972). Their study suggests that stereotypes about women are deeply rooted and shared within organizations. For instance, they find that male leaders are often ranked higher on leadership skills and managerial abilities compared to female managers. Moreover, although women are rated higher on performance and interpersonal skills than their male colleagues, they are, in general, rated lower on management potential. This illustrates a

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[10] The theory of tokenism explains how lonely minorities, "*tokens*", are affected of and affects the rest of the group's behavior, relations and preconceived ideas. The group's majority typical behavior becomes enhanced, meanwhile the person in a minority position becomes a representor for their group and thus becomes more visible. The result of this is that the person's mistakes and successes become more visible (Kanter, 1977).

discrepancy between the perception of female traits and managerial skills often found in professional settings (Heilman *et al.*, 1989).

From a finance and profitability perspective gender equality is of particular interest, as firms which have good gender diversity on average achieve higher economic performance than their peers (Desvaux, Devillard-Hoellinger, & Baumgarten, 2007). For instance, in the highly cited article by Adams & Ferreira (2009), it is suggested that women's board participation has a significant impact on the board outputs and firm outcomes. The study examines board members in the U.S. and concludes that boards with better gender diversity allocated more time to monitoring. Furthermore, CEOs in firms with more women on the board tend to have more equity-based compensation and are thus more sensitive to stock performance (R. B. Adams & Ferreira, 2009). Campbell & Mínguez-Vera (2008) investigated gender diversity on boards in Spain and find that having more women on the board has a positive effect on firm value. However, there are also studies that do not find any correlation between firm performance and gender diversity on public boards, such as (Rose, 2007).

2.4.5.2 National Diversity

The place where an individual is born often reflects where the person has spent the most formative years of their life. Oftentimes, a person's national origin causes differences in cultural patterns of thinking, feeling and acting (Nielsen & Nielsen, 2013). The idea that nationality affects cultural perceptions is not new. During the 70s, Hofstede explored the cultural differences between countries across four dimensions[11], with the conclusion that because of historical differences in social and economic policy as well as work policies countries exhibit different cultures which affect an individual's perception and views (Hofstede, 2011). As argued before, board members that are more similar, like those with the same national heritage, might find themselves in fewer emotional conflicts (Pelled *et al.*, 1999) leading to a more effective board work. However, companies with less national diversity might exhibit less innovation, which negatively affects performance in the long-term (Watson, Johnson, & Zgourides, 2002).

There are few studies looking at national diversity amongst the board of directors and its effect on performance. To the knowledge of the authors, no research has linked national diversity with underpricing. Nielsen & Nielsen (2013) find that having more national diversity has a positive effect on firm performance. Moreover, this effect is found to be stronger in highly internationalized firms, and amongst teams that spent longer time on the board. Although only a few researchers link national diversity on boards to performance, in the same fashion as gender, national diversity

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[11] The original four dimensions are: Power distance, Individualism vs Collectivism, Uncertainty Avoidance, Masculinity vs Femininity. Later, Long-term Orientation and Indulgence vs Restrain was included (Hofstede, 2011).

means that companies gain a variety of perspectives, leading to higher innovation and creativity. But at the same time it can result in more conflicts, and similar to women, national minorities are also at risk of tokenism and stereotyping (Bilimoria, 2000; Pelled *et al.*, 1999).

2.4.5.3 Age Diversity

Whilst gender and nationality are often associated with diversity, age is less frequently discussed. Recently, however, more people in academia and the business sphere have begun acknowledging the importance of increasing the number of young board members (PwC, 2018; StockholmDirekt, 2015). Among the S&P 500 companies, there are more directors aged 75 or older than there are directors aged 50 or below. Furthermore, according to PwC's annual corporate director survey, 90% of board directors believe that age is important, even more so than gender, race and other forms of diversity (PwC, 2018). Kang *et al.* (2007), explored board diversity in terms of gender and age on Australian boards, finding that larger boards tend to exhibit more age diversity. Furthermore, they find that age diversity largely differs across industries.

Looking at the dynamics in work groups, Pelled *et al.* (1999) find that age diversity is negatively associated with the emotional conflict (as referred to above). Thus, having a more diverse board in terms of age could mean that less emotional conflicts arise. In turn, this means that there is more focus on the task-related issues, thus increasing the performance. This result is explained by suggesting that age often is related to career progress. Hence, when a group showed greater age diversity, less conflict arose related to competition for promotions and recognition. Other studies, such as Wagner, Pfeffer, & O'Reilly (1984) explored how age diversity affected turnover in Fortune 500 companies, finding a weak positive correlation. This was later supported by Jackson *et al.* (1991).

However, certain scholars argue that since diversity in age implies different stages of aging and the experiences related to these, it might also lead to divergent attitudes. For this reason, more conflict could be expected in groups exhibiting a greater difference in age (Wagner *et al.*, 1984). In fact, in a study by Jehn, Northcraft, & Neale (1999), it was found that having more diverse boards in terms of age increased the group's conflict.

Because of the inconclusive research in the field of age diversity, it is relevant to further study how differences in age amongst board members might affect the outcome of an IPO. In Sweden, some call for more age diversity on boards (e.g., the association "*Fler unga*"). The main reason for this is to include perspectives brought by the younger generation in terms of technology and the digital transformation. Moreover, arguing along the line of Pelled *et al.* (1999), age diversity might decrease emotional conflicts in professional workgroups. For these reasons, it is reasonable

to believe that age diversity might increase the effectiveness of the board and will be viewed positively by investors during an IPO.

2.4.5.4 Diversity and Underpricing

Nielsen & Nielsen (2013) argue that the impact of diversity on company performance is highly dependent on context. Although sufficient studies have explored how diversity might affect the bottom line, very few have looked at the effect diverse boards might have during an IPO. The few existing studies mostly relate to gender diversity. For instance, (Reutzel & Belsito, 2015) made an attempt to look at investors' reactions to more gender equal boards prior to an IPO in the U.S. between 1997-2007. They find that investors, in general, reacted negatively to more women on the board. However, when the Sarbanes-Oxley act was implemented in 2002 the authors saw that the investors' reaction became less negative towards female board directors.

In terms of equality, Sweden stands out internationally. The public debate constantly asks for more diverse boards in Sweden, and some debaters even claim that there should be a quota on gender representation to speed up the process. At the same time, researchers such as Kang *et al.* (2007) argue that studies on board composition and diversity are hard to generalize across national borders, due to different governance systems, regulatory and economic environments as well as cultural differences, and size of capital markets. Moreover, close to no research has focused on the effect diversity has on the initial return of an IPO. Because Sweden is one of the most equal countries in the world, with an increasingly more diverse workforce, it is of special interest to understand if this influences the underpricing phenomenon. Since equality and diversity permeate the entire Swedish society, it might arguably be that Swedish investors prefer more diverse boards and believe that they entail performance benefits. Again, taking the perspective of information asymmetry and the signaling theory, the hypothesis is that more diverse board representatives will increase investors perception of the firm's quality, and therefore reduce the underpricing during an IPO.

H3: *A board with higher diversity in terms of age, gender and nationality will be negatively correlated with IPO underpricing.*

2.4.6 Education

According to Holland, Chait, & Taylor (1989), the competence of board directors is one of the main factors contributing to the board's effectiveness. However, since competencies are hard to observe and measure, scholars traditionally use the educational level as a proxy for competence (e.g., Maehler *et al.*, 2013). The authors are aware that this proxy might be flawed since education

does not fully capture the skillset of the board members (Desjardins, 2003). However, due to the issues in measuring competence in quantitative studies, educational level is used as a proxy for competence. Moreover, the variable's strength is later explored in depth using qualitative research.

The board member's educational level, or competence, and the impact they might have on performance has not been sufficiently researched. Bhagat, Bolton, & Subramanian (2010) explain that during the process of creating a board, the potential board members have both observable and non-observable skills, where education often serves as a qualification benefit to limit the risk of hiring directors without sufficient competences. Bantel & Jackson (1989) looked at innovation in U.S. banks. They find that the banks that are more innovative had a top management team that was more educated and diverse in terms of functional areas of expertise. The conclusion is that higher education and functional diversity increases the managers' level of creativity. Moreover, they suggest that top managers with higher education are better at processing information and adapting to changes in firm direction. Jalbert, Rao, & Jalbert (2002) examine the educational background of CEOs in U.S. firms and find that most CEOs have at least an undergraduate degree and about half have earned a graduate degree. Darmadi & Gunawan (2013) looked at how board members' education affects firm performance in Indonesia. Similarly to Jalbert *et al.* (2002), they suggest that the education of a board and the CEO matters for firm performance.

Overall, the research suggests that there is a positive link between education of the board of directors and firm performance. Because of this, the hypothesis predicts a negative correlation between the educational level and IPO underpricing.

H4: *The educational level of the board of directors will have a negative correlation with underpricing.*

3. Research Design and Hypotheses

This study is based on a mixed research method. Thus, it aims to understand the underlying relationship between board composition and underpricing using both statistical data analysis and qualitative semi-structured interviews. The use of mixed method design when studying the same phenomenon is commonly called a triangulation methodology, which was first defined by Denzin in 1978 but dates back to military practices from the second world war (Jick, 1979). Using both a qualitative and quantitative element means that one can overcome some of the limitations of the respective research methodologies. For instance, when generalizing numerical results through the use of cultural models, behaviors, and feelings it is possible to get a more comprehensive and rich result (Jemna, 2016). The use of statistical models and large data sets still constitutes the most common practice in financial research (Gippel, 2013), although an increasing body of researchers has begun discussing the benefits of a mixed research design (Kaczynski, Salmona, & Smith, 2014; Tashakkori & Creswell, 2007). Despite the fact that so few within financial academia adopt a qualitative method, some pioneering work within financial research, such as Lintner's (1965) famous study on dividend policy, initially started out as qualitative studies (Kaczynski *et al.*, 2014).

One of the more common dilemmas associated with statistical research is the inability to explain the relationship between variables, especially what is called an intervening variable, which affects the independent and in turn the dependent variables (Bryman & Bell, 2011). For instance, it is possible to use observable data to find the statistical relationship between gender (independent variable) and underpricing (dependent variable), but it is hard to use quantitative research methods to understand the underlying reason for this relationship. Thus, qualitative research might further explain the relationship between variables, and provide more comprehensive results. Moreover, the qualitative results can aid in understanding the social world as it is interpreted by the study's participants (Bryman & Bell, 2011).

Hence, because of the wide variation in result shown in previous studies looking at the underpricing phenomena, this study aims at analyzing the relationship at a deeper level using a mixed research method. As derived in the literature review, five hypotheses are analyzed in the following sections.

Hypothesis 1: *Board size is positively correlated with underpricing.*

Hypothesis 2a: *The percentage of board directors independent of company management will be negatively associated with IPO underpricing.*

Hypothesis 2b: *The percentage of board directors independent of largest owners will be negatively associated with IPO underpricing.*

Hypothesis 3: *A board with higher diversity in terms of age, gender and nationality will be negatively correlated with IPO underpricing.*

Hypothesis 4: *The educational level of the board of directors will have a negative correlation with underpricing.*

The study uses a sequential explanatory strategy, meaning that the first phase is categorized by a quantitative data collection in order to explain the link between board characteristics and underpricing. In a second phase, the phenomenon is deeper investigated through the use of semi-structured interviews. The subsequent section will describe this approach in more detail by first explaining the data selection and the statistical methodology. This is followed by an explanation of the selection of interview participants and the qualitative method design.

Figure 5 – The research design.

This figure shows an overview of the research design, based on Creswell (2013).

4. Quantitative Method

The following section starts by describing the sample selection and data gathering process. Subsequently, the variables are introduced explaining how they are calculated and why they take their current form. After this, summary statistics along with univariate and bivariate analyses of the variables is carried out. Lastly, the initial multivariate regression model is shown which will form the basis of the results section.

4.1 Sample Selection and Data

As this thesis investigates the influence of board structure on IPO underpricing, both firm-specific data and board specific data are needed. Due to the limited scope of this thesis, it only examines companies that went public in Sweden between January 1, 2015, and July 15 of 2018, a period characterized by a record IPO activity. In the context of this study, solely focusing on Sweden has several advantages. For instance, corporate governance regulations can vary heavily between countries, leading to inter-country differences in board structure. Additionally, as mentioned in section 2.4.4, the criteria for what qualifies as independent board members are different across countries.

4.1.1 Sample Collection

The data-gathering process started with a full list of all Swedish IPOs on NASDAQ (main market and First North) and Spotlight between 2015 and mid-July of 2018, resulting in 507 data points. July 15, 2018, was chosen as the end date as there were many IPOs at the beginning of 2018. Since only first-day closing prices were concerned, there was no reason to disregard the entire year of 2018. Furthermore, IPOs from Nordic Growth Market (NGM) are excluded from this study, since their prospectuses are oftentimes unavailable. Subsequently, IPO-specific and firm-specific data, as well as data on board members are gathered. Due to various factors, detailed at the end of this section, several IPOs are excluded from the sample, resulting in a final sample size of 316 companies.

As for the IPO data, *table 3* contains a list of all data points collected. First, a list of IPOs within the specified time period was downloaded from Bloomberg. However, around half of the companies were missing from the data sample as the Bloomberg data proved not to be exhaustive. Therefore, the remaining data observations were manually collected in a structured way. The reference point were official lists of IPOs from the stock exchanges (Nasdaq and Spotlight). These newly added companies were double checked online to make sure that they were also traded on, for instance, Avanza. In addition, once all companies were included in the sample, the offer and

closing prices were collected manually. These were used to calculate IPO underpricing in cases where the underpricing variable was not provided by Bloomberg. As described in section 4.1.2.1, IPO underpricing forms the dependent variable in the final model, whilst stock market return, firm age, and VC/PE backed are used as control variables.

Table 3 – IPO-specific data points

This table illustrates the IPO-specific data points that were collected.

Data point	Description	Source
IPO company	Name of the company going public	Bloomberg and manually extracted from the NASDAQ and Spotlight official lists, double-checked against Avanza
IPO date	Date of the IPO	Bloomberg and manually extracted from the NASDAQ and Spotlight official lists, double-checked against prospectus
Stock market return	Daily OMXS30 return (%)	Yahoo Finance
Offer price	Subscription price ahead of the IPO	Hand-picked from company prospectus and news articles
Closing price	Historical closing price of the stock at its first day of trading	Hand-picked from NASDAQ and Spotlight unadjusted official lists
Underpricing	Percentage difference between closing price and offer price of the IPO. $$\text{Underpricing} = \frac{P \text{ close} - P \text{ offer}}{P \text{ offer}} * 100$$ Underpricing is explained in more detail in the dependent variable description in section 4.1.2.1	Bloomberg and calculated manually from *offer price* and *closing price*

Firm-specific data points are described in detail in *table 4*. The industry classification of IPO companies was to a large extent extracted from Bloomberg and then completed manually. The other data points were entirely hand-picked based on IPO prospectus. *Firm age* and *VC/PE backed* are later used as control variables, whilst *industry* is used in the fixed effects analysis described in section 5.

Table 4 – Firm-specific data points

This table illustrates the firm-specific data points.

Data point	Description	Source
Industry	Industry selection based on the Global Industry Classification Standard (GICS) as stated by Bloomberg, and then narrowed down.[12]	Bloomberg and manually extracted from Avanza and company prospectus
Firm age	Length in years of the business activity since the firm's inception until its IPO	Manually extracted from the prospectus
VC/PE backed	"1" if the company is backed by a venture capitalist or private equity company, "0" otherwise.	Manually extracted from the prospectus

Variables on board members are described in detail in *table 5*. To a large extent, the data is supplied by Modular Finance[13] and gaps were filled through hand-picking data from the prospectus. The *independence* and *education* variables are entirely hand-picked from the prospectus, with gaps in *education* filled by further research, mainly from LinkedIn and Facebook. Using the prospectus to manually collect information is in line with the work of Dolvin & Kirby (2016), who collected their entire board structure data manually from S-1 statements filed at the time of the IPO. Almost all the board member data points are used as independent variables in the regression model (except for *Date of birth*), as detailed in section 4.1.2.2.

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[12] Industries with only few companies were clustered together with other similar industries, for instance "*Healthcare-products*", "*Healthcare-services*", "*Pharmaceuticals*", and "*Biotechnology*" were clustered into "*Healthcare and Pharma*".

[13] *Modular Finance* is an independent database that for instance collects information on board member data

Table 5 – Board-member specific data

This table illustrates the board-member specific data.

Data point	Description	Source
Board member	Name of the board member. Only board members at the time of the IPO are included. Mentions of futures changes in board composition are discarded.	Modular Finance and manually extracted from company prospectus
Date of birth	Date and year of birth of the board member	Modular Finance and manually extracted from company prospectus
Age	Age of the board member at time of the IPO (if hand-picked, calculated as the difference between year of birth and year of IPO)	Modular Finance and calculated manually
Gender	Gender of the board member	Modular Finance and manually extracted from the company prospectus
Country	Citizenship of the board member (in case of two citizenships, the country the person has spent the majority of their life)	Modular Finance and manually extracted from the company prospectus or researched from other sources
Diversity	Product of variables: *Age, Gender & Country*.[14]	Based on *Age, Gender & Country* (Modular Finance and manually extracted)
Independent of management	Dummy variable of whether the board member is independent in relation to the management of the company (see definition in section 2.4.4)	Manually extracted from the company prospectus
Independent of owners	Dummy variable of whether the board member is independent in relation to the largest owners of the company (see definition in section 2.4.4)	Manually extracted from the company prospectus
Education	The level of education of the board member (coded as "0" = no education, "1" = high school, "2" = higher vocational education, "3" = undergrad, "4" = civil economist, "5" = Grad/MBA, "7" = PhD or higher)	Manually extracted from company prospectus, LinkedIn, or Facebook

During the data collection process, the original sample of 507 IPOs was reduced by the exclusion of several cases where:

- The offering was not the true initial offering, in most cases due to a listing change from one marketplace to another.
- The company had more than one share class, e.g. both A and B shares.
- The IPO prospectus was not retrievable, in most cases due to the company delisting or being liquidated, or because the IPO had not been completed.

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[14] Calculated as (1+ standardized (st. dev. of age)) * (1+ % of women)) * (1+ % of non-Swedes)). The (1+) part prevents negative values.

- The IPO subscription price could not be found, or the company used a floating offer price.
- The initial sample contained duplicates, typically due to name changes, which were then excluded.
- The listing was a bond offering, rather than an equity offering.

These procedures reduced the size of the final sample to 316 IPOs, corresponding to 1,678 board positions (the total number of board members is lower, due to some individuals holding more than one board position). The quantitative analysis is based on this final sample size, which is in line with previous research that focuses on board composition characteristics and underpricing.[15]

4.1.2 Description of Variables

To test the study's hypotheses of finding a relationship between underpricing and board composition, a multiple regression is run. The model is based on one dependent variable along with independent and control variables. A description of all the variables and how they are calculated follows below.

4.1.2.1 Dependent Variable

In line with Certo *et al.* (2001) and Dolvin & Kirby (2016), amongst others, the model uses IPO underpricing (i.e. first-day return) as its dependent variable, defined as:

$$Underpricing = \frac{P_{close} - P_{offer}}{P_{offer}} * 100.[16]$$

Hence, underpricing occurs when the closing price exceeds the subscription/offer price, which translates into a positive first-day return. If there is no difference between the offer and the closing price, the company priced its shares in line with the market valuation. In cases where the first-day closing price is lower than the offer price (i.e. the stock price went down during the first day of trading), the firm overpriced its shares. Overpricing is henceforth referred to as negative underpricing, expressed as a negative percentage. According to the hypotheses stated in section 2.4, it is anticipated that underpricing will correlate positively with board size and negatively with the other independent variables (independence, diversity, and education).

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[15] *n=48* (Hearn, 2012), *n=101* (Darmadi & Gunawan, 2013), *n=140* (Chahine & Filatotchev, 2008), *n=251* (Filatotchev & Bishop, 2002), *n=385* (Yatim, 2011), *n=502* (Hill, 2006), *n=748* (Certo, Daily, *et al.*, 2001), *n=969* (Bertoni *et al.*, 2014), *n=1,585* (Dolvin & Kirby, 2016).

[16] The percentage difference between the closing price (P_{close}) of the first trading day and the subscription or offer price (P_{offer}) of the IPO.

4.1.2.2 Independent Variables

Board size

Board size refers to the number of individuals serving on the board at the time of the IPO. As it is an easily measurable metric, board size has been widely studied, as described in section 2.4.3. Researchers have not been able reach a definite consensus as to which board size is optimal (Bertoni *et al.*, 2014; Hearn, 2012). However, most recent studies argue that a smaller board is more effective. For the reasons described in section 2.4.3, the authors expect board size and underpricing to be positively related (**H1**).

Independence of company management

Independence of management is expressed as the percentage of board members who are independent of the management of the firm, as defined by NASDAQ OMX[17]. In the initial data, the independence is a dummy variable, TRUE if the board member is independent, and FALSE otherwise. The primary role of the board of directors is to protect the interests of the shareholders (Fama & Jensen, 1983). As described in section 2.4.4, having outside directors, with no relationships to the management of the firm, is beneficial to the firm. This translates to a higher firm performance (e.g., Rosenstein & Wyatt, 1990) and consequently a higher valuation. In comparable studies, researchers have found a negative relationship between the independence of the board with regards to company management and underpricing (Certo, Daily, *et al.*, 2001; Dolvin & Kirby, 2016). A similar outcome is expected in this study, as expressed by **H2a**.

Independence of largest owners

Independence of largest owners is also defined by NASDAQ OMX standards[18], referring to the proportion of board members who are independent of the largest shareholders of a company. Similar to the previous variable, it is initially a dummy variable for each board member, which is subsequently expressed as a percentage for each company. As described in section 2.4.4, this layer of board independence is less widely used and has thus been far less studied. In this study, a negative correlation with underpricing is anticipated (**H2b**).

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[17] NASDAQ defines *independence of company management* as not having been employed by the company within the last three years, amongst other criteria. A more extensive definition can be found in section 2.4.4.

[18] NASDAQ defines *independence of largest owners* as not owning 10% or more of company shares or not being affiliated to an individual or corporation owning 10% or more of company shares. A more extensive definition can be found in section 2.4.4.

Board diversity

Board diversity includes the percentage of women, the percentage of non-Swedish board members, and the age diversity of the board, as described in section 2.4.5. To assess age diversity, the standardized standard deviation of board member age is used to make it comparable with other diversity components. As for gender and nationality diversity, the percentage of women and the percentage of non-Swedes are used. Apart from a few outliers, all boards are overwhelmingly male and Swedish, which is why it can be argued that every additional woman or non-Swede on the board increases the diversity. Hence, diversity is calculated taking a product of variables using:

$$board\ diversity = (1 + stand(st.dev.of\ age)) * (1 + \%\ of\ women) * (1 + \%\ of\ non-Swedes)$$

Although a considerable amount of research has explored each of these diversity indicators in isolation (e.g., Hearn, 2012), defining diversity in this compounded fashion is unique. As **H3** states, board diversity is expected to be negatively correlated with underpricing.

Education of board members

Education of board members refers to the average level of education that the board members hold. On board member level, the variable is expressed as a scale ranging from 0 to 7. This numbering approach justly reflects both the complexity and length of education attained for each board member. To form the variable for each company, the average of these numbers is calculated. The level of education of board members in this context is used as a proxy for competence, as described in section 2.4.6. As a more competent board is linked to higher performance, a negative correlation between board education and underpricing is expected (**H4**).

4.1.2.3 Control Variables

Stock market return

The regression model includes the control variable *stock market return*, calculated as the cumulative return of the NASDAQ OMXS30 in the 15 trading days prior to the IPO. The OMXS30 is commonly used as a proxy for the Swedish market sentiment in general. Using *stock market return* mirrors the study of Dolvin & Kirby (2016) and is in line with Loughran & Ritter (2004), who claim that the market return in the three weeks prior to the IPO generally predicts underpricing.

VC/PE backed

Another control variable used is the dummy variable *VC/PE backed*. It refers to companies that are backed by Venture Capital (VC) or Private Equity (PE) investors. Dolvin & Kirby (2016) argue that VC companies do not only provide financing, but also expertise and additional value by being actively involved in the company. VC backing thus serves as a certification for other investors and signals high expertise, potentially leading to lower underpricing. Indeed, using VC backing as a control variable, Dolvin & Kirby (2016) find that the market values venture capital involvement. This thesis expands on that theory and includes PE investors in this variable, as they tend to be equally active and involved in the companies they invest in.

Firm age

Firm age is the difference in years between the founding of the company and the IPO. A considerable amount of previous research has been studying firm age in the context of underpricing. For instance, Certo, Covin, Daily, & Dalton (2001) and Dalton *et al.* (2003) use it as a control variable because of its positive correlation with firm performance. Daily *et al.* (2008) use it as a proxy for firm risk, as companies with a longer history have been covered more by analysts, making them less risky. As in previous research, this thesis uses the natural logarithm of 1 plus the firm's age (e.g., Bertoni *et al.*, 2014; Certo, Daily, *et al.*, 2001; Chahine & Filatotchev, 2008). In line with those scholars, a negative relationship between firm age and underpricing is to be expected

4.1.3 Summary Statistics

Summary statistics is a powerful tool that many authors start out with in order to give an unbiased overview of the data gathered (Dolvin & Kirby, 2016). The summary statistics show an average underpricing in the sample of 11.5%, which is low in relation to other studies (Loughran *et al.*, 1994). The underpricing variable is skewed to large positive values, with a higher relative standard deviation (in regard to the mean) compared to other variables in our sample. Therefore, the outliers have been winsorized[19] using cuts of 5% and 95%. The other variable that has a high relative standard deviation (in regard to the mean) is *Market return,* which also gets winsorized by the same cuts.

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[19] *Winsorizing* refers to a method developed by Charles P. Winsor, where rather than rejecting outliers, their value is being changed to the nearest value that isn't extreme (Tukey, 1963).

Table 6 – Summary statistics of data sample

The table presents summary statistics of the data sample. All the variables used in the Initial Model are included along with the components of *Diversity* variable (% of Women, Age at IPO, % of Swedes). (*) after certain data points/variables indicates that these are not used in the regression analysis.

(N=316)	Mean	SD	Min	25th	Median	75th	Max
Dependent variable							
Underpricing*	11.5%	40.7%	-69.4%	-9.8%	5.7%	23.6%	310.7%
Underpricing winsorized	9.2%	28.2%	-34.8%	-9.8%	5.7%	23.6%	78.2%
Independent variables							
Board characteristics							
Board size	5.30	1.50	3.00	4.00	5.00	6.00	11.00
Independent management	72.9%	22.0%	0.0%	60.0%	75.0%	85.7%	100.0%
Independent owners	57.8%	23.9%	0.0%	40.0%	60.0%	75.0%	100.0%
Diversity	2.60	0.60	1.10	2.20	2.60	3.00	4.40
Educational level	4.30	1.10	1.50	3.60	4.30	4.90	7.00
*Women**	*15.7%*	*16.2%*	*0.0%*	*0.0%*	*16.7%*	*25.0%*	*66.7%*
*Age at IPO**	*53.70*	*6.30*	*31.60*	*49.70*	*54.20*	*57.80*	*68.40*
*Swedish**	*81.7%*	*26.7%*	*0.0%*	*71.1%*	*100.0%*	*100.0%*	*100.0%*
Control variables							
Firm characteristics							
Firm age	12.90	16.40	0.00	4.00	9.00	15.00	139.00
Outside relationships							
VC/PE Backed	49.1%	50.1%	0.0%	0.0%	0.0%	100.0%	100.0%
Market conditions							
Market return*	0.2%	3.0%	-10.4%	-1.4%	0.3%	2.1%	8.6%
Market return winsorized	0.2%	2.7%	-5.3%	-1.4%	2.6%	2.1%	4.7%

As illustrated in *table 6*, the average *board size* is 5.3, which is considerably lower than the 11.76 in the study performed by Dolvin & Kirby (2016). Worth noting is that none of the Swedish boards consist of more than 11 members. The level of independence differs slightly if it is in relation to management or to major owners. 72.9% of the sample are independent in relation to management, whilst only 57.8% of the sample are independent in relation to major owners (as defined earlier). Despite the difference in definitions of external percentage (Dolvin & Kirby, 2016) and independence towards management, it is noteworthy that in the U.S. the percentage of external board members is much lower (36% in Dolvin & Kirby, 2016) than in Sweden (72.9%). This is a further indication that the board's composition is country-dependent. *Diversity* which is a variable based on the percentage of women, different nationalities other than Swedish, and the age diversity in the board, show that boards have low variation in diversity. The coefficient of variation, i.e. the ratio of standard deviation and the mean, is 23%. This is a low value in relation to the other

variables in the sample, indicating that many boards are relatively homogenous. The average *Educational level* is 4.3 which would represent a degree between a "civil economist" (4) and "MBA" (5), i.e. around 4 years of studies after secondary school. This result is supported in the trend in society of more people pursuing degrees in higher education (SCB, 2018). Contrasting the average number of IPO companies that have VC/PE backing in Sweden (49%), the results are similar to the ones used by Dolvin & Kirby (2016) in the U.S. (52%). Finally, the 15 days prior market returns is higher in Dolvin & Kirby's (2016) U.S. sample (1.1%) than in this Swedish sample (0.2%).

4.2 Variable Testing Leading to the Initial Model

4.2.1 Correlations and Univariate Analysis

The previous section describes the five independent variables that will be used to test the hypotheses laid out in the literature review. To get a deeper insight into the data, this section explains a number of initial data analysis measures. These measures are necessary to construct a sound model for the subsequent multivariate regression.

Following the methodology employed by Dolvin & Kirby (2016), each of the independent and control variable will be analyzed in relation to *Underpricing winsorized* (*table 7*). To determine how the variable differs between its high and low values, a variable can be divided into two groups (cut-off at the average) and the means of both groups can be compared. This is a comparison of means test, which also tests the significance of the difference in means between the two groups of the same variable. The null-hypothesis states that there is no difference in means before the two groups (Fisher, 1934). The null-hypothesis is either accepted or rejected depending on the level of the p-value. According to previous literature, a p-value that is lower than 5% should reject the hypothesis, and state that there is a difference in means between the two groups (Fisher, 1934).

There is no significant difference in means for *board size, independent owners, diversity or educational level* (p-values>5%). The variable that shows a significant difference in means is whether there are many independent board members in relation to the company's management. The higher level of independence, the higher the underpricing becomes (11.9% vs 5.5%). This relationship is not supported by our hypothesis (**H2a**). Despite the fact that the variables *independent owners* and *educational level* do not show any significance, their p-values are lower compared to the other variables and there is a visible difference between the means of the two groups. There is a tendency that boards with many independent members in relation to the owners result in higher underpricing (11.3% vs 6.5%). Additionally, the boards with a high average educational level also have a tendency

to display a higher underpricing (11.0% vs 7.4%). Furthermore, none of the control variables on a stand-alone basis present any difference in means.

Table 7 – Underpricing in sample

The table presents IPO Underpricing sorted by board characteristics variables and control variables. The p-value explains whether the difference in means between the two groups is significant, where p<0.05 displays a significant difference (*).

	N	Underpricing	P-value[20]
Independent variables			
Board Characteristics			
Smaller Boards (<5.3)	199	9.60%	0.76
Larger Boards (=>5.3)	117	8.50%	
Few Independent management (<72.9%)	133	5.50%*	0.05
More Independent management (=>72.9%)	183	11.90%*	
Few Independent owners (<57.8%)	142	6.50%	0.13
More Independent owners (=>57.8%)	174	11.30%	
Low Diversity (<2.6)	160	9.20%	0.99
High Diversity (=>2.6)	156	9.20%	
Low Educational level (<4.3)	162	7.40%	0.26
High Educational level (=>4.3)	154	11.00%	
Firm Characteristics			
New Companies (<=13)	140	10.20%	0.58
Old Companies (>13)	176	8.40%	
Outside Relationships			
No VC/PE backing (0)	161	9.30%	0.95
VC/PE backing (1)	155	9.10%	
Market Returns			
Low Market Return (<0.18%)	155	10.10%	0.56
High Market Return (=>0.18%)	161	12.80%	

Second, the correlation matrix (*table 8*) below gives further insight into how the variables react with each other, giving a first indication about possible multicollinearity issues (Farrar & Glauber, 1967). None of the variables reach a high correlation result. This means there is no multicollinearity present, which is a sign that none of the variables need to be transformed or changed before running the regressions (Farrar & Glauber, 1967). The highest correlation is between firm age and board size (0.35), which is logically explained by the fact that older firms are typically larger and therefore have an established board structure.

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[20] The null hypothesis is tested and a low p-value, 5%, indicates a rejection of the null hypothesis.

Table 8 – Correlation matrix

The table presents correlations between *Underpricing winsorized*, board characteristics variables and control variables. A correlation equal to +1/-1, indicate either the strongest possible agreement (+1) or the strongest possible disagreement (-1) between the two variables.

	Under-pricing_w	Board size	Indep. Mgmt.	Indep. owners	Diver-sity	Educa-tion	Firm Age	VC/PE Backed	Market _w
Underpricing_w	1								
Board size	0.01	1							
Independent mgmt	0.1	0.12	1						
Independent owners	0.13	0.13	0.17	1					
Diversity	0	0.02	0.07	0.07	1				
Education	0.1	-0.08	0.1	0	-0.05	1			
Firm Age	-0.02	0.35	0.1	0	0.07	0.02	1		
VC/PE Backed	-0.01	0.19	0.18	-0.05	-0.01	0.16	0.05	1	
Market_w	0.07	-0.05	0	-0,03	0.02	0.08	-0.06	0	1

4.2.2 Bivariate Analysis

Last, bivariate regressions are performed (*table 9*), in order to give an additional interpretation of how the independent variables in the sample behave in comparison to underpricing. All independent and control variables are displayed in relationship to the dependent variable in the sample. Noteworthy is that all variables except *Firm Age* and *VC/PE Backed* show a positive coefficient with underpricing. The variables that get a low, yet still a R-squared above 0.0%, are: *Independent mgmt (0.9%), Independent owners (1.9%), Educational level (0.7%)*, and *Market Return (0.6%)*. All of these R-squared values are low, however, their positive coefficients hint to the fact that the variables could work well together in a multivariate analysis. The other variables do not show any significant R-squared or coefficient value.

Table 9 – Bivariate regression

The table presents bivariate regression results between *Underpricing winsorized*, board characteristics and control variables. The p-value for each variable is presented in parentheses below the coefficients. Furthermore (*) symbols are disclosed next to the coefficients indicating if the variables are significant at a certain significance level; *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10.

	Bivariate 1	Bivariate 2	Bivariate 3	Bivariate 4	Bivariate 5	Bivariate 6	Bivariate 7	Bivariate 8
Board size	0.00 (0.78)							
Independent mgmt		0.12* (0.10)						
Independent owners			0.16** (0.01)					
Diversity				0.01 (0.76)				
Education					0.02 (0.13)			
Firm Age						-0.01 (0.68)		
VC/PE Backed							-0.00 (0.95)	
Market_w								0.81 (0.16)
Constant	0.08 (0.20)	0.00 (0.95)	-0.00 (0.91)	0.07 (0.36)	-0.00 (0.96)	0.11*** (0.01)	0.93*** (0.00)	0.09*** (0.00)
R-squared	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.01

4.2.3 The Initial Model

The effects that board structure has on IPO underpricing, as outlined in the hypotheses, is tested in a multivariate regression based on the variables described in section 4.1.2.2, used in the following OLS model (as suggested by Dolvin & Kirby, 2016):

$$Underpricing_w = \alpha + \beta1\ board\ size + \beta2\ independentmgmt + \beta3\ independentowners + \beta4\ diversity + \beta5\ education + \beta6\ firm\ age + \beta7\ VC/PE\ backed + \beta8\ market\ return_w$$

The previously formulated hypotheses of the independent variables will be judged depending on the regression outcome of the coefficients. ß6 - ß8, the control variables, are all included in the initial model. However, the function of control variables is to add possible other explanations for the dependent variable, apart from the already existing independent variables. Thus, following the stepwise regression method suggested by Greenland (1989), control variables that do not increase the explanatory power of the model and will thus be deleted.

5. Quantitative Results

As outlined in section 4.2.3, the initial Ordinary Least Square (OLS) regression model forms the basis of the results section. The regression results in a low explanatory power (Adjusted R-squared of 1.0%)[21]. At the same time, certain variables show low or nonexistent coefficient values (i.e. *board size* and *diversity*).

$$Underpricing_w = -0.13 + 0.00 \, board \, size + 0.09 \, independent mgmt + 0.13 \, independent owners *$$
$$- 0.00 \, diversity + 0.02 \, education - 0.01 \, firm \, age - 0.02 \, VC \, backed + 0.71 \, market \, return_w +$$

5.1 Expanding on the Initial Model

In order to increase the explanatory power of the model, a common approach used is to apply fixed effects. IPO underpricing could generally be higher in some industries than in others. For instance, Dolvin & Kirby (2016) find that underpricing in the U.S. is significantly higher in high-tech firms. Additionally, underpricing could be cyclical and differ from year to year. Industry- and year-fixed effects control for both those factors and thus might increase the explanatory power.

Table 10 shows the results of the initial OLS Model, followed by six different regression models where industry- and year- fixed effects have been carried out. Models 2-7 have different variations of control variables where Model 7 results in the highest Adjusted R-squared. This model only includes *Market Returns* as a control variable, and disregards *Firm Age* and *VC/PE Backed*.

Another method that might increase the explanatory power of the model is transforming the variables into dummies. Thus, all of the independent and control variables included in Model 7 are transformed into dummies depending on whether the data points are higher or lower than the average. The result of this treatment, along with running fixed effects, results in an Adjusted R-squared of 4.1% (see Model 8).

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[21] Where (*) symbols are disclosed next to the coefficients indicating if the variables are significant at a certain significance level; *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10.

Table 10 – Regression model

This table presents the variables included in the regression models and their corresponding coefficient ratios. The p-value for each variable is presented in parentheses below the coefficients. Furthermore (*) symbols are disclosed next to the coefficients indicating if the variables are significant at a certain significance level; *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10.

	OLS	Models with industry year fixed effects						Dummy transformations
Model	1	2	3	4	5	6	7	8
Board size	0.00 (0.86)	0.00 (0.62)	0.01 (0.65)	0.00 (0.72)	0.00 (0.69)	0.00 (0.76)	0.00 (0.74)	-0.01 (0.66)
Independent mgmt	0.09 (0.25)	0.11 (0.15)	0.12 (0.14)	0.11 (0.17)	0.11 (0.17)	0.11 (0.16)	0.10 (0.19)	0.07** (0.04)
Independent owners	0.13* (0.07)	0.14* (0.06)	0.13* (0.07)	0.14** (0.04)	0.15** (0.03)	0.14** (0.05)	0.15** (0.03)	0.08** (0.02)
Diversity	-0.00 (0.95)	0.00 (0.93)	-0.00 (0.98)	-0.00 (0.92)	0.00 (0.89)	-0.00 (0.96)	0.00 (0.90)	-0.01 (0.83)
Education	0.02 (0.11)	0.02 (0.20)	0.02 (0.18)	0.02 (0.24)	0.02 (0.32)	0.02 (0.21)	0.02 (0.36)	0.03 (0.39)
Firm Age	-0.01 (0.68)	-0.01 (0.70)	-0.01 (0.65)	-0.01 (0.73)		-0.01 (0.69)		
VC Backed	-0.02 (0.56)	-0.02 (0.53)	-0.02 (0.54)		-0.02 (0.64)			
Market_w	0.71 (0.23)	0.85 (0.15)		0.85 (0.15)	0.93 (0.11)		0.93 (0.11)	0.48 (0.13)
Year 2015		0.14*** (0.01)	0.13** (0.02)	0.14*** (0.01)	0.14*** (0.01)	0.12** (0.02)	0.14*** (0.01)	0.13** (0.01)
Year 2016		0.10* (0.06)	0.10* (0.08)	0.10* (0.07)	0.10* (0.06)	0.09* (0.08)	0.10* (0.06)	0.10* (0.07)
Year 2017		0.02 (0.65)	0.02 (0.70)	0.02 (0.67)	0.02 (0.65)	0.02 (0.73)	0.02 (0.66)	0.02 (0.65)
Year 2018		-0.03 (0.65)	-0.04 (0.56)	-0.03 (0.60)	-0.03 (0.64)	-0.04 (0.51)	-0.03 (0.61)	-0.04 (0.52)
Constant	-0.13	-0.23* (0.1)	-0.22 (0.10)	-0.22 (0.11)	-0.23* (0.08)	-0.21 (0.11)	-0.23* (0.09)	-0.09 (0.12)
Observations	306	306	306	306	316	306	316	316
Adjusted R-squared	1.0%	3.0%	2.6%	3.2%	3.5%	2.8%	3.8%	4.1%

Based on *table 10*, where different regression models are illustrated, the model with the highest explanatory power is Model 8 (Adjusted R-square of 4.1%)[22]. Moreover, in Model 8 a significant correlation is found for *independent mgmt,* which is not true in the other models. Therefore, Model 8 will be used to interpret the hypothesis as well as tested for its robustness.

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[22] In comparison to previous literature within this area, this is a relatively low adjusted R-squared (4.4% (Yatim, 2011), 8.2% (Hill, 2006), 11% (Filatotchev & Bishop, 2002)), 13.8% (Darmadi & Gunawan, 2013), 14.8% (Certo, Daily, et al., 2001), 22.5% (Hearn, 2012), 34.1% (Chahine & Filatotchev, 2008).

The next step is to test the aforementioned hypotheses with the coefficient results in Model 8. **H1** states that underpricing should be positively correlated with board size. Neither the bivariate analysis (*table 9*) nor the multivariate analysis indicate any significant correlation between the two variables. Additionally, the coefficient is close to zero which gives clear indication that the hypothesis can be rejected. **H2a and H2b** indicate that underpricing should have a negative correlation with the level of independence in the board. Model 8 indicates significant p-values to the 95% confidence interval for both of the *independence* variables. However, in contrary to the hypothesis stated, they reveal a positive correlation with underpricing. This is also supported by the univariate analysis where the comparison of means and t-test clearly imply that a higher level of independence results in higher underpricing. Therefore, the hypothesis of a negative correlation can be rejected. **H3** states that underpricing should be negatively associated with a higher diversity in terms of age, gender and nationality. Similar to *board size,* there is no significant values neither in the univariate nor the multivariate analysis (*tables 9* and *10*). Therefore, the hypothesis of a negative correlation with *diversity* can be rejected. **H4** implies that the educational level of the board of directors in terms of number of years studied will have a negative correlation with underpricing. The p-value for *educational level* is lower than *board size* and *diversity*, but insignificant nonetheless. In the different models, the coefficient displays a slightly positive correlation. This is, however, not something of importance considering its non-significance and therefore, the hypothesis regarding *educational level* (H4) can be rejected.

5.2 Final Model

The statistics and tests summarized above, leads to a final model that explains IPO underpricing and board composition in a Swedish context. Model 8 is the final model and is summarized below[23], this is followed by a section that tests the stability of the model through a number of robustness tests.

$Underpricing\_w = -0.09 - 0.02\ board\ size\ dummy + 0.07\ independent\ mgmt\ dummy **$
$+ 0.08\ independent\ owners\ dummy ** - 0.01\ diversity\ dummy + 0.03\ education\ dummy +$
$0.48\ market\ return\_w + 0.13\ Year2015 ** + 0.10\ Year2016 * + 0.02\ Year2017 - 0.04\ Year2018$

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[23] Where (*) symbols are disclosed next to the coefficients indicating if the variables are significant at a certain significance level; *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10.

5.3 Robustness Tests

Robustness tests indicate how accurate and stable regression results are, by either adding, removing, or changing variables. When the model achieves small changes in the coefficients, the model can be stated to have structural validity (Lu & White, 2014). Additionally, Leamer & Leonard (1983) argue that models with fragile regression coefficients indicate specification errors[24]. Thereby, he suggests that sensitivity analyses should be routinely employed to detect misspecifications in a regression model. Model 8 will thus be tested for structural validity and specification error. In total six different robustness tests will be performed.

The first part will be to test the model by running the regression using different dependent variables. As previous literature has shown, underpricing can be defined in different ways using different time horizons. For instance, Hearn (2012) looks at four-week returns as his underpricing variable. Therefore, the regression model will be tested using either first-week (**Robustness test A**), first-month (**Robustness test B**), or third-month returns (**Robustness test C**), instead of the first-day returns used in the current return metrics. The only companies in the data set where there is data available for other time horizons are the data points collected from the Bloomberg database (n=155). The hypothesis when using different time horizons is that the coefficients and significance levels will be similar to the Model 8 using the same observations (second column in *table 11*).

Additionally, (Chan, Wang, & Wei, 2004) look at underpricing and long-term performance of IPOs in China. In their regressions, they combine the market and underpricing as their dependent variable instead of using market return as a control variable (as is used in Chahine & Filatotchev, 2008; Dolvin & Kirby, 2016; Hill, 2006). Chan *et al.*'s (2004) definition of their dependent variable is the combined percentage change of first-day closing price to offer price and the market return of that day. For this reason, the authors complete a robustness test using the market adjusted return as a dependent variable and delete the cumulative market return as a control variable (**Robustness test D**). Another common robustness test is to randomly delete parts of the sample and to run the regression using the new sample (Certo, Covin, et al., 2001). The same approach is used in this paper (**Robustness test E**).

Lastly, the authors ran a robustness test using a logistic regression model (e.g., W. Adams, Einav, & Levin, 2009; Alfaro & Charlton, 2009; Angelucci & De Giorgi, 2009; Angrist & Lavy, 2009). A logistic regression is based on a binary dependent variable (Cox, 1958), which models probability of output in terms of input. For this sample, *Underpricing* is transformed into a dummy variable based on whether the *Underpricing* is higher or lower than the average. The logistic

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[24] *Specification error* = at least one of the key features or assumptions of the model is incorrect

regression then estimates odds ratios how likely a firm is to "*achieve*" underpricing, depending on different independent variables (**Robustness test F**). The hypotheses for **Robustness tests D-F** are that the coefficients and significance levels will be similar to Model 8 (sixth column in *table 11*).

Table 11 – Robustness tests

This table presents the robustness tests using different dependent variables. The p-value for each variable is presented in parentheses below the coefficients. Furthermore (*) symbols are disclosed next to the coefficients indicating if the variables are significant at a certain significance level; *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10.

	Model 8	A	B	C	Model 8	D	E	F
	Under-pricing 1 day	Under-pricing 1 week	Under-pricing 1 month	Under-pricing 3 months	Under-pricing 1 day	Market adjusted Under-pricing	Under-pricing 20% randomly removed	Logistic regres-sion
Board size dummy	0.01 (0.92)	-0.00 (0.97)	-0.09 (0.23)	-0.06 (0.49)	-0.02 (0.66)	-0.01 (0.73)	-0.02 (0.65)	0.01 (0.97)
Independent mgmt dummy	0.11** (0.01)	0.15** (0.02)	0.17** (0.02)	0.10 (0.16)	0.07** (0.04)	0.06* (0.06)	0.06* (0.09)	0.73*** (0.01)
Independent owners dummy	0.07 (0.15)	0.02 (0.83)	0.05 (0.50)	0.05 (0.56)	0.08* (0.02)	0.08** (0.02)	0.10** (0.01)	0.19 (0.50)
Diversity dummy	0.04 (0.34)	0.00 (0.98)	-0.00 (0.96)	-0.02 (0.78)	-0.01 (0.84)	-0.01 (0.80)	-0.02 (0.55)	-0.07 (0.78)
Education dummy	-0.02 (0.74)	-0.08 (0.23)	-0.10 (0.18)	-0.13 (0.10)	0.03 (0.40)	0.03 (0.37)	0.06 (0.10)	-0.15 (0.57)
Market_w	0.50 (0.50)	1.52 (0.17)	2.06*** (0.01)	1.05 (0.41)	1.04* (0.08)		0.96 (0.14)	6.99 (0.13)
Year=2015	0.15 (0.14)	0.03 (0.85)	0.07 (0.65)	-0.02 (0.90)	0.14*** (0.01)	0.13** (0.01)	0.12** (0.04)	0.91** (0.03)
Year=2016	0.10 (0.31)	0.04 (0.78)	-0.05 (0.76)	-0.00 (0.98)	0.10* (0.06)	0.09* (0.07)	0.09 (0.14)	0.65 (0.12)
Year=2017	-0.02 (0.83)	-0.26* (0.06)	-0.34** (0.03)	-0.35** (0.03)	0.02 (0.72)	0.02 (0.75)	0.01 (0.90)	0.08 (0.84)
Year=2018	-0.02 (0.89)	-0.19 (0.22)	-0.34** (0.05)	-0.39** (0.04)	-0.04 (0.56)	-0.04 (0.50)	-0.05 (0.53)	-1.04* (0.08)
Constant	-0.09 (0.41)	0.19 (0.22)	0.28 (0.11)	0.36** (0.05)	-0.07 (0.20)	-0.06 (0.27)	-0.08 (0.20)	
Adj R-squared	4.4%	6.6%	10.6%	8.1%	4.3%	3.6%	4.7%	
N	155	155	155	155	316	316	284	316

      Robustness tests A-C where different time horizons have been used for the dependent variable, indicate consistent coefficients for *Independent mgmt dummy* and *Independent owners dummy*. Significance to the 95% confidence interval is achieved for *Independent mgmt dummy* except for in **Robustness test C**. *Board size*, *Diversity* and *Education* show inconsistent coefficient value signs (both positive and negative in relation to Model 8). The explanatory power varies between the

different models (4.4% to 10.6% in Adjusted R-squared) but tends to increase when the underpricing time horizon is extended.

Robustness tests D-F indicate similar tendencies as **Robustness tests A-C**, as *independent mgmt dummy* and *independent owners dummy* display a consistency in coefficient value signs and in terms. Additionally, the *independent mgmt dummy* coefficient in the logistic regression is significantly (to the 99% confidence interval) higher than Model 8 (0.73 compared to 0.07).

In conclusion, the results in *table 11* suggest that Model 8 is valid regarding the variables *Independent mgmt* and *Independent owners*, since there is little variation in coefficients and significance for these variables when comparing the different models. The other variables show a more diverse outcome, strengthening the initial conclusion that their relationship with underpricing, if existent, cannot be explained by this model.

6. Qualitative Method

Given the rejection of all hypotheses and a low explanatory power of the final model, a qualitative study is performed to give further insights into the topic. The qualitative study consists of 14 interviews, eight interviews with board members and six with investors.

Since independence is the only significant variable in the model, it forms the basis for the sample selection of the board members, whereas the investors are selected using snowball sampling, as explained in section 6.2. The interviews with the board members aim to explain what they perceive to be the most effective board composition. Furthermore, they aim at understanding if the underpricing was planned prior to the IPO. In addition, the interviews with the investors explain how post-IPO investors value different board characteristics when investing, drawing on signaling theory. The following section gives an overview of the sample selection processes, followed by a section describing how the interviews are analyzed.

6.1 Data Collection - Board Members

To complement the quantitative findings, 19 of the sample companies are selected for a qualitative analysis. These companies have boards where between 50-100% of the directors are defined as truly independent directors[25]. Additionally, the 19 firms have all gone public within the last two years to ensure that the respondents are able to properly recall the IPO process, see 3.1. Furthermore, to ensure that the respondents have enough experience to thoroughly discuss the role of the board, 52 board members are identified as having relevant experience from at least three additional boards. Amongst these seven companies a total of eight board members were willing to participate in the study. The final sample consists of one female and seven male board members, similar to the current gender distribution on Swedish public boards (Allbright, 2017). The authors would have preferred to have an equal gender distribution, but were limited due to a retained number of female board members in their original sample.

In *table 12*, a complete list of the respondents and their respective companies can be found. Three of the board members are truly independent. Furthermore, to include the entire spectrum, two of the board members are truly dependent both towards management and the largest owners. Additionally, one interviewee is the CEO of the company. The rest of the sample consists of board members that are independent towards management, but not towards the largest owners.

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[25] A *truly independent* board member is a person with no operational or no/limited financial ties with the company, i.e. independent both towards the company and the owners.

Table 12 – Overview of qualitative sample – board members

This table shows an overview of the qualitative sample, i.e. which board members that were interviewed.

Company	Under-pricing	% of truly independent directors	Board member	Position on board	Independent towards management	Independent towards largest owners
Alpha	13.6%	80%	B1	Board member	Yes	Yes
Bravo	11.4%	66%	B2	CEO, board member	No	No
Charlie	-0.57%	80%	B3	Board member	Yes	No
Charlie	-0.57%	80%	B4	Board member	Yes	Yes
Delta	12.5%	50%	B5	Chairperson	Yes	No
Echo	-1.67%	100%	B6	Chairperson	Yes	Yes
Foxtrot	-42%	75%	B7	Chairperson	Yes	No
Golf	123%	80%	B8	Chairperson	No	No

The interviews are semi-structured and focuses on two main topics: Underpricing and board characteristics, explained more thoroughly in the literature review.

- **Underpricing**: Questions to understand how the pricing process worked, their perception of underpricing and the extent as to which the board were aware, or actively planning a price increase.
- **Board characteristics**: General questions about the role of the board, which board composition might be most effective during an IPO, and the board's effect on the price development during an IPO. Furthermore, the respondents are asked about specific board characteristics and how these are linked to the effectiveness of the board.

The full interview guide is shown in appendix 11.2. Although the authors followed a predetermined script, the questions are open-ended and when it seemed fitting follow-up questions were asked. Using semi-structured interviews increase the nuance in answers because the questions are asked in a way that allows for interpretation and deeper discussions (Bryman & Bell, 2011). Further, more open-ended questions are known to give more extensive and richer answers (Kvale & Brinkmann, 2014).

The interviews started with a brief explanation of the definition of underpricing and the research topic. In addition, to ensure integrity all respondents were asked if they and their company wished to remain anonymous, three respondents requested this. However, to ensure consistency, all the interviewees are anonymized. Most of the interviews were held in the respondents' native language to decrease potential misunderstandings and to avoid situations where the respondents' answers were affected by their English proficiency. When this was not possible, the interviews were held in English. The interviews took place either in person at the respondent's office, or through video chat via *Zoom*. One interview was held over phone. The duration of the interviews were 45-50 minutes each. At least two of the authors were present during the interviews, enabling one to lead the questioning, and one to take notes. All interviews were recorded, transcribed, and then coded (see section 6.3). Furthermore, once the recordings were transcribed the interviews held in Swedish were translated to English to ensure consistency.

6.2 Data Collection - Investors

Since this paper relies on signaling theory as a theoretical framework, it is of interest to qualitatively understand how investors value different board compositions during an IPO. For this reason, six additional semi-structured interviews have been conducted with investors. Unlike the selection of the board members, the sample selection of the investors are based on what Bryman & Bell (2011) call snowball sampling[26]. This means that the first respondent was found in the investor's immediate network, this person then helped the authors find the next interviewee and so on. Since the Swedish investor sphere consists of tightly linked professionals, snowballing is an effective way to find the suitable sample. All six of the respondents are professional investors, either working for a VC/PE firm or as angel investors. Furthermore, all the interviewees have participated in at least one IPO during the last two years, inclining that their memory of the IPO process is better than that of earlier IPOs. Similar to the board members, for privacy reasons, all of the interviewees are treated anonymously. In addition, there is only one woman amongst the respondents. Again, the authors aimed for a more gender diverse sample but were unable to find more female investors to participate in the timeframe. The sample is illustrated in *table 13*.

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[26] According to Faugier & Sargeant (1997), *snowball sampling* is a method whereby one respondents lead to another, which can help authors gain access to respondents that are otherwise hard to reach.

Table 13 – Overview of qualitative sample – investors

This table shows an overview of the qualitative sample, i.e. which investors that were interviewed.

Code name investor	Title
Investor 1	Investment manager
Investor 2	Angel investor
Investor 3	Investment manager
Investor 4	Angel investor
Investor 5	Investment manager
Investor 6	Investment manager

Most of the interviews took place in person and lasted for around 45 minutes each. For the two interviews where this was not possible, the interview occurred over video chat. All but one interview was held in Swedish, and then translated to English. All interviews were transcribed, and later coded as explained by section 6.3.

The interviews followed an interview guide that can be found in appendix 11.3. Similar to the board member interviews, the respondents were asked questions surrounding three themes outlined below:

- **Firm value during an IPO**: In order to understand the factors most important to investors during an IPO, they were initially asked to describe which factors they believed increase their confidence in the firm, and thus the firm value.
- **The perception of underpricing**: The concept of underpricing was explained, and the investors were asked to explain their perception of underpricing.
- **How board composition affects firm value**: Finally, the investors were asked to explain their perspectives on board composition and which characteristics they value most during investments in IPOs.

6.3 The Qualitative Analysis

Unlike quantitative analyses, there is no typical way in which qualitative data is analyzed. Hence, when developing the qualitative analysis structure, this report has drawn inspiration from multiple scholars. Firstly, Ritchie, Lewis, McNaughton Nicholls, & Ormston (2014), who researched the most common practices when analyzing qualitative data, leading up to a three-step approach called the analytic hierarchy, and Creswell's (2013b) famous seven step approach. The combination of these leads to the analysis framework applied which can be found in *table 14*.

Table 14 – Qualitative analysis step by step

This table shows the analytical steps, based on models by Ritchie et al. (2014) and Creswell (2013b).

1. Preparations: Organization and reading

Recording and transcribing data
Translation to English
Reading

2. Data management: Coding and themes

Identification of initial themes or concepts (index creation)
Labelling or tagging of the data by concept or theme
Sorting of the data by theme or concept
Summarizing or synthesizing data

3. Descriptive Accounts

Detecting patterns (associative analysis and identification of clustering)
Establishing typologies
Identifying elements and dimensions, refining categories, classifying data

4. Interrelation

Revisiting the interviews and literature

5. Interpretations

Developing explanations (answering how and why questions)

6. Data validation

Seeking applications to wider theory/policy strategies
Ensure research quality

First, there were *general preparations, organizing and reading the data*. The data was recorded, and then each word was transcribed and then translated to English. This was to ensure that the authors could go back to the original answers at any time during the analysis process. Thereafter, each author controlled the transcriptions and thoroughly read through the interviews. By allowing for each author to think about the data independently, the risk for subjectivity and group-think was limited. Second, during the *data management phase*, initial themes and concepts were identified. By listing relevant themes an index was created (Ritchie *et al.*, 2014), which revolved around two main themes; underpricing and the board characteristics. Following the index creation, each interview was sorted based on the main themes and collected in one Excel document.

In the final stage of data management, the material was reduced and synthesized. During this sorting, only the parts of the answers deemed relevant where included. However, the authors were cautious that the quotes where not presented out of context. In the third phase, *descriptive accounts,* the authors identified specific patterns across the data. These were color-coded, and then used in a framework chart (Ritchie *et al.*, 2014, p. 239). When looking for patterns, the authors

especially paid attention to repetitions across interviews, but also to similarities in answers. In the fourth phase, the themes and patterns were *interrelated* to the interviews and previous literature, in order to fully interpret and confirm connections (Creswell, 2013a; Glaser & Strauss, 1999). This was followed by the iterative process of constantly *interpreting* the data. Finally, the quality of the research was *validated*, which will be described in more detail below.

7. Qualitative Results

As explained in the qualitative methodology section, the final sample consists of 14 respondents. Eight interviews were held with board members to understand what board characteristics experienced directors believe leads to a more effective board. The firms are likely to focus on these characteristics in order to increase firm value and decrease the information asymmetry towards investors. Moreover, their views on underpricing and the IPO process were investigated to understand the extent to which the companies underpriced intentionally. Finally, six investors were interviewed about the signaling value of a board, and which characteristics affect their perception of firm value the most during an IPO. Thus, in the following section, the board members' perspective on how, or if, board size, board independence, diversity and education level contribute to the board's effectiveness is explored. This is followed by a section discussing the board members' perception of underpricing, and whether underpricing was found to be a conscious choice or not. Finally, the investor's perspective on board composition as a signaling effect is explored.

7.1 The Perspective of the Board

7.1.1 Board Size

When asked about the optimal board size, all but one of the respondents agreed that a small board is to prefer over a larger one, which is in line with **H1**. When the boards are too big, the board members risk feeling less responsible for the firm. Furthermore, a larger board size means that it is harder for everyone to have a knowledgeable advantage that can support the CEO in difficult decisions. Moreover, it is more challenging to coordinate meetings where everyone can participate. At the same time, a board with too few members means that there is risk that the board becomes an internal club with board members of the same opinion and background: *"Too few means it becomes an "internal" club, but too many means that some might just sit off their time and not contribute enough"* (B2). Most of the respondents felt that the optimal board size seemed to be between five to seven board members, which was well in-line with the board size observed in the quantitative sample (average board size = 5.3). *"The boards I have been on consist of five to seven people, more than this is not needed. You should be able to get the competence mix you need through the external board members"* (B8).

However, one of the respondents had a larger board of eight people explaining that this also worked: *"We probably have one of the largest boards - it was political as we wanted to represent all shareholders. So in order for this we accepted eight board members. (...) It is a really big board and sometimes we struggle with coordination, but overall it has been okay to handle"* (B6). All the board members thought that the size of the board could have important implications for the board's effectiveness. Although

most board members agreed that a smaller board is preferable, they also argued that the optimal size might differ from industry, depending on company age and size.

7.1.2 Independent Directors

During the interviews, three main reasons were identified which contributed to the effectiveness of having more independent directors. Independent directors were regarded as more unbiased monitors, better networkers, and more able to have a long-term focus in strategy setting. These attributes are all outlined in the following section.

Independent directors as monitors

All of the respondents argued that since independent board members lack ties to the company, they are less afraid to criticize and challenge the CEO. *"The beauty of an independent board member is that you come with an unbiased scrutiny that will question any event, performance, and development, and view it from a completely different angle* (B6)". Having more independent directors was thus found to increase the monitoring effect towards the company. In addition, the respondents argued that more independent directors illustrated a stronger force against top management: *"A very good composition is to have the majority of directors being independent, because then it is easier being a real party vis a vis management"* (B6). The ability to criticize management was further exemplified by a respondent with experience of an independent board member acting as a whistle blower in the cause of fraud.

Furthermore, having more independent board members were perceived as crucial to avoid situations where the majority owners had a too dominant influence. This was especially true looking at directors independent towards the owners. One respondent claimed that: *"It is good to have an equilibrium between the ones that represent the largest and the smallest owners, there is usually more representatives from the largest owners. It is important so that the biggest owners cannot push through all they want to management"* (B2). Another respondent responded similarly, claiming: *"You need to have independent board members, otherwise I am afraid that some interests will be favored more than others."* (B7). A third board member explains that in his/her experience independent board members tend to be more rational, since they are not personally involved in the company financially and/or operationally: *"It [independence] allows you to be more rational and logical in decision-making"* (B4). In general, all of the sample respondents seemed to believe that independent board members implied a better monitoring mechanism.

Independent directors as networkers

Furthermore, the independent board's network was regarded as one of the most important benefits, especially during the IPO process*: "If the firm had less independent board members - there would be less contacts: If it runs like it should, the board is not so important, but on a rainy day you can certainly have a*

great use of a good independent board with a network. It is rare that you have the resources internally. We are talking qualitative resources. The board network that independent directors can contribute with can become absolutely crucial" (B6). These networks were especially important during the IPO, as around half of the respondent explained that it was a board member that initiated the contact with the underwriters later used in the IPO process. The type of networks that were important seemed to differ depending on company, however most of the interviewees mentioned the importance of contacts in finance, media, consultants and potential customers.

Independent directors as long-term advocates

The respondents frequently mentioned long-termism as a benefit of having an independent board. The long-term perspective was especially enforced amongst the board members that were independent of the largest owners. "*It is good to be independent towards the owners, so you can make more long-term decision, if the owners are short term, which is often the case they only focus on next quarterly report. (..) But you cannot just have outsiders, you need relevant experience as well"* (B7). According to one respondent independent directors focus on the long-term often increase the company's focus on environmental issues, equality and other CSR-related topics.

Independence and board effectiveness

All the directors agreed that board independence could be linked to effectiveness in the boardroom and the performance of the firm. One respondent explains: "*I think the effect [of having independent directors] is positive, it leads to more free independent thinking. It means that you get a broader diverse setup"* (B3). Another respondent put it plainly: "*Independent boards lead to a more challenged corporate governance system, you ask the important questions and the: why are we doing this?"* (B7). Moreover, one respondent believed that it was especially important that the firm had more independent directors during an IPO, as it led to a more professional board: "*(...)When going public it is especially important that the board has more independent directors which usually entails more professionalism"* (B8).

7.1.3 Board Diversity

Most of the respondents mentioned phrased diversity in terms of age, nationality and gender. Especially gender diversity was phrased amongst the respondents. One interviewee even explained that Swedish investors demand more gender-equal boards, which he/she thought had an impact on the board representation: "*I know that some institutions say that if you do not have gender equality we will not invest"* (B3). One respondent explained the benefit of having a more equal board: "*It is be good to have both men and women, cause we tend to see things a bit differently"* (B4). Most of the board members

emphasized that although gender balance is important, ultimately it is the competences that are the crucial determinants of board effectiveness.

The board members thought that having more age diversity could benefit the company and increase the innovation level. In general, the board members described a sense of urgency where the fast pace at which the technological changes occur demands for younger boards. On the other hand, they argued that having substantial and relevant experience is equally, if not more important. In general, having more national diversity was seen as beneficial. However, two of the board members also had negative experience with this, mostly due to the language barrier, but also because of the cost involved in the board member flying to Stockholm: *"There is one Englishman on our board, and some people think that it is annoying to speak English and that all the documentation is in English, but I do not see this as a problem"* (B8). Except for these board members, the respondents argued that national diversity is positive and can increase innovation.

7.1.4 Educational Level

When inquiring about the importance of education, a majority of the respondents believed that a higher educational level enhanced the discussion and benefited the board dynamics. However, many of the respondents also noted that educational level is less important than experiences: *"I like education, but it is more important with experience. And preferable an experience such that you have been leading a company similar to the one where you are a board member more than once"* (B5). Another respondent emphasized that education is not the same as competences by saying that: *"I experience that education is not the same as competences. Education is just a verification that you have done something. It is of course better if you understand how the company works, but when it is about competences you are allowed to say that it is not about formal education. A lot of people do not take their diploma, competence is not just about education"* (B7). The same respondent argued along the line of three others when mentioning that it is not about the education level per se, but rather the mix in educational degrees. *"In some cases, I think it is good with general competences, but if you are running a research related company you need research related knowledge. Otherwise we cannot understand the problems the CEO raises! Ultimately, it is important with a relevant mix"* (B7).

In summary, all of the board members interviewed claimed that a smaller board increases the effectiveness of the board. Along the same line, having more independent directors could indeed increase the company's overall corporate governance by being effective monitors, long-term advocates and networkers. Diversity and educational level can also be linked to better effective boards. However, all the respondents thought that the general competence of each board member was more important than any of the above mentioned.

7.1.5 Underpricing

Contrary to what was argued using signaling theory, a majority of the board members described how the company had actively planned underpricing to achieve a price increase. One respondent described: *"Yes, it was an important part, and yes, we discussed what we believed to be the "minimum" percentage increase during the first day that was acceptable for it to be a successful IPO. I think it was 10% that we aimed for. But it was equally important to be oversubscribed"* (B5). Whilst another commented: *"Yes, we aimed for 15%"* (B3). A third respondent explained that underpricing is about creating a pull in the market: *"Absolutely, it is important to create a pull in the market. It is the combination of the interests of the investors, and you can quickly see this when looking at the subscription of the stock"* (B8). In contrast, two of the respondents explained that they did not care about the price development during the IPO, since they were more long-term in their perspective. One explained: *"We had a more long-term perspective with the stock. (...) We do not speak about the stock price, we give long-term goals. It is about not increasing the expectations to a level that we cannot meet, we want our results to be visible and during the public offering we felt like we did not have anything to gain from the stock price going up"* (B2). Overall, the companies seem to actively underprice to achieve a price increase. This notion goes against the way signaling theory has been applied in this thesis and most of the underpricing research.

7.2 The perspective of the Investors

When interviewing the investors, it was evident that they shared the board member's view on what constitutes an effective board. Overall, they believed that it is more efficient with a smaller board of around five to seven people. One investor explained: *"I prefer smaller boards. It can get messy with too many people. But it is also true that a board can be too small where there is not a good enough mix of competences"* (Investor 1). Another respondent argued along the same line: *"Smaller boards have a harder time "acting independent". Too large boards mean that you cannot control the competences needed on the board"* (Investor 5). Furthermore, in line with the board members, they believed that board diversity can be beneficial and enhance the board's effectiveness. Amongst gender, age and nationality the former was commented on the most: *"Gender is definitively important, it needs to be a good mix and I think it shows that the firm is open for diversity. What is more important, diversity on boards often start with gender, followed by nationality"* (Investor 4). Another investor spoke more general about the benefits and challenges with diversity, ultimately explaining that diversity is especially important for long-term strategy setting: *"Diversity is always important I think, it leads to a wider perspective. However, too many differences sometimes imply more conflicts which is not effective when you need to make quick decisions. But, when you set the long-term strategy more perspectives it is crucial to understand the market, the consumer and the future potential"* (Investor 1).

Similar to the board members themselves, the investors believed that the board's educational level was crucial, but that competences were more important. *"It is more about having a relevant mix of competences for the task at hand, for example that you have been leading similar companies before"* (Investor 5). When asking what the most important board characteristics is, all the investors agreed the board members competences was the most important. Competences was followed by independence. *"It is important with independence, then you bring in outside competences and I believe that an outside perspective is healthy"* (Investor 4). Another investor presents the benefit of having independent directors when saying: *"Independent directors put their name on the company, this is an important signal for the ones who decide to invest"* he/she continues by explaining that true independence is hard for the market to observe: *"It is important to note that even if you are independent, it is hard to prove"* (Investor 5). Another investor confirms the perspective of the board members, that independent directors contribute with network and objectivity. In addition, they can be beneficial in situations of conflict: *"I think that independent directors, if chosen wisely are a very positive thing. For example, independent directors do not have close ties to the company which means that they can be more objective. Also, they bring in outside expertise and are especially good in troubling times. I also have experience of independent directors being good when resolving conflicts. Mainly, I think independent directors are beneficial because of their networks, an independent director can bring in necessary skills for example during an IPO"* (Investor 1). The same investor argued that it is especially important to be independent of the main owners as these directors have less of a financial agenda: *"I think it is more important to be independent towards the investors. Firms should be independent entities and have a long horizon. Most investors have a certain agenda, e.g. the life time of their funds in minds, meaning that they are optimizing for local maxima. We believe that the long-term success of the firm is more important to the society and the financial ecosystem and thus, independent directors should fully focus on the success of the firm"* (Investor 1).

Although the investors argued similarly to the board members, they seemed to put less emphasis on the board during an IPO. Essentially all the investors explained that because of the extensive regulations on the marketplaces, the investors usually expect firms going public to have an effective board. For instance, one investor explained: *"You can say we always expect the company to have a proper and well-functioning board"* (Investor 1). Another investor argued similarly: *"I do not look so much at the board when investing, it is hard to assess and you usually only care about it if you see a warning signal"* (Investor 6).

In contrast to the board members, the investors were also asked about which factors increase their confidence in IPO firms. A majority of the investors explained that the most crucial factor is that the business idea is explained in a manner that they can understand and believe in. Then, the second most important factor was the competences of top management. *"What increases my confidence in the company in general is a competent top management team, and products and services that are*

distinct and can deliver on a consumer need" (Investor 4). Another investor illustrated the risk asymmetry that occurs during an IPO: *"I think it is important with underpricing, because when you are an investor you have less information about the company, you take extra risk. I think pre-IPO managers should share the upside to the investors daring to take the risk"* (Investor 6).

A majority of the investors believed that the board is very important for firm value, but that because of current regulations when they invest they always expect it to be at a certain level: *"In terms of governance, it is really important with a strong alignment of management and shareholder interests, this implies a well-established firm... Yeah I guess you can say we always expect the company to have a proper and well-functioning board"* (Investor 1). Thus, the investors arguably believed that having an effective board composition in many ways is a hygiene factor in order to get listed.

Finally, the investors said the price increase made them happier about their investment. However, the more long-term investors in the sample explained that, although a price increase is exciting, ultimately it is the long-term value that matters most: *"We are value investors, not short-term financial investors. Because of this we will not look at the stock price today. We are not in a hurry"* (Investor 5).

In conclusion, the investors argued similarly to the board members in terms of board characteristics and their effect on the boards' effectiveness. Amongst the board structures, investors seemed to regard board independence as the most important factor. However, from the investors perspective a well-functioning board is more or less always expected in Swedish firms completing an initial public offering. This finding leads to interesting new insights further discussed in section 9.2.

8. Research Quality

This study analyzes the effects of the board structure of a company on the underpricing during its IPO. The following section discusses whether the chosen method is reliable and valid, i.e. whether it can be replicated and that it measures what it is supposed to measure (Bryman & Bell, 2011). As mentioned earlier, this study uses a mixed research method, implying that multiple complementary data sources are used to study the same phenomena (Jacobsen, Sandin, & Hellström, 2002). Bryman & Bell (2011) argue that qualitative research relative to its quantitative counterpart is harder to replicate and more prone to biases. Hence, to ensure that the qualitative results of this study can be generalized in a broader context, for the qualitative part, it is necessary to also talk about generalizability in addition to reliability and validity (Bryman & Bell, 2011).

8.1 Reliability

8.1.1 Quantitative Study

Within the research context, *"reliability refers to the consistency of a measure of a concept"* (Bryman & Bell, 2011, p. 169). In short, reliability describes whether a study can be replicated, for instance by a different researcher or at a different time. Results are supposed to be stable and not random.

As described in section 4.1.1, the data for this study were gathered from reputable sources such as Bloomberg or supplied by Modular Finance. Where incomplete, the data is enriched manually through IPO prospectuses or press releases. A prospectus is subject to several regulations and compiled carefully by experienced investment bankers. It can thus be assumed that all sources of data are reliable. Due to some data being collected manually and transferred to different documents, mistakes are possible. However, the entire process was handled carefully and under the supervision of all three authors of this study, making it less prone to subjective mistakes. Additionally, some of the data was randomly cross-checked, to rule out possible systematic errors. No errors were found during the cross-checking procedure, which indicates a reliable data set.

The processing of data and the construction of the model are done applying methods based in previous, peer-reviewed research. Following this approach limits subjectivity in the process and makes it likely that different researchers would come to similar conclusions. This thesis, however looks at a comparatively short time period. Looking at a longer or different period in time could potentially lead to different results.

8.1.2 Qualitative Study

LeCompte & Goetz (1982) claim that a common weakness of many qualitative studies is that they are often hard to replicate. Because of the lack of standardization in the semi-structured interviews, concern can be raised whether or not other researchers might come to the same findings (Saunders, Lewis, & Thornhill, 2009). According to Bryman & Bell (2011) this issue can be limited by a thorough documentation of the methodology and the research process. Accordingly, the authors describe the research method extensively in the section above. All interviews were recorded, transcribed and analyzed in a structural manner. Moreover, two interview guides were created to ensure that all respondents answered the necessary questions (Silverman & Marvasti, 2008). In every possible aspect, the authors tried to approach each interviewee equally to limit the subject bias. Finally, to limit the observers own biases, only two out of the three authors conducted the interviews, allowing for the third author to provide an objective screening of the documentation. Furthermore, peer-debriefing, where the authors compared individual notes, took place in every step of the process (Creswell, 2013b). One limitation with the study's reliability is that the interviews were translated from Swedish to English which might affect its validity. However, to restrain this risk, both native Swedish speakers controlled that the translation was correct. Finally, it is worth noting that the snowball sampling is at risk for biases as the sample becomes more homogeneous. The authors tried limiting this by asking the investors to introduce possible respondents with dissimilar investment strategies.

8.2 Validity

8.2.1 Validity of Quantitative Study

Research validity in this context indicates whether the study actually measures what it is intended to measure (Bryman & Bell, 2011). There are several facets that measure different aspects of validity (one of which has been tested through the robustness tests), with the most relevant in the quantitative aspect of this study being measurement validity and internal validity.

Measurement validity reflects whether a measure or variable that is intended to represent a concept, really does measure that concept (Bryman & Bell, 2011). The variables in this study are constructed following proven research methods. IPO underpricing for instance, the dependent variable, sets out to measure the price correction from the offer price to the price at which the market values a share. The underpricing could also be calculated with the closing price after the first week of trading or after a longer time period. As stated in section 2.2, however, using first-day returns as a measurement for underpricing is the standard in the literature and can thus be

considered valid. The same applies to the other variables, which are also based on previous research. It should be noted, however, that education, used as a proxy for competence, might not perfectly reflect the competence of a board. Additionally, board diversity, although based on research as discussed in section 2.4.5, has been uniquely constructed for this thesis and there might be other factors more suitable to measure diversity.

Internal validity is concerned with whether conclusions drawn reflect reality and an accurate causality between variables (Bryman & Bell, 2011). As indicated by a low Adjusted R-squared in Model 8, the independent variables explain at best a very small portion of underpricing. However, this study does not claim to capture the entirety of factors that cause underpricing. Previous research has found several other significant variables that cause underpricing (section 2.3). As for the model itself, it follows the methodology laid out by other established researchers, indicating a high internal validity. To control for possible biases with regards to industry of the company and the year of the IPO, the model uses fixed effects, which increases the internal validity further. Several robustness tests were performed, which strengthened the results for the *independence* variables. This was not the case for the other variables, which sets the validity of parts of the model into question. However, those variables were already inconclusive in the model.

8.2.2 Internal Validity of Qualitative Study

The *internal validity* of the study is the extent to which the empirical evidence found reflects the reality under investigation (Bryman & Bell, 2011; Creswell, 2013a). In general, internal validity is considered a strength of qualitative research as a major exposure to the particular topic ensures a satisfactory level of congruence between theory and observations (LeCompte & Goetz, 1982). The authors have ensured internal validity by arranging the interview guides in such way that keeps the respondents open minded and thus limit potential biases. For instance, although most of the qualitative research focused on the importance of board independence, initially the interviewees were asked about all board characteristics covered in the study to limit such bias.

8.3 Generalization of the Study

Ritchie et al. (2014) claim that there are three criteria in which a qualitative study can prove its generalizability. Firstly, through *representational generalization*, that is the extent to which the research sample can be generalized to the parent population from which the sample is selected. This is ensured by a sample of interview subjects that come from (or have invested in) a wide range of IPO firms across industries and size. Because a clear pattern and saturation was found in the researched sample, the authors believe that additional interviews would provide similar findings.

Moreover, the participants were collected manually based on two different sampling criteria, which limits the bias using randomized volunteers, described by (Cook & Campbell, 1979). Furthermore, although the statistical model held a low explanatory value, the results found in the qualitative study confirms some of the quantitative findings which further increases the transferability. Thus, triangulation[27] was achieved by the use of both interviews, prospectuses and press releases which increase confidence with the results (Creswell, 2013a; Jick, 1979). Furthermore, *inferential generalization* is whether or not the research can be generalized to another context or setting. *Theoretical generalization*, as first defined by Kaplan (1964), involves causal relationships that can have an universal application. The authors would argue for caution when claiming these criteria, as findings can seldom be transferred directly to other contexts without modification (Bryman & Bell, 2011).

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[27] *Triangulation* in research refers to using two or more methods to confirm the respective results (Rothbauer, 2008).

9. Discussion and Limitations

Over the years, there has been extensive research into the topic of underpricing. Some of that research has touched upon the role the board of directors, however, to the knowledge of the authors, the Swedish market has not been analyzed in this context. This study follows a mixed research approach in trying to understand the relationship between IPO underpricing and the board composition. This section starts with discussing the limitations of the methodology, which is followed by a combined discussion of the results achieved in both the quantitative and qualitative research.

9.1 Limitations of the Methodology

9.1.1 Limitations of the Data Sample

As for the limitations of the quantitative methodology, it is important to consider the sample of IPOs studied and the methodology in gathering the data. First, this study focuses on a comparatively short time frame, examining IPOs between the beginning of 2014 and mid 2018. It has been widely reported that these years have seen record-breaking IPO activity, with Swedish stock exchanges accounting for three of the top five exchanges with the highest IPO activities in Europe in 2017 (EY, 2018; Segerstrom, 2018). As IPO activity and underpricing vary widely between years (e.g., Ritter & Welch, 2002), observing a more extensive period of time might have given a better insight into the phenomena, but would have gone beyond the scope of this thesis.

Second, only Swedish IPOs are considered. The rationale presented are differences in standards, for instance in the definition of independence, that would have made it hard to compare data from more countries. However, it might have been interesting to include the other Nordic countries in the studies, as their standards are comparable (Committee on Corporate Governance, 2013; Oslo Børs, 2018). Additionally, due to prospectuses not being universally available, IPOs on the NGM exchange were excluded from the sample. This might have distorted the results, as including the entire set of Swedish exchanges could have given a more exhaustive picture.

Last, the data collection has in part been performed manually. As mentioned in section 8.1.1, this process has been handled with due care, but mistakes are possible nevertheless and could limit the accuracy of some of the data.

9.1.2 Limitations of the Variables

In addition to the data itself, there are several possible alternative approaches and limitations that come with the variables chosen and how they are constructed. As discussed in section 2.2,

Underpricing could have been defined differently. A possibility would be to define it using a longer time horizon between closing and offer price, i.e. first week or first month returns (4 week returns: Hearn, 2012). However, the predominant amount of literature defines underpricing as first day returns, as discussed in section 2.2 (e.g., Bertoni *et al.*, 2014; Certo, Daily, *et al.*, 2001; Dolvin & Kirby, 2016). Additionally, another prevailing option in other studies is to use the market-adjusted return as dependent variable, as is the case in Chan *et al.* (2004). The counter argument for this, is that in those instances *Market Return* cannot be used as a control variable due to possible multicollinearity conflicts. In this thesis, *Market Return* helps to explain the board composition effects on underpricing, which is the reason for rather using it as a control variable.

For *board size,* the authors included employee representatives in the sample which consisted of a total of 43 out of 1678 board members (2.5%). It could be debated whether employee representatives have the same strategic role in the board work in terms of determining the offer price and in discussing underpricing in general. However, that remains unclear in existing research, and since employee representatives only constitute a small portion of the sample in relation to all board members (2.5%), it is logical to include them in this variable.

For the *independence* variables, an alternative approach would be to combine the two different *independence* variables into one. In this way, the variable would capture the true overall independence of board members. A test of this sort was carried out, but it did not add any additional explanatory power to the model. Additionally, as mentioned above, some of the data was hand-picked. This becomes especially relevant in the case of *independence*, where independence of the management, if not provided by the prospectus, might be challenging to establish. For instance, it is especially hard to ensure family relationships with other board members or management.

The *diversity* variable is unique and is calculated according to the authors' own formula[28]. It is therefore less grounded in previous research, and several different approaches could have been chosen. In terms of being exhaustive, there are other dimensions in diversity, i.e. religion, sexual orientation, disability, ethnicity etc. Although these variables would be interesting to include, the authors had limitations in terms of finding ways to effectively collect such information as it is rarely public. Furthermore, the variable could be calculated differently. The reason for taking the standard deviation of age was to determine the mix within the group. In terms of consistency with the other two diversity parameters, it could instead have been based on the sample mean and the percentage difference thereof. Connecting back to the theory of diversity in section 2.4.5, diversity can be split into observable and unobservable diversity. Although unobservable diversity would be equally

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[28] Diversity = (1 + standardized (st. dev. of age) * (1 + % of women) * (1 + % of non-Swedes)

interesting to study, the authors had limitations in terms of collecting that information for the sample size, and therefore focused on the observable diversity.

The last independent variable in this thesis, *education*, has been used as a proxy for competence to test **H4**. The variable was constructed by assigning a numerical value to each level of education, however during the interviews it became clear that this is not a relevant enough proxy for competence. As is always the limitation when quantifying a qualitative value, the discussion arises whether that numerical conversion is accurately capturing the competence level of the board. For future research it is of interest to test if education level is indeed an adequate proxy for competences. In addition, in future underpricing research it may be more valuable to test diversity of educational degrees rather than educational level. As explained in the interviews, having a high diversity of different knowledge fields could be more useful for the board.

The control variables initially chosen for the sample were based on previous research and collection availability. From this, the three control variables that the authors wanted to include were: *VC/PE Backed, Firm Age*, and *Market Return*. The benefit of control variables in a multivariate regression model is that not all need to be included in case they do not help to explain the model (i.e. improve the Adjusted R-squared). Therefore, an alternative approach would be for the authors to gather other control variables for their model. From previous research, frequently occurring variables that show significant results are: *Underwriter reputation, Total Risk Factors, Shares offered / Total outstanding shares post-IPO, Institutional quality index, Market Volatility, Offer size*, and *government control*, amongst others (Bertoni *et al.*, 2014; Certo, Daily, *et al.*, 2001; Chahine & Filatotchev, 2008; Darmadi & Gunawan, 2013; Dolvin & Kirby, 2016; Hill, 2006; Yatim, 2011). Including one or several of these variables might have increased the explanatory power of the model. However, as previously mentioned for other variables, this information was not consistently available in either a database or online and was outside the scope of this thesis.

9.1.3 Limitations of the Final Model

The initial model presented in section 4.2.3 had very low explanatory power and has thus been adjusted. Firstly, it has been analyzed using industry- and year-fixed effects. Fixed effects in this case allow to control for intra-industry and intra-year differences that would otherwise distort results. Secondly, the control variables that have not increased the explanatory power of the model have been excluded, as discussed above.

Thirdly, the independent variables have been converted into dummy variables depending on whether they are higher or lower than the average. The disadvantages of dichotomizing a continuous variable are that it manipulates the raw data and much of the information is lost. Observations close to the cut-point are characterized as very different when rather being similar

(Altman & Royston, 2006). Lastly, using dummies conceal any non-linearity in the relation between the variable and outcome. On the other hand, there are certain advantages of using dummy variables, e.g. *"If we conceive the task of regression analysis to be that of providing an estimate of a dependent variable, given certain information, the use of linear regression yields biased estimates in the event of curvature"* (Suits, 1957, p. 551). Additionally, using dummies tend to increase significance for variables that are typically U-shaped, which might be relevant for the variables in this study (Suits, 1957).

9.1.4 Limitations of the Qualitative Method

As with the quantitative method, there are limitations to the qualitative methodology. First, the eight board interviewees were selected from firms with an above average number of independent directors. An alternative approach to selecting the interviewees might have led to a better understanding of the true benefit or challenges of having independent directors, for instance through two contrasting groups to compare the two extremes (Bryman & Bell, 2011). That is, conducting half of the interviews with board members from companies with a high percentage of independent directors and the other half with directors from boards with mainly dependent directors. However, due to regulations of the marketplaces as well as the code of corporate governance, there were not enough firms amongst the 316 companies that had a truly dependent board for a representative sample. Furthermore, the sample selection could have been based on other characteristics, such as diversity and education. However, since only independence proved significant in the quantitative study, the authors aimed at understanding why this relationship was found. Additionally, although the number of women in the sample mirror the female representation on boards and in the investors' sphere, having more women in the sample could have provided a more versatile perspective. Finally, the interviews were semi-structured, meaning that respondents had the possibility to sometimes go off-topic, making it more challenging to establish a pattern across the sample. To ensure a better generalizability and comparison across the sample, the Likert scale could have been applied (Bryman & Bell, 2011). However, many methodology scholars (e.g., Creswell, 2013a; Ritchie *et al.*, 2014) argue that semi-structured interviews can also be generalized. Moreover, the authors wanted each interview to be a two-way communication and with the possibility of the respondent to express their views in their own terms.

9.2 Discussion of the Results

9.2.1 Diversity, Education, and Board Size

All hypotheses that were tested have been rejected by the final model. There are, however, some distinctive differences in the interpretation of the coefficients. For *diversity*, *education* and *board size*, there is no notable correlation with underpricing, neither in the univariate nor the multivariate analysis. The regression results imply that these variables do not affect the price development during an IPO in a Swedish context. Although contrary to the hypotheses of this study, similar results have been found by some researchers in other countries (e.g., Hearn, 2012; Rose, 2007).

Another explanation for the lack of correlation could be found in the definition of the variables themselves, as discussed in section 8.2.1. Defining underpricing or the independent variables differently could have led to different results. Indeed, the results of the qualitative study are mostly in line with the initial hypotheses. For instance, board directors and investors alike prefer higher board diversity, especially more female board representation. This is exemplified by an investor who emphasized that more women in general implies better diversity in perspectives and enhances innovation. In general, a majority of the respondents discussed the importance of a mixed board. Similarly, the respondents emphasized the importance of having a diverse mix of educational degrees, which they considered to be even more relevant than a higher overall educational level.

The thoughts of the interviewees regarding board size also confirm the initial hypothesis, as they agreed that a smaller board, of around five to seven members is optimal. However, this optimal board size is already reflected throughout the sample companies. As can be seen in the summary statistics in section 4.1.3, the average board size is slightly above five and with a low variance. A low correlation for board size and underpricing might thus neither imply the irrelevance of the variable nor a flaw in the model, but rather that, on average, boards of Swedish companies are already at their optimal size. Swedish investors might thus see board size as a given, expecting it on average to be optimal. This would indicate that the board size does not affect the underpricing but is viewed as a hygiene factor. The next section expands on this concept and generalizes it to cover *diversity* and *education* as well.

9.2.2 Board Characteristics as Hygiene Factor

The board characteristics *diversity*, *education*, and *board size* are not correlated with *underpricing*, yet board members and investors alike consider these characteristics to be important for an effective board. As indicated in the previous section, a reason for this contradiction could be that in most

Swedish boards these factors are already (or are expected to be) at an optimal level. This notion was confirmed in interviews with investors, where they argued that given the marketplace's high regulation, the code, and the pressure from the market, they always expect a more or less effective board to be in place. The respondents conveyed that factors such as higher female representation, an overall high educational level and a smaller board size was seen almost as a hygiene factor[29].

Given the Swedish culture of low corruption, high emphasis on cooperation and a low power distance (Lubatkin *et al.*, 2005), Swedish investors seem to simply take a good corporate governance system for granted. This is not surprising seeing that Sweden often is amongst the top in corporate governance rankings (e.g., WCGI, 2018). Arguing along the line of signaling theory, having a well-composed board does not signal higher quality to the investors, as argued by Certo, Daily, *et al.* (2001) and Chahine & Filatotchev (2008), but rather implies that the firm is conforming with a board structure that is always expected on the market. If an effective board structure fails to signal high quality to the market, the IPO firm cannot use a superior board structure to reduce its underpricing. Moreover, if board composition does not imply any effect on underpricing, it is no surprise that a low correlation was found.

The low explanatory power of the final model might indicate another case for the theory of board structure as a hygiene factor. The fact that the Adjusted R-squared remains low despite some efforts to increase it, implies that only a small portion of the underpricing phenomenon can be explained by the firm's board structure. Further data adjustments and manipulations might have increased the explanatory power slightly but are unlikely to have had a significant impact. Indeed, other researchers studying the topic, such as Dolvin & Kirby (2016), used simple OLS regressions without altering their data (e.g. winsorizing) or using fixed effects. In their case, the Adjusted R-squared was increased with the help of further control variables, as mentioned in section 8.1.2. Additional control variables could have proven helpful in this thesis as well, but a low explanatory role of the board structure in this context is a result in itself and confirms the hygiene theory. Since this study's results differ from other studies, that focus on e.g. the U.S. (Dolvin & Kirby, 2016) and the U.K. (Certo, Daily, *et al.*, 2001) market, it might imply that board structure has not yet been established as a hygiene factor in these countries.

In summary, *diversity, education*, and *board size* are not significantly related to underpricing, despite investors and board members alike finding those variables to be important for board

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[29] The concept of a hygiene factor was first developed by Frederick Herzberg in his two-factor-theory. The theory distinguishes between motivators, things that motivate individuals such as challenging work, responsibility and sense of importance. On the other hand, there is something called a hygiene factors such as salary or job securities, which is things that doesn't lead to a higher satisfaction, but rather is always expected in a work environment. Whilst hygiene factors cannot motivate, the lack of hygiene factors can lead to dissatisfaction (Herzberg, Mausner, & Snyderman, 1959).

effectiveness. The low explanatory power of the final model suggests that only a small portion of underpricing can be explained by board characteristics. The authors theorize that combined, these factors suggest that an optimal board structure is assumed to be in place in most Swedish companies and can thus be seen as a hygiene factor by investors. For this reason, altering the diversity, education and board size pre-IPO will not signal superior quality to investors as theorized by signaling theory. Therefore, these board characteristics will not decrease the extent of underpricing in Sweden.

9.2.3 Board Independence and Underpricing

The independence of the board has thus far been purposefully kept out of the discussion. The hypothesis of a negative correlation with IPO underpricing can be rejected and most arguments in the previously explained hygiene theory equally apply to *independence*. However, *independence* showed a significantly positive correlation with *underpricing*, which is worth exploring in more detail. Following the argument leading up to the original hypotheses, most theory states that independent directors are desirable, and underpricing is undesirable. The independent directors are supposed to signal superior quality to investors (Certo, Daily, *et al.*, 2001), which in turn should decrease the need for underpricing. This view is not supported by the quantitative results, leading to two possible explanations.

The first explanation considers the underpricing. As found in the final model, an increase in board independence is related to an increase in underpricing. Arguing along the line of signaling theory, a reason for this could be that board independence is *not* desirable for new investors, thus it is not a signal of superior quality but rather regarded as value-destroying. Instead, it could be theorized that investors prefer a dependent board. Thus, firms with more independent boards might need to underprice to compensate for the "*negative*" signal this entails. However, neither existing literature nor the qualitative research support this view. Interviewees found independent directors to be indeed value-adding, which should increase firm quality and function as a positive signal, as the initial reasoning states.

This leads to the other perspective. If board independence is indeed desirable, and a signal of good quality to investors, the results may be explained by underpricing itself not being as undesirable as hypothesized. Firms might not actively try to avoid underpricing. As described in section 2.3.2, this would go along the lines of Welch (1989) and Allen & Faulhaber (1989), who regard underpricing itself as a quality signal. They argue that only high-quality firms can afford to underprice. Additionally, boards with high dependence towards the large (pre-IPO) owners will have money to lose, and therefore try to avoid underpricing.

The perspective of both independent directors and underpricing being desirable is supported by the interviews with board members, the majority of which stated that their company actively underpriced the IPO to achieve reputational benefits. These reputational benefits were said to outweigh the economic loss of "*money left on the table*". At the same time, the investors confirmed this view, stating that an initial price increase enhanced their perception of the firm's outlook. Hence, it can be concluded that short-term returns are viewed as a key KPI to determine the success of an IPO in high quality firms. For future research it is of interest to understand if the attitudes towards underpricing has changed, and how important the reputational benefits are to determine the success of an IPO.

Concluding, the *independence* variables in the quantitative study were positively correlated with IPO underpricing, rejecting the initial hypothesis. This could be explained by either *independence* being considered undesirable, or *underpricing* being less undesirable than hypothesized. The latter finds more basis in the qualitative approach of this thesis as well as in previous research.

10. Conclusion

This thesis studies the link between IPO underpricing and board structure, which has not been explored on the Swedish market thus far. None of the initial hypothesized connections were found in the final model. Interviews with board members and investors led the authors to consider two main explanations for the achieved results.

The first explanation contemplates the size and diversity of the board, as well as the education of board members, which did not show any correlation with underpricing. However, interviewees in the qualitative study considered all these factors to be relevant for firm quality, but at the same time they predominantly expected IPO firms to have effective boards. Therefore, the authors theorize these board characteristics to be more of a hygiene factor: important for the company, but already expected by investors to be in place at an effective level. A first indication to confirm this theory could be seen in the board size, which exhibits a low variance and is on average within the range that is considered to be optimal by interviewees. The hygiene factor theory would go in line with Sweden consistently ranking amongst the countries with the best corporate governance systems in the world.

The second explanation is based on the result for board independence, which has been considered to be a positive signal indicating high firm value. Contrary to expectations, independence was found to be positively correlated with underpricing. The authors believe that the reason for this is related to the way that underpricing has been regarded throughout the study. IPO underpricing has been theorized to be negative for the companies, who subsequently try to avoid it. However, the qualitative study indicates that companies actively aim for underpricing. Thus, signaling high firm value through an independent board would indeed lead to higher underpricing.

Additional research is required to either confirm or deny these conclusions. Especially in the theory of corporate governance in Sweden as a hygiene factor, future research could focus on whether the board structure is indeed, on average, considered to be optimal. If that is the case, has it always been like that, or are company boards slowly converging into a consensus? Finally, the study theorizes that a certain underpricing is desirable by IPO firms. This raises the questions if future research should focus on ways in which companies can achieve a price increase during an IPO, rather than why it occurs.

11. Appendix

11.1 NASDAQ Marketplace Rule 4200(a)(15) – Definition of "*Independent Director*"

"*Independent director*" means a person other than an executive officer or employee of the company or any other individual having a relationship which, in the opinion of the issuer's board of directors, would interfere with the exercise of independent judgement in carrying out the responsibilities of a director.

The following persons shall not be considered independent:

A) a director who is, or at any time during the past three years was, employed by the company;

B) a director who accepted or who has a Family Member who accepted any compensation from the company in excess of $100,000 during any period of twelve consecutive months within the three years preceding the determination of independence, other than the following: i) compensation for board or board committee service; ii) compensation paid to a Family Member who is an employee (other than an executive officer) of the company; or iii) benefits under a tax-qualified retirement plan, or non-discretionary compensation. Provided, however, that in addition to the requirements contained in this paragraph (B), audit committee members are also subject to additional, more stringent requirements under Rule 4350(d).

C) a director who is a Family Member of an individual who is, or at any time during the past three years was, employed by the company as an executive officer;

D) a director who is, or has a Family Member who is, a partner in, or a controlling shareholder or an executive officer of, any organization to which the company made, or from which the company received, payments for property or services in the current or any of the past three fiscal years that exceed 5% of the recipient's consolidated gross revenues for that year, or $200,000, whichever is more, other than the following: i) payments arising solely from investments in the company's securities; or ii) payments under non-discretionary charitable contribution matching programs.

E) a director of the issuer who is, or has a Family Member who is, employed as an executive officer of another entity where at any time during the past three years any of the executive officers of the issuer serve on the compensation committee of such other entity; or

F) a director who is, or has a Family Member who is, a current partner of the company's outside auditor, or was a partner or employee of the company's outside auditor who worked on the company's audit at any time during any of the past three years.

G) in the case of an investment company, in lieu of paragraphs (A)–(F), a director who is an "*interested person*" of the company as defined in section 2(a)(19) of the Investment Company Act of 1940, other than in his or her capacity as a member of the board of directors or any board committee.

11.2 Interview guide for interviews with board members

Format:

The interview follows a standardized structure but allows for follow-up questions and an open dialogue between the interviewer and the respondents. Initially the interviewees are asked if they wish to remain anonymous and if they would like to get informed when the thesis gets published. In addition, the board members were asked to think back to a specific IPO in the company found in the study's sample. Following this, questions are asked surrounding two main themes, underpricing and board characteristics.

Underpricing

1. Explain how the process leading up to the IPO looked like in your company?
2. How involved were you (and the board) in the IPO process of your company?
3. Now we would like you to think back at the pricing process leading up to the IPO:
   a. What was your general perception of the pricing process? How was it carried out, and who was mainly driving the process? How much responsibility did the underwriter, the board, and top management respectively have?
   b. Was there any talk about underpricing before going public? We define underpricing as the percentage difference between the subscription price and the first day closing price.
   c. What was your/the board's/the management's reaction when after the first day it was clear that the price development was +/- X%?

Board characteristics

4. In your experience, what do you think the role of the board should be?

5. Do you, with your experience and knowledge, think that the composition of a board has any influence on the performance of a firm?

6. Our study especially looks at the following characteristics:

   a. Board size

   b. Whether the CEO is in the board

   c. The number of directors that are independence towards management and larger investors

   d. Average age

   e. Gender balance

   f. Educational background

   g. Nationality

   Do you think that any of these in isolation, have any influence on firm performance? How has it been in your experience?

7. We thought that your company was interesting to look at because you have an above average amount of independent directors.

   a. Do you think that has thus far have had any positive or negative effect on the work of the board?

   b. Thinking of the other boards you are, or have been active in, is this different? Have you noticed any differences?

   c. According to our regression, the only board characteristic with a significant effect on underpricing is independence of owners. Why do you think this is?

8. What other board characteristics do you think, in general, are important to consider that might influence IPO underpricing and/or improve the company's effectiveness?

9. What other firm characteristics do you think are important in order to improve IPO underpricing?

10. In specific about your company's board, in your opinion, are there any other characteristics at work that influence your performance?

11.3 Interview guide for interviews with investors

Format:

The interviews follows a standardised structure, but allows for follow-up questions and an open dialogue between the interviewer and the respondents. Initially the interviewees are asked if they wish to remain anonymous and if they would like to get informed when the thesis gets published. In addition, since the purpose is to investigate investments in IPOs the investors were asked to think back to the last time when they invested in an initial public offering. Following this, questions are asked surrounding three main themes, valuing a firm during an IPO, underpricing and board characteristics.

Valuing a firm during an IPO

1. When you invest in an IPO, which factors increases your trust in the company?
2. When you assess the company's value; which hygiene factors do you expect to always be present? That is, is there any firm specific factors or requirements that you expect the firm to always comply with?

Underpricing

3. Is it important for you that the price goes up the first day when you buy a stock during an IPO?
4. What are your thoughts on *"underpricing"*, defined as the increase in price during the first day when a stock is traded on an exchange.

Board characteristics

5. Our study especially focuses on the amount of independent directors in the board of the company, what's your opinion of independent board directors?
6. In your opinion, is it more or less important that the directors are independent towards the company or the largest owners?
7. Our study also looks at:
   a. The board size
   b. Board diversity in terms of gender, age and nationality
   c. The educational level of the board members

   Is any of these factors more important when you invest in IPO companies? Why/why not?

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