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The Impact of Corporate Governance on IPO Underpricing in the Nordics

Master Thesis

by
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ABSTRACT

This thesis examines the impact of corporate governance on IPO underpricing within the Nordic market, analyzing 774 IPOs from 2009 to 2024. Our research finds no significant evidence that corporate governance measures influence underpricing in Nordic IPOs due to the region's high level of investor protection and robust regulatory frameworks. In contrast, corporate governance significantly affects IPO underpricing in the US and emerging markets, where legal protections are gradually less robust. Empirical tests on 3,503 US IPOs and 10,747 IPOs from Emerging Markets finds that measures such as frequent board meetings, experienced boards, green shoe options and lock-up agreements reduce underpricing by aligning long-term incentives between insiders, outsiders and underwriters. Additionally, our study finds that PE/VC-backed IPOs in the Nordics experience lower underpricing, suggesting that active ownership and governance play a crucial role in these cases. Moreover, our research reveals that underpricing is a significant predictor of six-month post-IPO performance, with underpriced IPOs yielding better returns in both the Nordics and the US suggesting a short-term momentum effect. While corporate governance has a limited effect on IPO underpricing in the Nordics, it serves as a significant substitute for investor protection in less regulated markets.

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No text in this thesis has been generated or suggested using AI. We have used ChatGPT to improve the text and Grammarly to suggest grammatical or spelling corrections, and used our discretion to accept or reject any of the suggestions. We have used AI tools to improve part of the code in the computer programs used to conduct the research reported in this thesis. These AI tools were: ChatGPT. This disclosure is made in accordance with current guidelines provided by BI Norwegian Business School.

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1 Introduction and motivation

Initial Public Offerings (IPOs) are critical events in a company's lifecycle, marking its transition from private to public ownership. Underpricing, the difference between the IPO offer price and the first-day closing price, is a key concern as it results in substantial amounts of money being "left on the table." While there are several theories explaining the phenomenon of IPO underpricing, this thesis will investigate the role of asymmetric information in this context. In an IPO transaction, issuers, underwriters, and investors possess varying levels of information, leading to various agency problems. Previous research highlights the significant role of corporate governance in mitigating these issues by aligning interests, reducing information asymmetry, and boosting investor confidence. Robust governance practices have been shown to substantially influence the extent of underpricing, underscoring the critical importance of governance structures in the IPO process.

This thesis aims to contribute to the existing literature by focusing on the Nordic IPO market and examining the impact of corporate governance on IPO underpricing within this context. The Nordic market, characterized by high investor protection and robust legal frameworks, provides a unique setting for this investigation. Our research seeks to determine whether corporate governance measures in IPOs can act as substitutes for investor protection by better aligning incentives and mitigating conflicts of interest. We will conduct a comparative analysis to understand how these measures function in different market efficiencies, analyzing indicators such as board composition, ownership concentration, deal terms and IPOs backed by Private Equity and Venture Capital. By conducting empirical tests and analyzing data from the Nordic, US, and emerging markets, we aim to fill a gap in the literature where no comprehensive study has previously examined this issue within the Nordic context. Additionally, we will examine the short-run performance post-IPO

to determine the impact of IPO underpricing on a company's future success. Previous research suggests that firms with strong corporate governance practices tend to perform better after going public. Our study aims to investigate whether this holds true in the Nordic context and whether it also applies to PE/VC-backed companies.

Our study finds that the average IPO underpricing is 8.3% in the Nordics, 16.5% in the Unites States and 38.9% in Emerging Markets. While Nordic countries experience less underpricing, we find no significant evidence that corporate governance measures contribute to reducing this effect. In contrast, corporate governance significantly impacts IPO underpricing in the US and emerging markets, where legal frameworks are less robust, acting as a substitute for investor protection. In these regions, measures such as higher board age and more frequent board meetings correlate with reduced underpricing, indicating the value placed on board experience and active oversight.

We find that PE/VC-backed IPOs in the Nordics experience 7.1% lower underpricing compared to non-PE/VC-backed IPOs, suggesting that investors value the enhanced governance structures that PE/VC firms bring. This includes higher board independence and more effective oversight, where incentive structures and decision-making align with shareholder interests. To address potential selection bias problems due to unobservable variables that may affect the PE/VC outcome, we employed Heckman selection models to estimate PE/VC effects. Furthermore, we find that PE/VC-backed IPOs in the US and Emerging Markets experience higher underpricing, reflecting varied investor views on PE/VC involvement across different regions.

Finally, our findings show that underpricing is a significant predictor of six-month post-IPO performance, with underpriced IPOs yielding better returns in both the Nordics and the US. Previous literature suggest firms with good corporate governance, indicated by low underpricing, are better positioned

for higher six-month post-IPO returns. However, our results indicates that investors require higher short-term returns for risky IPOs.

In summary, while corporate governance has limited influence on IPO underpricing in the Nordics, it significantly substitutes for investor protection in less regulated markets, demonstrating more efficient governance models are benefiting shareholders.

2 Literature and Theoretical Framework

This section provides a theoretical framework for IPOs, focusing on the impact of corporate governance. It explores fundamental theories explaining why IPOs are underpriced, agency theory, and the role of governance in IPOs. It also analyzes the Nordic corporate governance model compared to the US and emerging markets.

2.1 IPO Underpricing

The concept of underpricing in IPOs refers to the practice of issuing securities at a price lower than their actual market value. Underpricing in the context of IPOs is quantified as the difference between the closing market price on the first day of trading and the original offer price. An analysis of IPOs listed on the NYSE, AMEX, and NASDAQ from 1980 to 2023 reveals a notable trend in this regard. The data shows that the equally weighted average underpricing for IPOs, with a minimum offer price of $5.00, stands at 18.9%. This statistic reflects a significant amount of capital, an aggregated total of $233.33 billion that was effectively 'left on the table' during this period (Loughran and Ritter (2002)).

Understanding why IPOs are frequently underpriced is crucial for issuers, underwriters, and investors. The subsequent sections will delve into theories that account for the underpricing of IPOs. This examination will cover key theories such as information asymmetry, pecking order, signaling, winner's curse, and underwriter reputation to understand their collective influence on IPO pricing dynamics.

2.1.1 Information Asymmetry

Information asymmetry arises between outside investors (outsiders), underwriters, and the company's management or initial shareholders (insiders) during an IPO. Insiders possess superior information about the firm, which they can exploit, leading to underpricing (Booth and Smith (1986)). This allows insiders to benefit at the expense of outsiders, who may lower their price due to distrust in insiders' motivations. In the context of IPOs, this asymmetry is evident, as issuers and underwriters usually possess a more detailed understanding of the company's prospects than investors. Akerlof (1970) seminal work, "The Market for 'Lemons'," illustrates how such information imbalances can cause markets to collapse.

2.1.2 Pecking Order Theory

The pecking order theory offers a vital perspective on the underpricing of IPOs. According to Myers and Majluf, firms experience information asymmetries between inside and outside investors, leading them to prioritize internal financing and debt over issuing new equity. This is because new equity involves higher transaction costs and adverse selection risks. In the context of IPOs, firms might strategically underprice their shares to compensate for these risks, making the equity more appealing to outside investors despite the existing information gaps (Myers and Majluf (1984)). This aspect of the pecking order theory explains why companies might underprice their IPOs to ensure successful capital raising.

2.1.3 Signalling Theory

Signaling theory, first introduced by Spence in the 1970s, significantly impacts our understanding of IPO underpricing. This theory suggests that firms can

signal their quality to outside investors through strategic financial decisions, especially in scenarios characterized by information asymmetry where insiders possess more detailed knowledge about the firm's true value than potential investors (Spence (1973)).

Building on this framework, Allen and Faulhaber (1989) argue that high-quality firms underprice their IPOs to signal their strong future potential. By setting their IPO prices lower than expected for their quality, these firms demonstrate confidence in their future performance. This strategic underpricing serves to build a robust investor base and achieve higher market valuations over time. Complementing this, Francis et al. (2010) find that firms in markets with high information asymmetry underprice their IPOs to signal quality, voluntarily leaving money on the table to secure favorable future financing terms.

2.1.4 Winner's Curse

The winner's curse can significantly impact the return on investment for outside investors. This concept, described in Rock (1986) foundational work, relates to the phenomenon where investors who 'win' an auction by paying a higher price than others may end up losing out if they've overestimated the asset's value. This phenomenon has been tested within the Finnish IPO market and the study found that the winner's curse was evident, affecting the returns of uninformed investors (Keloharju (1993)). A more recent study on another market, the Malaysian IPOs from 2000 to 2013, also supports these findings, showing a consistent pattern where uninformed investors tend to win IPOs that are less demanded by informed investors, leading to low or negative initial returns (Abdul-Rahim et al. (2016)). These results confirm the persistence of the winner's curse across different markets and periods.

2.1.5 Underwriter Reputation

Underwriters strategically underprice IPOs to ensure sufficient investor participation, a tactic influenced by both reputational concerns and the management of information asymmetry. Beatty and Ritter (1986) argue that underpricing compensates investors for the risk associated with potential overvaluation, thus ensuring the full subscription of offerings. This strategy not only manages information asymmetry but also preserves underwriters' reputations by demonstrating their ability to successfully market IPOs.

2.2 Agency Theory in IPOs

Jensen and Meckling (1976) foundational work in 1976 provides a comprehensive explanation of how agency costs arise from the separation of ownership and control. This separation can misalign the incentives of managers (agents) with the goals of shareholders (principals), who prioritize profit maximization. Agency costs primarily consist of residual loss, representing the intrinsic loss of value when managers do not maximize shareholder value. Additionally, Jensen and Meckling categorize bonding costs and monitoring costs as other forms of agency costs. Bonding costs refer to compensations designed to align managers' interests more closely with those of shareholders, while monitoring costs are expenses incurred to oversee managerial actions and ensure they align with shareholder interests.

2.2.1 Conflicts between shareholders and management

A typical agency problem between shareholders (the owners) and management are entrenched managers that have come into a position of power where shareholders no longer have influence on their decisions. Hence, they may not act on the half shareholders but on personal interests. In the context of an IPO, entrenched managers might set terms or engage in behaviours that solidify

their control over the company, potentially leading to decisions that do not maximize shareholder wealth (Easterwood and Singer (1994)). Shareholders might seek to maximize returns through higher stock prices, while managers might pursue corporate growth or stability that benefits their career security, potentially at the expense of shareholder returns

2.2.2 Conflicts between shareholders and underwriters

Underwriters face significant risks during the IPO process, prompting them to underprice shares as proposed by Beatty and Ritter (1986). This tactic ensures that all issued shares are sold, thereby reducing the risk of unsold shares and associated financial losses. Furthermore, underpricing aids in establishing a positive reputation among investors by delivering initial returns, despite potentially lowering earnings for issuers. The possibility of reputational damage is substantial if an IPO underperforms after listing, as the underwriter's credibility is closely tied to the success of the offerings they manage. Consequently, underwriters balance the immediate success of share sales with the need to maintain a strong long-term market reputation (Dimovski et al. (2011)).

2.2.3 Conflicts between insider shareholders and outside investors

Adverse selection

Adverse selection in IPOs arises from information asymmetry, where insiders have more comprehensive knowledge about the company's true condition than the potential investors. This disparity often leads insiders to present the company in an overly favorable light to maximize the IPO price, thus shifting inferior investment risks onto less informed outsider investors. Such actions are clear examples of adverse selection, where the quality of the investment may not be as represented, leading to potential conflicts post-IPO when the true state of the company becomes evident (Akerlof (1970)). However, if the actual

performance does not meet these inflated expectations, it can lead to long-term underperformance, eroding investor trust and value, which aligns with the findings of Balatbat et al. (2006) who discuss how information asymmetry can lead to both short-term IPO anomalies and poor long-term performance.

Moral hazard

Moral hazard arises because the risks and consequences of management's decisions are now shared with new public shareholders, who may not be fully aware of or consent to these risks. This shift allows insiders to pursue personal gains, such as excessive executive compensation or projects that enhance their control, which do not necessarily align with maximizing shareholder value (Arrow (1963)). Engagement in riskier business activities is particularly tempting because post-IPO, the pressure to maintain short-term financial performance can drive decisions that prioritize immediate results over long-term value creation. Rappaport (2005) supports this, indicating that short-term performance metrics often dominate decision-making, potentially at the expense of long-term shareholder value.

Implications for Long-Term Performance

The overpricing of an IPO, while potentially beneficial in the short term by raising more capital, can be detrimental in the long run. Overpriced IPOs often lead to subsequent market corrections when the company fails to meet the inflated expectations set during the IPO. This can damage investor relations and stock performance in the long term, as outlined by Pasupuleti and Jambotkar (2011), who found that overpriced IPOs tend to underperform in the market over the long term compared to reasonably priced or underpriced offerings.

2.2.4 Ownership Structure

Ownership structure significantly impacts agency costs (Shleifer and Vishny (1997)). Concentrated ownership, especially when held by active investors or institutions, can enhance management monitoring and align interests with shareholders, but it can also increase potential conflicts between majority and minority shareholders (La Porta et al. (1999)). Jensen and Meckling (1976) argue that increased managerial ownership decreases agency costs by aligning interests between managers and external shareholders. Burkart et al. (1997) note that while monitoring by large shareholders is beneficial, it can constrain managerial initiative. Pagano and Roell (1998) highlight the trade-offs between the benefits of a liquid market and the costs of increased external monitoring.

2.3 Corporate Governance in IPOs

In IPO transactions, information asymmetry is a major issue, where some parties have more information about the true value of the deal than others. This leads to conflicts of interest. Jog and McConomy (2003) found that high information asymmetry results in greater IPO underpricing. To address this, corporations are motivated to implement stronger corporate governance measures. This section explores various corporate governance practices, focusing on the impact of board characteristics ownership concentration, funding, lockup agreements, and green shoe options.

2.3.1 Composition of board of directors

Board characteristics are crucial indicators of corporate governance quality, impacting a company's strategic decisions, operational oversight, and risk management. Sharma et al. (2023) highlights that the expertise and qualifications of board members are fundamental in instilling stakeholder confidence and

demonstrating a firm's commitment to sound governance. These characteristics significantly influence not only company policies but also enhance a firm's reputation in the market.

Independent directors

The presence of independent directors on a board is crucial for ensuring unbiased oversight and effective governance. Independent directors are instrumental in mitigating conflicts of interest and enhancing the board's ability to monitor managerial actions. Bhagat and Bolton (2008) highlight that boards with a higher percentage of independent directors are better equipped to make decisions that align with shareholder interests, supporting firm performance and integrity.

Board size

The size of the board significantly affects a company's decision-making and oversight capabilities. Larger boards might bring diverse perspectives and expertise, enhancing strategic decisions. However, they can also suffer from coordination issues and slower decision processes.Yermack (1996) finds an inverse relationship between board size and firm performance, suggesting that smaller boards are generally more effective. Conversely, a study by Upadhyay and Sriram (2011) finds that larger boards enhance information transparency and reduce the cost of capital for firms, indicating improved corporate governance and lower agency costs. Thus, the optimal board size might depend on balancing these benefits and drawbacks to suit the specific needs of the company.

Board meetings

The frequency of board meetings is an indicator of the board's involvement and commitment to company governance. Frequent meetings can signify proactive engagement and better oversight. Vafeas (1999) suggests that more frequent

board meetings can lead to improved corporate performance, as they allow for timely interventions and more in-depth involvement in company affairs.

Board average age

The average age of board members can indicate the experience level and potentially correlate with the firm's strategic and risk management practices. Elderly directors might offer wisdom and experience but could also be less adaptive to new technologies and innovative practices. Wintoki et al. (2012) show that boards with a balanced mix of age and experience tend to make better governance decisions, aligning with both conservative and innovative strategies.

Women on the board

Gender diversity on boards is increasingly recognized for contributing to balanced decision-making and enhanced corporate governance. Adams and Ferreira (2009) demonstrate that boards with more female directors have better attendance records and are more likely to hold CEOs accountable, which can lead to improved performance and oversight.

CEO duality

CEO duality occurs when the CEO also serves as the chairman of the board. This can lead to conflicts of interest and reduce the effectiveness of the board's monitoring function. Fama and Jensen (1983) argue that separating the roles of CEO and chairman enhances the board's independence and effectiveness, thereby improving corporate governance.

2.3.2 Lockup provisions

Lockups are contractual restrictions preventing insiders from selling their shares for a specified period post-IPO as defined by the U.S. Securities and Exchange Commission (2011). These agreements ensure that insiders remain committed to the company's long-term success by aligning their interests

with the outside investors. Lockups enhance the independence and effectiveness of the board, which boosts governance and elevates investor confidence in the company's governance mechanisms, thereby stabilizing post-IPO performance. Lockups serve to extend the commitment of managers after the IPO and enhance governance by mitigating moral hazard among mangers. This commitment is crucial for aligning long-term growth with the interests of shareholders (Lee (2022)). Lockups also serve as a signal of confidence in the company's prospect (Brau and Hanka (2006)).

Longer lockup periods increase investor confidence and contribute to post-IPO performance stability by reducing price volatility risk caused by insider sales (Field and Hanka (2001)). Lockups also help to prevent the market from being flooded with shares, which helps to maintain the integrity of the stock and its price (Loughran and Ritter (2004)).

Insiders who adhere to lockup agreements not only protect their own reputations, but also the reputation of the firm. This is essential for maintaining business integrity during the transition from private to public (Ofek and Richardson (2003)). Additionally, lockups serve to mitigate moral hazard by ensuring that insiders cannot profit immediately after the IPO. This helps address issues such as adverse selection and the winner's curse (Aggarwal et al. (1993)).

2.3.3 Green shoe options

Green shoe options provide underwriters the ability to issue more shares than originally planned if demand is high, serving as a stabilizing agent. This mechanism ensures that the interests of underwriters align with the shareholders by managing the post-IPO market dynamics.

Green shoe options mitigate the risk of underpricing and optimize IPO pricing by aligning the incentives of underwriters with the company's goals (Michaely

and Shaw (1994)). Additionally, green shoe options increase market efficiency by providing a clearer understanding of investor demand, by setting more precise post-IPO prices (Chowdhry and Sherman (1996)). A study conducted by Saadah and Panjaitan (2016) confirmed the effectiveness of green shoe options in reducing post-IPO stock price volatility in the Indonesian market.

2.3.4 PE/VC-backed IPOs

PE and VC investments significantly influence the corporate governance of companies that go public through IPOs. They provide capital and actively engage in governance oversight before and after the IPO. Their involvement is strategically aimed at enhancing operational efficiency and market positioning. This active participation is often linked to improved post-IPO performance (Li (2022)). PE and VC firms also enhance governance frameworks with effective oversight and strategic input (Guo et al. (2015)).

PE/VC firms usually maintain a higher ownership concentration to secure controlling stakes in their investments. This concentrated control is crucial as it enables them to influence corporate decisions and strategies significantly. The governance structures they implement are geared towards enhancing value and ensuring the alignment of interests between management and external shareholders (Campbell and Frye (2008)). This result is backed by Jensen and Meckling (1976) research that concentrated ownership is linked to reduced agency costs.

Lock-up periods prevent PE/VC investors from selling their shares immediately post-IPO, signaling their long-term commitment to the company. The length of these lock-ups greatly influences the market's view of the firm's stability and future prospects. Longer lock-ups usually suggest strong investor confidence in the company (Kaufmann et al. (2022)).

These agreements also act as a commitment signal to external investors, demonstrating the PE/VC's belief in the firm's long-term success. This is important for reducing price volatility after the IPO and improving the long-term market performance, thus aligning the interests of internal and external stakeholders (Rashid et al. (2014)).

Lock-ups allow PE/VC firms to secure favorable exit terms during the IPO. This ensures that their exit strategy does not harm their market value by mitigating information asymmetry risk. The strategic planning of these lock-ups is crucial for maximizing returns and supporting the company's smooth transition to public trading (Kraus and Burghof (2003)).

2.3.5 Nordic Corporate Governance Model

The Nordic corporate governance model demonstrates a special blending of social values with corporate operations. This model is prevalent in countries like Denmark, Norway, Sweden, Finland, and Iceland, and is characterized by its robust integration of corporate governance with the region's extensive social welfare systems. The model promotes practices that prioritize ethical governance, inclusivity, and sustainable business operations (Lekvall et al. (2014)).

Board structure

One of the defining features of the Nordic governance framework is its dual board structure, which typically consists of a management board and a supervisory board. This separation enhances corporate oversight and strategic decision-making, separating operational responsibilities from supervisory duties. This structure enables effective governance by establishing clear roles, allowing for focused operational management and strategic oversight (Thomsen (2016)).

Board diversity

Board diversity and composition in the Nordic model stand out for their inclu-

sivity, encompassing not only gender and ethnic diversity but also a rich mix of expertise and professional backgrounds. This diversity enhances the board's ability to navigate complex global markets and broadens the scope of board deliberations, making for more robust decision-making processes.

Employee representation

A defining feature of this model proposed by Thomsen (2016) is the mandatory employee representation on boards, ensuring the integration of employee perspectives into board decisions. This feature fosters a more inclusive and transparent governance culture, aligning the interests of employees and the company, and promoting a harmonious work environment conducive to long-term business sustainability.

Ownership concentration

The ownership structure in Nordic countries typically involves concentrated ownership by institutional and governmental investors, aligning with long-term company goals and reducing agency costs. This arrangement supports strategic planning free from short-term market pressures, fostering a stable investment environment for long-term growth (Gilson (2014)). In Norway, for example, the ownership structure is characterized by a relatively high concentration of ownership among a few large shareholders, including a significant presence of governmental and financial institutions (Bohren and Odegaard (2000)). This structure enhances monitoring and ensures that management decisions are in the best interest of the company and its shareholders.

Shareholder Rights

Protecting shareholder rights, including minority shareholders, is fundamental in the Nordic governance model. This robust legal framework enhances shareholder engagement and trust, significantly boosting the integrity and appeal of Nordic markets. It ensures fair treatment of all shareholders, promoting transparency and fairness in corporate practices (Lekvall et al. (2014)).

Regulatory compliance

In the Nordic corporate governance model, committees dedicated to audit, risk, and ethics are crucial. They enforce standards of transparency and accountability, ensuring ethical operations and regulatory compliance. This solid governance structure helps safeguard stakeholder interests and sustains high investor confidence. The effectiveness of such committees in the Nordic context is recognized for enhancing corporate ethical standards and governance quality (Kjaerland et al. (2020)).

2.3.6 International Corporate Governance Models

The governance models in the US and emerging markets have different characteristics compared to the Nordic model, particularly in their board structure, ownership concentration, and shareholder rights. These models are specifically tailored to align with the unique economic, regulatory, and cultural landscapes of each region. The idea of investigating international corporate governance models is not only the models themselves, but the markets in which they operate. Holmstrom and Kaplan (2003) suggest that governance measures have less influence in efficient markets where regulation and transparency is generally high, effectively mitigating the magnitude of information asymmetry.

Board Structure and CEO Duality

In the US it is typical that a unitary board is responsible for both governance and management oversight. This structure fosters greater interaction among all board members on strategic, planning, and performance issues, enhancing corporate growth (Das and Dey (2016)). However, the common practice of CEO duality where the CEO also serves as the chairman of the board may compromise the board's effectiveness in overseeing management. This simplifies decision-making but often leads to conflicts of interest which can increase the risk of governance failures (Dalton and Kesner (1987)). Emerging markets

often have similar unitary board structures but with a greater emphasis on separating the roles of CEO and chair. This separation enhances board independence and improves oversight, significantly strengthening the governance framework (Buachoom and Amornkitvikai (2022)).

Ownership Concentration

In the US, ownership is usually spread out among many shareholders. This widespread ownership requires strong measures like proxy voting to ensure that the management's decisions align with the interests of the shareholders. Such a spread-out ownership pattern deeply influences the need for effective governance strategies (Fahlenbrach (2009)). On the other hand, in emerging markets, ownership is often more centralized, usually in the hands of families or state entities. While this can lead to better oversight, it also brings up issues about the protection of minority shareholders, affecting their rights and the overall integrity of corporations (Scafarto (2017)).

Board Diversity

In the US, board diversity is evolving due to social and regulatory pressures, significantly enhancing decision-making by incorporating varied perspectives of gender, age, and race (Boshnak (2021)). However, in emerging markets, progress in achieving gender, age, and racial diversity on boards is hindered by several challenges. Studies show that women, in particular, remain underrepresented, and the overall diversity rates are low due to cultural resistance and the dominance of family-controlled firms (Mahadeo and Hanuman (2012)). Additionally, the integration of diverse age groups and races is slow, influenced by traditional norms and a lack of supportive legal frameworks, which affects both governance quality and the ability to attract international investments (Ionascu et al. (2018)). Norway, on the other hand, has implemented a gender quota for boards, which has significantly increased female representation and serves as a model for promoting gender diversity in corporate governance. By

2025, it will be mandated that every board must have at least 40% female representation (Norwegian Government (2023)).

Shareholder Rights

The US has a comprehensive system for protecting shareholder rights, which helps shareholders actively participate and ensures that the market remains accountable and transparent. This strong framework is crucial for keeping everything open and honest in the markets (Fahlenbrach (2009)). However, in emerging markets, while efforts to strengthen shareholder rights are advancing, issues with enforcing and regulating these rights continue to pose challenges. Weaknesses in legal frameworks and enforcement mechanisms significantly impact shareholder rights efficacy leading to lower investor confidence and market integrity issues (Sergakis (2019)).

2.4 Post-IPO Performance

Post-IPO performance is influenced by various factors. This section covers the theories related to underpricing, momentum and reversal effects, and investor protection and market efficiency.

2.4.1 Underpricing and Future Performance

Underpricing in IPOs is often used strategically to generate interest and ensure a successful initial offering. It signals firm quality, attracting initial market attention and potentially leading to improved long-term outcomes (Allen and Faulhaber (1989)). This strategy is further supported by Brown (2016), who suggests that large underpricing can enhance the information content of future stock prices by incentivizing investors to produce information post-IPO, leading to higher firm value and better post-IPO performance. However, Charitou et al. (2020) indicate that while underpricing might yield immediate market

gains, it does not consistently predict long-term performance, highlighting the need to distinguish between market inefficiency and underwriter bias.

The Random Walk Theory, which posits that stock prices move randomly and cannot be predicted based on past information (Malkiel (1973)), further challenges the notion that underpricing can reliably forecast future performance. Additionally, Harrison and Kreps (1978) introduce the concept of heterogeneous expectations among investors, which can lead to speculative behavior and mispricing in the short term. This speculative behavior may initially drive up stock prices, but as information becomes more widely available and expectations converge, prices can adjust downward, impacting long-term performance.

2.4.2 Momentum and Reversal

Momentum is a common phenomenon observed in IPOs, where stocks with strong initial performance continue to perform well in the short term. Chan et al. (1996) proposed that stocks with high initial returns tend to sustain their performance, indicating a momentum effect. This suggests that IPO stocks often show positive returns during the six months following their initial offering.

Conversely, IPOs can also display reversal effects, where initial gains are followed by long-term underperformance relative to the broader market. This pattern can be attributed to over-optimism during the initial offering, leading to subsequent market corrections as valuations adjust to more realistic levels (Ritter (1991)). Additionally, IPOs are prone to market fads, where initial excitement and high valuations are eventually corrected as market sentiment normalizes (Aggarwal and Rivoli (1990)).

2.4.3 Investor Protection and Market Efficiency

Investor protection is a crucial factor influencing post-IPO performance, as highlighted by Shleifer and Wolfenzon (2002) They argue that strong investor protection mechanisms reduce information asymmetry and agency conflicts, leading to more efficient markets. In environments where investor rights are well-protected, companies are compelled to adhere to higher standards of transparency and governance, which can mitigate the initial underpricing often observed in IPOs. Consequently, these firms are better positioned to sustain their performance in the long term as they gain investor trust and institutional support. This aligns with the findings of Hartzell et al. (2004) where robust corporate governance mechanisms at IPO issuance contribute to long-term growth and performance.

3 Hypotheses and Methodology

This section outlines the hypotheses and methodology designed to investigate the research question. It details the analytical approaches and statistical techniques employed to test the hypotheses.

3.1 Research Question

The goal of the thesis is to examine how different corporate governance measures impacts IPO underpricing in the Nordic region. To explore the research question, we have developed the following three hypotheses:

3.2 Hypotheses

H1a: *Corporate governance reduces underpricing in Nordic IPOs.*

This hypothesis aims to test the relationship between good corporate governance and IPO underpricing in Nordic countries. We hypothesize that firms with better corporate governance will generally experience lower IPO underpricing. This idea is rooted in the agency theory work of Myers and Majluf (1984), which suggests that enhanced governance measures can mitigate information asymmetry and agency costs. Further support for this hypothesis comes from the findings of Jog and McConomy (2003), who demonstrate that reduced information asymmetry leads to lower underpricing. By examining corporate governance unconditionally on underpricing, we seek to determine if good governance practices can effectively mitigate information asymmetry and reduce the extent of IPO underpricing in the Nordic market.

H1b: *The effect of corporate governance on IPO underpricing varies across different markets.*

In this part of our hypothesis, we examine the different impact corporate governance has on IPO underpricing by comparing effects in the Nordics to United States and Emerging Markets. We hypothesize the impact of corporate governance on IPO underpricing is more pronounced in markets characterized by high information asymmetry, which are typically less efficient. This aligns with Holmstrom and Kaplan (2003), who assert that governance mechanisms have less influence in efficient markets with robust regulatory frameworks and high transparency. In such efficient markets, high investor trust leads to a lower risk premium demanded by external investors when participating in IPOs. Conversely, in less efficient markets with higher information asymmetry, strong corporate governance becomes more critical. Shleifer and Wolfenzon (2002) argue that corporate governance can act as a substitute for investor protection in countries lacking a robust legal framework, thereby mitigating the effects of high information asymmetry and reducing underpricing. Therefore, we expect that in markets with lower efficiency and greater information asymmetry, corporate governance will have a more significant impact on reducing IPO underpricing.

H2a: *PE/VC backed IPOs experience lower underpricing in the Nordics.*

We hypothesize that IPOs backed by private equity or venture capital firms will experience lower underpricing compared to those not backed by financial sponsors. PE and VC firms typically implement enhanced governance structures, characterized by higher ownership concentration and active oversight (Guo et al. (2015)). According to Campbell and Frye (2008), these

governance structures are designed to maximize value and align the interests of management and shareholders. Consequently, this reduces agency costs and mitigates underpricing. By fostering a more transparent and efficient governance environment, PE and VC backing helps lower the risk perceived by investors, leading to reduced underpricing in IPOs within the Nordic markets.

H2b: *The effect of PE/VC backed IPOs on underpricing varies across different markets.*

We hypothesize that PE/VC backing's influence on IPO underpricing varies across markets, similar to H1b. The impact is expected to be more pronounced in markets with higher information asymmetry and lower efficiency. In such markets, the governance and oversight from PE/VC firms can significantly reduce perceived risks and information asymmetry, leading to lower underpricing. Shleifer and Wolfenzon (2002) argue that strong governance can compensate for weak investor protection in these markets. Conversely, in efficient markets with robust regulatory frameworks, like the Nordics, the benefit of PE/VC backing is less noticeable due to already high levels of investor protection and transparency. Thus, PE/VC backed IPOs are expected to show a greater reduction in underpricing in emerging and less efficient markets compared to developed ones.

H3a: *Underpricing has predictive power on 6-month post-IPO performance in the Nordics.*

We hypothesize that the magnitude of underpricing following an IPO will influence the 6-month stock returns in the Nordic market. Previous research supports this hypothesis by demonstrating the relationship between

underpricing and subsequent stock performance. Hartzell et al. (2004) find that firms with strong corporate governance practices experience lower levels of underpricing and achieve higher long-term performance. This improvement in performance is attributed to better alignment of interests between shareholders and management, which enhances the firm's overall governance structure. Additionally, Pasupuleti and Jambotkar (2011) shows that overpriced IPOs tend to underperform compared to underpriced IPOs in the long run. This suggests that initial underpricing can be an indicator of future stock performance, where underpriced IPOs are more likely to yield better returns. Underpricing may signal to the market that the issuing firm is willing to leave some money on the table to ensure a successful offering, which can build investor confidence and lead to better performance in the medium term. Thus, we propose that the level of underpricing at the time of the IPO can serve as a predictor of the stock's performance over the following six months, with higher underpricing potentially indicating stronger subsequent returns.

H3b: *PE/VC-backed IPOs return higher 6-month post-IPO performance.*

We hypothesize that the value-maximizing governance structure that PE/VC employ will return higher 6-month post-IPO performance. Li (2022) emphasizes that PE/VC firm's concentrated ownership and active participation is linked to improved post-IPO performance.

3.3 Research Methodology

To test H1a, regression analysis will be performed. Dependent variable is underpricing measured in percentage, while independent variables are different governance measures including control variables. This will allow us to under-

stand any statistical relationships between corporate governance practices and IPO underpricing.

These governance measures are divided into three different sections within H1a to give a better picture of the hypothesis, as corporate governance practices differ fundamentally:

Board of directors: Percentage of independent directors, Board Size, Board Average Age, Number of Board Meetings, and Percentage of Women on Board are all aspects that provide a comprehensive view of how board composition can influence underpricing. Independent directors ensure decisions align with shareholder interests and enhance managerial oversight. Larger boards contribute diverse perspectives to the decision-making process. The average age of board members reflects their experience and industry knowledge. The number of board meetings indicates the level of director engagement. A higher percentage of women on the board represents increased diversity, bringing a range of backgrounds and perspectives that can enhance decision-making.

Board of directors: Percentage of independent directors, Board Size, Board Average Age, Number of Board Meetings and Percentage of Women on Board are all aspects in which are going to give a wider picture of how board composition can influence underpricing.

Ownership concentration: BvD Indicator is a metric that measure how fragmented the shareholders are in the issuing company, providing a better picture on how ownership concentration influence underpricing.

Deal Mechanics: Lock-up provisions and green shoe options are IPO mechanisms that are examined to understand how deal terms influence incentive alignment and underpricing. Lock-ups are particularly interesting to study because they involve insider shareholders agreeing not to sell stocks for a predetermined period, effectively aligning their interests with those of the company and mitigating conflicts of interest between insider and outsider shareholders.

Green shoe options are designed to align incentives between insider shareholders and underwriters, ensuring the IPO's success for both parties.

As proposed by Teti and Montefusco (2022), who have done similar approach in the Italian market, we have included control variables on size, hot markets, and industries. As a proxy for size, we have collected revenues from all issuing companies from the year going public. Higher revenues implicate larger firms which are considered more reliable (Beatty and Ritter (1986)). Revenues as a measure for size when we look at different markets later, as accounting rules, tax etc. varies across countries. A "hot market" variable is included to isolate years with exceptionally high times of underpricing, or years with abnormally high frequencies of issuance. For this, we have generated a dummy variable for the year 2021 given exceptionally high number of issuances, see Figure **??** in appendix. Lastly, we have included an industry dummy to control for different risk segments. High tech firms are considered riskier than other industries given the nature of these business, hence every high-tech firm is given an dummy of 1 (Benveniste and Jr. (2003)).

These controlling variables are proven to have explanatory effects on underpricing from previous research. Inclusion of controlling variables is to avoid omitted variable biases and reduces uncertainties around the variables.

The general regression in play for H1:

$$\begin{aligned} \text{Underpricing}_t = \beta_0 + \beta_1 &\text{Governance measure}_t && (1)\\ +\beta_2 &\ln(\text{Revenues})_t && (2)\\ +\beta_3 &\text{Hot market}_t && (3)\\ +\beta_4 &\text{Tech}_t + \epsilon_t && (4) \end{aligned}$$

To test H1b, similar approach is used but on the datasets of US and Emerging Markets. It is interesting to run same methodology on other markets as

it better illustrates differences in inherent market sentiments. This way we are able to explore how the same corporate governance measures have effects on different market environments. Comparable analysis will be employed to investigate differences in results between the different datasets.

To test H1b, we use a similar approach on datasets from the US and Emerging Markets. This comparison is valuable as it highlights differences in inherent market dynamics, enabling us to explore how identical corporate governance measures affect different market environments. By employing a comparable analysis, we can examine the variations in results across these distinct datasets.

For H2, we employ a similar approach, focusing on PE/VC funding as a governance measure. We address any selection biases arising from the likelihood of PE/VC presence in firms of different sizes, market segments, and industries. Selection bias might occur because certain types of firms are more likely to receive PE/VC funding than others. For instance, previous research from Boston Consulting Group (2022) highlights a higher presence of PE/VC involvement in the technology sector due to scalable business models and high growth potential. Similarly, Bottazzi et al. (2008) find increased PE/VC involvement in businesses with higher revenues, while S&P Global Market Intelligence (2021) reports that PE/VC investments rise in favorable economic conditions due to higher expected returns.

To address selection bias, we employ the Heckman two-step correction procedure as proposed by Li and Prabhala (2007).

First, we estimate the selection model using a probit regression:

$$\Pr(PE/VC - backed_t = 1) = \Phi(\beta_0 + \beta_1 \text{Revenue}_t + \beta_2 \text{MarketCondition}_t + \beta_3 \text{TechSector}_t + \epsilon_t)$$

From this model, we calculate the inverse Mills ratio (IMR), which corrects for selection bias.

Second, we include the IMR as an additional regressor in the main regression model examining the impact of PE/VC presence on IPO underpricing:

$$\begin{aligned}\text{Underpricing}_t = \alpha_0 + \alpha_1 PE/VC - backed_t + \alpha_2 \text{Revenue}_t \\ + \alpha_3 \text{MarketCondition}_t + \alpha_4 \text{TechSector}_t \\ + \alpha_5 \text{IMR}_t + \mu_t\end{aligned}$$

Including the IMR in the regression corrects for the selection bias, providing unbiased and consistent estimates of the effect of PE/VC backing on IPO underpricing.

To test H3a, we want to investigate the influence of IPO underpricing and it if has any significance in explaining the 6-month post-IPO performance. First, we will run a regression with 6 month returns from offer price on first-day returns, i.e. underpricing. To avoid endogeneity, as underpricing returns are inherently embedded in 6-months returns, we want to regress 6-month IPO returns excess of underpricing on the first day returns.

Regression in play:

$$\text{6-month post-IPO returns}_t^e = \beta_0 + \beta_1 \text{Underpricing}_t + \epsilon_t \tag{5}$$

To investigate H3b, we regress of PE and VC dummy variables on 6-monts returns, which will eventually tell us if PE/VC presence generates higher 6 months returns from IPO date.

3.3.1 Robustness checking

As OLS regression analysis constitutes most of our results, we conduct thorough diagnostic checks to ensure non-biased data. To test for heteroskedasticity, we employ the Breusch-Pagan test (see Table 15 in the Appendix). To ensure that the variables included in the regression analysis are not correlated, we use Variance Inflation Factors (VIF) to detect multicollinearity (see Table 16 in the Appendix).

4 Data and Preliminary Analysis

This section provides an overview of the data sources, selection criteria, dataset construction, limitations, and preliminary analysis methods used in this study. We outline the various types of data collected, the criteria for selecting relevant IPOs, the methodology for constructing the dataset, and the considerations taken to address potential limitations. The preliminary analysis forms the basis for our investigation into the impact of corporate governance on IPO underpricing.

4.1 Data Sources

Data for this thesis were sourced primarily from Bloomberg, supplemented by Orbis M&A provided by Moody's and BoardEx from WRDS (Wharton). These are all established data providers and commonly accepted in academic and professional environments. Data across different sources were merged using International Securities Identification Numbers as ISIN is the most common identification number across borders.

4.2 Data Selection

We decided to focus only on primary listings. This choice highlights the agency issues discussed in this thesis because primary offerings are more affected by asymmetric information. Libison and Narasimham (2012) point out that the lack of trading history and the presence of insider information increase information asymmetry, especially in primary offerings compared to secondary ones. This is because companies already traded publicly have a track record, reducing the information advantage insiders might have.

We used Bloomberg's IPO tool, filtering it to capture only initial offerings. This ensures that we are looking at companies entering the public market for

the first time, giving a consistent basis for analyzing initial market reactions. Using Bloomberg's IPO tool to filter for primary issues allowed us to gather governance measures and financial data from each firm at their IPO. This method helped us collect all necessary data for detailed analysis and refine the dataset for specialized examination.

4.2.1 Time period selection

The analysis covers the period from 2009 to 2024. This timeframe lets us explore recent trends in corporate governance and IPO dynamics. It also reflects changes in regulatory frameworks that came after the 2008 financial crisis and excludes the unusual market conditions during the crisis. In the rapidly changing world of finance, we focus on using the most up-to-date data.

4.2.2 Geography selection

We collected IPO data from the Nordics, US and Emerging Markets to study how different governance models affect IPO underpricing. These markets were chosen to represent various dynamics in trust, transparency, and efficiency, and to examine how corporate governance operates under different regulatory conditions.

According to Holmstrom and Kaplan (2003), market efficiency in IPO pricing is linked to market trust. In high-trust, transparent markets like the Nordics, information asymmetry is less significant, reducing the impact of corporate governance on IPO underpricing. The US, as the largest capital market with a distinct governance model, and Emerging Markets, characterized by less regulation and higher information asymmetry, offer a diverse range of conditions for this study.

In the Nordic sample, IPOs from Iceland were excluded to align with the Nordic Corporate Governance Model conducted by Lekvall et al. (2014). The US

sample comprises data from the NYSE and NASDAQ, while for the Emerging Market sample, we chose the MSCI Emerging Markets Index, which includes data from 24 different countries (MSCI (2021)).

4.2.3 Corporate governance selection

In line with Lekvall et al. (2014), we have focused on corporate governance measures within boards and ownership structures. Boards are recognized as a strong indicator of good corporate governance, with board effectiveness positively correlated with governance quality at the country level (Bota-Avram (2013)). To explore board mechanisms and their impact on underpricing, we first focused on board independence. We also collected data such as the size of the board (number of directors) and the average age of directors.

Data on board meetings were included to measure board involvement. We gathered information on the percentage of women on the board of directors to assess diversity. Adams and Ferreira (2009) suggest that female directors significantly impact board outcomes, as they often have higher attendance records than male directors. This implies that higher diversity on boards can enhance active oversight and monitoring, which Tiller (2001) identifies as crucial to prevent corporate failures.

We also collected data on CEO duality, where the chairman of the board also acts as the CEO. However, we expect some of these effects to be captured by the percentage of board independence since the CEO would be an executive director (i.e., not independent) Deal terms such as lock-up provisions and greenshoe options were also collected from a governance perspective. A lock-up period aligns outsider and insider incentives by preventing insiders from selling shares for a specified period, typically 180-360 days. Greenshoe option data measures the agency conflicts between the issuing company and the underwriter. All data on corporate governance and deal terms were extracted

from company profiles at the issuance date. Table 1 describes the governance data we used:

Table 1: *Description of Governance Measures*

The table outlines various governance measures and their descriptions, highlighting key measures used in our analysis to evaluate corporate boards.

Measure	Description
% Independent Directors	Board directors unaffiliated with company management.
Board Size	Number of board directors.
Board Average Age	Average age on board of directors.
# of Board Meetings	Number of board meetings annually.
% of Women on Board	How many female directors on board.
CEO Duality	The CEO also acts as Chairman of the Board.
Lock-up Provision	Issuing firm has restriction on selling IPO shares for a predetermined period.
Greenshoe Option	Underwriter's option to sell additional shares in an IPO.

4.3 Dataset Construction

In the following section we elaborate further on how we have constructed our dataset and how the data is defined.

4.3.1 PE/VC determination

To accurately categorize the sponsors of IPOs within the sample, a methodology was developed utilizing Bloomberg's IPO tool and specific databases for PE and VC transactions. The initial dataset was compiled from Bloomberg,

detailing all IPOs within the specified time frame and geography without sponsor classification. For sponsorship identification, separate databases within Bloomberg that exclusively list PE and VC transactions were employed. By aligning ISIN and IPO dates across the unclassified full sample and these specialized databases, each IPO was accurately identified as either PE or VC sponsored.

An IPO was classified as PE-sponsored or VC-sponsored if its details matched the entries in the respective PE or VC databases. This matching process enabled the assignment of a dummy variable: 1 for PE and 1 for VC sponsorship. IPOs that did not match either database were designated as non-sponsored, receiving a dummy variable of 1 in the non-sponsored category. If an IPO was sponsored by both PE and VC, both categories were assigned a 1. It's important to note that these dummy variables were created for classification purposes within the dataset and are not directly used in regression analyses to avoid the dummy variable trap. This categorization allows for a more structured analysis of IPO sponsorship and its potential effects on market outcomes, consistent with the methodologies used in studies such as Ritter (2011) and Lerner et al. (2012), which emphasize the significant impact of sponsorship on IPO success.

4.3.2 Deal terms

We examine the use of lockups and greenshoe options as governance tools to reduce information asymmetry and agency costs. These terms are seen not just as deal specifics but as strategic tools that enhance corporate governance at the time of the IPO. For each IPO with a lockup agreement, we assign a dummy variable of 1, indicating the presence of such terms. The idea is that lockups, by preventing insiders from selling shares shortly after the IPO, help stabilize initial pricing and reduce underpricing (Haman et al. (2020)).

Greenshoe options are similarly assigned a dummy variable of 1 when included in the IPO. These options allow underwriters to sell extra shares, providing a buffer against price changes during the market debut, which can positively impact underpricing. Greenshoe options have been shown to reduce stock price volatility after the IPO, protecting investors from potential losses and boosting market confidence (Patel (2015)). We do not analyze the actual exercise of these options but focus on their availability at issuance, highlighting their role in initial price stabilization rather than long-term market effects.

4.3.3 Governance data

To assess corporate governance data in our study, we used several reputable databases for comprehensive data extraction. Board characteristics, deal terms, and sponsor data were obtained from Bloomberg. Ownership concentration was measured using the BvD Independence rating from Orbis M&A. This rating assigns companies a score from A+ (highly fragmented ownership) to D (high ownership concentration), quantified as 9 for A+ down to 1 for D. BvD Indepenence is a governance measure introduced by Horobet et al. (2019).

For CEO duality, we utilized data from WRDS, focusing on the non-executive director (NED) indicator to determine the independence of board directors. A company with a NED director is characterized as one where the chairman of the board is not part of the firm's management. We matched each company's IPO date with the corresponding year's NED data. If a director was not independent, serving both as CEO and chairman, the company received a dummy variable of 1. Conversely, a score of 0 was assigned if the director was independent.

4.3.4 Performance data

In our analysis of IPO performance, we distinguish between short-term underpricing and six-month returns as long-term performance indicators. Both data points are extracted from the Bloomberg database. For the six-month returns, we adjust the data to exclude the first-day underpricing effect. This adjustment is crucial for isolating the influence of underpricing from the overall six-month returns, which are initially calculated from the offer price to the six-month price. By excluding the first-day underpricing, we prevent it from artificially inflating the variation in six-month returns, thus avoiding erroneous regression analysis due to overlapping data periods, a methodological concern highlighted in Quintana et al. (2005). This methodology ensures a more accurate assessment of the IPOs' long-term market performance.

4.3.5 Dataset

The complete dataset for our analysis is summarized in Table **??**. This dataset includes a comprehensive set of observations across the Nordic, US, and Emerging Markets (EM) regions, ensuring robust statistical power for our analysis. With sufficient observations across most variables, we can confidently proceed with examining the impact of corporate governance on IPO performance.

Table 2: *Summary of Data Observations*

The table summarizes our entire dataset for the Nordic, US, and Emerging Markets. It details the number of observations for each data point. The "Offer To 1st Close" column indicates the total number of IPOs collected in each market, such as 774 IPOs in the Nordics. For dummy variables, the table shows the count of "1" observations, e.g. in the Nordics, 79 IPOs were backed by PE in our dataset.

Variable	**Nordic**	**US**	**EM**
Offer To 1st Close	774	3 502	10 746
Offer To 1st 6 Months	766	3 367	10 145
Non-PE/VC	649	2 452	8 271
PE	79	797	2 342
VC	59	656	1 671
Lock-up provision	482	3 159	5 684
% Indep Directors	159	1 399	1 519
Size of the Board	193	1 415	1 570
Board Average Age	134	1 389	1 251
# Board Meetings	138	1 281	1 345
% Women on Board	176	1 216	1 150
Greenshoe Option	340	3 287	1 935
BvD Quantified	358	1 622	6 870
CEO Duality	138	*NA*	*NA*
Revenues	697	3 474	2 420

4.4 Data Limitations

While our dataset is comprehensive and robust, there are inherent limitations that must be acknowledged. One significant concern is the potential bias introduced by missing data. When creating dummy variables, we assumed that the absence of data indicated the non-existence of certain characteristics

or terms. This assumption could lead to misclassification. For example, if data for a lockup provision or greenshoe option was missing, we might have incorrectly categorized an IPO as not having these features.

The lower number of observations for PE and VC in the Nordic region is another limitation. While we deemed the available data sufficient for meaningful analysis, the smaller sample size could impact the statistical power and generalizability of our findings in this specific context.

The merging of data from different sources using ISINs presents its own challenges. Although ISINs are the most common identification numbers across borders, discrepancies or inconsistencies in data entry between sources could result in incorrect data alignment. Our reliance on historical data means that the analyses are subject to the conditions and availability of data at the time of collection. Changes in market conditions, regulatory environments, and corporate governance practices over time may also influence the applicability of our findings to future IPOs.

4.5 Descriptive Statistics and Preliminary Analysis

This section provides an overview of the descriptive statistics and preliminary analysis conducted on the data. It includes a detailed examination of underpricing, corporate governance, PE/VC-backed IPOs, and IPO performance across the different markets.

4.5.1 Underpricing

This section analyzes the data on underpricing, comparing our findings with existing literature to understand IPO underpricing dynamics. We focus on the main drivers of underpricing, contextualizing the results across different markets. The primary factors impacting IPO underpricing include the year of issuance, industry sector, company size, and the involvement of PE or VC

sponsors. By examining these factors, we can draw comparisons across the Nordic, US, and Emerging Markets to identify patterns and deviations in underpricing behavior.

Table 3: *Descriptive Statistics on Underpricing*

The table summarizes IPO underpricing data across the Nordics, United Stated and Emerging Markets. It counts the number of IPOs and the average underpricing percentage annually from 2009 to 2024.

Year	Nordic		US		EM	
	# IPOs	UP (%)	# IPOs	UP (%)	# IPOs	UP (%)
2009	3	18.7	63	8.0	362	47.5
2010	30	0.6	155	13.0	819	31.1
2011	20	6.7	118	22.6	834	20.6
2012	8	-1.6	154	13.1	505	26.0
2013	13	18.6	231	21.7	355	25.3
2014	30	3.3	259	42.2	500	29.4
2015	49	9.5	181	18.9	631	30.8
2016	76	12.8	246	10.9	580	29.4
2017	113	7.7	195	14.4	470	33.6
2018	62	0.4	208	17.6	649	21.6
2019	34	9.1	341	7.0	650	33.3
2020	72	12.4	421	15.2	810	63.9
2021	222	9.6	620	10.0	966	84.7
2022	38	4.7	141	13.7	732	40.2
2023	3	8.6	92	14.9	954	38.0
2024	1	3.1	18	13.1	115	59.2
Total	774	8.3	3520	16.5	10746	38.9

The results are significant and in line with various theories on IPO underpricing. For instance, the information asymmetry theory by Akerlof (1970) explains that underpricing serves as a strategy to counteract the information disadvantage faced by investors. The pecking order theory (Myers and Majluf (1984)) suggests that firms might underprice their shares to make equity more appealing to outside investors despite existing information gaps. Signaling theory proposed by Allen and Faulhaber (1989) posits that high-quality firms underprice their IPOs to signal strong future potential. The winner's curse from Rock (1986) and underwriter reputation theory suggested by Beatty and Ritter (1986) also explain why IPOs might be underpriced to attract and compensate investors for the risks associated with potential overvaluation.

The differences across markets are also consistent with theoretical expectations. The Nordic market, with the lowest average underpricing, aligns with the idea that markets with stringent regulatory frameworks and lower information asymmetry tend to exhibit less underpricing (Loughran and Ritter (2004)). On the other hand, Emerging Markets, having the highest average underpricing, reflect the higher risks and lower regulatory oversight (Mehmood et al. (2021)).

4.5.2 Corporate Governance

Table 4: *Summary Statistics for Governance by Region*

The table summarizes the governance statistics for the Nordic, US, and Emerging Markets regions, highlighting mean value, standard deviation, min and max values.

Variable	Mean	SD	Min	Max
Nordic Governance				
% Indep Directors	74.805	21.219	3	100
Size of the Board	6.435	1.725	3	12
Board Average Age	55.922	4.747	44.714	73.714
# Board Meetings	15.783	6.249	5	41
% Women on Board	35.718	12.036	11.111	66.667
Lock-up provision	0.623	0.485	0	1
Greenshoe Option	0.439	0.497	0	1
BvD Quantified	6.483	3.043	1	9
PEVC	0.161	0.368	0	1
US Governance				
% Indep Directors	76.590	13.696	20	100
Size of the Board	8.161	1.846	2	16
Board Average Age	58.812	5.327	6.300	75
# Board Meetings	8.607	4.866	1	49
% Women on Board	25.586	11.544	6.250	100
Lock-up provision	0.902	0.297	0	1
Greenshoe Option	0.939	0.240	0	1
BvD Quantified	5.465	3.620	1	9
PEVC	0.300	0.458	0	1
EM Governance				

Continued on next page

Table 4: *Summary Statistics for Governance by Region (continued)*

Variable	Mean	SD	Min	Max
% Indep Directors	42.667	11.894	12.500	100
Size of the Board	8.388	2.345	2	18
Board Average Age	54.121	5.040	37	69.667
# Board Meetings	9.035	4.443	1	53
% Women on Board	21.865	11.588	5.560	100
Lock-up provision	0.529	0.499	0	1
Greenshoe Option	0.180	0.384	0	1
BvD Quantified	5.675	2.938	1	9
PEVC	0.230	0.421	0	1

Board of Directors

On Nordic boards, there are on average 35% women, aligning with the findings of Thomsen (2016) that the Nordic Corporate Governance Model emphasizes wider diversity. Additionally, the governments in the Nordics follow gender quotas for board of directors Board independence is high, with 3 out of 4 members being independent, though employee representation can detract from this. The average board size is 6-7 members, supporting Yermack (1996) conclusion that small boards operate more efficiently, however larger boards bring diverse perspectives. The average age on Nordic boards is approximately 56 years, indicating significant experience. Nordic boards meet frequently, with an average of 15 meetings per year, suggesting active involvement in decision-making.

In contrast, US boards have on average 1 out of 4 board members as women, while in Emerging Markets, it is approximately 1 out of 5. The higher representation of women on boards in the Nordics is primarily due to strong regulatory mandates and quotas promoting gender diversity (Lekvall et al. (2014)). In

the US, while facing social and regulatory pressures, lacks comprehensive legal requirements, resulting in slower progress relying on voluntary practices (Boshnak (2021)). Emerging markets encounter significant challenges, including cultural resistance and the dominance of family-controlled firms, which hinder the integration of women and diverse age and racial groups. Traditional norms and a lack of supportive legal frameworks further affect governance quality and the ability to attract international investments (Mahadeo and Hanuman (2012) and Ionascu et al. (2018)).

Larger boards in the US and emerging markets compared to the Nordics may be less effective due to coordination issues and slower decision processes (Yermack (1996)). However, they often demonstrate good corporate governance by incorporating diverse perspectives and expertise, enhancing strategic decision-making and oversight capabilities. In the Nordics, smaller boards are seen as more efficient and conducive to higher profitability. Board independence is similar in the Nordics , but significantly lower in emerging markets. The lower independence in emerging markets is due to weaker regulatory frameworks and especially family ownership structures prioritizing control over governance (Buachoom and Amornkitvikai (2022)). High independence in the Nordics and the US supports better oversight and decision-making, aligning with Bhagat and Bolton (2008) findings that independent boards align with shareholder interests.

The average age of board members in the US is 58.81 years, slightly higher than in the Nordics, indicating experienced boards in both regions. In emerging markets, the average age is lower at 54.12 years. Older boards are associated with conservative and risk-averse decision-making, which can impact IPO pricing strategies (Wintoki et al. (2012)).

Nordic boards meet frequently, with an average of 15.78 meetings per year, compared to 8.61 in the US and 9.04 in emerging markets. The high frequency

of meetings in the Nordics reflects a proactive engagement and oversight approach, leading to improved performance (Vafeas (1999)). In contrast, fewer meetings in the US and emerging markets suggest less frequent oversight, potentially impacting governance quality.

Ownership concentration

Nordic states have a quantified average BvD score of 6.48, which yields a BvD independence score of B+. With reference to Horobet et al. (2019), a B+ company is characterized with a known recorded shareholder base with ownerships below 50%, but higher than 25%, i.e. the average Nordic company has "Medium-Low ownership concentration". This is in line with Lekvall (2016) that suggests Nordic companies have concentrated ownership increasing alignment of long-term goals and reducing agency theory. We see that US and Emerging Markets yields lower BvD scores at approx. 5.5. This is classified as B suggesting slightly more ownership concentration than in the Nordics, however still at moderate levels. This is in line with Scafarto (2017) who finds that in emerging markets ownership is more centralized due to higher fractions of family and state-owner companies.

Deal terms

Lock-up provisions and green shoe options are frequently used governance tools. In the Nordics, approximately 2/3 IPOs have lock-up agreements while in the US it happens for every 9/10. Green shoe options is almost issued at every US IPO transactions, while in emerging markets, it is not that common.

4.5.3 PE/VC-backed IPOs

Table 5: *Comparison between PE/VC and Non-PE/VC in the Nordics*

This table compares various governance measures between PE/VC-backed firms and non-PE/VC-backed firms in the Nordic region, highlighting differences in means and standard deviations. The p-value represents the significant difference from a two-sample t-test.

	PE/VC(n=125)		Non-PE/VC (n=649)		
Variable	Mean	SD	Mean	SD	p-value
% Indep Directors	78.927	20.840	72.501	21.180	0.002
Size of the Board	7.017	1.907	6.179	1.579	0.000
Board Average Age	55.939	4.727	55.913	4.784	0.955
# Board Meetings	15.771	6.366	15.789	6.222	0.977
% Women on Board	36.661	12.456	35.290	11.868	0.258
Lock-up provision	0.824	0.382	0.584	0.493	0.000
Greenshoe Option	0.752	0.434	0.379	0.486	0.000
BvD Quantified	6.684	3.087	6.427	3.034	0.394

From Table 5 we especially note that PE/VC firms have significantly higher percentage of independent directors which Bhagat and Bolton (2008) finds to better align with shareholder interests and integrity. In the Nordics, PE/VC firms also tends to operate with larger boards compared to non-PE/VC firms in which enhances information transparency as proposed by Upadhyay and Sriram (2011). Additionally, PE/VC firm significantly take to use deal tools such as lock-up agreements and green shoe options to stabilize the IPO process.

4.5.4 IPO performance

Table 6: *Descriptive Statistics on 6-month post-IPO Performance*

This table presents descriptive statistics for 6-month post-IPO performance across the Nordics, United States, and emerging markets. The table shows the number of observations, mean returns, standard deviation, Sharpe ratio, and the minimum and maximum values. Sharpe ratios are calculated by dividing returns on standard deviation.

Variable	Count	Mean	SD	Sharpe	Min	Max
Nordics	772	0.135	0.899	0.151	−0.960	13.036
United States	3,454	0.239	5.128	0.047	−0.990	3.302
Emerging Markets	10,297	0.707	1.527	0.463	−0.760	10.484

Average 6-month post-IPO returns are ascending from the Nordics markets to emering markets. However, the volatility in terms of standard deviation is lower in Nordic markets post-IPO whereas the standard deviation in Unites States is significantly higher. This results in poor Sharpe ratio in the US markets 6-months post-IPO where investors are not well compensated for their risk-taking.

5 Results and Discussion

This section presents the results of our analysis and discusses the findings in the context of our hypotheses. We explore the impact of corporate governance on IPO underpricing, analyze the role of PE/VC backing, and assess the predictive power of underpricing on post-IPO performance. The discussion highlights key patterns and differences across the Nordic, US, and emerging markets, providing insights into the varying effects of governance mechanisms and market conditions.

5.1 Hypothesis 1

H1a: *Corporate governance influences underpricing in the Nordics.*

H1b: *The effect of corporate governance on IPO underpricing varies across different markets.*

We want to investigate the influence of incorporating corporate governance has influence on IPO underpricing. The first hypothesis will try to give answer to whether corporate governance can mitigate investor uncertainty, effectively reducing their risk premium. Additionally, by looking at international effects we will find answers to whether corporate government can act as a substitute for legal protection to investors as regulatory frameworks varies across countries.

Before we explain our results, we want to address that there are no biased data for the Nordic datatable. However, in the US and Emerging Market, we did detect some heteroskedasticity, see Table 15 in Appendix. To correct for non-constant variance in the error term, we employ Newey and West (1987) standard errors which adjust, which adjust the covariance matrix of the coefficient estimates to account for heteroskedasticity, and in fact autocorrelation problems. The regression results shown below for US and Emerging Markets are ex-post Newey-West corrected. VIF test results show no multicollinear-

ity between governance measures and controlling variables, see Table 16 in Appendix.

5.1.1 Board Governance

We have conducted five independent regressions on five board measures: Board independence, size of the board, average age on the board, number of board meetings, and the percentage of women on the board. As previously discussed, regression results are controlled for size and hot markets.

Table 7: *Board Measures Impact on Underpricing in the Nordics*

This table show regression results where dependent variable is Nordic Underpricing and independent variables are board governance measures including control variables. Regression (1) to (5) are single governance regressions while regression (6) includes all variables.

	Dependent variable:					
	Offer To 1st Close					
	(1)	(2)	(3)	(4)	(5)	(6)
% Indep Directors	0.001					0.001
	(0.001)					(0.001)
Size of the Board		−0.005				0.023
		(0.012)				(0.016)
Board Average Age			0.002			0.004
			(0.004)			(0.005)
# Board Meetings				0.0004		0.002
				(0.003)		(0.004)
% Women on Board					−0.001	0.002
					(0.002)	(0.002)
log_revenues	−0.006	−0.006	0.002	−0.002	−0.0003	0.003
	(0.012)	(0.011)	(0.011)	(0.010)	(0.012)	(0.014)
year_dummy	0.005	−0.020	0.0001	−0.014	−0.020	0.007
	(0.055)	(0.045)	(0.046)	(0.044)	(0.048)	(0.052)
tech_dummy	−0.016	0.005	0.033	0.048	0.026	0.087
	(0.064)	(0.051)	(0.053)	(0.049)	(0.054)	(0.063)
Constant	0.112	0.191**	−0.004	0.108	0.155*	−0.465
	(0.122)	(0.085)	(0.241)	(0.078)	(0.084)	(0.347)
Observations	154	188	130	134	172	103
R^2	0.007	0.004	0.004	0.008	0.003	0.054
Adjusted R^2	-0.020	-0.017	-0.028	-0.023	-0.020	-0.027
Residual Std. Error	0.277 (df = 149)	0.262 (df = 183)	0.215 (df = 125)	0.207 (df = 129)	0.264 (df = 167)	0.207 (df = 94)
F Statistic	0.254 (df = 4; 149)	0.201 (df = 4; 183)	0.132 (df = 4; 125)	0.267 (df = 4; 129)	0.142 (df = 4; 167)	0.666 (df = 8; 94)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 8: *Board Measures Impact on Underpricing in the United States*

This table show regression results where dependent variable is US Underpricing and independent variables are board governance measures including control variables. Regression (1) to (5) are single governance regressions while regression (6) includes all variables. Note: Results on regression (6) are corrected for hetereskedasticity.

	Dependent variable:					
	Offer To 1st Close					
	(1)	(2)	(3)	(4)	(5)	(6)
% Indep Directors	0.002***					0.002***
	(0.001)					(0.001)
Size of the Board		−0.003				0.006
		(0.006)				(0.006)
Board Average Age			−0.009***			−0.007***
			(0.002)			(0.002)
# Board Meetings				−0.004**		−0.003*
				(0.002)		(0.002)
% Women on Board					0.004***	0.003***
					(0.001)	(0.001)
log_revenues	0.001	−0.005	−0.007	−0.003	−0.008	−0.006
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
year_dummy	0.037	0.023	−0.003	0.025	−0.011	−0.017
	(0.027)	(0.034)	(0.035)	(0.029)	(0.037)	(0.031)
tech_dummy	0.106***	0.105***	0.088***	0.106***	0.106***	0.096***
	(0.025)	(0.030)	(0.031)	(0.027)	(0.034)	(0.030)
Constant	−0.031	0.218***	0.721***	0.211***	0.118***	0.377***
	(0.054)	(0.049)	(0.125)	(0.031)	(0.041)	(0.143)
Observations	1,253	1,268	1,243	1,148	1,085	1,005
R^2	0.029	0.011	0.025	0.020	0.026	0.048
Adjusted R^2	0.026	0.008	0.022	0.016	0.023	0.040
Residual Std. Error	0.301 (df = 1248)	0.374 (df = 1263)	0.373 (df = 1238)	0.312 (df = 1143)	0.391 (df = 1080)	0.319 (df = 996)
F Statistic	9.375***($df = 4; 1248$)	3.536***($df = 4; 1263$)	8.016***($df = 4; 1238$)	5.710***($df = 4; 1143$)	7.304***($df = 4; 1080$)	6.211***($df = 8; 996$)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 9: *Board Measures Impact on Underpricing in Emerging Markets*

This table show regression results where dependent variable is Emerging Markets Underpricing and independent variables are board governance measures including control variables. Regression (1) to (5) are single governance regressions while regression (6) includes all variables. Note: Results on regression (6) are corrected for hetereskedasticity.

	Dependent variable:					
	Offer To 1st Close					
	(1)	(2)	(3)	(4)	(5)	(6)
% Indep Directors	−0.004***					−0.003
	(0.001)					(0.002)
Size of the Board		0.0003				−0.009
		(0.006)				(0.009)
Board Average Age			−0.010***			−0.011**
			(0.003)			(0.005)
# Board Meetings				0.001		0.006
				(0.003)		(0.005)
% Women on Board					−0.0002	−0.002
					(0.001)	(0.002)
log_revenues	−0.017*	−0.015*	−0.020**	−0.019*	−0.028***	−0.039***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.013)
year_dummy	0.173***	0.154***	0.160***	0.206***	0.125**	0.185**
	(0.052)	(0.052)	(0.058)	(0.062)	(0.058)	(0.079)
tech_dummy	0.355***	0.371***	0.344***	0.404***	0.380***	0.409***
	(0.059)	(0.059)	(0.064)	(0.067)	(0.067)	(0.082)
Constant	0.549***	0.362***	0.990***	0.400***	0.452***	1.358***
	(0.084)	(0.078)	(0.184)	(0.079)	(0.085)	(0.257)
Observations	930	942	841	802	711	547
R^2	0.066	0.057	0.074	0.068	0.067	0.118
Adjusted R^2	0.062	0.053	0.070	0.063	0.062	0.104
Residual Std. Error	0.436 (df = 925)	0.439 (df = 937)	0.447 (df = 836)	0.451 (df = 797)	0.426 (df = 706)	0.444 (df = 538)
F Statistic	16.389*** (df = 4; 925)	14.152*** (df = 4; 937)	16.768*** (df = 4; 836)	14.427*** (df = 4; 797)	12.681*** (df = 4; 706)	8.962*** (df = 8; 538)
Note:						*p<0.1; **p<0.05; ***p<0.01

Independent Directors

The regression analysis shows that in Nordic markets, the percentage of independent directors has a positive but statistically insignificant effect on IPO underpricing. This indicates that having more independent directors does not strongly impact underpricing for Nordic listings. In contrast, in the US, a higher percentage of independent directors positively impacts underpric-

ing, possibly due to signalling effects in markets with prevalent CEO duality (Certo (2001)). Bhagat and Bolton (2008) suggest that independent directors align with shareholder interests, the distinct market context and unitary board structure in the US, where the CEO often chairs the board, may lead investors to view increased independence as compensatory for governance risks. This contrasts with Nordic boards, which typically feature dual structures and high transparency, inherently reducing information asymmetry and diminishing the need for such signalling through underpricing. Higher percentage of independent directors on boards in Emerging Markets are also significantly associated with lower IPO underpricing.

Board Size

The regression analysis indicates a negative but not significant relationship between board size and IPO underpricing. This implies that larger boards are associated with slightly lower underpricing, though the relationship is not statistically robust. Yermack (1996) found an inverse relationship between board size and firm performance, suggesting smaller boards are generally more effective. The negative coefficient aligns with theoretical expectations, but the insignificance implies that board size alone does not strongly influence IPO pricing. The findings from emerging markets, with a significant negative coefficient for board average age, further support the notion that experience and conservatism in older boards can reduce underpricing.

Board Average Age

Regression results from the Nordics give insignificant results, suggesting that average board age have no influence on underpricing. However, both in the US and Emerging Markets, board average age is negative and statistically significant meaning older boards are associated with lower underpricing. This suggests that investors might perceive the experience and wisdom of older directors as a stabilizing factor, enhancing the firm's strategic and risk man-

agement practices. Experienced directors may be better at navigating complex market environments and mitigating risks associated with IPOs, thereby reducing the need for underpricing to attract investors. This aligns with Wintoki et al. (2012) who found that a balanced mix of age and experience leads to better governance decisions, suggesting that the presence of older directors can provide valuable oversight and reduce uncertainties, resulting in lower underpricing. Additionally, Filatotchev and Bishop (2002) finds a positive relationship between age and experience, a relationship that is highly valued by outside investors in an IPO.

Number of Board Meetings

The regression analysis for Nordic boards shows that the number of board meetings has a positive but insignificant effect on IPO underpricing. Conversely, in the US, the negative coefficient for the number of board meetings suggests that more frequent meetings might be associated with better monitoring and lower underpricing, supporting Vafeas (1999) findings on the benefits of active board engagement. This despite that boards in US have significantly fewer meetings than in the Nordics. It is important to note that the magnitude is low given that one more board meeting a year is associated with a reduced underpricing of only approx. 0.4%.

Women on the Board

The regression analysis for Nordic boards shows a negative but insignificant relationship between the percentage of women on the board and IPO underpricing. Adams and Ferreira (2009) finds that gender-diverse boards have better attendance and CEO accountability, potentially improving performance. However, in the US, higher percentage of women on board is statistically significantly associated with higher underpricing. Rau et al. (2021) finds that the arise in underpricing may stem from increased focus on diversity investing for institutional investors. Boards with higher women percentages increases

diversity scores and which increases investor demand increasing underpricing. However, the relationship is stated in a log-log matter, indicating limited direct impact on IPO underpricing.

5.1.2 Ownership Concentration

Table 10: *Ownership Concentration Impact on Underpricing Across Regions*

This table show regression results where dependent variable is Underpricing and independent variable is ownership concentration. Regression (1) shows results for the Nordics, (2) United States, and (3) Emerging Markets.

	Dependent variable:		
	Offer To 1st Close		
	(1)	(2)	(3)
BvD Quantified	0.003	0.001	0.009***
	(0.007)	(0.004)	(0.003)
log_revenues	−0.002	−0.019***	−0.002
	(0.006)	(0.006)	(0.006)
year_dummy	0.095*	0.003	0.096***
	(0.049)	(0.044)	(0.034)
tech_dummy	0.007	0.137***	0.186***
	(0.051)	(0.038)	(0.042)
Constant	0.062	0.268***	0.186***
	(0.055)	(0.041)	(0.049)
Observations	328	1,271	1,429
R^2	0.013	0.017	0.028
Adjusted R^2	0.0004	0.014	0.025
Residual Std. Error	0.361 (df = 323)	0.495 (df = 1266)	0.396 (df = 1424)
F Statistic	1.030 (df = 4; 323)	5.614*** (df = 4; 1266)	10.337*** (df = 4; 1424)
Note:			*p<0.1; **p<0.05; ***p<0.01

The regression analysis shows that ownership concentration has varied impacts on IPO underpricing. In the Nordic and US markets, ownership concentration

does not significantly influence underpricing, with coefficients of 0.004 and 0.002, respectively. This insignificance aligns with the efficient market hypothesis and strong governance frameworks in these regions, where dispersed ownership necessitates robust governance mechanisms (Fahlenbrach (2009)). In contrast, in emerging markets, a higher 'BvD Quantified' score significantly increases underpricing This finding aligns with Jensen and Meckling (1976)'s agency theory, which suggests that dispersed ownership increases agency costs due to misaligned interests and weaker oversight. Scafarto (2017) also note that fragmented ownership in emerging markets exacerbates risks for minority shareholders, leading to higher underpricing to attract investors. While concentrated ownership in emerging markets typically enhances monitoring and reduces agency costs (Gilson (2014)), higher fragmentation leads to governance inefficiencies, increasing perceived risks. Thus, in less efficient markets, ownership structure significantly influences underpricing, underscoring the importance of effective governance mechanisms to mitigate these effects.

5.1.3 Deal term governance

Table 11: *Lockups and Green Shoe Options Impact on Underpricing*

This table show regression results where dependent variable is Underpricing and independent variables are lockups and green shoe options, including control variables. Regression (1) and (2) show results from the Nordics, (3) and (4) for United States and (5) and (6) for Emerging Markets. Lock-up and green shoe options are as discussed dummy variables, explaining the presence of deal terms on underpricing.

	Dependent variable:					
	Offer To 1st Close					
	(1)	(2)	(3)	(4)	(5)	(6)
Greenshoe Option	−0.044		−0.248***		−0.298***	
	(0.031)		(0.046)		(0.022)	
Lock-up provision		0.017		−0.308***		−0.048*
		(0.029)		(0.045)		(0.025)
log_revenues	0.008	0.005	−0.012**	−0.011**	0.012**	−0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
year_dummy	0.031	0.025	0.048	0.049	0.204***	0.203***
	(0.032)	(0.031)	(0.034)	(0.034)	(0.030)	(0.031)
tech_dummy	−0.002	0.003	0.113***	0.112***	0.265***	0.287***
	(0.035)	(0.035)	(0.033)	(0.033)	(0.036)	(0.037)
Constant	0.079***	0.057**	0.445***	0.496***	0.285***	0.318***
	(0.023)	(0.027)	(0.047)	(0.046)	(0.038)	(0.044)
Observations	696	696	2,205	2,205	2,420	2,420
R^2	0.005	0.003	0.024	0.032	0.111	0.042
Adjusted R^2	-0.0005	-0.003	0.022	0.030	0.109	0.041
Residual Std. Error	0.371 (df = 691)	0.372 (df = 691)	0.565 (df = 2200)	0.562 (df = 2200)	0.491 (df = 2415)	0.510 (df = 2415)
F Statistic	0.917 (df = 4; 691)	0.504 (df = 4; 691)	13.628*** (df = 4; 2200)	18.121*** (df = 4; 2200)	75.090*** (df = 4; 2415)	26.530*** (df = 4; 2415)

Note: *p<0.1; **p<0.05; ***p<0.01

In the Nordics, green shoe options and lock-up agreements are not significant factors in explaining IPO underpricing. The theory behind lock-up agreements suggests they enhance governance by aligning insiders' interests with those of outside investors and mitigating moral hazard (Lee (2022) and Brau and Hanka (2006)). However, in highly transparent environments like the Nordics, where governance standards are inherently high, the need for such mechanisms is reduced. Similarly, green shoe options aim to stabilize post-IPO performance

and align underwriters' incentives with company goals(Michaely and Shaw (1994)). Existing transparency and robust regulatory practices in Nordic markets already mitigate underpricing risks, making the additional effects of these mechanisms less significant. Studies by Field and Hanka (2001) and Loughran and Ritter (2004) support that in well-regulated markets, the effectiveness of additional governance mechanisms is diminished because insider trading and information asymmetry are already well-controlled.

We see that in US and Emerging Markets, lock-up agreements are highly significant and negative, indicating that its presence is associated with lower underpricing. By allowing underwriters to issue additional shares if demand is high, greenshoe options stabilize IPO prices and align underwriter incentives with company goals, reducing price volatility and the need for underpricing. This finding supports Michaely and Shaw (1994), who noted the role of greenshoe options in managing post-IPO market dynamics, and Chowdhry and Sherman (1996), who highlighted their impact on market efficiency.

Lock-up provisions also demonstrates a negative and highly significant impact on underpricing. Lock-ups signal insider confidence and commitment, reducing information asymmetry and investor concerns about immediate insider sales post-IPO. This aligns with the theories of Field and Hanka (2001) and Brau and Hanka (2006), which emphasize that lock-up provisions enhance governance and stabilize post-IPO performance by aligning insiders' and investors' interests, effectively reducing IPO underpricing.

5.1.4 Summary

For H1a, we reject the hypothesis that corporate governance influences underpricing in the Nordics, as none of the board measures significantly impacted IPO underpricing. This suggests that inherent transparency and existing governance structures mitigate the need for additional governance signals.

For H1b, the data supports the hypothesis that the effect of corporate governance on IPO underpricing varies across different markets. In the US and emerging markets, independent directors and stronger governance mechanisms significantly reduce IPO underpricing, indicating that corporate governance impacts IPO underpricing differently depending on the market context. Ownership concentration and deal term governance mechanisms like lock-ups and green shoe options also show varied significance across regions, further supporting the hypothesis.

Overall, these findings highlight that while corporate governance can reduce underpricing, its effectiveness is contingent on specific regulatory and market environments.

5.2 Hypothesis 2

H2: *PE/VC backed IPOs experience lower underpricing in the Nordics.*

H2b: *The effect of PE/VC backed IPOs on underpricing varies across different markets.*

In this section, we discuss the results of our regression analysis on the influence of PE/VC presence on IPO underpricing. This is particularly interesting because PE/VC-backed firms have different governance structures compared to non-PE/VC-backed firms. Additionally, by examining international effects, we can determine whether PE/VC-backed firms can serve as substitutes for legal protections for investors, given the diverse regulatory frameworks across countries

Table 12: *Heckman Two-Step Model Results for PE/VC Presence*

This table presents regression results for selection models examining PE/VC presence and its influence on underpricing across different regions. Models (1), (3), and (5) are probit regressions, while models (2), (4), and (6) are OLS regressions incorporating the IMR from the probit model. The variable PEVC is of particular interest, as it explains the impact of PE/VC presence on underpricing.

	Dependent variable:					
	Nordic PEVC		US PEVC		EM PEVC	
	probit	*OLS*	*probit*	*OLS*	*probit*	*OLS*
	(1)	(2)	(3)	(4)	(5)	(6)
PEVC		−0.071*		0.072***		0.165***
		(0.041)		(0.026)		(0.022)
log_revenues	0.112***	0.069	0.112***	0.118*	−0.107***	0.045
	(0.022)	(0.065)	(0.012)	(0.060)	(0.016)	(0.072)
year_dummy	−1.290***	−0.729	−0.559***	−0.643**	−0.412***	0.386
	(0.225)	(0.781)	(0.083)	(0.307)	(0.083)	(0.283)
tech_dummy	−0.296*	−0.167	0.288***	0.443***	0.609***	0.023
	(0.170)	(0.178)	(0.075)	(0.151)	(0.093)	(0.371)
IMR		0.682		1.743**		−0.572
		(0.716)		(0.759)		(0.947)
Constant	−1.062***	−1.003	−0.766***	−2.103**	0.317***	0.506
	(0.100)	(1.135)	(0.068)	(1.015)	(0.102)	(0.540)
Observations	696	696	2,205	2,205	2,420	2,420
R^2		0.007		0.018		0.063
Adjusted R^2		0.0001		0.016		0.061
Log Likelihood	-264.195		-1,409.766		-1,531.120	
Akaike Inf. Crit.	536.390		2,827.532		3,070.241	
Residual Std. Error		0.371 (df = 690)		0.567 (df = 2199)		0.504 (df = 2414)
F Statistic		1.013 (df = 5; 690)		7.996*** (df = 5; 2199)		32.358*** (df = 5; 2414)
Note:						*p<0.1; **p<0.05; ***p<0.01

Firstly, our selection models regressions (1), (3) and (5) from Table 12 indicates that firms with high revenues are significantly more likely to get PE/VC-backing than others, hence in line with Bottazzi et al. (2008) who suggests PE/VC involvement is more likely for larger firms. In the highly frequent 2021 market, we see same patterns across markets for less likeliness for PE/VC-backing in IPOs. In the United States and Emerging Markets, tech firms show significantly higher probability of getting PE/VC funding. Secondly, we observe that the Inverse Miller Ratio is only significant in the OLS model for

United States markets, indicating that in the Nordic and Emerging Markets, we have no inherent selection bias. In United States, the selection bias is corrected by the significance of the IMR variable.

For the analysis of PE/VC presence on IPO underpricing in the Nordic, we focus on regression (2) from Table 12. We find that PE/VC-backed IPOs yields 0.71% lower underpricing than IPOs not backed by PE/VC in the Nordics at the 10% significance level. Hence, PE/VC-backed IPOs significantly reduces underpricing. The significant negative impact of PE/VC suggests that these firms provide substantial value through their active governance and strategic input. PE/VC firms often enhance operational efficiencies and market positioning, leading to better-prepared companies that require less underpricing to attract investors (Guo et al. (2015)). This aligns with the theory that PE/VC firms mitigate information asymmetry and signal firm quality to the market, thereby reducing the need for underpricing (Rashid et al. (2014)).

In the US and Emerging Markets regressions (4) and (6) from Table 12, PE/VC involvement are positive and significant. This positive impact can be attributed to the signalling effect where the presence of reputable PE/VC firms enhances the perceived quality of the IPO, leading to higher demand and consequently higher underpricing (Michaely and Shaw (1994)). For Emerging Markets, the higher underpricing in these markets can be explained by the higher risks and information asymmetry inherently due to weaker investor protection as proposed by Shleifer and Wolfenzon (2002). PE/VC firms signal their confidence in the firms' prospects, thereby enhancing their attractiveness despite the higher risks, leading to higher underpricing as a result of increased IPO demand.

5.2.1 Summary

For H2a, the data supports the hypothesis that PE/VC-backed IPOs experience lower underpricing in the Nordics. Regression analysis shows that PE/VC-backed IPOs have lower underpricing than non-PE/VC-backed IPOs at the 10% significance level, indicating a weak relationship. This suggests that PE/VC firms improve governance and signal quality, thereby reducing the need for underpricing.

For H2b, the data supports the hypothesis that the effect of PE/VC-backed IPOs on underpricing varies across different markets. In the US and Emerging Markets, PE/VC involvement is positively and significantly related to underpricing, contrasting with the results from Norway. This suggests that investors have varied views on PE/VC involvement across different regions.

Overall, while PE/VC involvement appears to reduce underpricing in the Nordics, it has the opposite effect in the US and Emerging Markets, where it increases underpricing.

5.3 Hypothesis 3

H3a: *Underpricing has predictive power on 6-month post-IPO performance in the Nordics.*

In this section, we investigate whether underpricing can serve as a predictor for 6-month stock returns. Predicting stock returns is notoriously difficult, as suggested by the Random Walk Theory, which posits that stock prices move randomly and cannot be predicted based on past information (Malkiel (1973)). However, if underpricing does have predictive power, this knowledge could be valuable for investors seeking to optimize their strategies based on initial IPO pricing.

Table 13: *Underpricing Impact on 6-month Post-IPO performance*

This table show regression results where dependent variable is six-month post-IPO returns and independent variable is initial underpricing. Six-month post-IPO returns are excess of first day returns. Regression (1) shows results for the Nordics, (2) United States, and (3) Emerging Markets.

	Dependent variable:		
	six_ret		
	(1)	(2)	(3)
'Offer To 1st Close'	0.530***	7.636***	−0.229***
	(0.091)	(0.505)	(0.020)
Constant	0.019	−0.817**	0.409***
	(0.034)	(0.352)	(0.016)
Observations	772	3,454	10,297
R^2	0.042	0.062	0.012
Adjusted R^2	0.041	0.062	0.012
Residual Std. Error	0.930 (df = 770)	20.077 (df = 3452)	1.429 (df = 10295)
F Statistic	33.928*** (df = 1; 770)	229.072*** (df = 1; 3452)	128.492*** (df = 1; 10295)
Note:			*p<0.1; **p<0.05; ***p<0.01

From Table 15, we find that in the Nordics (1), underpriced IPOs yield an average 0.53% increase in 6-month post-IPO returns for every 1% initially underpriced. This indicates a positive and significant relationship between underpricing and 6-month returns. Our findings align with Brown (2016) who suggests that larger IPO underpricing leads to higher firm valuations and better post-IPO performance. These results support momentum theory proposed by Chan et al. (1996) who suggested that firms continue to perform good in the short-term. The adjusted R^2 value of 0.041 indicates that underpricing can ex-

plain approximately 4.1% of the variance in stock returns, providing a notable exception to the Random Walk Theory by demonstrating some predictability in stock returns based on initial underpricing.

Comparatively, the US results also show a significant positive relationship between underpricing and 6-month post-IPO performance. However, the impact is much higher in the US, where a 1% increase in underpricing leads to an average 7.63% increase in six-month returns.

In contrast, the trend changes in emerging markets. Here, higher underpricing often leads to lower future returns, a reversal effect observed over a six-month period rather than the long-term horizons discussed by Ritter (1991) and Aggarwal and Rivoli (1990). These papers suggests initial over-optimism are corrected over time. This short-term reversal suggests that initial high valuations correct more rapidly, aligning with market adjustments seen in these developing economies.

H3b: *PE/VC-backed IPOs return higher 6-month post-IPO performance.*

We aim to investigate whether PE/VC-backed IPOs generate higher 6-month post-IPO performance. Despite potential investor concerns regarding the exit incentives of PE and VC firms, the theoretical framework proposed by Li (2022) and Hartzell et al. (2004) suggests that enhanced corporate governance increases post-IPO performance due to well-aligned incentives. These mechanisms contribute to long-term growth and performance, positioning firms to sustain their performance in the long term by gaining investor trust and institutional support.

Table 14: *Six-months post-IPO returns for PE/VC-backed IPOs*

This table show regression results where dependent variable is six-month post-IPO returns and independent variable is PE/VC presence. Six-month post-IPO returns are excess of first day returns. Regression (1) shows results for the Nordics, (2) United States, and (3) Emerging Markets.

	Dependent variable:		
	six_ret		
	(1)	(2)	(3)
PEVC	−0.131	−0.188	−0.014
	(0.107)	(0.927)	(0.035)
log_revenues	0.026**	−0.559***	0.051***
	(0.013)	(0.183)	(0.010)
year_dummy	−0.269***	−1.162	−0.310***
	(0.085)	(1.252)	(0.048)
tech_dummy	0.113	−0.141	0.081
	(0.092)	(1.219)	(0.059)
Constant	0.083	3.476***	−0.214***
	(0.060)	(1.046)	(0.066)
Observations	694	2,192	2,366
R^2	0.021	0.005	0.032
Adjusted R^2	0.015	0.003	0.030
Residual Std. Error	0.981 (df = 689)	20.614 (df = 2187)	0.791 (df = 2361)
F Statistic	3.650*** (df = 4; 689)	2.669** (df = 4; 2187)	19.333*** (df = 4; 2361)

Note: *p<0.1; **p<0.05; ***p<0.01

From Table 14, it is evident that PE/VC firms do not significantly influence 6-month stock returns. Specifically, the PEVC variable does not show statistical significance in any of the columns, indicating that the involvement of PE/VC firms does not lead to higher post-IPO returns compared to non-PE/VC firms. This finding contradicts the results of previous research, such as Li (2022), which suggested that active participation by PE/VC firms is linked to improved post-IPO performance.

Additionally, the control variables reveal key insights across different markets. The variable log revenues is significant and positive in the Nordic and Emerging markets, suggesting that larger companies perform better in the 6-month post-IPO period. Conversely, the US market shows a significant negative coefficient for log revenues, indicating that larger companies may perform worse post-IPO. The year dummy variable is significant and negative in the Nordic and Emerging markets, indicating that IPOs in "Hot years" have a negative impact on returns, but it is not significant in the US market. The tech dummy variable does not show consistent significance, implying that being a tech firm does not uniformly affect 6-month post-IPO returns across the markets.

5.3.1 Summary

For H3a, the data supports the hypothesis that underpricing predicts 6-month post-IPO performance in the Nordics. The relationship is positive and significant, suggesting underpricing can predict 6-month post-IPO performance.

For H3b, we reject the hypothesis that PE/VC-backed IPOs have higher 6-month post-IPO performance. The analysis shows no significant impact from PE/VC involvement on returns.

Overall, underpricing positively impacts 6-month post-IPO performance in the Nordics and the US but negatively in Emerging Markets, which can be explained by reversal theory. Larger companies perform better post-IPO in the

Nordics and Emerging Markets but worse in the US. "Hot years" negatively affect returns in the Nordics and Emerging Markets, while the tech sector impact is inconsistent.

6 Conclusion

To conclude, our findings show no evidence that corporate governance measures influence underpricing in Nordic IPOs. While previous literature emphasizes that enhanced corporate governance practices better align incentives between the issuing firm, underwriter, and outside investor, our research shows no impact on reducing underpricing. The low significance of corporate governance in IPOs can be attributed to the high level of investor protection in Nordic markets. This is underscored by the significantly lower average underpricing in Nordic markets, at 8.3%, compared to 16.5% in the US and 38.9% in Emerging Markets. The difference reflects that Nordic investors do not demand a high-risk premium in IPOs due to the robust investor protection and regulatory framework inherent in these markets. However, in markets with weaker investor protection, such as the US and Emerging Markets, we find strong evidence that corporate governance measures influence IPO underpricing.

Firstly, regressions on board measures reveal that higher average board age reduces underpricing, suggesting that investors value board experience in the US and Emerging Markets. Additionally, an increased number of board meetings in the US correlates with reduced underpricing, indicating that investors value active oversight. However, board diversity, measured by the percentage of women, shows a positive effect on underpricing, suggesting that diversified experience is not yet valued. Deal terms as governance tools have significantly impact on reducing underpricing. Lockups have an impact on reducing agency costs arising from moral hazard problems and green shoe options align incentives between issuing firm and underwriter.

Secondly, by comparing PE/VC-backed IPOs to non-PE/VC IPOs, we find that in the Nordics, PE/VC-backed IPOs experience 7.1% lower underpricing. This suggests that the active ownership and oversight by PE/VC firms,

characterized by significantly higher percentages of independent directors and larger boards, better align decision-making with shareholder interests. Additionally, by running Heckman selection models on PE/VC presence we find no evidence that PE/VC effects are explained by unobservable factors in the Nordics. Conversely, PE/VC-backed IPOs in the US and Emerging Markets experience underpricing of 7.2% and 16.5% higher than IPOs not backed by PE/VC. This reflects varied investor views on PE/VC involvement across different regions.

Lastly, we find that underpricing is a significant predictor of six-month post-IPO performance for all markets. Underpriced IPOs in the Nordics and the US yield 0.53% and 7.64% for every percent initially underpriced, suggesting a momentum explanation as higher underpricing is associated with higher six-month post-IPO return. While PE/VC firms experience lower underpricing in the Nordics, we find no evidence they yield higher 6-month post-IPO returns.

In summary, corporate governance has no influence on IPO underpricing in the Nordics but serves as a significant substitute for investor protection in less regulated markets. PE/VC firms have more efficient governance models in the Nordics, effectively reducing IPO underpricing, however they do not yield higher 6-month post-IPO returns.

APPENDIX

Table 15: *Breusch-Pagan Test Results for Nordic, US, and Emerging Markets Board Governance*

The table presents the results of the Breusch-Pagan test for heteroskedasticity in the board models. Note: We reject homoscedasticity for US and Emerging Markets. Hence, heteroscedasticity is present and needs to be adjusted.

Region	**BP Statistic**	**df**	**p-value**
Nordic	9.685	8	0.2879
US	19.85	8	0.01092
Emerging Markets	56.728	8	2.035e-09

Table 16: *VIF for Multicollinearity in Nordic, US, and Emerging Markets Board Governance*

The table presents the Variance Inflation Factors (VIF) for multicollinearity in the board models. Note: All variables are > 1 *and* < 5*, indicating no to none multicollinerity between governance variables.*

Variable	**Nordic**	**US**	**Emerging Markets**
% Indep Directors	1.223487	1.081701	1.290196
Size of the Board	1.291236	1.134502	1.232910
Board Average Age	1.178920	1.117665	1.244902
# Board Meetings	1.117920	1.041049	1.037515
% Women on Board	1.130280	1.071712	1.061153
log_revenues	1.284971	1.159070	1.131578
year_dummy	1.142735	1.114353	1.057673
tech_dummy	1.099380	1.059810	1.050947

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