



Vaasan yliopisto
UNIVERSITY OF VAASA

Jukka Alapiha

IPOs in Nordic countries during the COVID-19

A Comparative Study of IPOs returns on the Nordic Stock Exchanges

School of Accounting and Finance
Master's thesis in Finance
Master's Degree Program in Finance

Vaasa 2025

UNIVERSITY OF VAASA**School of Accounting and Finance**

Author: Jukka Alapiha
Title of the thesis: IPOs in Nordic countries during the COVID-19: A Comparative Study of IPOs returns on the Nordic Stock Exchanges
Degree: Master of Science in Economics and Business Administration
Discipline: Master's Degree Programme in Finance
Supervisor: Janne Äijö
Year: 2025 **Pages:** 68

ABSTRACT:

The COVID-19 pandemic surprised investors in March 2020 and caused a sharp market drop, with major stock indices falling by over 30%. The pandemic led to a significant increase in IPOs on stock exchanges, and during the hot issue market, IPO underpricing increased. According to previous studies, as IPO volumes increase, underpricing also grows because companies go public when markets are favorable. IPOs of small and growing companies are more uncertain, and investors demand more underpricing for the risk they take.

In response to the pandemic, central banks introduced stimulus measures and lowered interest rates as monetary policies. With interest rates in the Eurozone already negative during that time, central banks further increased asset purchases. The rapid market recovery, strong capital inflows, and growing digitalization encouraged many companies to take on more risk and go public.

High investor confidence, influenced by many factors, led to a surge in IPO activity. Many companies experienced significant underpricing on their first day of trading as the market heated up. Heated markets attract smaller, younger, and technology-oriented companies, which tend to have higher than average underpricing. We analyze the IPOs in more detail using firm characteristics and industry distribution to determine whether there was a difference in underpricing between the periods when these factors are taken into account.

This study looks at the IPOs of Nordic companies that went public during the COVID-19 years of 2020–2021 and compares them to those before the pandemic, from 2015 to 2019. The research compares underpricing and the effect of firm-level characteristics on underpricing.

The research results were statistically insignificant. Individual firm-level characteristics did not significantly affect underpricing between the COVID-19 period and the non-COVID period. A slight significance was observed in the M/B ratio, but it did not reach statistical significance. Therefore, in the Nordic countries, no significant impact on IPO underpricing measured by firm characteristics was observed.

KEYWORDS: Initial Public Offering, IPO, underpricing, COVID-19, pandemic, firm characteristics

VAASAN YLIOPISTO**School of Accounting and Finance**

Tekijä:	Jukka Alapiha		
Tutkielman nimi:	IPOs in Nordic countries during the COVID-19: A Comparative Study of IPOs returns on the Nordic Stock Exchanges		
Tutkinto:	Kauppatieteiden maisteri		
Oppiaine:	Rahoituksen maisteriohjelma		
Työn ohjaaja:	Janne Äijö		
Valmistumisvuosi:	2025	Pages:	68

TIIVISTELMÄ:

COVID-19-pandemia yllätti sijoittajat maaliskuussa 2020, josta seurasi jyrkkä markkinoiden lasku ja monet suurista osakeindekseistä menette arvostaan yli 30 %. Pandemia johti merkittävään listautumisantien ruuhkaan pörsseissä, ja tämän kuumen markkinan aikana IPO-alihinnoittelu kasvoi. Aiempien tutkimusten mukaan listautumisantien määrän kasvaessa myös alihinnoittelu kasvaa, koska yritykset pyrkivät listautumaan, kun markkinat ovat suotuisat niille. Pienten ja kasvavien yritysten listautumiset ovat epävarmempia, ja sijoittajat vaativat enemmän alihinnoittelua kompensoidakseen riskinsä.

Vastauksena pandemiaan keskuspankit ottivat käyttöön elvytystoimenpiteitä ja laskivat korkoja osana rahapolitiikkaansa. Kun korkotaso euroalueella oli jo tuolloin negatiivinen, keskuspankit lisäsivät edelleen omaisuuserien ostoja. Markkinoiden nopea elpyminen, vahvat pääomavirrat ja kasvava digitalisaatio kannustivat monia yrityksiä ottamaan enemmän riskiä ja listautumaan pörssiin.

Korkea sijoittajien luottamus, johon vaikutti useita tekijöitä, johti listatumisaktiivisuuden kasvuun. Monet yritykset olivat merkittävästi alihinnoiteltuja ensimmäisenä kaupankäyntipäivänään markkinoiden kumentuessa. Kuumat markkinat houkuttelevat pienempiä, nuorempia ja teknologiapainotteisia yrityksiä, joilla on markkinoita keskimääräistä suurempaa alihinnoittelua listautumisanneissaan. Tutkimme Pohjoismaiden listautumisia tarkemmin yritysten tunnuslukuja ja toimialajakaumaa käyttäen selvittääksemme oliko pandemian aikana eroa listautumisantien alihinnoittelussa, kun nämä tekijät huomioidaan.

Tässä tutkielmassa tutkin pohjoismaisten yritysten pörssilistautumisia, jotka listautuivat COVID-19-pandemian aikana (2020–2021), ja vertaan niitä ennen pandemiaa (2015–2019) listautuneisiin pörssiyrityksiin. Vertailen alihinnoittelua ja tutkin yritysten tunnuslukujen vaikutusta siihen.

Tutkimus osoitti tulosten olevan tilastollisesti merkitsemättömiä. Yksittäiset tunnusluvut eivät vaikuttaneet merkittävästi alihinnoitteluun COVID-19-kauden ja sitä edeltävän ajanjakson välillä. Vaikka markkina-arvon ja kirjanpitoarvon suhdeluvussa (M/B) havaittiin pientä merkittävyyttä, se ei saavuttanut tilastollista merkitsevyyttä. Siten Pohjoismaissa ei havaittu merkittävää vaikutusta IPO-alihinnoitteluun, kun sitä mitattiin yritysten tunnusluvuilla.

AVAINSANAT: Initial Public Offering, IPO, underpricing, COVID-19, pandemic, firm characteristics

Contents

1	Introduction	7
1.1	The purpose of the study	8
1.2	Hypotheses of the study	9
1.3	Structure of the study	12
2	Initial public offerings	14
2.1	Theory of IPOs	14
2.1.1	IPO waves and the impact of market conditions	16
2.2	IPO valuation and process	17
2.2.1	Valuation	18
2.2.2	Pricing methods	22
2.3	IPO underpricing	24
2.4	Firm characteristics	30
2.4.1	Underpricing	30
2.4.2	Post-IPO performance	32
3	IPOs and COVID-19 pandemic	34
3.1	Stock markets and COVID-19	35
3.2	IPO returns during COVID-19	36
3.3	Economic policy uncertainty and government actions on IPOs	38
4	Data and methodology	41
4.1	Data description	41
4.2	Descriptive Statistics	45
4.3	Methodology	48
4.3.1	Variables	48
4.3.2	Regression models	49
5	Results	52
6	Conclusions	57
6.1	Discussions	57

6.2	Limitations for future research	59
	References	60

Figures

Figure 1. IPOs return from 1980 to 2023 (Ritter, 2023).	17
Figure 2. IPO valuation and pricing progress (Roosenboom, 2012)	18
Figure 3. Mean first-day returns for IPOs in the U.S. (Ritter, 2023).	27
Figure 4. VIX Values from 2015 to 2023 (Cboe Global Markets, n.d.)	34
Figure 5. Number of IPOs by industry Sector 2015-2021	42
Figure 6. Industry Distribution in Main and Secondary Markets (2015-2019 vs 2020-2021)	44

Tables

Table 1. Number of IPOs and first-day return by country (Jamaani & Ahmed, 2021)	26
Table 2. Number of IPOs in the Nordics by Year from 2015 to 2021	41
Table 3. Sample distribution	45
Table 4. Panel A. Descriptive statistics for whole period	46
Table 5. Panel B & C. Descriptive statistics for two periods	47
Table 6. Covid Period and IPO Underpricing: Baseline Regression	52
Table 7. Covid period and IPO underpricing: traditional firm-level characteristic	54

1 Introduction

The COVID-19 pandemic modified the global economy and caused a significant surge in initial public offerings (IPOs) across various stock exchanges worldwide. In a stimulative economic environment, many companies found the courage to seek growth and funding by going public. According to PwC Global IPO Watch (n.d.), the number of IPOs increased significantly during the pandemic. Activity increased by 36.9% in 2020 and approximately 89.4% in 2021. The Nordic countries—Finland, Sweden, Norway, and Denmark—and many other nations, experienced an increasing amount of IPO listings. In the Nordics, a total of 242 companies listed during 2020–2021, whereas there were 244 listings from 2015 to 2019. Thus, in two years, there were almost as many listings as in the previous five years combined (DataStream, 2024). In this study, we examine IPO underpricing during the COVID-19 period and investigate the impact of firms' characteristics on underpricing, as well as changes in these factors between the different time periods. Additionally, in the theoretical section, we include previous literature on the impact of COVID-19 on IPOs.

From 2015 to 2021, a total of 486 companies listed on the Nordic markets. Most of them joined the First North market which is designed for smaller and growing companies in the Nordics. IPO offerings have been extensively studied across different time periods and stock exchanges worldwide. In this research, we follow methodologies from previous studies related to IPOs. Our data includes stock exchange listings in the Nordic countries during the COVID-19 period (2020–2021) and the non-COVID period (2015–2019). These time frames were selected based on prior research (Zhang & Neupane, 2024; Wei & Han, 2021).

According to Espinasse (2011), IPO is one of the most important milestones in a company's existence. Typically, a company offers its shares to third-party investors for the first time which provides additional liquidity to the company's owners. Many companies experience IPO underpricing when they go public to make themselves more attractive to investors and to differentiate themselves from already listed companies.

The underpricing of IPOs which is defined as the price change of a stock on its first trading day, will also be examined. The extent of underpricing varies across countries and different time periods. According to Ritter's data (2023), between 1980 and 2022, the average first-day return for U.S. IPOs was 19%, while in Japan, between 1970 and 2022, it was 49%. In contrast, in China, the first-day return from 1990 to 2022 was 162.2%, and in Saudi Arabia during the same period, it was 179.2%.

The Nordic countries are known for their high levels of transparency and trustworthiness, which makes them attractive during the times of uncertainty. Investors often seek a discount to compensate the risk of uncertainty they have when they are investing in IPOs, though in the Nordic region, this uncertainty risk tends to be lower than average. During periods of increased uncertainty, like the COVID-19 pandemic, the risk of information asymmetry rises, and investors are more willing to pay extra premium for safer investments. A significant increase in underpricing happened during the COVID-19 pandemic as IPO markets became significantly more active. In these hot markets, a larger part of IPOs were small and technology-focused companies. This study analyzes IPO underpricing by examining firm characteristics and industry sectors which gives us a better understanding of underpricing trends during the pandemic. The study uses regression analysis similar to the approach used by Zhang and Neupane (2024) in their global IPO study.

1.1 The purpose of the study

The purpose of this study is to examine how the stocks of companies that went public during the listing boom in the Nordic countries between 2020 and 2021 performed compared to IPOs during the non-COVID period of 2015 to 2019 by researching their underpricing. Additionally, the study investigates the firm-level characteristics of these IPOs and analyzes how they influenced IPO underpricing during both the pandemic and non-COVID periods. For example, Hahl et al. (2013) and Bask & Nätter (2021) have also

conducted research on IPOs in the Nordic countries. The aim of this study is to provide new insights and updated information on Nordic IPOs.

According to Zheng and Neupane (2024), globally, IPOs were more underpriced during the COVID-19 period than during the non-COVID period. The study aims to determine whether the underpricing in the Nordic countries was caused by changes resulting from COVID-19 or by the different sector distribution and firm characteristics of companies that went public during a hot IPO market. As IPO markets heat up, often smaller and younger companies go public, and these tend to experience more underpricing on average.

Like many other stock exchanges, the Nordic stock markets experienced a significant surge in company listings during the COVID-19 period. For instance, Sweden saw 133 listings between 2019 and 2022, while Denmark had only 36. Among these years, 2021 was the most active in terms of IPOs (Nasdaq, 2023).

1.2 Hypotheses of the study

The valuation and underpricing of IPOs have been widely studied. Prior academic literature (Kim & Ritter, 1999; Loughran & Ritter, 2004; Lowry & Murphy, 2007; Ljungqvist, 2007; Jenkinson & Jones, 2009; Roosenboom, 2012) indicates that valuing companies going public is challenging, as these companies are typically young and their valuation depends on forecasting future cash flows. However, IPO underpricing has varied significantly over time. In the United States, the average first-day return was 7% in the 1980s, doubling to nearly 15% between 1990 and 1998. During the Internet bubble of 1999-2000, the first-day return soared to 65%, but it dropped to 12% between 2001 and 2003.

In this study, we examine the performance of IPOs on the Nordic Stock Exchange during the COVID-19-era listing rush from 2020 to 2021. Westerholm (2006) studied 254 Nordic IPOs from 1991 to 2002 and found that initial returns were approximately 17%, with high

industry clustering correlating with higher initial returns and lower long-run performance. In Finland, IPOs listed between 1994 and 2006 have been poor long-term investments (Hahl et al., 2014). According to Zhang & Neupane (2024), IPOs listed during the COVID-19 period were underpriced by 17.6% more than in the non-COVID period globally. The Nordics were included in that study, and differences in IPO underpricing were observable. During the COVID-19 period, IPOs were underpriced by 25.2% in Finland, 24.6% in Denmark, 3.4% in Norway, and 10% in Sweden more than during the non-COVID period. However, that study does not account for the changed industry distribution of Nordic IPOs during the COVID-19 period. In our first hypothesis, we investigate whether the increase in underpricing in the Nordics during the COVID-19 period was driven by the change in industry distribution.

H1: After controlling for industry distribution, IPOs in the Nordic countries experienced more underpricing during the COVID-period 2020-2021 than during the pre-COVID period

According to Vismara et al. (2012), IPOs listed on second markets underperform compared to main market IPOs over the long term. Second markets have less stringent regulations, allowing smaller companies to apply. Markets like Neuer Markt and AIM, which are similar to First North, attracted smaller and less established firms. These markets often have lower regulatory standards and may attract companies with higher risks and lower quality. Lighter regulation can lead to the listing of unstable companies. Between 1995 and 2009, in four of Europe's largest economies, main market IPOs had an average 3-year buy-and-hold abnormal return (BHAR) of +12.3%, while second market IPOs had an average 3-year BHAR of -19%.

During the COVID-19 period, more companies listed on the secondary market compared to the main list. These companies are usually younger and smaller in size, which increases underpricing (Daily et al., 2003). By using firm fundamentals, we can examine

whether the companies' fundamentals contributed to the increased underpricing during COVID-19 or if it was due to other factors.

Firms tend to prefer going public during periods when the market values them favorably, often reflected in an optimistically high market-to-book ratio. Firm size also affects underpricing, with larger companies generally experiencing less underpricing than smaller firms. Larger firms tend to face lower levels of uncertainty. Similarly, older companies experience less underpricing (Daily et al., 2003). Most of the IPOs during the COVID-19 were technology firms that tends to have small size and young age. Zhang and Neupane (2024) found that firms with strong fundamentals experienced more underpricing globally during the COVID-19 period and the uncertainty increased the demand for them which caused more underpricing than in previous time period. Focusing on the Nordic markets, we examine whether firm fundamentals played a role in IPO underpricing during the COVID-19 pandemic. This leads us to the following hypothesis:

H2: IPOs in the Nordic countries with strong fundamentals between 2020 and 2021 experienced higher underpricing compared to the non-COVID period from 2015 to 2019.

IPO underpricing has been widely studied across different time periods and markets, but the Nordic IPO markets have not yet been extensively examined during the COVID-19 period, and there is a notable gap in this area. Nordic IPOs have been studied previously (Hahl et al., 2013; Bask & Nätter, 2021), but these researches focus on periods before the pandemic. Westerholm, for instance, studied Nordic IPOs from 1991 to 2002 and found an initial return of approximately 17%, emphasizing industry clustering in performance. Hahl et al. (2013) found that Finnish IPOs are poor long-term investments and that growth stocks have stronger short-term returns than value stocks.

Zheng and Neupane's (2024) study revealed that high political uncertainty and economic support measures increased underpricing, and companies with strong fundamentals experienced more underpricing. These effects were most strong in countries with higher

levels of corruption and less reliable markets. The Nordic region, with its high transparency and low corruption, offers a different environment for IPOs, where firm fundamentals might have a different impact on underpricing (Transparency International, 2023). Higher underpricing was also observed in the Nordic countries, but during COVID-19 there was noticeable heating up of the IPO markets. In hot markets, many smaller and younger companies go public, which increases underpricing. In Zheng & Neupane's sample distribution, higher underpricing was observed in the Nordic countries; however, the figures did not account for the industry distribution or firm fundamentals.

In this study, we investigate whether the increased underpricing in the Nordics was due to a change in the average IPO company by examining the industry distribution and firm fundamentals. In the global study, it was observed that companies with strong fundamentals experienced significant underpricing. However, that study included countries with high corruption, where uncertainty further increases underpricing. During COVID-19, investors trusted strong fundamentals and were willing to pay a higher price for them and we investigate if investors were ready to pay for it in the Nordics as well. In this study, we narrow the geographical focus to the Nordic countries and examine whether investors valued firm fundamentals in the same way as on a global scale. By limiting the research area to the Nordics, we aim to highlight their characteristics in the IPO environment and provide additional insight into the trust they enjoy from high transparency. At the same time, we investigate how IPOs in the Nordic countries perform in crisis situations compared to the global scale, which would also provide new insights into the characteristics of Nordic IPOs during periods of high uncertainty.

1.3 Structure of the study

This study begins with an introduction that outlines the purpose of the research, followed by an overview of the research hypotheses and the overall structure of the study. It provides a preview of the empirical research section, which follows the theoretical section. The theoretical section includes a review of prior academic literature related to

the topic, focusing on IPOs and the various financial indicators used in the study. This section provides the reader with a solid foundation before moving into the empirical research.

The empirical research is covered in the fourth and fifth sections of the study. In the fourth section, the data used in the regression analysis is presented, followed by an examination of the empirical research findings in the fifth section. Finally, the last section summarizes the study.

2 Initial public offerings

In the next chapter, we will discuss the principles of the corporate initial public offering (IPO) process through which a private company transforms into a publicly listed company whereby the company's shares are offered to the public for the first time. In this literature review, we go through the motives that make a company go public, as well as the types of companies that goes public. IPO is a long process for a company and in this section we will look at the different stages of the process and what happens to the stocks IPOs after which listing.

2.1 Theory of IPOs

The decision for a company to go public, to offer shares to third-party investors through IPOs, is considered one of the most important steps during the life of a company. The primary reasons for a company to go public are diverse.

Firstly, for shareholders, going public provides a valuable source of liquidity for their holdings. Secondly, companies can benefit significantly from an IPO as it provides a low-cost source of capital essential for supporting their development. Investors are attracted to IPOs because they offer the opportunity to establish a significant position in a stock, which would be more expensive and time-consuming in the secondary market. IPOs offers financial growth or increasing opportunity of selling the company. For entrepreneurs, going public may offer an opportunity to exit, especially if they foresee potential challenges for the business. Furthermore, companies often offer IPO discount to attract investors which makes their stock more attractive compared to competitors already listen on exchanges (Espinasse, 2011; Jain & Kini, 1999; Zingales, 1995).

According to Jenkinson & Ljunqvist (2001), the IPO process involves several steps, including regulatory compliance with stock exchanges and regulatory bodies, as well as selecting an underwriter. Companies must complete two main procedures: finding investors

willing to purchase offered shares and listing shares to a stock exchange for trading. Some exchanges are even conducting their own initial public offerings. The rise of segmented markets, particularly in Europe, presents opportunities for younger, high-growth firms. Vernimmen et al. (2017) states that it takes typically six months to make a listing after firm decides to pursue for an IPO.

Nelson (2003) highlights that if an IPO is led by founder-CEO, market reactions tends to be more positive for the IPO. However, IPOs are more likely to be cancelled when CEOs own little or a large amount of the equity which results in a U-shaped relationship between CEO ownership and cancellation. Roughly 20% of planned IPOs are withdrawn due to weak investor demand. Withdrawal causes significant financial losses and reputational damage for the company. Balancing managerial incentives and organizational needs is crucial when preparing for an IPO (Latham & Braun, 2010; Dunbar & Foerster, 2007). Other reasons for company to withdraw from IPO are unfavorable market conditions, valuation issues, operational or financial concerns, management or strategic changes and legal or regulatory issues (Brau & Fawcett, 2006; Chemmanur & Fulghieri, 1999). Still, approximately 26% of withdrawn IPOs successfully raise capital privately within three years of the withdrawn, with 7% eventually going public (Boeh & Dunbar, 2021).

Firms have to be mature before going public. Ritter (2003) notes significant differences between IPO markets in Europe and the United States. Historically, European firms undergoing IPOs, particularly in continental Europe, have been significantly older than their U.S. counterparts. Vandemaele (2003) provided data on the French stock markets and reported a median age of 28 years for 220 IPOs between 1984 and 1995. In comparison, Loughran and Ritter (2003) noted a significantly lower median age of seven years for 6,149 U.S. IPOs from 1980 to 2000. However, the age at IPO also varies by the industry. For example, life science companies in the U.S. had a median age of just 5 years for IPOs between 2015 and 2023 (Ritter, 2023).

Ritter & Welch (2002) list raising equity capital and creating liquidity as primary reasons for a company to go public. Life cycle theories suggest that IPOs facilitate business acquisitions and allow for more dispersed ownership as the company grows. On the other hand, market timing theory suggests that companies' times their IPOs based on the market conditions, with some considering information spreading across the markets while others highlight the role of irrational market behavior. Additionally, going public raises a company's visibility and recognition, which can boost its market profile and simplify trading. Issuing new shares through an IPO can be a practical strategy for reducing accumulated debt resulting from costly acquisitions. Furthermore, some companies decide to list on multiple stock exchanges to access a global investor base, especially if they have become large or global entities (Espinasse, 2011, p. 3-4).

2.1.1 IPO waves and the impact of market conditions

IPOs often happen in waves. According to Pástor & Veronesi (2005), IPO waves occur in response to drops in expected market returns and increases in expected profitability. These waves are typically preceded by high market returns and followed by low returns. Additionally, IPO volume correlates positively with recent changes in profitability and negatively with market return volatility. He (2007) proposes that the behavior of investment banks affects IPO volume and underpricing. Investment banks increase their information production during hot IPO periods, which reduces uncertainty and attracts lower-quality firms to go public. This leads to higher IPO volume and secondary market prices. Underpricing of IPOs is considered necessary for IPO success by investment banks.

As shown in Figure 1 below, we can observe IPO waves during several key periods in the U.S.. There was a surge in IPOs at the 1990s, and another wave is visible before the financial crisis, followed by years of lower activity. A more recent IPO wave occurred during the pandemic in 2020 and 2021. The reasons behind the pandemic wave will be further discussed in Chapter 3.

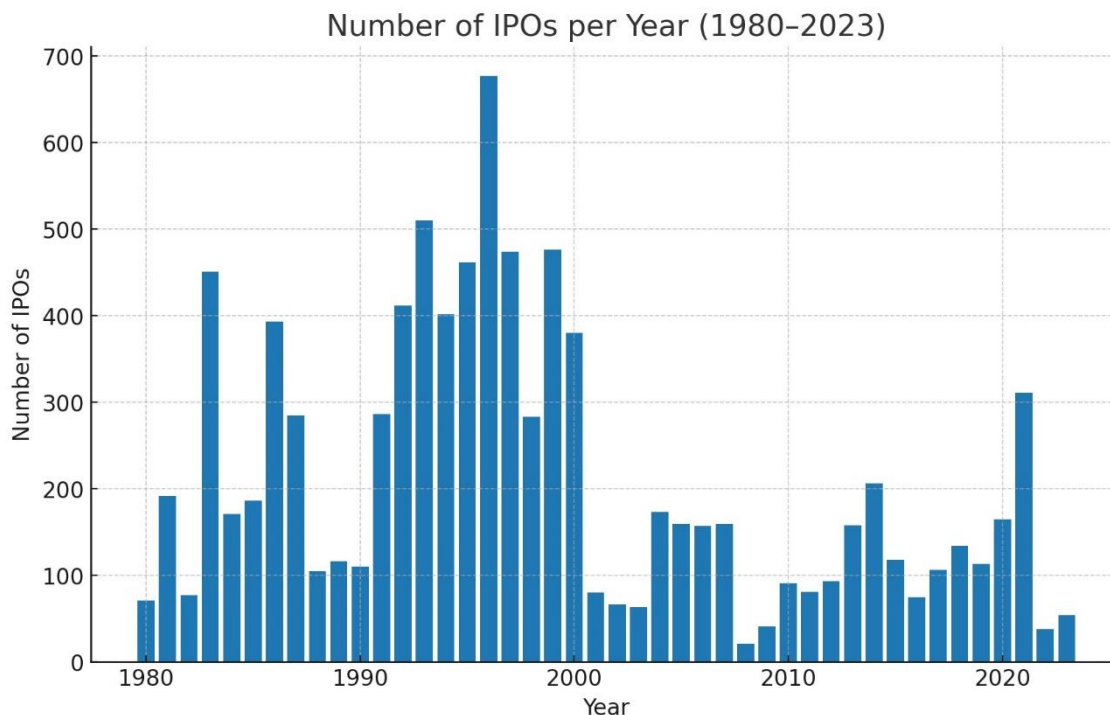


Figure 1. IPOs return from 1980 to 2023 (Ritter, 2023).

Chemmanur & He (2011) explain IPO waves based on product market competition, where companies go public to raise capital at lower costs and gain competitive advantages over their rivals. The authors predict that firms going public during these hot waves will experience lower productivity and post-IPO profitability compared to firms going public outside of these waves.

In summary, the decision to go public through an IPO is motivated by a combination of financial considerations, strategic objectives, and the desire for increased visibility and recognition in the market, as well as market timing with regard to IPO waves.

2.2 IPO valuation and process

In the previous chapter, we discussed the reasons why a company should pursue an IPO, and in this chapter, we explore what happens after the decision has been made.

Roosenboom (2012) illustrated the IPO process very well in Figure 2. We start with the valuation process of the IPO and continue from there through different stages toward to the IPO pricing process.

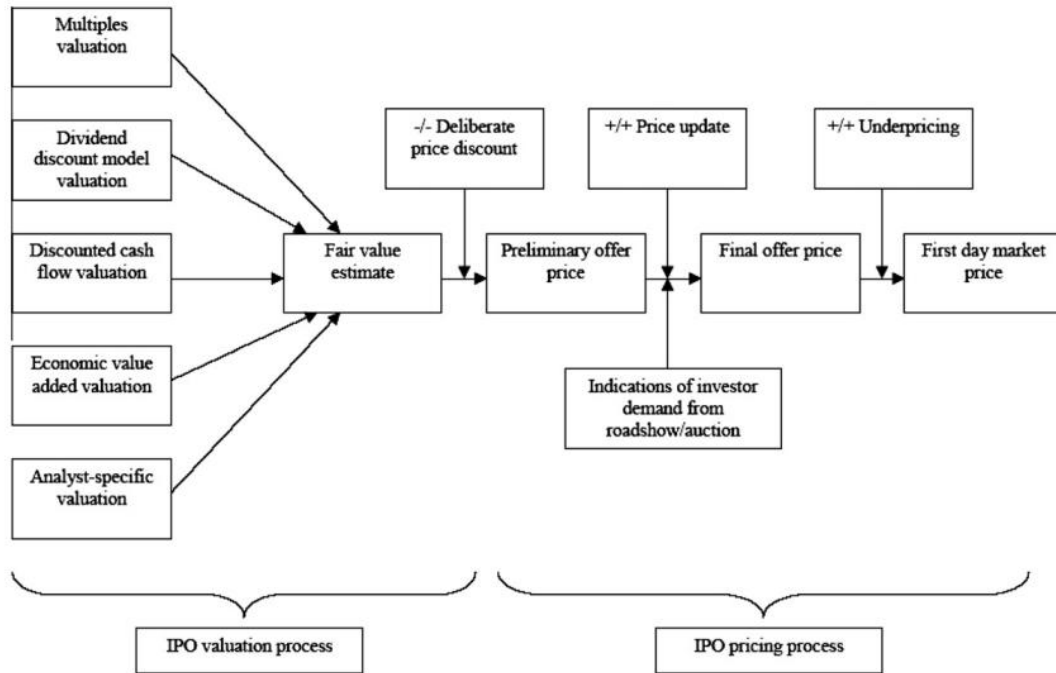


Figure 2. IPO valuation and pricing progress (Roosenboom, 2012)

2.2.1 Valuation

An IPO has to be valued and priced before going public. Valuing IPOs can be a challenging task and issuing company have to hire an investment bank to work as a underwriter. Analysts have developed various models to estimate an IPO's fair value. Underwriters typically rely on discounted cash flow (DCF), multiple valuation, and dividend discount models (DDM) when determining the appropriate price range for an IPO (Roosenboom, 2012). However, according to Kim & Ritter (1999) historical metrics like P/E or P/S ratios can produce limited accuracy due to wide variation across firms and especially for young firms. Forecasted earnings, however, greatly improve valuation precision. Although multiple valuation is widely used, DCF and DDM are also widely used to refine an IPO's fair

value. Moreover, investment bankers add value by using fundamental analysis and by testing market demand. All of these models tend to overvalue the IPO if compared to its later market price.

Underwriters set their fair value estimates of IPO firms and determine the offer prices. During the pricing process, underwriters apply a discount to their fair value estimates when setting the preliminary offer price to encourage investor participation especially for the roadshow phase when introductions are made for the investors. Initial returns and media coverage have a positive correlation and greater long-term success. After evaluating demand from roadshows and auctions, the final offer price for the IPO is determined. Firms can use discounts in their IPOs purposely and use it as a strategic tool to gain investors' attention which leads to better yields. Notably, higher-reputation underwriters tend to apply smaller discounts overall for the prices. (Roosenboom, 2012; Liu et al., 2023).

Valuation is tricky and many factors influence the price of an IPO. In the study by Blankespoor et al. (2017), a test group ranked CEOs based on roadshow presentations using criteria such as competence, trustworthiness and attractiveness. IPOs led by CEOs who received the highest scores enjoyed higher valuations at every stage of the IPO process. They also attracted underwriters with higher reputations. Gustafson et al. (2024) analyzed the trends in roadshows over the last 15 years and found that their duration has gradually decreased. The reasons for this include technological advancements, regulatory changes, and the growth in passive index investing. COVID-19 accelerated the phenomenon as roadshows shifted to virtual formats and the entire bookbuilding process sped up.

Chemmanur (1993) presented an information-theoretic model of IPO pricing. According to this theory, insiders, who have private information about the true value of the firm, sell shares both in the initial public offering and later in the secondary market. High-value firms purposely price their IPOs below potential maximum levels to cause outside

investors to produce informational research on the firm. This extra information then appears in the secondary market share price and boosts its valuation for high-quality firms.

The valuation of IPOs varies over time. Aggarwal et al. (2009) studied valuations in the 1990s and found that during crises, investors focus more on physical capital while in the late 1990s boom investors appreciated research and development (R&D) and price-to-sales ratios. Growth-related measurement methods became critical in IPO valuation. The researchers also observed a V-shaped relationship between value and earning. IPOs with high positive earnings were valued highly, but so were those with significant negative earnings. One explanation is that losses often comes from substantial investments or growth-oriented strategies, especially during hot market periods. Investment in technology were particularly prized before boom ended, but valuation criteria shifted once the bubble burst. Despite these changing market conditions, fundamental factors remain a key factor in any firm's valuation. During the end of 1990s, over 90% of IPOs in U.S gained instant analyst coverage as soon as the 25 days quiet period expired. These analyses were overwhelmingly positive and recommendatations were buy or strong buy 96% of the time. In an overly positive environment, company valuations also tend to be higher than average (Bradley et al., 2003).

Also, Bartov et al. (2002) studied the valuation of internet and non-internet IPOs during the internet boom of the late 1990s and early 2000s. The industry exhibited clearly distinct valuation approaches. For non-internet companies, traditional earnings and cash flow models performed as expected, with strong earnings and cash flows correlating with higher valuations. In contrast, for internet companies, earnings had no significant impact on valuation, and even negative cash flows positively influenced the IPO valuation. Traditional valuation models did not apply as straightforwardly to internet companies as they did to non-internet companies. Internet companies were assigned high growth expectations despite their negative cash flows.

According to Hukkanen & Keloharju (2015), round initial offer prices typically lead to unfavorable outcomes for the bidder in M&A deals. In their study, a large number of bids are quoted precisely, such as at \$1, \$5, \$0.50, or \$0.25 increments, rather than being simply rounded. When the initial offer price is round, bidders end up paying more for the target and are less likely to close the deal. They receive weaker reactions from the stock market. Moreover, the authors also highlights that the virtually costless nature of changing an offer price from round to precise provides a strategic signaling opportunity for bidders. According to Griffith et al. (2025), during the uncertainty caused by COVID-19, there was a relationship between COVID-19 cases, deaths, and price clustering. In regions where the impact of COVID-19 was most severe, stock prices clustered around certain round numbers, as mentioned above. This uncertainty led investors to prefer investing at familiar, round numbers when trading.

The primary buyers of IPO shares at the offering price are typically large players such as wealthy investors, endowments, mutual funds, and hedge funds. These entities have the capacity to purchase substantial amounts of stock, and IPOs are often seen as a reward for their top clients. Interestingly, even among large investors, there is no guarantee of receiving allocations of sought-after IPOs, and the allocation process can be unpredictable (Taulli, 2012).

Vivien (2023) studied the growth processes of IPO firms compared to non-IPO firms. IPO lead to a two-stage growth process. First IPO firm acquire fixed assets and additional workforce and later experienced increased sales which is marking the performance-enhancing stage. It is more likely that firms that went through IPOs are going to experience high growth episodes in sales compared to non-IPO firms but additionally, study suggests that there are driven by financial decisions rather than IPO process.

In this chapter, we covered the IPO process and its steps. In the following section, we will take a closer look at IPO underpricing.

2.2.2 Pricing methods

In the United States, the book building method is one of the leading approaches to managing an IPO, and it has also gained popularity in other countries. In a book building process, the listing company can gather preliminary subscription commitments from institutional investors. The goal for both the company and the underwriters is to gauge the level of demand and the price that investors are willing to pay. Book building is market-driven, and the resulting demand helps determine the correct price while enabling efficient allocation to large investors. On the other hand, book building is costly and time-consuming because it requires extensive collaboration with investors. However, allocation flexibility allows certain regular investors to be favored, encouraging them to provide valuable pricing information. Thanks to this flexibility, IPO underpricing tends to be lower, and the risk of a failed offering decreases once there is certainty that major investors plan to buy (Sherman, 2000; 2005).

Another approach is to organize an auction, where investors can submit bids at various prices, and each investor pays the price they bid if their offer is accepted. There are two main sets of rules for auctions. In a discriminatory auction, investors place bids at different price levels and pay their individual bid prices if those bids are accepted. Another option is the uniform price auction, where all accepted bids pay the same price, determined by the lowest accepted bid. Such auctions are in use, for example, in Japan.

A third method is the fixed price or open offer approach, in which the issuer and underwriters set a fixed share price before selling. This price is the same for every investor. While it's straightforward and quick to implement, there is an inherent risk of either over- or underpricing. This method is more popular in emerging markets and in smaller IPOs. In contrast to book building, however, these approaches do not offer effective means to control who buys and how many shares. As a result, they tend to experience higher volatility and more underpricing. Many countries that have tried auction-based

methods have ended up returning to book building or adopting hybrid models, which we'll discuss next (Sherman, 2000; 2005).

In addition to IPOs, there are other ways to go public. Direct listing (DL) is not as popular as an IPO, but its popularity has been on the rise in the US in recent years. DL is suitable for companies that want to go public without the need to raise additional capital. Often, companies that go for a DL have already raised capital privately and are generally more mature. With a DL, a company does not require an underwriter and thereby, saves on costs. However, companies that go public via an IPO experience less volatility than those using a DL due to the involvement of an underwriter. This increased volatility lasts on average for 20 trading days after the listing. The difference arises from the IPO process's due diligence, roadshow, and book building, which reduce uncertainty among investors. Price volatility is more significant in industries where the quality of disclosures is relatively lower. Therefore, although DL offers cost savings and other advantages to the company, investors face higher short-term risk (Brown et al., 2024).

Through a Special Purpose Acquisition Company (SPAC), a company can also go public without undergoing a long IPO process. A SPAC is a publicly listed company that does not have any actual operational business. Its purpose is to acquire another company, whereby the acquired company becomes publicly listed without going through the IPO process. A SPAC raises money through a public share issue to finance its acquisition. This often enables companies to obtain capital more quickly and flexibly and to get listed on the stock exchange. However, during the 2010s in the USA, it was observed that SPACs were inferior investment targets compared to corresponding IPOs. In addition, SPACs are more sensitive to uncertainty than IPOs, and it can be seen that when there is market uncertainty, the number of SPACs decreases accordingly (Blomkvist & Vulcanovic, 2020; Anconetani et al., 2024).

2.3 IPO underpricing

IPO underpricing has been extensively researched (Ibbotson, 1975; Ibbotson, Sindelan & Ritter, 1988; Ritter, 1998), and in this chapter, we will review the early studies on underpricing as well as more recent articles related to the research topic.

In the first equation, the study's dependent variable, underpricing, is calculated by subtracting the offer price from the closing price on the first trading day and then dividing the result by the offer price. The first-day trading return is calculated in the same manner.

$$\textit{Underpricing} = \frac{\text{Closing price on the first day} - \text{Offer Price}}{\text{Offer price}} \quad (1)$$

The phenomenon of underpricing in IPOs was initially addressed in David Ibbotson's (1975) paper titled "Price Performance of Common Stock New Issues." In this seminal work, Ibbotson extensively documented the occurrence of substantial initial price increases for stocks upon their entry into public trading, noting that average initial stock returns were positive throughout the 1960s. Underpricing has been one of the most researched areas related to IPOs which refers to the price change of an IPO's stock after the first day of trading. Underpricing has varied across different time periods and industries. For example, the oil boom of 1980-1981 was one of the first studied hot issue markets, where underpricing reached 48.4% compared to 16.3% during the years 1977-1982. The high underpricing was primarily concentrated around oil companies (Ritter, 1984). On the other hand, IPO overpricing have also been studied but not as much underpricing. Rossovski et al. (2024) studied IPOs from U.S between 2000 – 2020 and revealed that 21,27% of the firms experienced negative first-day returns. Research indicates that larger deal sizes and the use of over-allotment shares reduces the probability of IPO overpricing.

The concept of the Winner's Curse was first introduced by Rock (1986). Rock's primary objective was to clarify the underpricing in IPOs by presenting the Winner's Curse hypothesis. According to this hypothesis, uninformed investors are in risk to winning

allocations for overpriced new issues, as their informed counterparts avoid underpriced offerings. This means that company's owners can have better knowledge about firms' future potentials than possible investors. This can lead to underpricing, where IPO is offered with a discount to attract investors and to ensure successful listing. Additionally, some argue that the discount serves as compensation for the underwriting banks, and it makes the IPO easier to market, reducing risk, and fulfilling the demand of institutional clients. Also, it is seen as reward for the investors who are willing to take the risk for the uncertainty and encourage them. It helps to attract investors to participate in a transaction that might be perceived as risky (Vernimmen et al., 2017; Ljunqvist, 2007).

This strategy also helps to balance the interests of both informed and uninformed investors because high valuation doesn't drive away uninformed part. Good information of the IPO is very important, and it doesn't necessarily have to be comprehensive to already have an effect on underpricing. Even if the IPO have a Wikipedia page, it will be a significant factor for the IPO underpricing (Boulton et al., 2021). According to Abraham et al. (2016) the volume of shares bought by informed traders predicts higher returns on the announcement day, while uninformed traders' activity contributes to increased volatility. Overall, extensive communication within the company and to investors during an IPO helps the company succeed in its public offering. Winner's curse hypothesis is just one of the many perspectives used to explain underpricing.

Also, country-specific factors have an impact on underpricing. In the study by Jamaani and Ahmed (2021), country-level transparency influences underpricing on a global scale. The study demonstrates that variations in formal institutional quality explain a significant portion of underpricing. Transparency not only directly reduces underpricing, but it also indirectly affects firm-level factors such as underwriter reputation, issuer incentives, and ex-ante uncertainty. According to the findings, improving formal institutional quality can reduce IPO underpricing, especially in countries with weak governance structures.

Table 1. Number of IPOs and first-day return by country (Jamaani & Ahmed, 2021)

Country	# of IPO	First-day returns (%)
Australia	1138	0.18
Brazil	88	0.06
Canada	193	0.21
China	1533	0.57
Denmark	26	0.02
France	95	0.04
Germany	35	0.02
Greece	28	0.16
India	363	0.29
Indonesia	103	0.34
Italy	63	0.18
Japan	1913	0.60
Mexico	28	0.03
Poland	64	0.35
Russia	31	0.56
Saudi Arabia	102	2.13
South Africa	29	0.17
South Korea	689	0.37
Sweden	57	0.06
Turkey	24	0.06
United Kingdom	404	0.27
United States	3206	0.24
<i>Average</i>		0,38
<i>Median</i>		0,14
<i>Max</i>		16,8
<i>Min</i>		-0,89

Underpricing varies significantly across countries. In the Table 1 above, the average underpricing percentages for different countries from 1995 to 2016 and the number of IPOs are shown. Saudi Arabia experienced the highest underpricing at 213%, while Germany had only 2%. In terms of quantity, most IPOs occurred in Australia, China, Japan, and especially the United States, which had a staggering 3,206 IPOs. Even among large countries, there is a significant difference, with Japan exhibiting 60% underpricing compared to 24% in the U.S. In European countries, underpricing is lower than in global level.

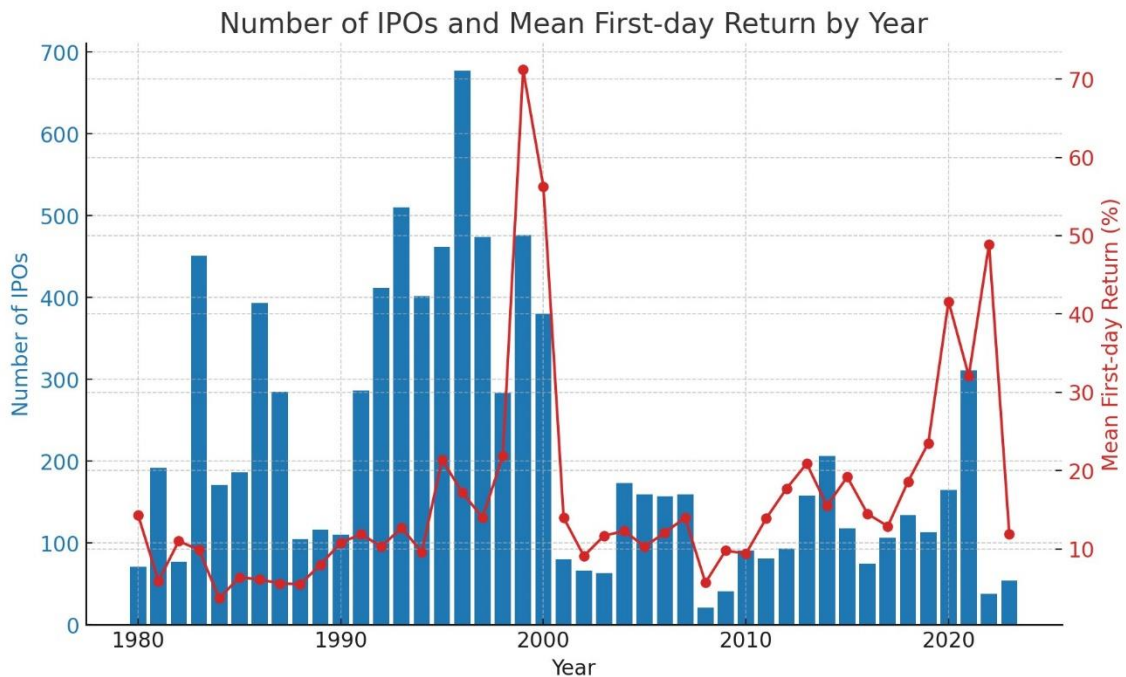


Figure 3. Mean first-day returns for IPOs in the U.S. (Ritter, 2023).

In Figure 3, we can identify three significant time periods. The Dot-com Boom in the late 1990s saw a huge rise in both IPO numbers and first-day returns, caused by speculative investments in tech startups. A major peak occurred in 2000, when the mean first-day return hit around 70%. In the post-Great Recession period, we observed the opposite situation, where IPO activity was low and first-day returns were minimal. This reflected investors' mistrust of the investment markets after the crisis. During the pandemic era of 2020–2021, we witnessed another surge in the IPO markets and high first-day returns. Lowry and Schwert (2002) studied the natural cycle of IPOs and hot IPO markets, where higher initial returns increase alongside IPO volume.

Keloharju (1993) conducted a study examining the performance of IPOs in Finland, analyzing 80 IPOs spanning from 1984 to 1989. This research provides valuable insights into the dynamics of the Finnish IPO market. The findings support the winner's curse hypothesis previously discussed. The study reveals that uninformed investors in Finnish IPOs experience lower-than-expected initial returns, consistent with the winner's curse

phenomenon. Additionally, IPOs in Finland substantially underperform the broader market in the long run. Although IPOs often experience significant underpricing leading to substantial short-term gains, they tend to underperform over time. IPOs seem to be overvalued in the early aftermarket trading, and holding IPOs for over a year leads to negative returns (Aggarwal & Rivoli, 1990; Ritter, 1991; Loughran & Ritter, 1995).

In a related study, Hahl et al. (2014) also investigated the long-term performance of Finnish IPOs, particularly focusing on growth stock IPOs. Their research covered the period from 1994 to 2006. The results of their study align with the earlier findings by Keloharju (1993), indicating a tough trend of underperformance among Finnish IPOs, especially with growth stocks. These studies contribute to the understanding of the dynamics and outcomes of IPOs in the Finnish context and on both short-term and long-term performance patterns.

Once the IPO valuation is complete and the fair value has been determined, underwriters apply a clear discount when setting the preliminary offer price (Roosenboom, 2012). According to Loughran & Ritter (2002), issuers often show little concern regarding the significant potential gains left unclaimed during IPOs. This phenomenon, termed 'leaving money on the table,' refers to the difference between the first day's closing market price and the offer price, multiplied by the number of shares sold. On average, IPOs in the study period of 1990-1998 left 9.1\$ million untouched, which is twice the fees paid to investment bankers. The research that focused on IPOs in the United States, revealed that companies collectively lost over 27\$ billion. It has also been explained that "money on the table" serves as compensation for the asymmetry risk due to the asymmetry problem (Ljungqvist, 2007).

Many authors have explained underpricing with asymmetry in the information (Vernimmen et al., 2017; Ljungqvist, 2007). This means that company's owners have better knowledge about firms future potentials than possible investors. This can lead to underpricing, where IPO is offered with a discount to attract investors and to ensure successful

listing. Underpricing is seen as compensation for the risk that investors are willing to take for the uncertainty and encourage them. This strategy also helps to balance the interests of both informed and uninformed investors because high valuation doesn't drive away uninformed part. Overall, extensive communication within the company and to investors during an IPO helps the company succeed in its public offering.

Keloharju (1995) investigated Finnish IPOs from 1960 to 1993, testing three hypotheses. The study supported the signaling hypothesis which indicates that the willingness of original shareholders to retain equity positively correlates with firm value. This implies that investors are more inclined to pay premium prices for shares in companies where original owners maintain larger equity stakes, signaling confidence in the firm's value. Additionally, the agency hypothesis suggests that when managers own more shares, their interests align better with other owners which leads to higher firm value. This effect is stronger when management owns a small share, but beyond a certain point, more ownership doesn't significantly boost firm value. The wealth effect hypothesis points out that smaller firms often raise larger amounts of equity compared to their book value which is likely to encourage trading or lower the costs of issuing stock. On the other hand, according to the model by Aggarwal et al. (2002), owner-managers intentionally underprice IPOs to attract media and analyst attention. Owners are typically subject to a lock-up period, which on average lasts six months after the IPO. During that time, they cannot sell their shares. According to the model, managers are using underpricing to increase the stock's later price, which benefits them when they can sell their shares after the lock-up period expires. Between 1994 and 1999, underpricing was greater the higher the manager's ownership stake in the IPO.

Field and Hanka (2002) also studied lockup expirations. Once the lockup expires, trading volume increases by approximately 40% and remains elevated. Over a three-day period around the unlock day, the average abnormal return is around -1.5%, and the negative returns persist without a quick reversal. Furthermore, differences were observed for venture-backed companies. In such cases, the negative returns and increased trading

volume were more pronounced. This is because venture capitalists, as one of the owners, tend to sell their shares more aggressively upon lockup expiration compared to other owners.

The following section discusses the impact of firm characteristics on IPO underpricing and how they influence IPO performance after listing.

2.4 Firm characteristics

Underpricing has been widely studied through firms' characteristics, and their impact on underpricing has also changed over different time periods. In this section, we examine this in more detail, and in our research, we also use firm-level characteristics to study IPO underpricing.

2.4.1 Underpricing

To compensate uninformed investors for the winner's curse, IPOs are underpriced as informed investors tend to participate more in underpriced issues. The more uncertainty there is in an IPO, the more it is underpriced. This uncertainty that investors face is called ex ante uncertainty. It refers to the uncertainty concerning how the market will price the firm before the IPO. The phenomenon has been explained by the asymmetric information hypothesis (Beatty & Ritter, 1986). Ex-ante uncertainty has been widely studied and is most commonly measured by company characteristics such as age, size, and industry volatility. Forecasting earnings improves IPO pricing accuracy. A young, small-sized company operating in a highly volatile industry is thus the riskiest and has the highest ex-ante underpricing (Beatty & Ritter, 1986; Ritter, 1984, 1991, 1999; Clarkson, 1994; Chemmanur, 1993).

Bédard et al. (2016) argued that a company can reduce underpricing by disclosing their earnings forecasts before the IPO. Management's earnings forecasts reduce underpricing in IPOs because investors see this as reducing information asymmetry. Additionally, firms with reputable auditors, underwriters, and robust board structures experience less underpricing even without disclosing earnings forecasts. This reflects investors' high level of trust. The study attempted to find different ways to measure the relationship between the reliability of the forecast and underpricing, but a reliable relationship was not found. It seems that the most important factor is the publication of the forecast itself.

Underpricing of IPOs varies over time, and markets price them differently. For example, during the DotCom bubble, internet firms experienced extremely high market pricing compared to non-internet companies. Many companies did not have earnings, but their stock prices still soared due to expected future growth prospects. High pricing, in turn, led to significant price volatility, which made these investment targets riskier compared to more traditional companies. Speculation in the stock also led to increased trading and high retail investor participation, which further increased volatility and uncertainty. Insider holdings also have significance in the success of an IPO because, during the dotcom era, many owners sold their shares after the lockup period, causing selling pressure (Ofek & Richardson, 2003; Ljungqvist & Wilhelm, 2003).

An important factor related to IPO underpricing is ownership structure. According to signaling theory, owners can send a signal about the quality of the IPO to investors by retaining a significant share of the company in their ownership. Investors perceive that the presence of an owner with extensive insider information reduces information asymmetry in the IPO. A high ownership stake by existing owners also signals confidence in the firm and its future success (Leland & Pyle, 1977). The quality of venture capitalists also matters because if investors see a high-quality VC as an owner in the company, it increases trust in the company. On the other hand, VCs are often seen selling their shares when the company goes public, which reduces long-term commitment. The same

applies to angel investors. When trust is high, the underpricing caused by asymmetry decreases (Chahine et al., 2007; Sur & Martens, 2013).

High levels of ownership increase firm performance, but excessively high ownership reduces efficiency. Similarly, too little ownership is not beneficial, suggesting that the relationship between ownership and performance is U-shaped. In Europe, companies with institutional investors have the highest shareholder value, whereas family and government ownership has a negative effect on performance (Thomsen & Pedersen, 2000). Michel et al. (2020) found that institutional investors are more interested in the proportion of share capital that is publicly traded than in pre-IPO operating performance measures such as return on sales or return on assets.

2.4.2 Post-IPO performance

Post-IPO performance is one of the most studied aspects of initial public offerings. Ritter (1991) investigated the long-term performance of IPOs and found that they tend to underperform over the long run. Since then, the long-term development of IPOs has been extensively studied.

Loughran and Ritter (1995) argue that certain firm characteristics, such as size and book-to-market ratios, significantly affect the long-term performance of IPO firms. Specifically, IPO firms tend to be growth-oriented with low book-to-market ratios, which have been associated with lower returns. Small companies are more speculative and, due to uncertainty, also more underpriced compared to larger and more stable companies. Firm characteristics such as size, age, growth expectations, and prior performance affect a company's underpricing as well as its long-term performance.

Taulli (2012) discusses the challenges that individual investors face in acquiring shares at the offering price in hot IPOs and the historical trend of strong gains on the first day of trading, especially during the dot-com boom. The difficulty for individual investors to

secure shares at the offering price often results in purchasing stocks once trading has commenced, which carries its own set of risks. The text suggests that waiting a few days until the trading activity settles may be a reasonable approach.

According to Abraham et al. (2016), firms with high returns on equity and those successfully capitalizing on growth opportunities tend to have better long-term returns. Vismara et al. (2012) also note a difference in post-IPO performance between IPOs listed on the main market and those on the secondary market. IPOs listed on the secondary market tend to underperform compared to those on the main market, showing significantly lower long-term returns and higher delisting rates. Secondary markets attract firms looking to go public but have faced challenges with sustainability and investor skepticism. These markets generally have smaller requirements for listing and attract more firms with uncertainty.

3 IPOs and COVID-19 pandemic

The COVID-19 pandemic caused a significant economic and financial shock worldwide, which led to extraordinary market instability (Altig et al., 2020). Major stock indices like the S&P 500, FTSE, DAX, and Nikkei experienced significant over -30% drop in early 2020. This period of heightened uncertainty negatively impacted markets across all asset classes, including stocks, bonds, commodities, and derivatives. The CBOE Volatility Index (VIX), also known as the fear index, saw a dramatic increase during February and March 2020 while rising by over 340% during this period.

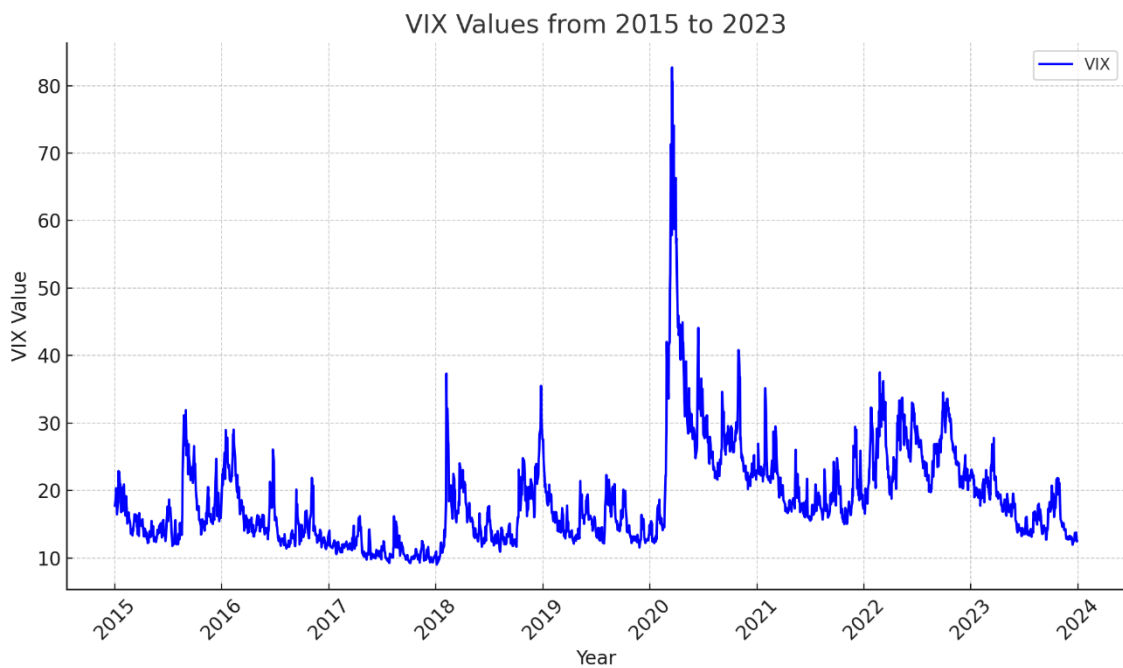


Figure 4. VIX Values from 2015 to 2023 (Cboe Global Markets, n.d.)

The pandemic's effect on the IPO market was marked by a decline in IPO activity initially, followed by a recovery in late 2020 and 2021. During this time IPO underpricing became more obvious. The uncertainty brought by the pandemic heightened underpricing, as companies and underwriters searched for to attract investors in the middle of volatile market conditions.

Research has shown that traditional determinants of IPO underpricing, such as firm fundamentals, underwriter reputation, and global factors like economic policy uncertainty and ESG performance, remained influential during the pandemic. However, the pandemic intensified these effects which led to higher levels of underpricing. Government economic support also played a critical role in stabilizing markets and boosting investor confidence which further increased IPO underpricing.

In this chapter, we are going through how IPOs and stock markets managed during the COVID-19 pandemic.

3.1 Stock markets and COVID-19

On 11 March 2020, stock markets saw one of its most dramatic crashes which was triggered by COVID-19. S&P500 saw its biggest drop in 30 years, when it declined over 30% in a month, and the US stock market hit circuit breaker mechanism four times in ten days (Zhang et al, 2020). Respectively, FTSE index declined around 18%, DAX around 40% and Nikkei 30% (Zhang & Neupane, 2024). According to Mazur et al. (2021) there are differences in the sector performance during the pandemic. Stocks in the healthcare, food, natural gas, and software sectors experienced significant positive returns and the other way round, companies in crude petroleum, real estate, entertainment and hospitality gained negative returns, with market values declining by over 70%. These sectors were hit extremely hard due to economic shutdown and panic.

COVID-19 had a significant effect on stock return and it increased volatility globally. The impact varies regionally. Asian markets showed greater resilience to the uncertainty compared to Latin American markets. High volatility correlated negatively with stock returns and research found extreme asymmetry in the volatility (Szczygielski et al., 2021).

As a quick response to the pandemic crises, U.S Federal Reserve announced two new facilities, for instance, to support large corporations struggling with cash flows and those

with high leverage. This caused reaction in the stock market when in short term, firms stock prices with high leverage improved, while firms with high cash holding declined. At the long-term market's fears were not fully relieved by Fed's initial measures (Ramelli et al., 2020).

Based on the analysis in Lloyd and Ostry's (2024) article, unconventional monetary policies like quantitative easing (QE) and quantitative tightening (QT) can have asymmetric effects on financial markets, particularly in how they influence expectations around future interest rates. While the Federal Reserve's swift actions during the pandemic, including QE and zero-percent interest rates, these measures introduced further uncertainties and volatility, especially in the long term. The findings of Lloyd and Ostry reinforce the concerns raised by Zhang et al. (2020) about the potential long-term risks of these policies, particularly in the absence of coordinated global efforts. This underlines the importance of careful communication and strategic timing by policymakers to minimize unintended economic consequences and effects to the stock markets during COVID-19.

3.2 IPO returns during COVID-19

Pandemic caused volatility in the stock markets, as we can see from the Figure 4. Altig et al. (2020) examined several uncertainty indicators during the COVID-19 and found out that all indicators show spiked in uncertainty and some of them reached their highest levels. For example, stock market volatility peaked in March 2020. Mazumder & Saha (2021) investigated the relationship between short-term IPO performance and fear during the COVID-19. Average IPO returns were higher in 2020 than in the previous decades, but the returns decreased as pandemic-related fear increased. Analyzing firms from the U.S., India, China, and Japan, they found that IPO firms are more sensitive to fear than already existing firms.

Panda & Guha Deb (2023) a comparative study that finds out that IPOs during the COVID-19 were more underpriced than in the previous decade but corrected shortly afterwards in various countries. Various factors like the pandemic's severity, and industry affiliation influenced these outcomes. Notably, reputable underwriters were associated with higher underpricing, and IPOs backed by venture capitalists experienced even greater underpricing. Government anti-COVID-19 measures significantly reduced IPO underpricing, regardless of their effectiveness. Zheng & Neupane (2024) reported that the number of IPOs increased globally by over 30% during the pandemic period of 2020–2021 compared to the non-COVID period. The coronavirus generated massive media attention, and in China it was clearly observed that positive COVID-19-related news reduced IPO underpricing, and vice versa. This effect was particularly evident in the primary market and was likely due to adjustments made by underwriters (Feng et al., 2024).

According to Sun et al. (2022) mutual funds participation in IPOs had many effects during the pandemic in China. Mutual fund participation in IPOs increased its offer price which leads lower initial short-term returns and reduces underpricing. This effect is particularly strong in areas affected by COVID-19. Stocks with higher mutual fund allocation exhibit lower volatility in the weeks following their IPO. Mutual fund allocation reduces trading activity, which is common among smaller and speculative investors.

As previously mentioned, global IPO underpricing during the COVID-19 pandemic was studied by Zheng and Neupane (2024). Their international research also included an analysis of Nordic IPO underpricing. On average, underpricing during the pandemic increased in Finland by 29.2%, Sweden by 22.7%, Norway by 4.7%, and Denmark by 33.1% compared to the non-COVID period according to their research. These figures do not take into account changes in the industry distribution of companies or changes in companies' financial fundamentals. Iceland was excluded from the study due to its low number of IPOs. Overall, Nordic countries experienced more significant underpricing than the global average of 17.6%.

In this study, we will similarly examine underpricing in Nordic IPOs but with a deeper focus on firm fundamentals and industry distribution in the Nordics, which will be discussed in more detail in Chapter 4. During the pandemic, reputable underwriters and venture capitalists played a more significant role in IPOs. Notably, reputable underwriters were associated with higher underpricing, and IPOs backed by venture capitalists experienced even greater underpricing.

3.3 Economic policy uncertainty and government actions on IPOs

The effects of policy uncertainty on macroeconomic dynamics have been widely studied, particularly in relation to corporate investment decisions, stock market development, and volatility. However, research focusing specifically on IPOs remains relatively new. Policy uncertainty, often caused by political or economic changes, can significantly impact market behavior. Pástor & Veronesi (2012; 2013) highlight that the announcement of new policies often increases market uncertainty which leads to higher discount rates, lower stock prices, and higher risk premiums. This increase in the cost of capital can prevent companies from going public.

During the COVID-19 pandemic, economic policy uncertainty reached unusual levels due to government interventions and public health measures. Baker et al. (2016; 2020) found that policy responses, such as lockdowns and restrictions on commercial activity, were major drivers of extraordinary market volatility. Similarly, Zhang & Neupane (2024) observed that higher economic policy uncertainty during the pandemic led to increased IPO underpricing, particularly in countries with weaker shareholder protections. This suggests that regulators play a critical role in reducing underpricing during periods of increased uncertainty. Sun et al. (2022) proposes that regulators should consider adjusting policies to reduce the risks transferred to retail investors through mutual funds. They suggest that mutual fund allocations influence IPO pricing dynamics and may impact retail investors' outcomes during COVID-19.

Government interventions, including monetary and fiscal policies, also influenced IPO activity and pricing dynamics. For example, Wei & Han (2021) noted that traditional monetary policies were less effective during the pandemic, which encourages central banks to adopt aggressive and unconventional measures such as quantitative easing. These actions helped stabilize financial markets but also introduced additional uncertainties, which further increased the volatility of newly issued IPOs. Narayan et al. (2021) emphasize that such interventions, while stabilizing stock markets, had varying effects across different countries and asset classes, with IPOs being particularly affected.

The pandemic also revealed how government policy responses shaped IPO cycles. Çolak et al. (2017) had previously shown that political events, such as elections, create IPO cycles by increasing the cost of capital and deterring companies from going public. Similarly, during COVID-19, government interventions and policy changes created both challenges and opportunities for IPO markets. Ashraf (2020) and Baig & Chen (2022) found that government income support measures and stimulus packages boosted investor confidence which leads to increased IPO activity and higher underpricing. However, this IPO activity also caused greater volatility in post-IPO returns.

Finally, research by Duong et al. (2022) highlights the role of institutional environments in moderating the effects of policy uncertainty. Transparent and stable political systems, such as those in democratic countries, often reduce information asymmetry and IPO underpricing. However, countries with weaker institutions experience higher levels of underpricing during periods of uncertainty. This shows the importance of robust regulatory frameworks in managing the risks associated with IPOs in uncertain times.

In summary, economic policy uncertainty and government actions significantly influence IPO markets. While uncertainty generally increases underpricing and market volatility, proactive government interventions and regulatory adjustments can help stabilize markets and reduce information asymmetry. The COVID-19 pandemic highlighted the need for innovative policy responses to address these challenges which highlights the role of

central banks and governments in supporting financial markets during crises.

4 Data and methodology

The purpose of this following chapter is to provide a comprehensive overview of the different stages and main points of data collection. The SDC Platinum database was used to collect data, and missing information about companies was gathered from their own financial documents. It is important to present the different stages of data collection from a methodological perspective.

4.1 Data description

Data for this research was collected from multiple sources for two different time periods. The pre-COVID period is defined as 2015–2019, and the COVID period as 2020–2021, following the approach of Zhang & Neupane (2024). The dataset was taken from IPOs available on SDC Platinum database on September 17, 2024. Similarly to previous studies (Zhang & Neupane, 2024; Duong et al., 2022), rights issues and spin-offs are excluded from the dataset. The research focuses solely on traditional IPOs. The dataset includes only companies that were available on SDC Platinum database. Iceland is excluded from the study, as there were only two IPOs during the research period.

Table 2. Number of IPOs in the Nordics by Year from 2015 to 2021

Year	Denmark	Finland	Norway	Sweden	Total per Year
2015	1	9	5	24	39
2016	3	5	2	22	32
2017	3	8	8	42	61
2018	8	9	3	15	35
2019	4	3	6	9	22
2020	13	2	20	15	50
2021	15	19	30	65	129
Total	47	55	74	192	368

The study includes only IPOs with Live status, indicating they were actively traded. Rumored and withdrawn IPOs are not considered in this study. The data collected for the study includes only IPOs that contained firm characteristics information. This resulted in a dataset of 368 IPOs from the Nordic countries for the years 2015-2021. Some IPOs were missing data, such as the stock exchange where they were listed and firm characteristics, and this information was manually retrieved from the Nasdaq, companies websites and annual reports. Table 2 above presents the distribution of IPOs across the countries during the years 2015–2021. IPO activity in Sweden is significantly higher than in the other Nordic countries. The data also show a significant surge in IPOs in 2021. After this table, we no longer differentiate between the Nordic countries individually, but instead focus on the Nordics as a whole.

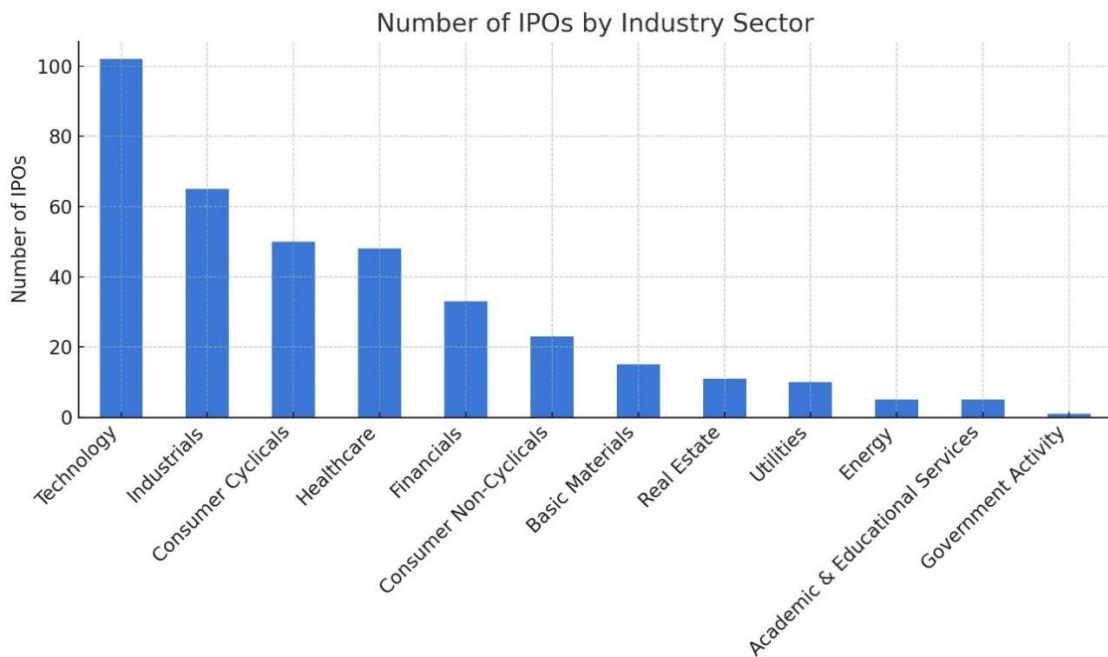


Figure 5. Number of IPOs by industry Sector 2015-2021

The majority of these IPOs have been directed toward the technology sector. Second is industrials and healthcare and consumer cyclicals are third and fourth, as seen in Figure 5. There are several reasons for the popularity of the technology sector, such as the increasing digitalization, the shift to remote work and electronic channels caused by

COVID-19, high growth potential, and lower capital requirements compared to industries like industrials.

The research thus includes IPOs conducted by Nordic companies listed on the stock exchanges of Norway, Sweden, Finland, and Denmark. The main stock exchanges in these countries are Oslo Stock Exchange, Nasdaq Stockholm, Nasdaq Helsinki, and Nasdaq Copenhagen (Nasdaq, n.d.). The secondary markets, which are intended for smaller companies, include Oslo Axess in Norway, Aktietorget, NGM, and First North in Sweden, First North in Finland, and First North in Denmark.

The Nasdaq First North Growth Market is a platform created by Nasdaq Stockholm in 2006, and it is designed for early-stage companies that are looking for capital. It has lower requirements for listing than the main markets and it attracts more smaller companies. The First North includes two segments: the standard Growth Market and the Premier Growth Market, which prepares companies for future listing on the main market. Companies can use local accounting standards, and companies in the Premier list need to use IFRS standards. First North is seen as a stepping stone to the main market, and 110 companies have already done so. Currently, 550 companies are listed on First North (Nasdaq, n.d.)

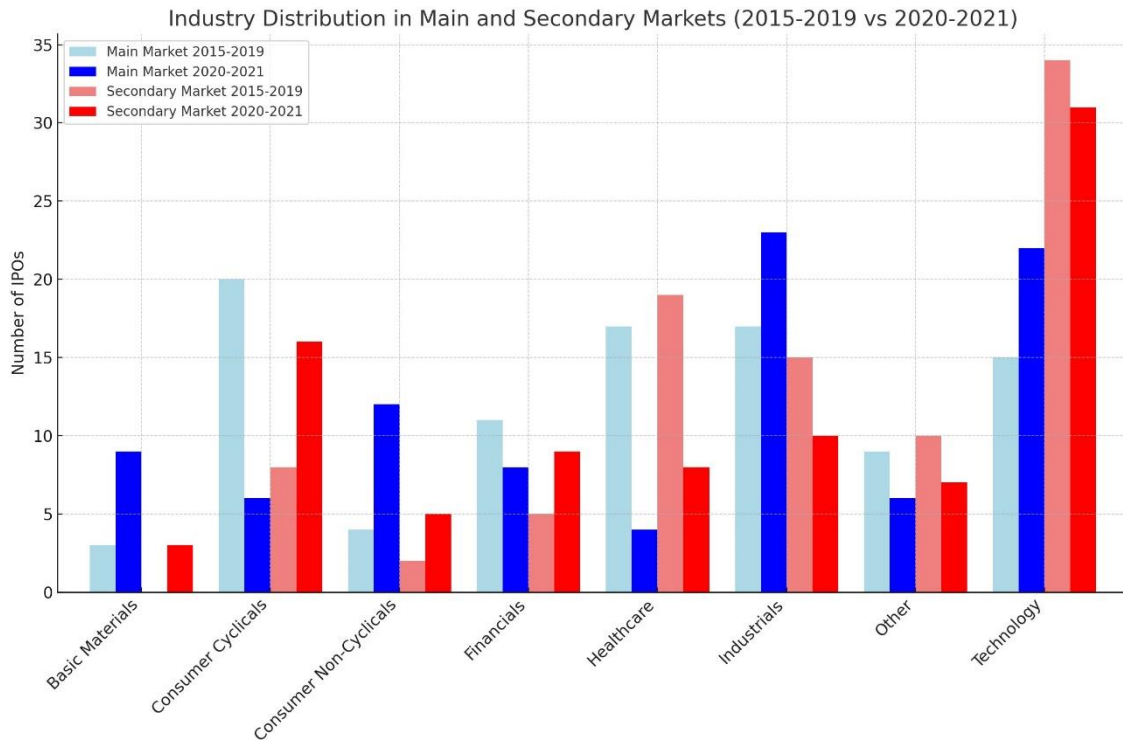


Figure 6. Industry Distribution in Main and Secondary Markets (2015-2019 vs 2020-2021)

Of the IPOs in this dataset, 50,5% were listed on the main market and 49.5% on the second markets. Figure 6 illustrates the industry distribution between the first and second markets, divided into non-COVID-19 and COVID-19 periods. During these periods, the number of listings was nearly the same, with 186 and 182 listings. In the main market listings, there was a noticeable shift from consumer cyclical industries to non-cyclical industries, and a decline in the number of financial and healthcare listings. In the second markets, growth was observed in almost all industrial sectors, particularly in technology. Over 60 IPOs on the secondary markets during the entire measurement period were in the technology sector. High-tech companies tend to experience more underpricing than non-tech companies. The increase in IPO activity within the technology sector may be driving higher levels of underpricing. (Loughran & Ritter, 2003).

According to Westerholm (2006), the listing requirements for IPOs on the Nordic markets are generally equal to or stricter than those of other European markets. While the

average size of companies listing on Nordic markets is smaller than in the rest of Europe, this is comparable when considering the size and maturity of the respective economies. Finland has the strictest listing requirements, followed by the other Nordic countries.

4.2 Descriptive Statistics

Table 3. Sample distribution

Country	Full Sample		Non-Covid Period		Covid Period		Difference	T-statistic
	# of IPO	Aver. Underpricing	# of IPO	Aver. Underpricing	# of IPO	Aver. Underpricing		
Sweden	192	13,4	112	11,1	80	16,6	5,5	0,81
Finland	55	8,9	34	4,2	21	16,5	12,2	2,59
Denmark	47	32,3	19	23,6	28	38,3	14,6	0,80
Norway	74	3,3	24	4,0	50	3,0	-1,1	-0,23
Total	368	13,1	189	10,2	179	16,2	5,9	1,79

Table 3 shows the distribution of underpricing and IPOs across the Nordic countries during the period 2015–2021, as well as during the non-COVID and COVID periods. Sweden clearly had the highest number of IPOs, followed by Norway, Finland, and Denmark. On average, Danish IPOs were the most underpriced, followed by those in Sweden and Finland. Iceland is not included in the list due to its low number of IPOs.

On average, the number of IPOs per year increased by 137% during the COVID period compared to the non-COVID period, respectively. In this individual variable analysis, we begin with the first-day returns for the two different time periods. The difference between these periods has also been calculated, along with the t-statistic to measure the significance of the differences. Out of the four Nordic countries, three experienced higher underpricing during the pandemic. The most significant change in underpricing was observed in Denmark, followed by Finland. Based on the t-statistics, the most statistically significant change occurred in Finland, with a t-value of 2.59, which is clearly

significant at the 5% level. In contrast, Sweden, Denmark, and Norway do not show statistically significant results, even at the 10% level.

Equivalent with previous studies (Zheng & Neupane, 2024; Chen et al., 2022; Duong et al., 2022), we selected five firm-level characteristics for our research: firm size, asset turnover, profitability, market-to-book (MB) ratio, and leverage. Firm size is measured as the natural logarithm of the company's total assets at the time of its IPO which provides an indication of the company's scale. Asset turnover is calculated by dividing revenue by total assets at the time of listing which tells us how efficiently the company utilizes its assets to generate sales. Profitability is calculated by dividing earnings before interest and taxes (EBIT) by total assets at the time of the IPO, representing the firm's financial performance. The MB ratio is computed by dividing the market value of assets by their book value at the time of listing, serving as an indicator of the company's growth opportunities. Leverage is measured by dividing total debt by total assets at the time of the IPO, which reflects the company's capital structure.

Table 4. Panel A. Descriptive statistics for whole period

Panel A

Variables	Observations	Mean	Std.Dev	5 %	Median	95 %
Underpricing	368	13,11	42,18	-25,99	3,33	73,5
Firm Size MEUR	368	34,12	9,87	0,94	33,45	1465,57
Asset Turnover	368	0,66	0,87	0	0,42	1,89
Profitability	368	-0,06	0,32	-0,52	0,01	0,18
Leverage	368	18,44	28,29	0	11,64	53,07
MB Ratio	368	4,84	7,31	0,857	3,01	13,64

Table 4 presents the descriptive statistics for all the variables used later in the baseline regression. The table includes the number of observations, mean, standard deviation, the 5th percentile (the value below which 5% of observations fall), the median, and the 95th percentile (the value below which 95% of observations fall). On average, the typical IPO in the study experienced 13.11% underpricing. The firm size is 34.12 million euros asset turnover is 0.66, profitability is -0.06, leverage is 18.44, and the MB ratio is 4.84.

Table 5. Panel B & C. Descriptive statistics for two periods**Panel B**

COVID IPOs (N = 179)

Variables	Mean	Std.Dev	5 %	Median	95 %
Underpricing	16,16	38,66	-18,85	5,39	96,5
Firm Size (ln)	3,46	1,97	0,48	3,52	6,63
Asset Turnover	0,57	1,02	0	0,29	1,55
Profitability	-0,08	0,38	-0,53	-0,01	0,18
Leverage	16,68	18,36	0	10,02	54,76
MB Ratio	5,26	5,58	0,94	3,3	14,74

Panel C

Non-Covid IPOs (N = 189)

Variables	Mean	Std.Dev	5 %	Median	95 %	difference in mean	t-statistic
Underpricing	10,22	45,18	-29,81	1,64	48,32	5,94	1,36
Firm Size (ln)	3,59	2,56	-0,25	3,39	7,6	-0,13	0,55
Asset Turnover	0,75	0,7	0,00	0,61	1,99	-0,18	-1,96
Profitability	-0,03	0,25	-0,49	0,03	0,19	-0,05	-1,48
Leverage	20,1	35,18	0	12,84	51,76	-3,42	-1,18
MB Ratio	4,46	8,65	0,81	2,96	10,63	0,8	1,06

In Table 5, we compare Panel B's COVID-19 IPOs with Panel C's Non-COVID period IPOs. On average, underpricing increased by 5.94%, with a median of 1.64%. Underpricing was higher during the COVID-19 period than during the comparison period, and the average firm size was approximately -4,41 MEUR smaller than in the earlier period. Asset turnover decreased by 0.18, which is a significant change. Profitability declined by -0.05, indicating that less profitable companies went public during the COVID-19 period. However, this change was not statistically significant. Leverage also decreased by -3.42 percent, suggesting a slight change in the capital structure. The MB Ratio increased by an average of 0.8, although this was not statistically significant.

4.3 Methodology

In the methodology section, we discuss the variables used in our research and the regression models used to run the study. We also provide a more detailed presentation of the firm characteristics that we used.

4.3.1 Variables

The control variables are the firm characteristics. In this study, we use the same firm-characteristic variables as in previous research (Zheng & Neupane, 2024; Chen et al., 2022). Next, we will elaborate on the methods used to calculate these variables.

Firm Size: Measured as the natural logarithm of the firm's total assets at the time of the IPO. This variable accounts for the effect of firm size on underpricing, as larger firms may have more established operations and greater visibility in the market.

$$\text{FirmSize}_{(i)} = \ln(\text{TotalAssets}_{(i)}) \quad (2)$$

Asset Turnover: Defined as the ratio of total revenue to total assets. This variable measures how efficiently a firm utilizes its assets to generate sales.

$$\text{Asset turnover} = \frac{\text{Total Revenue}}{\text{Total Assets at IPO}} \quad (3)$$

Profitability: Measured using return on assets (ROA) and calculated as net income divided by total assets. Profitability indicates the firm's ability to generate earnings from its assets.

$$\text{Profitability} = \frac{\text{EBIT}}{\text{Total Assets}} \quad (4)$$

Leverage: Calculated as the ratio of total debt to total assets. Leverage reflects the firm's financial risk and can influence investor perceptions during the IPO.

$$Leverage = \frac{\text{Total debt}}{\text{Total Assets}} \quad (5)$$

Market-to-Book (MB) Ratio: Calculated as the market value of equity divided by the book value of equity. The MB Ratio serves as a proxy for growth opportunities and investor expectations of future performance.

$$MB \text{ Ratio} = \frac{\text{Market Value of Equity}}{\text{Book Value of Equity}} \quad (6)$$

These control variables are included to account for firm-specific factors that may influence IPO underpricing. We are keeping these factors the same so we can better see how the Covid period affects underpricing.

4.3.2 Regression models

To test the first hypothesis, we use a similar model to the one Zheng & Neupane (2024) used in the model (7), to examine underpricing during the non-Covid and Covid periods:

$$\begin{aligned} Underpricing_{\{i\}} = & \alpha + \beta_1 CovidPeriod_i \times \sum \gamma ControlVariables_{\{i\}} + \\ & IndustryYear + \varepsilon_i \end{aligned} \quad (7)$$

In this model, i represents the IPO firm, and the dependent variable is underpricing, as defined earlier. The primary variable of interest is the Covid Period dummy. As mentioned previously, our control variables consist of firm-specific factors, including firm size, asset turnover, profitability, market-to-book ratio, and leverage. Firm size is measured by the firm's total assets, and its value is expressed as the natural logarithm. IndustryYearFE

refers to the industry-year fixed effects of the IPO firm, based on the Fama-French 12 industry classification. Lastly, ε represents the error term. Following the methodology of Zheng and Neupane (2024) and Chen et al. (2022), we estimate Model 1 using ordinary least squares (OLS), with standard errors adjusted for heteroskedasticity.

The independent variable is the CovidPeriod dummy, which measures IPO performance during the pandemic period, specifically in the years 2020–2021 compared to the pre-COVID period of 2015–2019. The dummy variable takes the value of 1 when the IPO's listing year is 2020 or 2021 and otherwise, it is 0.

Additionally, we include a fixed effect, IndustryYearFE, which utilizes the Fama-French 12 industry classification. This variable accounts for the effects of different industries in different years. For example, during the COVID period, there was an increase in technology sector companies, which may have a completely different risk profile and average underpricing compared to industrial companies. By incorporating IndustryYearFE, we can better account for this in our analysis and focus more on changes caused by COVID rather than changes in the industry composition of IPOs. It effectively removes industry effects from underpricing in the study. The industry classifications were obtained from DataStream. For the analysis, industries were coded along with the listing year into the IndustryYearFE variable.

To examine the characteristics of firms more closely during the COVID and non-COVID periods, we use a similar approach to that of Zheng & Neupane (2024) in the following model:

$$\begin{aligned}
 \text{Underpricing}_{\{i\}} &= \alpha + \beta_1 \text{CovidPeriod}_i + \beta_2 \text{Firm Level Characteristics}_i \\
 &+ \beta_3 \text{CovidPeriod}_i \times \text{Firm Level Characteristic}_i \\
 &+ \sum \gamma \text{ControlVariables}_i + \text{IndustryYearFE} + \varepsilon_i \quad (8)
 \end{aligned}$$

This model is similar to the one previously presented in Equation (7), but it includes the interaction term Covid Period x Firm Level Characteristic interaction term, which is our main variable of interest. The coefficient of this interaction term indicates whether the impact of given firm-level factor on underpricing changes under pandemic conditions. For example, if the interaction coefficient for M/B ratio is positive and statistically significant, it means that profitability's positive relationship with underpricing grows stronger during the pandemic. This helps us understand whether strong firm fundamentals increase underpricing during the pandemic. The firm-level characteristics considered are Firm Size, Asset Turnover, Profitability, Market-to-Book (MB) Ratio, and Leverage. The model also incorporates Fama-French 12 industry classification fixed effects IndustryYearFE , and standard errors are adjusted for heteroskedasticity.

5 Results

Table 6. Covid Period and IPO Underpricing: Baseline Regression

Dependent Variables	Full Period Underpricing	Full Period Underpricing
	(1)	(2)
CovidPeriod	2,775 (0,42)	2,773 (0,29)
Leverage		-0,01 (-0,84)
Asset Turnover		-0,9 (-0,34)
MB Ratio		0,316 (1,01)
Profitability		0,07 (0,918)
Firm Size		0,69 (0,64)
Constant	8,34* (1,78)	6,96 (0,833)
Observations	368	368
R-Squared	0,005	0,012
IndustryYearFE	YES	YES

Robust t-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We present the regression analysis results in Table 6. Column 1 shows the regression results with the Covid Period and Industry-Year Fixed Effects, but without firm-level control variables. Column 2 displays the results with all firm-level control variables included. The baseline regression includes 368 IPOs from the Nordic countries during the years 2015–2021. The regression was performed using ordinary least squares (OLS), and t-statistics were calculated using standard errors robust to heteroskedasticity. Industry-Year Fixed Effects (IndustryYearFE) are included in both regressions.

In Column 1, the coefficient for Covid Period is positive, with a value of 2.775, indicating that IPOs were more underpriced during the pandemic; however, it is not statistically significant, as indicated by the t-statistic of 0.42 ($p > .05$). This suggests that, when control variables are not included, there is no strong evidence to support the claim that IPOs were significantly more underpriced during the Covid period.

In Column 2, after adding the firm-level control variables (Leverage, Asset Turnover, MB Ratio, Profitability, and Firm Size), the coefficient for Covid Period remains positive at 2.773 but is still not statistically significant, with a t-statistic of 0.29 ($p > .05$). This lack of statistical significance does not provide strong support for the first hypothesis, which posited that IPOs during the Covid-19 period were significantly more underpriced.

Among the firm-level control variables, Leverage and Asset Turnover have slightly negative coefficients, but these are insignificant, indicating no relationship with underpricing. MB Ratio, Profitability, and Firm Size show positive coefficients, but these are also statistically insignificant.

In Column 1, the constant term is positive and significant, indicating a baseline level of underpricing when no firm-level control variables are included. However, in Column 2, this significance disappears once the control variables are added. This means that once firm-level control variables are included in the model, the constant term no longer shows a statistically significant effect. In other words, the underpricing without controls can be explained by firm-specific factors.

In summary, the coefficient for Covid Period is positive in both columns but is not statistically significant, which does not provide strong support for the first hypothesis. Furthermore, the model explains little variation, as indicated by the very low R-squared values. This suggests that factors other than firm characteristics may play a more significant role in explaining underpricing.

Table 7. Covid period and IPO underpricing: traditional firm-level characteristic

Dependent Variables	Non-Covid Period Underpricing (1)	Full Period Underpricing (2)	Full Period Underpricing (3)	Full Period Underpricing (4)	Full Period Underpricing (5)	Full Period Underpricing (6)
Covid Period		1,536 (0,148)	6,412 (0,626)	1,37 (0,135)	4,138 (0,360)	-4,745 (-0,433)
Covid Period × Leverage		0,096 (0,479)				
Covid Period × Asset Turnover			-7,879 (-1,436)			
Covid Period × Profitability				-0,117 (1,088)		
Covid Period × Firm Size					-0,456 (-0,222)	
Covid Period × MB Ratio						1,12 (1,650)
Leverage	-0,095 (-0,818)	-0,09 (-0,964)	-0,057 (-0,672)	-0,093 (-1,034)	-0,07 (-0,818)	-0,079 (-0,935)
Asset Turnover	4,331 (0,814)	-0,935 (-0,356)	4,484 (0,980)	-1,136 (-0,429)	-0,909 (-0,346)	-0,713 (-0,272)
MB Ratio	-0,054 (-0,133)	0,3 (0,952)	0,274 (0,873)	0,339 (1,077)	0,316 (1,009)	-0,009 (-0,024)
Profitability	0,101 (0,551)	0,073 (0,950)	0,063 (0,814)	0,162 (1,088)	0,071 (0,926)	0,067 (0,880)
Firm Size	0,438 (0,296)	0,56 (0,505)	0,6 (0,559)	0,619 (0,573)	0,853 (0,654)	0,795 (0,741)
Constant	4,599 (0,388)	8,102 (0,931)	2,011 (0,223)	7,518 (0,895)	6,149 (0,673)	6,862 (0,823)
Observations	368	368	368	368	368	368
R-squared	0,013	0,013	0,018	0,014	0,012	0,012
Industry Year FE	YES	YES	YES	YES	YES	YES

Robust t-statistics are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1

Next, we examine in greater detail the impact of firm-level characteristics on IPO underpricing during the non-Covid and Covid periods by using the regression model presented in Equation (8). Table 7 above presents the regression results.

In Column 1, we show the effects of firm-level characteristics during the non-Covid period. None of the firm characteristics exhibit a statistically significant relationship with underpricing. For instance, Leverage has a coefficient of -0.095 (t = -0.818) which indicates a negative but insignificant effect. Similarly, Asset Turnover has a coefficient of 4.331 (t = 0.814), and the MB Ratio has a coefficient of -0.054 (t = -0.133). Both are statistically insignificant.

Columns 2 to 6 introduce interaction terms between the Covid period and each firm-level characteristic to examine potential changes in their effects during the pandemic. In

Column 2, the interaction term CovidPeriod \times Leverage has a coefficient of 0.096 ($t = 0.479$), which is not statistically significant. This suggests that the impact of Leverage on underpricing did not significantly change during the Covid period.

Column 3 includes the interaction term CovidPeriod \times Asset Turnover, yielding a coefficient of -7.879 ($t = -1.436$). While this negative coefficient indicates a potential decrease in the effect of Asset Turnover on underpricing during the Covid period, it is not statistically significant ($p > 0.10$). In Column 4, the interaction term CovidPeriod \times Profitability has a coefficient of -0.117 ($t = 1.088$), which is not statistically significant. This result implies that the effect of Profitability on underpricing remained consistent during the Covid period in the Nordics.

Column 5 examines the interaction CovidPeriod \times Firm Size, with a coefficient of -0.456 ($t = -0.222$). Again, the lack of statistical significance indicates no notable change in the impact of Firm Size on underpricing during the pandemic. In Column 6, the interaction term CovidPeriod \times MB Ratio has a positive coefficient of 1.12 ($t = 1.650$). This result is approaching significance at the 10% level ($p < 0.10$), suggesting that the MB Ratio may have had a slightly stronger positive effect on underpricing during the Covid period compared to the non-Covid period.

Across all these models, the CovidPeriod variable itself is not statistically significant, indicating that the average level of underpricing did not differ significantly between the two periods. The low R-squared values in all models (ranging from 0.012 to 0.018) suggest that the explanatory variables account for only a small proportion of the variation in underpricing. This indicates that factors beyond the firm-level characteristics studied may play a more substantial role in determining IPO underpricing in the Nordic markets.

In summary, our analysis does not show strong statistical evidence that traditional firm-level characteristics had a significantly different effect on IPO underpricing in the Nordic countries during the COVID-19 period. The only exception is the MB Ratio, which exhibits

a marginally significant increase in its positive effect on underpricing, possibly indicating that investors placed slightly more weight on growth prospects amidst pandemic-related uncertainty. However, due to the overall lack of strong statistical significance, these results should be interpreted with caution.

In contrast to Hypothesis 2, the data did not reveal a statistically significant rise in underpricing for firms with strong fundamentals during the COVID-19 period in the Nordic context. This outcome suggests that the relationship reported in certain global studies may not hold in the Nordics, possibly because of stricter regulations, higher transparency, or other region-specific factors.

6 Conclusions

6.1 Discussions

This study examined IPO underpricing in the Nordic countries during the COVID-19 period (2020-2021) and compared it to a pre-COVID period (2015-2019). The primary objective was to define whether IPO underpricing differed significantly during the COVID-19 pandemic and did the firm level characteristics such as size, profitability, asset turnover, leverage, and the M/B ratio affected underpricing differently in the COVID era compared to the pre-COVID era in the Nordics.

Prior literature suggested that increased uncertainty and heightened market activity during the pandemic might lead to greater underpricing, especially for firms with stronger fundamentals or those operating in growth oriented sectors such as technology. However, our empirical findings do not strongly support these expectations in the Nordics at least. First, the regression analysis shows that, after controlling for firm-level characteristics and industry-year fixed effects, the difference in IPO underpricing between the COVID-19 and pre-COVID periods is not statistically significant. This finding suggests that Nordic market conditions, such as high transparency, stronger investor protection, and low political uncertainty, may have helped lessen the pandemic's influence on IPO underpricing. In contrast, global studies (Zheng & Neupane, 2024; Chen et al., 2022; Duong et al., 2022) have reported more statistically significant underpricing during the COVID-19 period.

Second, none of the examined firm-level characteristics showed a statistically change in their relationship with underpricing during the COVID-19 period. Although the M/B ratio's interaction with the COVID dummy approached marginal significance, which suggest slightly stronger positive effect on underpricing during the pandemic. Still, it didn't common significance levels. This suggest that the heightened uncertainty did not knowingly change how investors priced firm fundamentals in Nordic IPOs.

The consistently low R-squared values across all regression models imply that the chosen firm-level characteristics and the COVID dummy variable explains only a small fraction of the variation in IPO underpricing. This suggests that other factors not included in our analysis, like market sentiment, underwriters characteristics, higher ESG figures or economic policies, may have a greater effect on IPO pricing in the Nordic region.

In conclusion, the results indicate that the surge in IPO listings during the COVID-19 period did not lead to noticeably higher underpricing in the Nordic countries. Firm-level fundamentals also did not exhibit a distinctly different effect on underpricing during the pandemic. These findings suggest that the Nordic markets' transparency, credibility, and strong institutional frameworks may have helped maintain relatively stable IPO pricing amidst global market turbulence. According to Zheng & Neupane (2024), stronger shareholder protection and robust ESG performance helped reduce underpricing globally during the COVID-19 period.

The study provided further insight into the Nordic IPO markets during the crisis. The results suggested that market conditions remain relatively stable even in times of crisis. However, investors should still evaluate companies planning to go public in a comprehensive manner, as underpricing is influenced by many other factors, such as market sentiment, industry, and, for example, potential oversubscriptions. Investors should also take into account the ratio of industry sectors represented in IPOs during different IPO cycles, since a hot IPO market tends to produce more technology-focused companies. The M/B ratio should be monitored, as it might attract somewhat more underpricing during periods of uncertainty. The stability and predictability of the Nordics can serve as an incentive for companies considering listing there. Especially in times of high uncertainty, this should be leveraged in marketing, as it is a distinctive advantage of the Nordics compared to other markets.

Future research could investigate additional factors, such as ESG metrics, underwriter reputation and shareholder protection in the Nordics. Moreover, a promising global research avenue would be to examine IPOs' long-term performance and investigate whether firm fundamentals affect their success over an extended timeframe. Also, during COVID-19, there were noticeable changes in IPO industries as we can see in Figure 6. For example, the technology sector grew strongly. It might be interesting to study how industries shift during crises and how these shifts affect IPO underpricing and the likelihood of going public in different industries and market phases.

6.2 Limitations for future research

A major limitation in studying Nordic IPOs is the availability of data. In this research as well, some data points were missing and had to be collected manually from company financial statements and websites. Initially, the plan was to include the effect of ESG values on underpricing, but only 142 companies had ESG ratings available, and even fewer had both ESG data and the necessary firm fundamentals. As a result, the dataset would have been too small to broaden the scope of this study, which significantly limited its extent.

References

- Abraham, R., Harris, J., & Auerbach, J. (2016). IPO performance at announcement and in the aftermarket. *Journal of Economic Studies* 43(4), 574–586. <https://doi.org/10.1108/JES-04-2015-0062>
- Aggarwal, R., & Rivoli, P. (1990). Fads in the initial public offering market? *Financial Management* 19(4), 45–57. <https://doi.org/10.2307/3665609>
- Anconetani, R., Colantoni, F., Martielli, F., Bui Huu, D., & Binh, D. (2024). Are SPACs a good investment deal for investors? A performance comparison between SPACs vs IPOs. *Journal of Small Business and Enterprise Development*. <https://doi.org/10.1108/JSBED-11-2023-0555>
- Altig, D., Baker, S., Barrero, J. M., Bloom, N., Bunn, P., Chen, S., Davis, S. J., Leather, J., Meyer, B., Mihaylov, E., Mizen, P., Parker, N., Renault, T., Smietanka, P., & Thwaites, G. (2020). Economic uncertainty before and during the COVID-19 pandemic. *Journal of Public Economics* 191, 104274. <https://doi.org/10.1016/j.jpubeco.2020.104274>
- Ashraf, B. N. (2020). Economic impact of government interventions during the COVID-19 pandemic: International evidence from financial markets. *Journal of Behavioral and Experimental Finance* 27, 100371. <https://doi.org/10.1016/j.jbef.2020.100371>
- Baig, A. S., & Chen, M. (2022). Did the COVID-19 pandemic (really) positively impact the IPO market? An analysis of information uncertainty. *Finance Research Letters* 102372. <https://doi.org/10.1016/j.frl.2021.102372>
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics* 131(4), 1593–1636. <https://doi.org/10.1093/qje/qjw024>
- Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *The Review of Asset Pricing Studies* 10(4), 742–758. <https://doi.org/10.1093/rapstu/raaa008>

- Bartov, E., Mohanram, P., & Seethamraju, C. (2002). Valuation of Internet stocks—An IPO perspective. *Journal of Accounting Research*, 40(2), 321–346. <https://doi.org/10.1111/1475-679X.00050>
- Bask, M., & Nätter, A. L. (2021). Latent class analysis of IPOs in the Nordics. *PLoS ONE* 16(11), e0259510. <https://doi.org/10.1371/journal.pone.0259510>
- Beatty, R. P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics* 15(1–2), 213–232. [https://doi.org/10.1016/0304-405X\(86\)90055-3](https://doi.org/10.1016/0304-405X(86)90055-3)
- Bédard, J., Coulombe, D., & Courteau, L. (2016). The credibility of earnings forecasts in IPO prospectuses and underpricing. *Accounting Perspectives* 15(4), 235–267. <https://doi.org/10.1111/1911-3838.12130>
- Blankespoor, E., Hendricks, B. E., & Miller, G. S. (2017). Perceptions and price: Evidence from CEO presentations at IPO roadshows. *Journal of Accounting Research*, 55(2), 275–327. <https://doi.org/10.1111/1475-679X.12164>
- Blomkvist, M., & Vulcanovic, M. (2020). SPAC IPO waves. *Economics Letters*, 197, 109645. <https://doi.org/10.1016/j.econlet.2020.109645>
- Boeh, K. K., & Dunbar, C. G. (2021). Raising capital after IPO withdrawal. *Journal of Corporate Finance* 69, 102020. <https://doi.org/10.1016/j.jcorpfin.2021.102020>
- Boulton, T., Francis, B. B., Shohfi, T., & Xin, D. (2021). Investor awareness or information asymmetry? Wikipedia and IPO underpricing. *Financial Review* 56(3), 535–561. <https://doi.org/10.1111/fire.12276>
- Bradley, D. J., Jordan, B. D., & Ritter, J. R. (2003). The quiet period goes out with a bang. *The Journal of Finance*, 58(1), 1–36. <https://doi.org/10.1111/1540-6261.00517>
- Brau, J. C., & Fawcett, S. E. (2006). Initial public offerings: An analysis of theory and practice. *Journal of Financial Economics* 81(2), 359–400. <https://doi.org/10.1111/j.1540-6261.2006.00840.x>
- Brown, A. B., Byard, D., & Suh, J. (2024). *A comparison of direct listings and IPOs*. *Contemporary Accounting Research*, 41, 1186–1215. <https://doi.org/10.1111/1911-3846.12940>

- Cboe Global Markets. (n.d.). Historical price data for VIX index. Cboe. https://www.cboe.com/tradable_products/vix/vix_historical_data/
- Chahine, S., Filatotchev, I., & Wright, M. (2007). Venture capitalists, business angels, and performance of entrepreneurial IPOs in the UK and France. *Journal of Business Finance & Accounting* 34(3–4), 505–528. <https://doi.org/10.1111/j.1468-5957.2007.02045.x>
- Chemmanur, T. J., & Fulghieri, P. (1999). A theory of the going-public decision. *The Review of Financial Studies* 12(2), 249–279. <https://doi.org/10.1093/rfs/12.2.249>
- Chemmanur, T. J., & He, J. (2011). IPO waves, product market competition, and the going public decision: Theory and evidence. *Journal of Financial Economics* 101(2), 382–412. <https://doi.org/10.1016/j.jfineco.2011.03.009>
- Chemmanur, T. J. (1993). *The pricing of initial public offerings: A dynamic model with information production*. *The Journal of Finance*, 48(1), 285–304.
- Clarkson, P. (1994). The underpricing of initial public offerings, ex ante uncertainty, and proxy selection. *Accounting & Finance* 34(2), 69–78. <https://doi.org/10.1111/j.1467-629X.1994.tb00270.x>
- Çolak, G., Durnev, A., & Qian, Y. (2017). Political uncertainty and IPO activity: Evidence from U.S. gubernatorial elections. *Journal of Financial and Quantitative Analysis* 52(6), 2523–2564. <https://www.jstor.org/stable/26590489>
- Daily, C. M., Certo, S. T., & Roengpitya, R. (2003). IPO underpricing: A meta-analysis and research synthesis. *Strategic Management Journal* 27(3). <https://doi.org/10.1111/1540-8520.t01-1-00004>
- Duong, H. N., Goyal, A., Kallinterakis, V., & Veeraraghavan, M. (2022). Democracy and the pricing of initial public offerings around the world. *Journal of Financial Economics* 145(1), 322–341. <https://doi.org/10.1016/j.jfineco.2021.07.010>
- Espinasse, P. (2011). *IPO: A global guide*. Hong Kong University Press. <https://ebookcentral-proquest-com.proxy.uwasa.fi>
- Feng, J., Pan, W., Tao, L., & Hu, W. (2024). COVID-19 media sentiment and IPO underpricing. *Economics Letters*, 234, 111474. <https://doi.org/10.1016/j.econlet.2023.111474>

- Feng, Z.-Y., Chen, C. R., & Tseng, Y.-J. (2018). Do capital markets value corporate social responsibility? Evidence from seasoned equity offerings. *Journal of Banking & Finance* 94, 54–74. <https://doi.org/10.1016/j.jbankfin.2018.06.015>
- Ferri, S., Tron, A., Colantoni, F., & Savio, R. (2023). Sustainability disclosure and IPO performance: Exploring the impact of ESG reporting. *Sustainability* 15(5144), 1–15. <https://doi.org/10.3390/su15065144>
- Field, L. C., & Hanka, G. (2002). The expiration of IPO share lockups. *The Journal of Finance*, 57(2), 471–500. <https://doi.org/10.1111/0022-1082.00334>
- Griffith, T., Baig, A. S., Berkowitz, J. P., & DeLisle, R. J. (2025). *Covid-19 Exposure and Price Clustering* [Preprint]. SSRN. <https://doi.org/10.2139/ssrn.5087338>
- Gustafson, M., Henry, J. J., Kim, E., & Pisciotta, K. (2024, November 18). *The evolution of IPO bookbuilding*. <https://dx.doi.org/10.2139/ssrn.3830911>
- Hahl, T., Vähämaa, S., & Äijö, J. (2013). Value versus growth in IPOs: New evidence from Finland. *Research in International Business and Finance* 31, 17–31. <https://doi.org/10.1016/j.ribaf.2013.11.004>
- He, P. (2007). A theory of IPO waves. *The Review of Financial Studies* 20(4), 983–1020. <https://doi.org/10.1093/rfs/hhm004>
- Hukkanen, P., & Keloharju, M. (2019). Initial offer precision and M&A outcomes. *Financial Management* 48(1), 291–310. <https://doi.org/10.1111/fima.12229>
- Ibbotson, R. (1975). Price performance of common stock new issues. *Journal of Financial Economics* 2(3), 235–272. [https://doi.org/10.1016/0304-405X\(75\)90015-X](https://doi.org/10.1016/0304-405X(75)90015-X)
- Jain, B. A., & Kini, O. (1999). The life cycle of initial public offering firms. *Journal of Business Finance & Accounting* 26(9–10), 1281–1304. <https://doi.org/10.1111/1468-5957.00298>
- Jamaani, F., & Ahmed, A. D. (2021). Modifier effects of country-level transparency on global underpricing difference: New hierarchical evidence. *International Review of Financial Analysis*, 74, 101667. <https://doi.org/10.1016/j.irfa.2021.101667>
- Jamaani, F., & Alidarous, M. (2024). Does voluntary environmental, social, and governance disclosure impact initial public offer withdrawal risk? *European Financial Management*. <https://doi.org/10.1111/eufm.12345>

- Jenkinson, T., Ljungqvist, A., & Ritter, J. (2001). *Going public: The theory and evidence on how companies raise equity finance* (2nd ed.). Oxford University Press.
- Keloharju, M. (1993). The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland. *Journal of Financial Economics* 34(2), 251–277. [https://doi.org/10.1016/0304-405X\(93\)90020-C](https://doi.org/10.1016/0304-405X(93)90020-C)
- Keloharju, M., & Kulp, K. (1996). Market-to-book ratios, equity retention, and management ownership in Finnish initial public offerings. *Journal of Banking & Finance* 20(9), 1583–1599. [https://doi.org/10.1016/S0378-4266\(96\)00012-X](https://doi.org/10.1016/S0378-4266(96)00012-X)
- Kim, M., & Ritter, J. R. (1999). Valuing IPOs. *Journal of Financial Economics*, 53(3), 409–437. [https://doi.org/10.1016/S0304-405X\(99\)00027-6](https://doi.org/10.1016/S0304-405X(99)00027-6)
- Latham, S., & Braun, M. R. (2010). To IPO or not to IPO: Risks, uncertainty and the decision to go public. *British Journal of Management* 21(1), 45–56. <https://doi.org/10.1111/j.1467-8551.2010.00707.x>
- Lefebvre, V. (2023). The growth process of IPO firms. *Journal of Business Venturing Insights* 19, e00377. <https://doi.org/10.1016/j.jbvi.2023.e00377>
- Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The Journal of Finance* 32(2), 371–387. <https://doi.org/10.2307/2326770>
- Liu, L. X., Lu, R., Sherman, A. E., & Zhang, Y. (2023). IPO underpricing and limited attention: Theory and evidence. *Journal of Banking & Finance* 154, 106932. <https://doi.org/10.1016/j.jbankfin.2023.106932>
- Ljungqvist, A., & Wilhelm Jr., W. J. (2003). IPO pricing in the dot-com bubble. *The Journal of Finance* 58(2), 723–752. <https://doi.org/10.1111/1540-6261.00543>
- Ljungqvist, A. (2007). IPO underpricing. In B. E. Eckbo (Ed.), *Handbook of empirical corporate finance* (Vol. 1, pp. 375–422). Elsevier. <https://doi.org/10.1016/B978-0-444-53265-7.50021-4>
- Lloyd, S., & Ostry, D. (2024). The asymmetric effects of quantitative tightening and easing on financial markets. *Economics Letters* 238, 111722. <https://doi.org/10.1016/j.econlet.2024.111722>

- Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance* 50(1), 23–51. <https://doi.org/10.1111/j.1540-6261.1995.tb05166.x>
- Loughran, T., & Ritter, J. R. (2002). Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies* 15(2), 413–443. <https://doi.org/10.1093/rfs/15.2.413>
- Loughran, T., & Ritter, J. R. (2004). Why has IPO underpricing changed over time? *Financial Management* 33(3), 5–37. <https://doi.org/10.2307/3666262>
- Lowry, M., & Schwert, G. W. (2002). IPO market cycles: Bubbles or sequential learning? *The Journal of Finance* 57(3), 1171–1200. <https://doi.org/10.1111/1540-6261.00458>
- Mazumder, S., & Saha, P. (2021). COVID-19: Fear of pandemic and short-term IPO performance. *Finance Research Letters* 43, 101977. <https://doi.org/10.1016/j.frl.2021.101977>
- Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the March 2020 stock market crash: Evidence from S&P1500. *Finance Research Letters* 38, 101690. <https://doi.org/10.1016/j.frl.2020.101690>
- Michel, A., Oded, J., & Shaked, I. (2020). What determines institutional investors' holdings in IPO firms? *International Review of Finance* 21(4), 1302–1333. <https://doi.org/10.1111/irfi.12326>
- Narayan, P. K., Phan, D. H. B., & Liu, G. (2021). COVID-19 lockdowns, stimulus packages, travel bans, and stock returns. *Finance Research Letters* 38, 101732. <https://doi.org/10.1016/j.frl.2020.101732>
- Nasdaq. (n.d.). Going public: Listing guide to Nasdaq First North Growth Market. <https://www.nasdaq.com/solutions/nasdaq-first-north-growth-market>
- Nelson, T. (2003). The persistence of founder influence: Management, ownership, and performance effects at initial public offering. *Strategic Management Journal* 24(8), 707–724. <https://doi.org/10.1002/smj.328>
- Ofek, E., & Richardson, M. (2003). Dotcom mania: The rise and fall of Internet stock prices. *The Journal of Finance* 58(3), 1113–1137. <https://doi.org/10.1111/1540-6261.00560>

- Panda, A., & Guha Deb, S. (2023). IPO underpricing and short-term performance: A comparative analysis during the COVID-19 pandemic and tranquil periods in a cross-country setting. *Emerging Markets Finance and Trade* 59(7), 2145–2159. <https://doi.org/10.1080/1540496X.2022.2147780>
- Pástor, L., & Veronesi, P. (2005). Rational IPO waves. *The Journal of Finance* 60(4), 1713–1757. <https://www.istor.org/stable/3694852>
- Pástor, L., & Veronesi, P. (2012). Uncertainty about government policy and stock prices. *The Journal of Finance* 67(4), 1219–1264. <https://doi.org/10.1111/j.1540-6261.2012.01746.x>
- Pástor, L., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics* 110(3), 520–545. <https://doi.org/10.1016/j.jfineco.2013.08.007>
- PwC. (n.d.). Global IPO watch: Global IPO activity. <https://www.pwc.com/gx/en/services/audit-assurance/ipo-centre/ipo-journey/ipo-watch-data-explore-exchange.html>
- Ramelli, S., & Wagner, A. F. (2020). Feverish stock price reactions to COVID-19. *Review of Corporate Finance Studies* 9(3), 622–655. <https://doi.org/10.1093/rcfs/cfaa012>
- Reber, B., Gold, A., & Gold, S. (2021). ESG disclosure and idiosyncratic risk in initial public offerings. *Journal of Business Ethics* 168(4), 867–888. <https://doi.org/10.1007/s10551-021-04861-8>
- Ritter, J. R. (1984). The "hot issue" market of 1980. *Journal of Business* 57(2), 215–240. <https://doi.org/10.1086/296260>
- Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance* 46(1), 3–27. <https://doi.org/10.1111/j.1540-6261.1991.tb03743.x>
- Ritter, J. R. (2024). IPO data. Retrieved from <https://site.warrington.ufl.edu/ritter/ipo-data/>
- Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing, and allocations. *The Journal of Finance* 57(4), 1795–1828. <https://doi.org/10.1111/1540-6261.00478>
- Rock, J. (1986). Why new issues are underpriced. *Journal of Financial Economics* 15(1–2), 187–212. [https://doi.org/10.1016/0304-405X\(86\)90054-1](https://doi.org/10.1016/0304-405X(86)90054-1)

- Roosenboom, P. (2012). Valuing and pricing IPOs. *Journal of Banking & Finance* 36(6), 1653–1664. <https://doi.org/10.1016/j.jbankfin.2012.01.009>
- Rossovski, J., Lucey, B., & Helbing, P. (2024). Determinants of IPO overpricing. *British Journal of Management* 1–15. <https://doi.org/10.1111/bjom.2024>
- Sherman, A. E. (2000). IPOs and long-term relationships: An advantage of book building. *The Review of Financial Studies*, 13(3), 697–714. <https://doi.org/10.1093/rfs/13.3.697>
- Sherman, A. E. (2005). Global trends in IPO methods: Book building versus auctions with endogenous entry. *Journal of Financial Economics*, 78(3), 615–649. <https://doi.org/10.1016/j.jfineco.2004.09.005>
- Sun, F., Yin, C., Zhou, S., & Zhu, Z. (2022). IPO underpricing and mutual fund allocation: New evidence from registration system. *International Review of Financial Analysis* 84, 102405. <https://doi.org/10.1016/j.irfa.2022.102405>
- Sur, S., & Martens, M. L. (2013). Whose firm is it anyway? Analyzing ownership effects on IPO performance. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration* 30(4), 264–279. <https://doi.org/10.1002/cjas.1266>
- Szczygielski, J. J., Bwanya, P. R., Charteris, A., & Brzeszczynski, J. (2021). The only certainty is uncertainty: An analysis of the impact of COVID-19 uncertainty on regional stock markets. *Finance Research Letters* 43, 101945. <https://doi.org/10.1016/j.frl.2021.101945>
- Taulli, T. (2012). *High-profit IPO strategies: Finding breakout IPOs for investors and traders*. Wiley.
- Thomsen, S., & Pedersen, T. (2000). Ownership structure and economic performance in the largest European companies. *Strategic Management Journal* 21(6), 689–705. [https://doi.org/10.1002/\(SICI\)1097-0266\(200006\)21:6<689::AID-SMJ115>3.0.CO;2-Y](https://doi.org/10.1002/(SICI)1097-0266(200006)21:6<689::AID-SMJ115>3.0.CO;2-Y)
- Transparency International. (2023). *Corruption perceptions index*. <https://www.transparency.org/en/cpi/2023>

- Vernimmen, P., Dallochio, M., Le Fur, Y., Quiry, P., & Salvi, A. (2017). *Corporate finance*. John Wiley & Sons.
- Vismara, S., Paleari, S., & Ritter, J. R. (2012). Europe's second markets for small companies. *European Financial Management* 18(3), 352–388. <https://doi.org/10.1111/j.1468-036X.2012.00641.x>
- Wei, X., & Han, L. (2021). The impact of COVID-19 pandemic on transmission of monetary policy to financial markets. *International Review of Financial Analysis* 74, 101705. <https://doi.org/10.1016/j.irfa.2021.101705>
- Westerholm, P. J. (2006). Industry clustering in Nordic initial public offering markets. *International Review of Finance* 6(1–2), 25–41. <https://doi.org/10.1111/j.1468-2443.2007.00058.x>
- World Economics. (2024). Governance by country. <https://www.worldeconomics.com/Rankings/ESG-Governance.aspx>
- Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters* 36, 101528. <https://doi.org/10.1016/j.frl.2020.101528>
- Zhang, Z., & Neupane, S. (2024). Global IPO underpricing during the Covid-19 pandemic: The impact of firm fundamentals, financial intermediaries, and global factors. *International Review of Financial Analysis* 91, 102954. <https://doi.org/10.1016/j.irfa.2023.102954>
- Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies* 62(3), 425–448. <https://doi.org/10.2307/2298036>