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How is ESG disclosure perceived in IPO context: An analysis of the Nordic market

Master thesis

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Abstract

This thesis aims to investigate how ESG factors disclosed in prospectuses affect underpricing in Initial Public Offerings of companies in the Nordic market. The thesis will reduce the gap in academic literature related to our topic. Our methodological approach involves defining instances of underpricing in a modern timeframe, 2011-2021. We utilise textual analysis to identify ESG term frequency and ESG sentiment variables used in our OLS regression models. Our findings suggest that Social term frequency and sentiment and Governance sentiment disclosure have an increasing effect on underpricing. Relevant literature suggests our results are a contradiction of the Information asymmetry model. ESG-related literature support that our results show an increase in idiosyncratic risk and market demand, resulting in higher underpricing.

Acknowledgments

We would like to begin by expressing our gratitude to our supervisor, Associate Professor Salvatore Miglietta, from the Department of Finance at BI Norwegian Business School. His guidance and positive attitude have been a motivation through this entire process. His contribution has been highly appreciated.

Furthermore, we would like to thank Pierre-Michel Dumesnil, Head of Sales Moody's ESG Solution, Co-founder and lecturer ESG Investing program at ESSEC Business School, for his valuable advice.

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List of abbreviations

BLUE – Best, linear unbiased estimators

CAPM – Capital Asset Pricing Model

CSR – Corporate social responsibility

ESG – Environmental, social, governance

IPO - Initial public offering

IR – Investor relations

JB – Jarque and Bera

LM – Loughran and McDonald (2011) dictionary

VC – Venture Capital

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1. Introduction and motivation

In this thesis, we combine Initial Public Offerings (IPOs) and Environmental, Social, and Governance (ESG), two topics relevant to the modern business world and financial markets. We begin by investigating IPO underpricing in the Nordic financial markets for our chosen time period. Then we examine the companies' transparency concerning ESG when taking the company public by creating quantitative measurements. Lastly, we combine these findings to understand how ESG disclosure affects IPO underpricing in the Nordic market.

Nordic IPO markets (Norway, Denmark, Sweden, and Finland) are the geographical scope for our research. We find this market intriguing because of the minority of previous research and high focus on ESG (PricewaterhouseCoopers, 2022). We merge these markets so that, without forfeiting homogeneity, we can create a sufficient sample base. Furthermore, since these countries are frontiers in ESG-focused activities and corporate ESG-motivated movements (RobecoSam, 2021), we believe this is a fitting geographical area to conduct our research.

IPO underpricing is defined as when the share price tends to increase substantially from the offer price to the closing price of the first day the firm is listed (Ljungqvist, 2007). It has been profoundly researched for many decades, resulting in many researchers reporting evidence of underpricing. Previous research confirms positive average initial performance in newly issued common stocks since the 1960s (Ibbotson, 1975), followed by additional research by known academics such as Beatty and Ritter (1988).

This empirical phenomenon fluctuates across time periods, from 7% during 1980-1989 to almost 15% during 1990-1998 in the U.S. market (Loughran & Ritter, 2004). These are variating positive profit margins, making the time period of our research a critical aspect. To base our analysis on a pertinent and recent time period, we have chosen to study the IPO underpricing fluctuations in the financial markets from 2011-2022.

ESG has, in the past few years become an essential topic in business. Economic and environmental crises have underlined the importance of ESG in companies, making it an important aspect to include in a company and a popular observation in the stock market. Furthermore, increasing demand from governments to implement ESG systems

in the corporate world might make this important for corporations to stay operational and profitable. The new generation of investors, who are set to inherit $30 to $68 trillion (Forbes, 2021), are especially keen that their investments "do well" and "do good" by promoting the best ESG practices in their investee companies. Schroders' Global Investor Study 2020 suggests that a vast majority of investors are unwilling to compromise on their personal beliefs when putting their money to work, even if returns are higher (Schroders, 2020).

In commenting on the increased support from investment managers for responsible investment, Mark Carney, then governor of the Bank of England, observed in 2019 that companies that score well on ESG metrics could better anticipate future climate-related risks and opportunities. This makes them more strategically resilient and, therefore able to anticipate and adapt to the risk and opportunities on the horizon. Carney (2019) argues that this helps firms generate true alpha from ESG. Strong ESG scores could signal that a firm is more naturally disposed to longer-term strategic thinking and planning. Climate disclosure is increasingly seen not only as necessary in and of itself but also as informative about the extent to which companies are focused on long-term value creation. Strong ESG firms may enjoy valuation premiums consistent with shifting investor preferences (Carney, 2019).

Through studies and analysis in this thesis, we investigate how ESG disclosure is perceived in the IPO context. Will our research support the "asymmetric information theory" suggesting that increased disclosure should decrease the IPO underpricing? Will the Nordic market's appreciation for ESG contribute to an increase in the first-day closing price of the IPO, resulting in higher underpricing? These are some questions that our thesis will investigate through textual and quantitative analysis.

In our study, we will not consider the long-term performance post IPO. This is irrelevant to our research question, as we only focus on first-day returns. We will neither examine topics such as data outside our chosen time period nor from Icelandic IPOs. Lastly, we will not focus on the valuation process for private companies, as our goal is to investigate how the market perceives ESG and not the underwriters' valuation method.

This thesis will explore a subject with well-established existing research but with differences in data and methodology. Previous studies focus mainly on the U.S market, whereas we use data from the Nordic market. This will reduce our sample data but result in original analyses with unmapped results. Furthermore, most existing literature utilises multiple regressions with existing data as variables, whereas our methodology will differ by also including textual analysis.

The thesis will be relevant for academics for further research, investors for knowledge about Nordic capital allocation, and corporations for how the market value ESG in newly public companies. Our thesis will shed light on this field, perhaps create ideas for further research opportunities and prove whether ESG has a definite effect on IPO underpricing. This may help entrepreneurs and private companies reconsider their involvement in ESG before an initial public offering. As the Nordic countries radiate an environmental front, it would be interesting to find proof in the financial patterns of how Nordic investors perceive ESG as a value-increasing trait and whether this reduces underpricing because of decreased asymmetric information. This decrease in asymmetric information is, according to Ljungqvist (2007), caused by a reduced knowledge gap between the informed and uninformed investor. On the contrary, ESG disclosure might even increase the knowledge gap, because of corporate greenwashing, resulting in a disadvantage for the uninformed investor. These findings can also be compared to similar research focusing on other geographical areas.

2. Literature review

In this part of our thesis, we explore the existing theory, research, and data for our scope. We divide our literature review into two subsections, “IPO underpricing” and “ESG”. This is to create a clear and appropriate approach to the existing literature regarding our topic.

2.1 Initial Public Offering

An Initial Public Offering (IPO) is the process of selling company stock to the public for the first time (Berk & DeMarzo, 2014). This is an action performed by private companies, offering their company shares to the public market. I.e., an IPO is a partial ownership transfer so that anyone with capital to offer can take the role as an owner of a company. The firm's original owners decide to issue stocks and seemingly hope to receive the highest price possible in return. The trading price that the market pay for company shares is affected by several factors, such as market conditions, firm-specific factors, and policies of investment banks (Ibbotson et al., 1988).

Two primary motivations for going public are greater liquidity and better access to capital. Public companies traditionally have greater access to capital by offering their shares to a public market and present the opportunity to offer shares on multiple occasions (Berk & DeMarzo, 2014). Furthermore, taking the company public creates an opportunity for private equity investors to diversify their holdings (Ibbotson et al., 1988). Enabling outside investors to have stakes in the company results in the publicly traded price to reflect and inform management and shareholders about important outside information concerning the firm value. On the other hand, by going public, the company acquires additional obligations such as disclosure requirements and transparency, as well as their obligations to a larger and more diverse pool of shareholders (Ljungqvist, 2007).

Ritter and Welch (2002) investigate more complex theories about why companies choose to go public. The aforementioned financial and non-financial motivations, such as increased publicity, are mentioned only as introductory arguments. Theories, such as “Life Cycle Theories” and “Market-Timing Theories”, investigate the underlying motivation for IPOs disregarding cash considerations. The Life Cycle Theories discuss topics such as greater chances of a potential acquirer to spot latent takeovers in public

companies, the entrepreneur's enhanced ability to facilitate the acquisition of the company to a higher value, recovery of entrepreneurial control from venture capitalists in venture-capital-backed companies, and arguments regarding the dispersity of ownership. Market-Timing Theories bring points such as asymmetric information and postponing equity issues in cases of temporary undervaluation or periods of general market appreciation (Bull-markets), and avoidance of issuing in periods with the scarcity of high-quality IPOs (Ritter & Welch, 2002).

2.2.1 IPO underpricing

The extent to which issues are underpriced is a central measure of the Initial Public Offering markets' efficiency (Chambers & Dimson, 2009). If an offer price is set too high, the investor would obtain a lesser return and thus reject the offering. When an offer price is set too low, the company issuing shares would not receive the full extent of its opportunity to raise capital (Ibbotson et al., 1988). It is documented that owners can alter the level of underpricing through specific choices they make when performing an IPO, for example, which underwriter to hire or what exchange they list on (Habib & Ljungqvist, 2001). It is therefore important for firms to set the correct offer price.

The historical literature on this phenomenon goes back to a study by the U.S. Securities and Exchange Commission in 1963, concluding with findings of positive average initial returns on companies going public (Ibbotson et al., 1988). According to Ljungqvist (2007), the underpricing discount has averaged about 19% in the United States since the 1960s, resulting in the companies missing out on large amounts of capital. Furthermore, Loughran et al. (1994) find an equally weighted average initial return in Norway (1984-2018) of 6,7%, Sweden (1980-2015) of 25,9%, Finland (1971-2018) of 14,2%, and Denmark (1984-2017) of 7,4%.

The relevant literature has established many theories on the IPO. Most of these theories can be divided into four groups: *Asymmetric information*, *Institutional reasons*, *Control considerations*, and *Behavioural approaches*. Of these groups, the asymmetric information model is the most established (Ljungqvist, 2007), based on the assumption that one IPO participant is less informed than others. Underpricing hypotheses attempt to explain the reason behind and the level of mispricing of newly public companies. An example from Ibbotson et al. (1988) is *"The winner's curse hypothesis"*.

2.2.2 Asymmetric Information Model

Given the nature of our research question, the most applicable theoretical foundation regarding underpricing is “Asymmetric information”. The main parties relevant for the model are the issuing firm, the bank underwriting and marketing the deal, and investors. This model assumes that one of these knows more than the others (Ljungqvist, 2007). The issue of concern in this model is not necessarily the accuracy of the information shared but rather the banker’s access to information not readily available to the issuer (Baron & Holmström, 1980). Missing data can result in inaccurate analyses and valuations of investments, leading to mispricing of investment instruments.

This model is fundamental for our research since ESG disclosure should help reduce any knowledge gap between parties and consequentially help minimise any underpricing. The model is further divided into three sub-models: “The winner's curse”, “Information revelation theories”, and “Principle-agent models” (Ljungqvist, 2007).

The winner's curse, introduced by Kevin Rock (1986), is one of the more popular sub-models of this theorem. On average, IPOs have positive initial returns, yet a large portion still experiences a decline in prices. Offerings that have increased in price are commonly oversubscribed, unlike those that do not. If investors choose to place purchase orders for issues on all occasions, they will experience allocation in the offerings with declining prices more often than those who increase in price. This results in a reduced average initial return since the return are conditional on the investor receiving shares.

Consequentially, the investor faces a “winner’s curse”. The expected initial return will be less than average if the investor is given the requested number of shares. The fact that IPOs are, on average underpriced suggests that some investors must experience excess return. Rock (1986) states that the representative investors (uninformed investors) take the losses. This is because the positive initial average return and the high chances of receiving lower returns than average create an incentive to incur costs from security analysis. This analysis will reveal what issues are probable to be underpriced. These informed investors will receive sufficient returns to cover these costs. With this problem, representative investors will only choose to place purchasing orders if IPOs are underpriced on average. These issues are related to an ex-ante

uncertainty about the value of an issue, and as this uncertainty increases, the winner's curse will strengthen. Given this increase in uncertainty, the representative investors will naturally expect higher returns through underpricing (Beatty & Ritter, 1986). A greater ex-ante uncertainty will result in a higher expected underpricing. Therefore, this expected underpricing can be reduced by minimising the information asymmetry between informed and uninformed investors (Ljungqvist, 2007), in our case ESG-disclosure.

Ljungqvist (2007) mentions the "Information revelation theories" and "Principal-agent models", both based on dishonest behaviour from investors. The first phenomenon focuses on the investors' lack of incentive to disclose positive information to underwriters in hopes of reducing the offer price and how bookbuilding mechanisms can mitigate this behaviour (Ljungqvist, 2007). The latter explains how the wealth transfer of underpricing from the IPO company to investors can motivate actions such as side payments from investors to underwriters to secure allocation of underpriced issues (Loughran & Ritter, 2004).

2.3 ESG

2.3.1 ESG's role in IPOs

ESG is a term with high growth in popularity in the corporate world, suggesting that it is of rising importance in IPOs. According to an article by PricewaterhouseCoopers (2020), ESG continues to gain momentum in the investment world. This makes it important for private companies planning an IPO to promote their ESG strategies to investors. Investors have traditionally been interested in a good equity story, but today investors also value positive ESG disclosure beyond mandatory prospectus requirements (PricewaterhouseCoopers, 2020). Furthermore, ESG should not only be an afterthought of the IPO but rather be integrated into its strategy and purpose. Almost 80% of those participating in "PwC's 2021 Global Investor Survey" view ESG risks as a significant factor in their investment evaluation (PricewaterhouseCoopers, 2022). Whether to incorporate this in an IPO can significantly impact the potential outcome (PricewaterhouseCoopers, 2020).

Bollazzi et al. (2017) investigate the impact of ESG policies in newly listed companies and their performance on the first day of listing in the Italian stock market. Their results

indicate a higher average underpricing for companies publishing a sustainability report. However, these results are not statistically significant in multivariate analysis, which could be explained by a small dataset of only 48 companies.

However, there is not much research on how ESG factors affect IPO underpricing. This is the gap in academic research to which we wish to contribute. This is particularly the case for the Nordic market, a market experiencing growth and has ESG deeply rooted in its business culture.

2.4 Summary of findings

In summary, underpricing in initial public offerings has been a common phenomenon through the years. As underpricing means that companies are leaving money on the table, it is a significant cost and should therefore be avoided. This section will summarise our literature and provide an economic explanation that will justify our hypotheses.

Theory suggests that a decreased level of asymmetric information reduces underpricing (Ljungqvist, 2007). ESG disclosure might lead to less asymmetric information because such information is not public. Investors may not be aware of ESG information of firms when there is no regulatory framework requiring disclosure. More information disclosed to the market could decrease the knowledge gap between the informed and the uninformed, resulting in lower underpricing. This may lead to less idiosyncratic risk, which means less ex-ante uncertainty and a decrease in the chance of mispricing.

Literature regarding focus on ESG in companies suggests that this is highly valued by investors, a trend that will only increase in the future (PricewaterhouseCoopers, 2022). This can increase demand for such investment opportunities and surpass the underwriters' expected interest in the IPO. Increased demand will increase the IPO price, leading to a higher level of underpricing if not incorporated accurately by the underwriter.

Factors such as improved expected financial- and stock performance are usually incorporated in the underwriter’s analysis when pricing a company. A deviation in expected financial performance between underwriters and investors can lead to differences in valuation analyses because of misconceptions of expected growth, resulting in mispricing of companies.

Literature relevant for ESG disclosure's effect on IPO underpricing suggests an increasing effect. Still, it appears to be limited research in this field. The existing research has questionable findings because of restricted data samples. Therefore, we aim to research this relationship. Firstly, we wish to explore whether ESG disclosure reduces asymmetric information and idiosyncratic risk and thus reduces mispricing of IPOs. Secondly, we will explore whether an increase in ESG disclosure will increase IPO demand, resulting in a higher market demand than anticipated by underwriters and therefore increased underpricing. This will substantiate the reasoning behind our research question and the structure of our hypotheses.

3. Research question and hypothesis

This chapter will clarify and present the research question of our thesis, along with structured clarifications of fundamental hypotheses, acting as a red thread through our analysis.

3.1 Research question

This thesis investigates the relationship between ESG disclosure in IPO prospectuses and underpricing within Nordic countries. Since ESG disclosure can be a good proxy of ESG policies (Hummel & Schlick, 2016), we wish to test if this affect underpricing. The asymmetric information model suggests that an increase in disclosure of any ESG activities should decrease idiosyncratic risk, resulting in a reduced chance of mispricing. Additionally, in the case of ESG disclosure leading to a higher demand for the issue, we expect to see a linear relationship between disclosure and underpricing. We have divided our hypotheses into the respective E, S and G categories. This is to obtain a precise result that can explain not only whether ESG has any impact on underpricing but also what segment has the most influence. To test whether there exists an increasing or decreasing effect, we present the following research question and hypotheses:

How does ESG disclosure affect IPO underpricing in the Nordic market?

3.2 Environmental Disclosure

Existing research indicates that environmental-friendly properties in IPOs result in a "green premium" as well as a significant underpricing in the U.S. market (Chan & Walter, 2014). We aim to test whether a relationship exists in the Nordic market, isolating the environmental effect on underpricing, resulting in hypothesis 1:

Hypothesis 1: The underpricing of companies with high environmental disclosure is not significantly different from those with less transparency in this context.

3.3 Social Disclosure

Existing research on Social disclosure of ESG suggests that there should, to some extent, exist an increasing relationship between this variable and underpricing (Bollazzi

et al., 2017). To reveal any existing connection in the Nordic market, we formulate the second hypothesis as the following:

> *Hypothesis 2: The underpricing of companies with high social disclosure is not significantly different from those with less transparency in this context.*

3.4 Governance Disclosure

The Governance factor, such as board knowledge, has been proved in existing research to be inversely related to IPO underpricing (Judge et al., 2015). This suggests that our analysis should show similar results. In the third hypothesis, we investigate this relationship:

> *Hypothesis 3: The underpricing of companies with high governance disclosure is not significantly different from those with less transparency in this context.*

3.5 ESG-variables effect on IPO underpricing

Our final hypothesis is focused on the big picture of the relationship between ESG disclosure and IPO underpricing. As previously mentioned, information asymmetry suggests an inverse linear relationship between ESG disclosure and underpricing because of reduced idiosyncratic risk. Additionally, ESG-relevant literature suggests a linear relationship between the two variables, meaning that higher demand from investors should result in higher underpricing. In summary, to investigate this relationship, our main hypothesis is the following:

Hypothesis 4:

> $\boldsymbol{H_0}$: *The underpricing of companies with high ESG disclosure is not significantly different from those with less transparency in this context*
>
> $\boldsymbol{H_A}$: *The underpricing of companies with high ESG disclosure is significantly different from those with less transparency in this context.*

4. Data

This chapter of our thesis is devoted to clarifying the characteristics of our data. For example, we will reflect on our collected data and provide descriptive and summary statistics. The chapter will help create a general understanding of our data and work as a bridge toward our analysis.

4.1 Data collection

We have collected data on IPOs from Bloomberg, and the dataset contains 250 IPOs in the Nordic markets between 01.01.2011 and 01.01.2022. A sample period of 11 years should be able to reflect fluctuations in the economic activity and financial markets. If we were to use IPOs from earlier years, we would likely have to exclude a relatively large part of the offerings due to missing information and, in particular, prospectuses.

As no ESG information is available for private firms, we create our own system to evaluate ESG disclosure. We do this by textual analysis: first, we count the frequency of ESG terms in the IPO prospectuses. Secondly, by measuring the sentiment (positive or negative tone) of the ESG content in the prospectuses. The choice of word list will be thoroughly discussed in the next chapter. Additionally, the dataset from Bloomberg did not contain information about firm age. Thus, we have used secondary sources such as Yahoo Finance and the firm's homepage to obtain the firm age of each company.

IPO prospectuses are not available from databases such as Bloomberg or Eikon. The Swedish and Finish financial supervisory have all approved prospectuses available through their sites, however only in the domestic language. For an English version, firms usually publish the prospectus (and a translation) on their investor relations (IR) page. In some cases, the prospectus was unavailable on the respective firm's homepage. Thus, we had to send an email to some firms.

Since there is no regulation regarding prospectuses on Euronext Growth (formerly known as Merkur Market), we exclude the listings from this exchange. Though there have been many listings on Euronext Growth during the last two years. We exclude these listings from our selection to achieve a sample with adequate liquidity size and information. Nasdaq operates the other secondary lists in the Nordics, and firms are here required to publish a prospectus when conducting an IPO (EU prospectus regulation).

Further, we have removed dual listings, i.e., when a firm lists on two or more exchanges. This means that the price is already set in the market. Thus, there is no underpricing on the first trading date on the new exchange. For example, when Boozt AB was listed on Nasdaq Copenhagen in 2020, the price was already set in the Swedish market. We have also removed Icelandic IPOs due to the very small sample size (only two firms that fulfil our requirements, prospectus available in English, and adequate liquidity).

As the deal size was downloaded in local currency, e.g., NOK for listings in Norway, SEK for listings in Sweden, DKK for listings in Denmark, and EUR for listings in Finland, we have converted all deal sizes to NOK by multiplying the respective exchange rate, e.g., (NOK/EUR), at the correct date, retrieved from Yahoo finance.

4.2 Term Frequency

The term frequency is the number of occurrences of each E, S, and G word in the prospectus. These variables indicate how much each firm discloses of ESG information in the IPO process. Thus, we now have three independent variables: *environmental term frequency* (*e_freq*), *social term frequency* (*s_freq*), and *governance term frequency* (*g_freq*).

4.3 Sentiment analysis

To obtain the ESG sentiment score, we rely on textual analysis. First, we isolate all ESG contexts from the prospectuses, i.e., sentences including an ESG word. Using the LM-dictionary (further discussed in chapter 5.2.3), we get both a positive and negative sentiment score for each E, S, and G variable. By subtracting the negative score from the positive, we obtain three more independent variables, *environmental sentiment score* (*sent_e*), *social sentiment score* (*sent_s*) and *governance sentiment score* (*sent_g*). Intuitively, higher scores imply more positive sentiment, and lower scores imply more negative sentiment.

4.4 Descriptive statistics

This leaves us with 143 observations—81 IPOs in Sweden, 42 in Norway, 12 in Denmark, and 9 in Finland. From table 4.1, we observe that the independent variable, underpricing, has an average return of 9.37%, with a maximum of 98.87% and a minimum of 16.44%. For the control variables, firm age, deal size, and the VC-backed

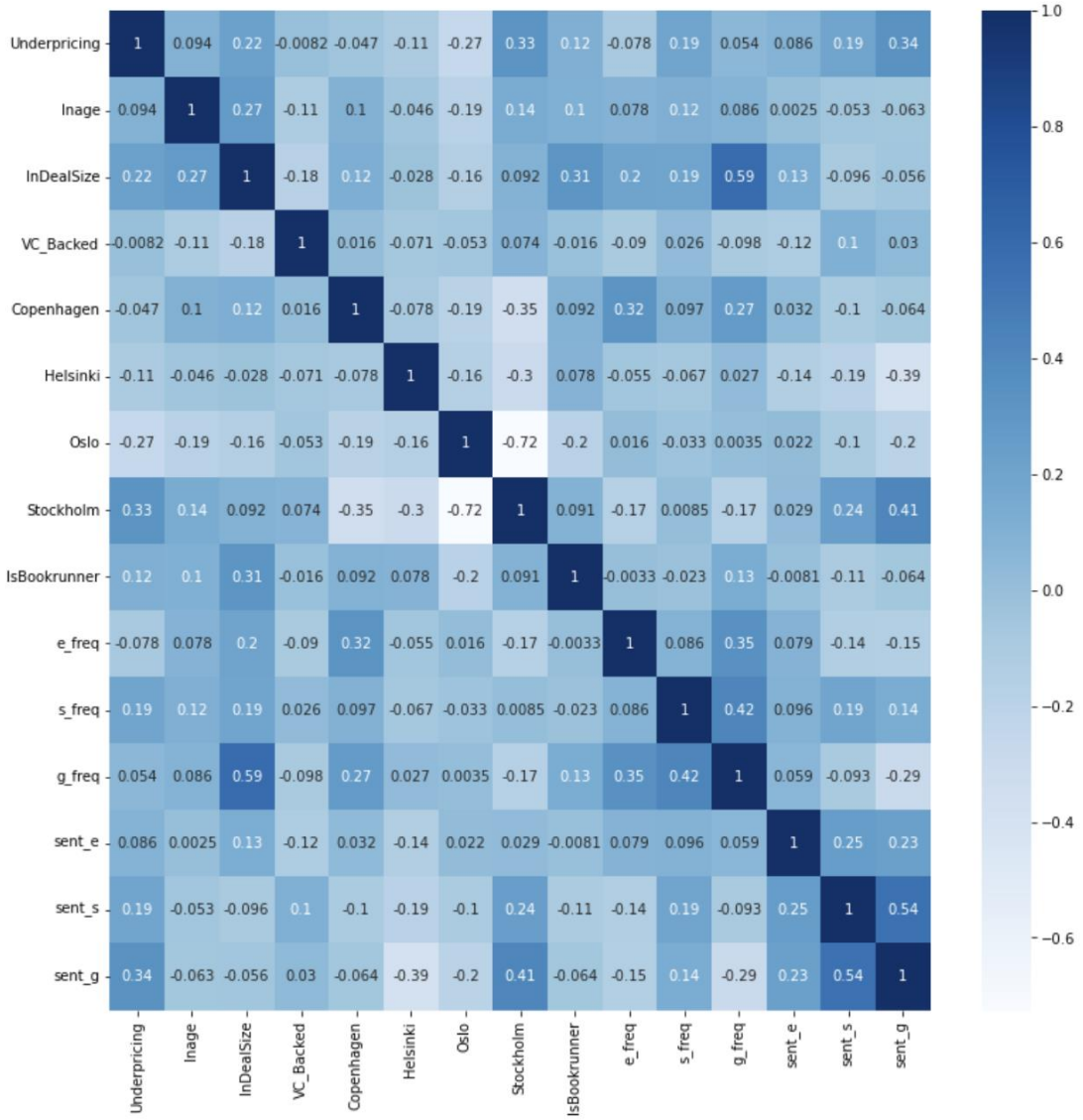
dummy and exchange dummies, we can observe the largest deal was 23 bn NOK while the smallest deal was 67 m NOK. Approximately 57% of the listings were conducted in Sweden, 29% in Norway, and less than 10% in Copenhagen and Helsinki. We observe firms of 0 years of age, meaning they were founded the same year they went public.

Table 4.1 *Descriptive statistics*

	count	mean	std	min	max
Underpricing	143	9.37%	15.93%	-16.44%	98.87%
Firm age	143	32	39	0	266
Deal Size NOK	143	2 279 243 675	3 564 789 179	66 870 000	23 000 000 000
VC_Backed	143	0.070	0.256	0	1
Copenhagen	143	0.084	0.278	0	1
Helsinki	143	0.063	0.244	0	1
Oslo	143	0.287	0.454	0	1
Stockholm	143	0.566	0.497	0	1
IsBookrunner	143	0.916	0.278	0	1
e_freq	143	120.748	320.582	0	2994
s_freq	143	244.916	230.600	34	1929
g_freq	143	1 188.517	469.572	355	3315
sent_e	143	-0.008776	0.017007	-0.080645	0.034384
sent_s	143	-0.008957	0.008257	-0.034188	0.008543
sent_g	143	-0.005862	0.002691	-0.013761	0.001434

In table 4.2 below, we have visualised the correlations between our variables. We observe that the sentiment of governance disclosure has a relatively high correlation with underpricing. This is interesting because we expect less information asymmetry when firms report well on governance. However, it may be explained by the fact that investors value the positive tone about governance and thus buy the stock on the first trading day. Further, 91% of the listings in our sample are represented by one of the top 5 bookrunners in the Nordic region that year, as per Kantar Sifo domestic equity rankings.

Table 4.2 *Correlation matrix*



5. Methodology

In this chapter of our thesis, we will elaborate on our methodological approach and how this will be used to answer our research question from an econometric point of view. We will also explain the tests used to secure the quality of our results.

5.1 Dependent variable

Underpricing is defined as the following:

$$Underpricing = \frac{First\ trading\ day\ closing\ price - Offer\ price}{Offer\ price}$$

5.2 Independent variables

The independent variables in our thesis will be constructed using both textual and sentiment analysis. This part of our methodology will explain the theory around these types of analyses to help better understand the creation of the ESG-indicators.

5.2.1 Textual analysis

By programming in Python, we can analyse every firm IPO prospectus published around the date of announcement of the IPO. The main shortcoming of textual analysis is that the result we get will likely measure the level of disclosure rather than the actual ESG characteristics of the firm. However, according to Hummel & Schlick (2016), there is a positive relationship between ESG performance and voluntary disclosure of ESG-related information. Thus, we argue that ESG firms will be willing to disclose ESG-related information in their IPO prospectuses, while non-ESG firms will not disclose such information.

5.2.2 Term frequency

The approach of term frequency is relatively simple and only counts the frequency of each ESG-related word mentioned in the prospectus. It will provide a benchmark for ESG disclosure levels. For example, if a firm has a whistle-blower system in place, the term whistle-blower will appear in the prospectus. The more ESG-related terms in the prospectus, the more the firms disclose their ESG activities. Using the term frequency as a measurement of ESG activities is used in studies such as Loughran et al. (2009) and Baier et al. (2018) and can thus be a proxy for ESG disclosure. However, this

approach has its limitations. For example, words that we define as ESG-related, may not be used in an ESG-related setting.

Using an ESG word list designated for finance purposes is crucial. For the term frequency, we rely on the word list created by Baier et al. (2018). It was developed by analysing all words appearing in a report and assigning the word to the word list if it appeared in an ESG context in most of its occurrences. Further, the word had to appear in at least 5% of all 10-k and annual reports. Although the word list was constructed for 10K reports in the US, we believe it is a good proxy for our study. The word list contains 11.41% words categorized as *environmental*, 31.33% as *social*, and 57.26% as *governance*. These numbers are reasonable as IPO prospectuses are based on a regulatory framework. However, the skewness might indicate that we lack some words under the environmental category.

5.2.3 Sentiment analysis of ESG related context

The next textual analysis method we apply is sentiment analysis, which measures the context's underlying tone. Hence, we can measure whether the tone in a sentence is positive or not. Sentiment analysis has been used in previous financial research, proving that the sentiment of financial reports, newspaper articles, and social media can be used as an indicator of the operation of the firm (Pengnate et al., 2020) and stock returns (Edmans et al., 2007). Further, Hanley & Hoberg (2010) finds that the net positive tone in the Risk Factors section of the IPO prospectus could reduce the uncertainty for investors and thus less underpricing.

For the sentiment analysis, we rely on the word list by Loughran & McDonald (LM). It was created with financial communication in mind, making it suitable. The list is extensive, with 354 positive words and 2329 negative words. It has been used in many empirical studies: Kearney & Liu (2014) note that “The L&M lists have become predominant in more recent studies” (p. 175). Feldman et al. (2010) found higher stock market returns when changes in tone are more positive in the MD&A section for a large sample of 10-K and 10-Q filings, even after controlling for earnings surprises and accruals using the LM positive and negative word list.

5.3 Control variables

Control variables are included in a regression to isolate the causal effect of a certain variable (Wooldridge, 2020, p.91). Due to limited data and time constraints, we can only test a limited number of control variables: we have included eight control variables in our regressions to account for ex-ante uncertainty. The distribution of firm age and deal size are highly skewed. Thus, we take the natural logarithm of both. Since the variables are not the primary interest of our research, they are only briefly described below.

- Firm age

As older firms are less risky, firm age can represent a proxy for the risks of IPO firms (Ritter, 1984). Ritter (1991) finds evidence for higher initial returns for younger firms. We take the natural logarithm of the age plus one:

$$\ln(Age) = \ln(IPO\ year - firm\ age + 1)$$

- Deal size

Large IPOs are often conducted by well-established firms; thus, the risk should be smaller and hence lower initial returns (Beatty & Ritter, 1986). Therefore, to control for any systemic influence due to offering size, we include the natural logarithm of the deal size.

- VC backed

Bradley and Jordan (2002) find that venture-backed firms are more underpriced than non-VC-backed firms. Our dataset contains information about whether the IPO is venture-backed or not. Thus, we create a dummy variable equal to 1 if the listing is VC-backed and zero if not.

- Country

To control for country effects, we include a dummy variable representing the issuing country.

- Bookrunner ranking

Carter et al. (1998) finds that IPOs managed by more reputable underwriters are associated with less short-run underpricing. We use Kantar Sifo rankings of Nordic investment banks (domestic equity) in the respective IPO issuing year and add a dummy variable which equals 1 if one of the bookrunners is on the top 5 list that year and equals 0 if one of the bookrunners is not on the ranking that year (presented in appendix A).

5.4 Regulation

The sentiment of the ESG disclosure could be helpful since, apart from the ESG voluntary disclosure from the firms, the EU IPO regulation (2017) also demands some compulsory ESG disclosure in the IPO prospectuses, e.g., in terms of material risk factors. It means that firms cannot entirely hide the ESG information and must be transparent about what is presented in the IPO prospectus. In other words, IPO regulations ensure that critical information, good or bad, is included in the prospectus. Therefore, the sentiment of the ESG disclosure, i.e., whether the ESG content is positive or negative, can be used to compare the ESG activities of the firms at the time of the IPO.

5.5 Analysis

Until this section, we have presented existing research and theories indicating that ESG disclosure should have either a positive or a negative effect on underpricing. The asymmetric information model suggests that a knowledge gap reduction should decrease underpricing, whereas research regarding ESG disclosure indicates a positive relationship. Surveys indicate that investors value ESG policies in companies, which would increase stock demand and thereby underpricing. In this section, we will clarify the methodology of the analysis used to test these contradictions. It will contain information about our regressions and the tests relevant to ensure the quality of our results.

5.5.1 OLS-Regression Analysis

The multiple regression models in our analysis are used to study the relationship between two or more variables (Wooldridge, 2020). The aim of the regressions is to investigate the relationship between IPO underpricing and ESG indicators, or more

precisely, ESG indicators effect on the IPO underpricing variable. Our OLS-regression model is the following:

$$Underpricing = \beta_0 + \beta_1 \times ESG\ score_i + \beta_2 \times lnage_i + \beta_3 \times lndealsize_i + \beta_4 \times D.VC_i + \beta_5 \times D.country_i + \beta_6 \times D.BR_i + \varepsilon$$

Where $ESG\ score_i$ represents both the term frequency, e.g., e_{freq}, and the sentiment score, e.g., e_{sent}, for all factors, respectively.

5.5.2 Assumptions for Classical Linear Regression Model (CLRM)

To satisfy the first assumption of OLS, a constant term is included in the regression model. By applying Breusch-Pagan test, we can uncover and manage any heteroskedasticity in our data, satisfying the second assumption. The third assumption assumes no autocorrelation, which we will use the Durbin-Watson test to verify. The fourth assumption tests that the covariance between the residuals and the independent variables are zero. Finally, the fifth assumption tests whether the residuals are normally distributed, which we will assess using the Jarque and Bera test.

A final test relevant for regression analysis with cross-sectional data is Multicollinearity. This is when there is a high (but not perfect) correlation between two or several independent variables (Wooldridge, 2020). We will measure this aspect by simply studying the correlation matrix between the individual independent variables.

6. Results and analysis

This chapter will contain our empirical findings and our approach to reaching these results. We begin by presenting our OLS-regression models, including any results from statistical tests. Second, we will declare our approach and results from our regressions with ESG-term frequency and ESG sentiment. Finally, we provide the discussion and interpretation of our findings.

6.1 OLS-regression model

Our regression models are based on one dependent variable and twelve independent ESG variables, along with our control variables. Our independent variables are divided into two sections as a result of the textual analysis: ESG-frequency and ESG-sentiment. ESG frequency contains three regression models: E_freq, S_freq and G_freq. The ESG-sentiment regression models result in three subcategories, with three regression models in each, a total of nine models. We will present statistics regarding the models, such as significance and goodness of fit (adjusted R^2) for each of our twelve models. This will be performed in the respective order:

Table 6. 1 *Regression overview*

Analyse method	**Model number**	**Independent variable**
ESG frequency	*1*	E_freq
	2	S_freq
	3	G_freq
ESG sentiment	4	E_pos
	5	E_neg
	6	Sent_e
	7	S_pos
	8	S_neg
	9	Sent_s
	10	G_pos
	11	G_neg
	12	Sent_g

Table 6.1 illustrates the regression order of our analysis. Models 1-3 will contain the ESG-frequency variables, and models 4-12 will contain the ESG sentiment variables. This creates a structured framework for our analysis, resulting in a logical presentation of our results.

After fitting our models, we test the CLRM assumptions and the multicollinearity test, ensuring none is violated. By applying the Breusch-Pagan test for heteroskedasticity, we uncover violations of the assumption for models (4) and (10). To satisfy this assumption, we use heteroscedasticity-consistent standard error estimates. Thus, if the variance of the errors is positively related to the square of an explanatory variable, the standard errors for the slope coefficients are increased relative to the usual OLS standard errors. This would make hypothesis testing more 'conservative' so that more evidence would be required against the null hypothesis before being rejected (Brooks, 2019). Further, assumption three and four is satisfied.

For the assumption of normality (5), we use the Jarque-Bera test, which indicates a violation, as the JB-values are high, and the p-values are equal to zero. To solve the problem of non-normality, we take the natural logarithm of the underpricing. This makes the distribution of the residuals closer to a normal (Brooks, 2019). To further reduce the effect of outliers, we winsorise the dependent variable at the 25^{th} and 75^{th} percentiles, consistent with previous literature such as Liu & Ritter (2009). After performing these altercations, we observe satisfying values implying that assumption five holds.

Finally, we test for multicollinearity by studying our correlation matrix between the individual independent variables, presented in table 5.2. Our highest correlation is 0,59 between *g_freq* and *lndealsize*, indicating no correlation high enough to conclude any violations. In summary, all assumptions are now satisfied, and we can proceed with our OLS-regression model.

6.2 Regressions with ESG-term frequency

We have included three variables in the ESG-term frequency testing pool, resulting in three separate regression models. These regression models test the impact of Environmental frequency, Social frequency, and Governance frequency on underpricing. From table 6.2 we find that the p-values vary between 0,0706 (s_freq) and 0,836 (g_freq), meaning that s_freq is significant at the 10% level. This implies only a weak relationship between the variables. Further, the coefficient of s_freq is 0.000072, suggesting a weak positive effect.

Furthermore, we observe that the three models have poor goodness of fit, with low values of adjusted R^2. This means that models (1), (2), and (3) have low explanatory power on the dependent variable. Further, in table 6.2, we observe that the Helsinki and Oslo dummy variable are significant, as well as the deal size variable, at the 10% level, for the three models.

Table 6. 2 *Regression ESG-term frequency summary*

	Model 1	Model 2	Model 3
	(1)	(2)	(3)
e_freq	-0.000030		
	(0.000031)		
s_freq		0.000072*	
		(0.000040)	
g_freq			-0.000005
			(0.000025)
lnage	-0.000084	-0.001227	-0.000338
	(0.008487)	(0.008436)	(0.008542)
lnDealSize	0.020938**	0.016100*	0.020687*
	(0.009396)	(0.009337)	(0.011481)
Intercept	-0.309966**	-0.251047*	-0.305727*
	(0.148775)	(0.147397)	(0.169680)
C(VC_Backed)[T.1]	-0.003364	-0.005642	-0.001107
	(0.036740)	(0.036458)	(0.036810)
C(IsBookrunner)[T.1]	0.011450	0.019874	0.013566
	(0.035157)	(0.034918)	(0.035256)
C(Copenhagen)[T.1]	-0.075073	-0.072189	-0.080824
	(0.048098)	(0.047727)	(0.050480)
C(Helsinki)[T.1]	-0.104316**	-0.082976*	-0.099825*
	(0.046917)	(0.046173)	(0.050799)
C(Oslo)[T.1]	-0.100761**	-0.084483**	-0.098605**
	(0.039314)	(0.038764)	(0.044577)
C(Stockholm)[T.1]	-0.029817	-0.011399	-0.026473
	(0.040906)	(0.039979)	(0.047531)
Observations	143	143	143
R^2	0.152995	0.166851	0.147286
Adjusted R^2	0.102428	0.117110	0.096378
Residual Std. Error	0.108544 (df=134)	0.107653 (df=134)	0.108910 (df=134)
F Statistic	3.025562*** (df=8; 134)	3.354437*** (df=8; 134)	2.893161*** (df=8; 134)
Note:			*p<0.1; **p<0.05; ***p<0.01

6.3 Regressions with ESG sentiment

Next, we include the ESG sentiment variables along with our dependent variable. As illustrated in table 6.1, each ESG component (E, S, and G) are divided into a negative-sentiment variable, a positive-sentiment variable, and a joint variable of both negative- and positive sentiment. In total, this results in additional nine regression models. This section will be divided into the respective ESG factors, structured with a statistical description, statistics table, and short interpretation for each factor.

6.3.1 Environmental sentiment

In models (4), (5), and (6), we include *e_pos*, *e_neg*, and *sent_e* as our independent variables. From table 6.3, we find that none of our variables are statistically significant. Furthermore, we observe that all variables have a low adjusted R^2. *E_pos* have an adjusted R^2 of 0,118, the highest of the three variables, meaning our model shows weak explanatory power of the dependent variable. Our control variables indicate similar results as earlier, with Oslo- and Helsinki-Dummy being statistically significant at the 5% level. Further, deal size is also significant at the 5% level. Thus, the model cannot prove that the market values Environmental disclosure regardless of sentiment.

Table 6. 3 *Environmental regression summary*

	Model 4	Model 5	Model 6
	(1)	(2)	(3)
e_pos	2.358610		
	(1.576529)		
e_neg		0.138921	
		(0.647519)	
sent_e			0.317839
			(0.550847)
lnage	0.000993	-0.000227	0.000035
	(0.008193)	(0.008516)	(0.008515)
lnDealSize	0.017596**	0.019460**	0.018657**
	(0.008786)	(0.009308)	(0.009326)
Intercept	-0.277680*	-0.293002*	-0.276421*
	(0.149578)	(0.149159)	(0.148903)
C(VC_Backed)[T.1]	0.005053	-0.001959	0.001131
	(0.043712)	(0.036937)	(0.036997)
C(IsBookrunner)[T.1]	0.007109	0.013361	0.014755
	(0.034133)	(0.035327)	(0.035154)
C(Copenhagen)[T.1]	-0.079115	-0.078657	-0.075720
	(0.048359)	(0.048386)	(0.048254)
C(Helsinki)[T.1]	-0.087052**	-0.097306**	-0.090040*
	(0.037462)	(0.046987)	(0.047066)
C(Oslo)[T.1]	-0.090836**	-0.094887**	-0.091780**
	(0.035869)	(0.039022)	(0.039000)
C(Stockholm)[T.1]	-0.020676	-0.022152	-0.018882
	(0.041090)	(0.040320)	(0.040219)
Observations	143	143	143
R^2	0.167674	0.147306	0.149127
Adjusted R^2	0.117983	0.096399	0.098329
Residual Std. Error	0.107600 (df=134)	0.108908 (df=134)	0.108792 (df=134)
F Statistic	9.059466*** (df=8; 134)	2.893622*** (df=8; 134)	2.935666*** (df=8; 134)
Note:			*p<0.1; **p<0.05; ***p<0.01

6.3.2 Social sentiment

Regression model (7), (8), and (9) tests sentiment variables of the Social disclosure. This includes three variables, *s_pos*, *s_neg*, and *s_sent*, resulting in three additional regression models. Table 6.4 shows that both *s_pos* and *sent_s* are statistically significant at the 10% level. Furthermore, the models' highest adjusted R^2 is 0.128, from model (7).

Table 6. 4 *Social regression summary*

	Model 7	Model 8	Model 9
	(1)	(2)	(3)
s_pos	6.099185*		
	(3.386775)		
s_neg		-1.354655	
		(1.343002)	
sent_s			2.084838*
			(1.155822)
lnage	-0.001234	0.000575	0.000635
	(0.008359)	(0.008518)	(0.008427)
lnDealSize	0.019944**	0.019797**	0.020298**
	(0.008828)	(0.009253)	(0.009180)
Intercept	-0.338543**	-0.280149*	-0.292843**
	(0.150189)	(0.147303)	(0.145893)
C(VC_Backed)[T.1]	-0.005964	-0.002869	-0.005327
	(0.042920)	(0.036701)	(0.036437)
C(IsBookrunner)[T.1]	0.012741	0.017988	0.019645
	(0.031162)	(0.035259)	(0.034895)
C(Copenhagen)[T.1]	-0.089360*	-0.075587	-0.078428
	(0.046963)	(0.048055)	(0.047618)
C(Helsinki)[T.1]	-0.100042***	-0.089797*	-0.088329*
	(0.036825)	(0.046348)	(0.045802)
C(Oslo)[T.1]	-0.108468***	-0.091921**	-0.095681**
	(0.036654)	(0.038757)	(0.038392)
C(Stockholm)[T.1]	-0.040673	-0.022844	-0.030406
	(0.041532)	(0.039954)	(0.039922)
Observations	143	143	143
R^2	0.177227	0.153441	0.167233
Adjusted R^2	0.128106	0.102900	0.117516
Residual Std. Error	0.106980 (df=134)	0.108516 (df=134)	0.107628 (df=134)
F Statistic	9.424850*** (df=8; 134)	3.035975*** (df=8; 134)	3.363671*** (df=8; 134)
Note:			*p<0.1; **p<0.05; ***p<0.01

Model (7) and (9) are weakly significant, implying only a restricted impact. Both variables have positive coefficients, indicating a positive relationship between the sentiment and underpricing. Thus, the more positive sentiments, the higher underpricing. We find similar results for the control variables as in the previous models.

6.3.3 Governance sentiment

Finally, regression models (10), (11), and (12) include independent variables relevant to Governance disclosure: *g_pos*, *g_neg*, and *sent_g*. These variables result in three additional regression models. Data from table 6.5 imply that *g_pos* and *sent_g* are statistically significant at the 1% level. Model (10) has the highest adjusted R^2 of 0.178.

Table 6. 5 *Governance regression summary*

	Model 10	Model 11	Model 12
	(1)	(2)	(3)
g_pos	21.581042***		
	(5.907785)		
g_neg		-5.263688	
		(4.775370)	
sent_g			12.564829***
			(3.834701)
lnage	-0.001200	0.001535	0.003351
	(0.008126)	(0.008622)	(0.008265)
lnDealSize	0.018286**	0.020421**	0.021414**
	(0.008848)	(0.009289)	(0.008947)
Intercept	-0.368618**	-0.259967*	-0.267236*
	(0.142491)	(0.149214)	(0.142198)
C(VC_Backed)[T.1]	0.001905	0.000483	0.004781
	(0.035111)	(0.036676)	(0.035463)
C(IsBookrunner)[T.1]	0.014576	0.016602	0.020407
	(0.033547)	(0.035094)	(0.033903)
C(Copenhagen)[T.1]	-0.095812**	-0.075130	-0.082097*
	(0.046223)	(0.048031)	(0.046388)
C(Helsinki)[T.1]	-0.105844**	-0.075105	-0.052957
	(0.044134)	(0.049538)	(0.046290)
C(Oslo)[T.1]	-0.106740***	-0.088999**	-0.089333**
	(0.037206)	(0.038943)	(0.037404)
C(Stockholm)[T.1]	-0.060222	-0.020733	-0.042848
	(0.039680)	(0.039893)	(0.039119)
Observations	143	143	143
R^2	0.224264	0.154678	0.210286
Adjusted R^2	0.177952	0.104211	0.163138
Residual Std. Error	0.103877 (df=134)	0.108437 (df=134)	0.104809 (df=134)
F Statistic	4.842401*** (df=8; 134)	3.064924*** (df=8; 134)	4.460200*** (df=8; 134)
Note:			*p<0.1; **p<0.05; ***p<0.01

Model (10) and (12) are strongly significant, implying a strong relation to the dependent variable. The coefficients of our significant variables are positive, revealing that these variables have an increasing effect on underpricing. Thus, the higher values of *g_pos* and *sent_g*, the more increase in underpricing. We find some statistically significant control variables at the 1%, 5%, and 10% levels, as seen in table 6.5.

6.4 Discussion of results

6.4.1 Discussion of ESG-term frequency results

The results reveal that only the term frequency variable of Social disclosure is statistically significant, weakly significant at that. This implies that it is likely that the Social-term frequency can affect the level of underpricing observed in the market. Furthermore, the positive coefficient indicates a positive impact, i.e., an increase in Social-term frequency results in a slight increase in underpricing. This result contradicts the Information Asymmetry models, or more specifically, the Winners Curse model. According to these models, a decrease in the knowledge gap between the informed and uninformed investors should result in a lower underpricing (Rock, 1986), whereas our results indicate the opposite. I.e., our results suggest that a reduction of the asymmetric asymmetry does not necessarily reduce idiosyncratic risk. This result in no obvious observable relationship between underpricing and idiosyncratic risk.

Regarding whether ESG term frequency has any effect on the demand of the issues, a result of how investors value ESG-oriented companies, we find no support. As our results indicate no or small effects, we cannot conclude that investor demand for the issues has affected its mispricing, consistent with Bollazzi et al (2017).

The ESG-frequency variables only measure how often the words from our word list are mentioned in the IPO prospectuses but do not include any context of the words included. However, according to Hummel & Schlick (2016), the frequency can be a good proxy of ESG policies. Consequentially, these results suggest that only including ESG disclosure without accounting for how it is communicated will only affect how the market perceives the company value to a limited extent. This indicates that the sentiment discussed in the next section might be crucial. Regarding our research question, these results do not clarify any considerable support.

6.4.2 Discussion of ESG sentiment analysis results

The ESG sentiment variables reflect the words' context, resulting in an analysis that can differentiate between a positive and negative message. Our research investigates how and to what degree these sentiments affect underpricing. Table 6.6 illustrates the significant variables and the respective models' explanatory power.

Table 6. 6 *Summary significant variables with sentiment*

Model number	**Independent variable**	**Adjusted R^2**
7	S_pos*	0.128
9	Sent_s*	0.118
10	G_pos***	0.178
12	Sent_g***	0.163

** p<.1, ** p<.05, ***p<.01*

We find that the positive information disclosed associated with the Social factor (*s_pos*), as well as the total sentiment variable (*sent_s*), are weakly significant. Furthermore, both variables have positive coefficients. These findings suggest that the variables could have a positive impact on underpricing. I.e., an increase in the number of positive words regarding Social disclosure, to some extent has a chance of increasing the level of underpricing.

The positive sentiment words under the Governance category (*g_pos*), as well as the total sentiment variable (*sent_g*), are highly statistically significant. In addition, both variables have positive coefficients. This means that an increase in *g_pos* or *sent_g*, will with a high probability increase the level of underpricing.

The positive sentiment variables and the total sentiment variables have a significant increasing impact on underpricing. This positive relationship of the significant sentiment variables and the insignificance of the remaining sentiment variables contradicts the Information asymmetry models, e.g., (Rock, 1986). This contradiction is because theory indicates that closing the knowledge gap between participants should reduce idiosyncratic risk and therefore underpricing, whereas our results cannot prove such a relationship.

Literature on ESG in IPOs suggests that including ESG in company strategy and purpose is a valuable attribute in the eyes of investors (PricewaterhouseCoopers, 2022). This is in accordance with our significant results, meaning that an increase in ESG

disclosure will increase issue demand more than expected. This excess demand can be a contributing factor to the increased underpricing, simply meaning that this is something that investors find appealing.

In accordance with the introductive analysis of Bollazzi et al (2017), our results indicate higher underpricing in companies with more extensive ESG disclosure. This indicates that an increase in ESG disclosure has an increasing effect on idiosyncratic risk. This increased idiosyncratic risk is reflected in the first-day return volatility. This makes it more difficult for underwriters to perform accurate valuations that are in accordance with the market view. The results of Bollazzi et al. (2017) are not conclusive but can be an indication of similar trends in other geographical markets.

Our models show relatively weak explanatory power for underpricing. This suggests that the dependent variable is also affected by variables not included in our analysis. Yet, we observe similar explanatory power in comparable research, such as Liu & Ritter (2009). We conclude that this is not a critical impediment for our thesis.

Underlying or external causes could further explain some aspects of our results. For example, market cycles have an effect on underpricing (Ritter, 1984). This means that our results can be affected because the market-cycle in our timeframe is not properly reflected in our current control variables. Further, words categorized as Environmental are underrepresented in the word list. This could be an additional factor in why none of the related variables has been significant.

7. Conclusion

This thesis has studied how initial ESG-disclosure can influence underpricing in IPOs. Our data consists of 143 IPOs in the Nordic markets between 2011 and 2022 (excluding Island). To investigate this relationship, we established our ESG-variables through textual analysis. We divided it into ESG term frequency and ESG sentiment to measure the impact of ESG on underpricing. The aim was to reveal any existing relationship between the two factors using a structured methodology and an academic approach.

By conducting multiple regressions on each ESG indicator, we found 5 out of 12 to be statistically significant. We did not find a statistically significant relationship between Environmental frequency nor Governance frequency with underpricing. On the other hand, we find a significant positive relationship with Social frequency. This contradicts the information asymmetry models, suggesting that more disclosure should reduce the information asymmetry between informed and uninformed investors, thus decreasing ex-ante uncertainty and further decreasing the underpricing. Additionally, a positive significant relationship suggests an increase in underpricing and idiosyncratic risk, which also contradicts the asymmetric information model. Therefore, investors seem to value disclosure about Social policies, meaning firms should be aware that disclosure about their social policies may influence underpricing.

We find a positive relationship between Governance- and Social sentiment disclosure and IPO underpricing. This suggests that an increase in positive disclosure regarding the firm's governance and social policies increases the initial first-day return. Surveys indicate that this could occur due to Nordic investors valuing positive information about ESG (PricewaterhouseCoopers, 2022), more specifically, governance and social efforts. This could explain our results since it would increase issue demand and therefore underpricing. On the other hand, we do not find evidence that there exists a relation between Environmental sentiment and underpricing. Thus, this may not be an important factor for investors in Nordic IPOs.

The statistically insignificant variables in the Environmental category support *hypothesis 1* since this factor does not affect underpricing. On the other hand, our results reflect support rejection of *hypothesis 2*. Further, the results show strong support

for rejection of *hypothesis 3*. Finally, we can reject H_0 of *hypothesis 4* and conclude that ESG disclosure impacts underpricing in the Nordic market.

We have revealed an existing relationship between ESG disclosure and underpricing, though our results are dispersed. The market values companies that disclose Social- and Governance information. We conclude that increased ESG disclosure contradicts the asymmetric information model, it may increase idiosyncratic risk, and therefore increase underpricing overall. Furthermore, investors do not show a significant interest in companies communicating their environmental practices but do show signs of increased demand for the other aspects. Regarding our research question, we can now confirm that the Social- and Governance-factor have an increasing effect on underpricing. Entrepreneurs and underwriters should consider this when conducting an IPO.

8. Limitations and further research

8.1 Limitations

The most significant limitation of our study is the limited sample size. However, it is inevitable when dealing with such a small region as the Nordic region. IPO prospectuses are more challenging to retrieve from the years before 2011 as many of these prospectuses are not digitalised.

Further, an additional limitation of our study is the way we score firms based on ESG disclosure. Because these firms are private (prior to the listing), there is no available source for ESG scores. However, we know that ESG teams are heavily involved in assessing these metrics for listings of large new firms.

The third limitation of our study is the textual analysis. The words in the prospectuses are considered out of context, meaning our scoring could very well misunderstand the message about how the firm operates ESG-wise. I.e., the ESG keywords from the word list can have different meanings in different contexts. Further, companies that don't have a positive message to share about ESG policies may instead choose to avoid discussing it, creating bias in our ESG metrics.

The final limitation is in the control variables for the final regressions. For example, we cannot test whether the underpricing is more profound in family firms or when the entrepreneur retains a large share of their initial stake in the firm. This limitation is mainly rooted in time distribution and capacity.

8.2 Further research

Further research is necessary to fully explain ESG disclosure's impact on underpricing in the Nordic market. It would be interesting to study how ESG events around the time of the listing affect the first-day return for ESG firms. Such events, for example, a big oil leak, may increase investors' awareness and thus drive up the first-day return following the event.

We also suggest a similar approach to other (and larger) markets, e.g., the U.S. or other European markets. For example, Bollazzi et al. (2017) find no statistically significant relationship between ESG disclosure and IPO underpricing in the Italian market. This

can be used to compare the effect that ESG has on underpricing across several cultures and financial markets.

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Appendix A: Data

Investment bank rankings

Year	Rank	Score	Investment Bank
2021	1	4.05	Carnegie
2021	2	3.83	Danske Bank
2021	3	3.78	SEB
2021	4	3.76	Nordea Markets
2021	5	3.74	ABG Sundal Collier
2020	1	4	Carnegie
2020	2	3.85	Danske Bank
2020	3	3.82	Nordea Markets
2020	3	3.82	SEB
2020	5	3.71	ABG Sundal Collier
2019	1	3.89	Carnegie
2019	2	3.88	SEB
2019	3	3.79	Nordea Markets
2019	4	3.75	Danske Bank
2019	5	3.62	ABG Sundal Collier
2018	1	3.92	Carnegie
2018	2	3.76	Nordea Markets
2018	2	3.76	SEB
2018	4	3.67	Danske Bank
2018	5	3.66	ABG Sundal Collier
2017	1	3.84	Carnegie
2017	2	3.77	Danske Bank
2017	3	3.74	Nordea Markets
2017	4	3.68	SEB
2017	5	3.61	ABG Sundal Collier
2016	1	4.01	Nordea Markets
2016	2	3.83	SEB
2016	3	3.81	Carnegie
2016	4	3.79	Danske Bank
2016	5	3.44	ABG Sundal Collier
2015	1	4.06	Nordea Markets
2015	2	3.88	SEB
2015	3	3.63	Danske Bank
2015	4	3.56	Carnegie
2015	5	3.47	ABG Sundal Collier
2014	1	4.03	Nordea Markets
2014	2	3.77	SEB

2014	3	3.63	Carnegie
2014	4	3.44	Danske Bank
2014	5	3.43	ABG Sundal Collier
2013	1	3.82	SEB
2013	2	3.79	Nordea Markets
2013	3	3.66	Carnegie
2013	4	3.53	Handelsbanken
2013	5	3.5	ABG Sundal Collier
2012	1	4.02	SEB
2012	2	3.76	Handelsbanken
2012	3	3.7	Nordea Markets
2012	4	3.63	ABG Sundal Collier
2012	5	3.61	Carnegie
2011	1	3.95	SEB
2011	2	3.85	Handelsbanken
2011	3	3.84	Carnegie
2011	4	3.75	Nordea Markets
2011	5	3.66	ABG Sundal Collier

Regressions

Model 1

Dep. Variable:	lnUnderpricing	**R-squared:**	0.153
Model:	OLS	**Adj. R-squared:**	0.102
Method:	Least Squares	**F-statistic:**	3.026
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00372
Time:	08:58:07	**Log-Likelihood:**	119.28
No. Observations:	143	**AIC:**	-220.6
Df Residuals:	134	**BIC:**	-193.9
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.3100	0.149	-2.083	0.039	-0.604	-0.016
C(VC_Backed)[T.1]	-0.0034	0.037	-0.092	0.927	-0.076	0.069
C(Copenhagen)[T.1]	-0.0751	0.048	-1.561	0.121	-0.170	0.020
C(Helsinki)[T.1]	-0.1043	0.047	-2.223	0.028	-0.197	-0.012
C(Oslo)[T.1]	-0.1008	0.039	-2.563	0.011	-0.179	-0.023
C(Stockholm)[T.1]	-0.0298	0.041	-0.729	0.467	-0.111	0.051
C(IsBookrunner)[T.1]	0.0115	0.035	0.326	0.745	-0.058	0.081
e_freq	-3.001e-05	3.09e-05	-0.973	0.332	-9.1e-05	3.1e-05
lnage	-8.409e-05	0.008	-0.010	0.992	-0.017	0.017
lnDealSize	0.0209	0.009	2.228	0.028	0.002	0.040

Omnibus:	5.011	**Durbin-Watson:**	2.143
Prob(Omnibus):	0.082	**Jarque-Bera (JB):**	4.533
Skew:	0.415	**Prob(JB):**	0.104
Kurtosis:	3.270	**Cond. No.**	2.23e+18

Model 2

Dep. Variable:	lnUnderpricing	**R-squared:**	0.167
Model:	OLS	**Adj. R-squared:**	0.117
Method:	Least Squares	**F-statistic:**	3.354
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00156
Time:	08:58:07	**Log-Likelihood:**	120.46
No. Observations:	143	**AIC:**	-222.9
Df Residuals:	134	**BIC:**	-196.3
Df Model:	8		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	-0.2510	0.147	-1.703	0.091	-0.543	0.040
C(VC_Backed)[T.1]	-0.0056	0.036	-0.155	0.877	-0.078	0.066
C(Copenhagen)[T.1]	-0.0722	0.048	-1.513	0.133	-0.167	0.022
C(Helsinki)[T.1]	-0.0830	0.046	-1.797	0.075	-0.174	0.008
C(Oslo)[T.1]	-0.0845	0.039	-2.179	0.031	-0.161	-0.008
C(Stockholm)[T.1]	-0.0114	0.040	-0.285	0.776	-0.090	0.068
C(IsBookrunner)[T.1]	0.0199	0.035	0.569	0.570	-0.049	0.089
s_freq	7.226e-05	4.05e-05	1.786	0.076	-7.75e-06	0.000
lnage	-0.0012	0.008	-0.145	0.885	-0.018	0.015
lnDealSize	0.0161	0.009	1.724	0.087	-0.002	0.035

Omnibus:	5.887	**Durbin-Watson:**	2.104
Prob(Omnibus):	0.053	**Jarque-Bera (JB):**	5.409
Skew:	0.432	**Prob(JB):**	0.0669
Kurtosis:	3.403	**Cond. No.**	2.88e+18

Model 3

Dep. Variable:	lnUnderpricing	**R-squared:**	0.147
Model:	OLS	**Adj. R-squared:**	0.096
Method:	Least Squares	**F-statistic:**	2.893
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00526
Time:	08:58:07	**Log-Likelihood:**	118.80
No. Observations:	143	**AIC:**	-219.6
Df Residuals:	134	**BIC:**	-192.9
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.3057	0.170	-1.802	0.074	-0.641	0.030
C(VC_Backed)[T.1]	-0.0011	0.037	-0.030	0.976	-0.074	0.072
C(Copenhagen)[T.1]	-0.0808	0.050	-1.601	0.112	-0.181	0.019
C(Helsinki)[T.1]	-0.0998	0.051	-1.965	0.051	-0.200	0.001
C(Oslo)[T.1]	-0.0986	0.045	-2.212	0.029	-0.187	-0.010
C(Stockholm)[T.1]	-0.0265	0.048	-0.557	0.578	-0.120	0.068
C(IsBookrunner)[T.1]	0.0136	0.035	0.385	0.701	-0.056	0.083
g_freq	-5.279e-06	2.55e-05	-0.207	0.836	-5.57e-05	4.51e-05
lnage	-0.0003	0.009	-0.040	0.969	-0.017	0.017
lnDealSize	0.0207	0.011	1.802	0.074	-0.002	0.043

Omnibus:	5.540	**Durbin-Watson:**	2.133
Prob(Omnibus):	0.063	**Jarque-Bera (JB):**	5.072
Skew:	0.437	**Prob(JB):**	0.0792
Kurtosis:	3.296	**Cond. No.**	1.59e+19

Model 4

Dep. Variable:	lnUnderpricing	**R-squared:**	0.168
Model:	OLS	**Adj. R-squared:**	0.118
Method:	Least Squares	**F-statistic:**	9.059
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	1.28e-10
Time:	08:58:07	**Log-Likelihood:**	120.53
No. Observations:	143	**AIC:**	-223.1
Df Residuals:	134	**BIC:**	-196.4
Df Model:	8		
Covariance Type:	HC1		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-0.2777	0.150	-1.856	0.063	-0.571	0.015
C(VC_Backed)[T.1]	0.0051	0.044	0.116	0.908	-0.081	0.091
C(Copenhagen)[T.1]	-0.0791	0.048	-1.636	0.102	-0.174	0.016
C(Helsinki)[T.1]	-0.0871	0.037	-2.324	0.020	-0.160	-0.014
C(Oslo)[T.1]	-0.0908	0.036	-2.532	0.011	-0.161	-0.021
C(Stockholm)[T.1]	-0.0207	0.041	-0.503	0.615	-0.101	0.060
C(IsBookrunner)[T.1]	0.0071	0.034	0.208	0.835	-0.060	0.074
e_pos	2.3586	1.577	1.496	0.135	-0.731	5.449
lnage	0.0010	0.008	0.121	0.904	-0.015	0.017
lnDealSize	0.0176	0.009	2.003	0.045	0.000	0.035

Omnibus:	2.411	**Durbin-Watson:**	2.155
Prob(Omnibus):	0.300	**Jarque-Bera (JB):**	2.324
Skew:	0.310	**Prob(JB):**	0.313
Kurtosis:	2.919	**Cond. No.**	1.33e+17

Model 5

Dep. Variable:	lnUnderpricing	**R-squared:**	0.147
Model:	OLS	**Adj. R-squared:**	0.096
Method:	Least Squares	**F-statistic:**	2.894
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00526
Time:	08:58:07	**Log-Likelihood:**	118.81
No. Observations:	143	**AIC:**	-219.6
Df Residuals:	134	**BIC:**	-192.9
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.2930	0.149	-1.964	0.052	-0.588	0.002
C(VC_Backed)[T.1]	-0.0020	0.037	-0.053	0.958	-0.075	0.071
C(Copenhagen)[T.1]	-0.0787	0.048	-1.626	0.106	-0.174	0.017
C(Helsinki)[T.1]	-0.0973	0.047	-2.071	0.040	-0.190	-0.004
C(Oslo)[T.1]	-0.0949	0.039	-2.432	0.016	-0.172	-0.018
C(Stockholm)[T.1]	-0.0222	0.040	-0.549	0.584	-0.102	0.058
C(IsBookrunner)[T.1]	0.0134	0.035	0.378	0.706	-0.057	0.083
e_neg	0.1389	0.648	0.215	0.830	-1.142	1.420
lnage	-0.0002	0.009	-0.027	0.979	-0.017	0.017
lnDealSize	0.0195	0.009	2.091	0.038	0.001	0.038

Omnibus:	5.681	**Durbin-Watson:**	2.129
Prob(Omnibus):	0.058	**Jarque-Bera (JB):**	5.220
Skew:	0.444	**Prob(JB):**	0.0735
Kurtosis:	3.298	**Cond. No.**	1.19e+17

Model 6

Dep. Variable:	lnUnderpricing	**R-squared:**	0.149
Model:	OLS	**Adj. R-squared:**	0.098
Method:	Least Squares	**F-statistic:**	2.936
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00471
Time:	08:58:08	**Log-Likelihood:**	118.96
No. Observations:	143	**AIC:**	-219.9
Df Residuals:	134	**BIC:**	-193.3
Df Model:	8		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	-0.2764	0.149	-1.856	0.066	-0.571	0.018
C(VC_Backed)[T.1]	0.0011	0.037	0.031	0.976	-0.072	0.074
C(Copenhagen)[T.1]	-0.0757	0.048	-1.569	0.119	-0.171	0.020
C(Helsinki)[T.1]	-0.0900	0.047	-1.913	0.058	-0.183	0.003
C(Oslo)[T.1]	-0.0918	0.039	-2.353	0.020	-0.169	-0.015
C(Stockholm)[T.1]	-0.0189	0.040	-0.469	0.639	-0.098	0.061
C(IsBookrunner)[T.1]	0.0148	0.035	0.420	0.675	-0.055	0.084
sent_e	0.3178	0.551	0.577	0.565	-0.772	1.407
lnage	3.507e-05	0.009	0.004	0.997	-0.017	0.017
lnDealSize	0.0187	0.009	2.001	0.047	0.000	0.037

Omnibus:	5.144	**Durbin-Watson:**	2.115
Prob(Omnibus):	0.076	**Jarque-Bera (JB):**	4.670
Skew:	0.421	**Prob(JB):**	0.0968
Kurtosis:	3.273	**Cond. No.**	1.59e+17

Model 7

Dep. Variable:	lnUnderpricing	**R-squared:**	0.177
Model:	OLS	**Adj. R-squared:**	0.128
Method:	Least Squares	**F-statistic:**	9.425
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	5.02e-11
Time:	08:58:08	**Log-Likelihood:**	121.36
No. Observations:	143	**AIC:**	-224.7
Df Residuals:	134	**BIC:**	-198.1
Df Model:	8		
Covariance Type:	HC1		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-0.3385	0.150	-2.254	0.024	-0.633	-0.044
C(VC_Backed)[T.1]	-0.0060	0.043	-0.139	0.889	-0.090	0.078
C(Copenhagen)[T.1]	-0.0894	0.047	-1.903	0.057	-0.181	0.003
C(Helsinki)[T.1]	-0.1000	0.037	-2.717	0.007	-0.172	-0.028
C(Oslo)[T.1]	-0.1085	0.037	-2.959	0.003	-0.180	-0.037
C(Stockholm)[T.1]	-0.0407	0.042	-0.979	0.327	-0.122	0.041
C(IsBookrunner)[T.1]	0.0127	0.031	0.409	0.683	-0.048	0.074
s_pos	6.0992	3.387	1.801	0.072	-0.539	12.737
lnage	-0.0012	0.008	-0.148	0.883	-0.018	0.015
lnDealSize	0.0199	0.009	2.259	0.024	0.003	0.037

Omnibus:	2.818	**Durbin-Watson:**	2.108
Prob(Omnibus):	0.244	**Jarque-Bera (JB):**	2.532
Skew:	0.325	**Prob(JB):**	0.282
Kurtosis:	3.059	**Cond. No.**	1.23e+17

Model 8

Dep. Variable:	lnUnderpricing	**R-squared:**	0.153
Model:	OLS	**Adj. R-squared:**	0.103
Method:	Least Squares	**F-statistic:**	3.036
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00362
Time:	08:58:08	**Log-Likelihood:**	119.32
No. Observations:	143	**AIC:**	-220.6
Df Residuals:	134	**BIC:**	-194.0
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.2801	0.147	-1.902	0.059	-0.571	0.011
C(VC_Backed)[T.1]	-0.0029	0.037	-0.078	0.938	-0.075	0.070
C(Copenhagen)[T.1]	-0.0756	0.048	-1.573	0.118	-0.171	0.019
C(Helsinki)[T.1]	-0.0898	0.046	-1.937	0.055	-0.181	0.002
C(Oslo)[T.1]	-0.0919	0.039	-2.372	0.019	-0.169	-0.015
C(Stockholm)[T.1]	-0.0228	0.040	-0.572	0.568	-0.102	0.056
C(IsBookrunner)[T.1]	0.0180	0.035	0.510	0.611	-0.052	0.088
s_neg	-1.3547	1.343	-1.009	0.315	-4.011	1.302
lnage	0.0006	0.009	0.067	0.946	-0.016	0.017
lnDealSize	0.0198	0.009	2.140	0.034	0.001	0.038

Omnibus:	5.600	**Durbin-Watson:**	2.096
Prob(Omnibus):	0.061	**Jarque-Bera (JB):**	5.126
Skew:	0.437	**Prob(JB):**	0.0771
Kurtosis:	3.309	**Cond. No.**	1.14e+17

Model 9

Dep. Variable:	lnUnderpricing	**R-squared:**	0.167
Model:	OLS	**Adj. R-squared:**	0.118
Method:	Least Squares	**F-statistic:**	3.364
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00152
Time:	08:58:08	**Log-Likelihood:**	120.50
No. Observations:	143	**AIC:**	-223.0
Df Residuals:	134	**BIC:**	-196.3
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.2928	0.146	-2.007	0.047	-0.581	-0.004
C(VC_Backed)[T.1]	-0.0053	0.036	-0.146	0.884	-0.077	0.067
C(Copenhagen)[T.1]	-0.0784	0.048	-1.647	0.102	-0.173	0.016
C(Helsinki)[T.1]	-0.0883	0.046	-1.928	0.056	-0.179	0.002
C(Oslo)[T.1]	-0.0957	0.038	-2.492	0.014	-0.172	-0.020
C(Stockholm)[T.1]	-0.0304	0.040	-0.762	0.448	-0.109	0.049
C(IsBookrunner)[T.1]	0.0196	0.035	0.563	0.574	-0.049	0.089
sent_s	2.0848	1.156	1.804	0.074	-0.201	4.371
lnage	0.0006	0.008	0.075	0.940	-0.016	0.017
lnDealSize	0.0203	0.009	2.211	0.029	0.002	0.038

Omnibus:	4.040	**Durbin-Watson:**	2.073
Prob(Omnibus):	0.133	**Jarque-Bera (JB):**	3.608
Skew:	0.378	**Prob(JB):**	0.165
Kurtosis:	3.183	**Cond. No.**	1.05e+17

Model 10

Dep. Variable:	lnUnderpricing	**R-squared:**	0.224
Model:	OLS	**Adj. R-squared:**	0.178
Method:	Least Squares	**F-statistic:**	4.842
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	2.95e-05
Time:	08:58:08	**Log-Likelihood:**	125.57
No. Observations:	143	**AIC:**	-233.1
Df Residuals:	134	**BIC:**	-206.5
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.3686	0.142	-2.587	0.011	-0.650	-0.087
C(VC_Backed)[T.1]	0.0019	0.035	0.054	0.957	-0.068	0.071
C(Copenhagen)[T.1]	-0.0958	0.046	-2.073	0.040	-0.187	-0.004
C(Helsinki)[T.1]	-0.1058	0.044	-2.398	0.018	-0.193	-0.019
C(Oslo)[T.1]	-0.1067	0.037	-2.869	0.005	-0.180	-0.033
C(Stockholm)[T.1]	-0.0602	0.040	-1.518	0.131	-0.139	0.018
C(IsBookrunner)[T.1]	0.0146	0.034	0.435	0.665	-0.052	0.081
g_pos	21.5810	5.908	3.653	0.000	9.896	33.266
lnage	-0.0012	0.008	-0.148	0.883	-0.017	0.015
lnDealSize	0.0183	0.009	2.067	0.041	0.001	0.036

Omnibus:	3.345	**Durbin-Watson:**	1.999
Prob(Omnibus):	0.188	**Jarque-Bera (JB):**	3.002
Skew:	0.351	**Prob(JB):**	0.223
Kurtosis:	3.102	**Cond. No.**	1.06e+17

Model 11

Dep. Variable:	lnUnderpricing	**R-squared:**	0.155
Model:	OLS	**Adj. R-squared:**	0.104
Method:	Least Squares	**F-statistic:**	3.065
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	0.00335
Time:	08:58:08	**Log-Likelihood:**	119.43
No. Observations:	143	**AIC:**	-220.9
Df Residuals:	134	**BIC:**	-194.2
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.2600	0.149	-1.742	0.084	-0.555	0.035
C(VC_Backed)[T.1]	0.0005	0.037	0.013	0.990	-0.072	0.073
C(Copenhagen)[T.1]	-0.0751	0.048	-1.564	0.120	-0.170	0.020
C(Helsinki)[T.1]	-0.0751	0.050	-1.516	0.132	-0.173	0.023
C(Oslo)[T.1]	-0.0890	0.039	-2.285	0.024	-0.166	-0.012
C(Stockholm)[T.1]	-0.0207	0.040	-0.520	0.604	-0.100	0.058
C(IsBookrunner)[T.1]	0.0166	0.035	0.473	0.637	-0.053	0.086
g_neg	-5.2637	4.775	-1.102	0.272	-14.709	4.181
lnage	0.0015	0.009	0.178	0.859	-0.016	0.019
lnDealSize	0.0204	0.009	2.198	0.030	0.002	0.039

Omnibus:	6.283	**Durbin-Watson:**	2.151
Prob(Omnibus):	0.043	**Jarque-Bera (JB):**	5.842
Skew:	0.465	**Prob(JB):**	0.0539
Kurtosis:	3.340	**Cond. No.**	1.36e+17

Model 12

Dep. Variable:	lnUnderpricing	**R-squared:**	0.210
Model:	OLS	**Adj. R-squared:**	0.163
Method:	Least Squares	**F-statistic:**	4.460
Date:	Tue, 21 Jun 2022	**Prob (F-statistic):**	8.14e-05
Time:	08:58:08	**Log-Likelihood:**	124.29
No. Observations:	143	**AIC:**	-230.6
Df Residuals:	134	**BIC:**	-203.9
Df Model:	8		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-0.2672	0.142	-1.879	0.062	-0.548	0.014
C(VC_Backed)[T.1]	0.0048	0.035	0.135	0.893	-0.065	0.075
C(Copenhagen)[T.1]	-0.0821	0.046	-1.770	0.079	-0.174	0.010
C(Helsinki)[T.1]	-0.0530	0.046	-1.144	0.255	-0.145	0.039
C(Oslo)[T.1]	-0.0893	0.037	-2.388	0.018	-0.163	-0.015
C(Stockholm)[T.1]	-0.0428	0.039	-1.095	0.275	-0.120	0.035
C(IsBookrunner)[T.1]	0.0204	0.034	0.602	0.548	-0.047	0.087
sent_g	12.5648	3.835	3.277	0.001	4.980	20.149
lnage	0.0034	0.008	0.405	0.686	-0.013	0.020
lnDealSize	0.0214	0.009	2.394	0.018	0.004	0.039

Omnibus:	3.486	**Durbin-Watson:**	2.112
Prob(Omnibus):	0.175	**Jarque-Bera (JB):**	3.190
Skew:	0.364	**Prob(JB):**	0.203
Kurtosis:	3.068	**Cond. No.**	2.01e+17