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The Influence of ESG Disclosure on the Underpricing and Financial Performance of Initial Public Offerings: U.S. Evidence

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ABSTRACT:
The importance of environmental, social, and governance (ESG) practices in financial activities has been gaining attention in global markets. However, only a few studies have researched the effects of firms' ESG issues on initial public offering (IPO) valuation and performance. This thesis investigates the influence of ESG factors on IPO underpricing and operating performance in the United States stock markets. This thesis utilises natural language processing (NLP) techniques for text mining and analytics to create ESG variables based on prospectuses from IPOs obtained from the centralised EDGAR database. The data covers a five-year period from 2016 to 2020. The measures are split into the frequency of terms and the sentiment of language used in the ESG context, which would implicate the attitude and interest towards ESG. Furthermore, this study employs OLS regression models to investigate the influence of ESG factors, along with control variables on two dependent variables: underpricing and return on assets, the latter serving as an indicator of operating performance.

The results suggest that companies with strong governance practices encounter higher levels of underpricing and are perceived as high-quality issuers. Companies with higher environmental sentiment tend to have higher levels of underpricing, while those with higher social and governance sentiment experience lower levels. Moreover, the thesis demonstrates that negative sentiment scores in environmental issues are associated with lower levels of underpricing in IPOs when examined with other ESG variables. In comparison, higher negative sentiment scores in social and governance issues tend to lead to higher levels of underpricing, mainly when tested with the negative score variable of environmental issues. However, the importance of these negative sentiment variables reduces when evaluated as lone ESG variables in regression models. This study demonstrates that environmental terminology positively impacts operational performance while using social terms has a negative influence. The findings suggest that stakeholders value the environmental context more as it is perceived as forward-thinking. In contrast, using social terms may be perceived as diminishing the company's value in the context of IPO disclosures. These results have implications for companies seeking to enhance their operational performance and effectively communicate to stakeholders in the context of an IPO.

The findings reveal the significant implications of using ESG terms in IPO disclosures, as they could inform stakeholders for investment decisions and the development of ESG policies and practices. As there are limitations to the methodology, the thesis provides new insights into the ESG factors' relationship with IPO underpricing and operating performance. Additionally, this highlights the importance of terms and sentiment of ESG context in IPO disclosures.

KEYWORDS: initial public offering, IPO, natural language processing, NLP, text analysis, environmental, social, governance, ESG, operative performance, underpricing

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TIIVISTELMÄ:
Ympäristö-, sosiaalisten ja hallinnollisten (ESG) tekijöiden integraation merkitys finanssitoiminnassa on herättänyt huomiota kansainvälisillä markkinoilla. Kuitenkin yritysten ESG-kysymysten vaikutuksia listautumisannin (IPO) arvostukseen ja suorituskykyyn on tutkittu vain vähän. Tässä pro gradu -tutkielmassa selvitetään ESG-tekijöiden vaikutuksia julkisen listautumisannin alihinnoitteluun ja operatiiviseen suorituskykyyn Yhdysvaltain osakemarkkinoilla. Tutkimuksessa hyödynnettiin luonnollisen kielen käsittelyn (NLP) menetelmiä ESG-muuttujien rakentamisessa tekstilouhinnan sekä analytiikan avulla. Tutkimusaineistona käytettiin yritysten listautumisesitteitä. Aineisto kerättiin EDGAR-tietokannasta viiden vuoden ajalta vuosilta 2016–2020. Mittaukset jaettiin termien esiintymistiheyden ja ESG-kontekstissa käytetyn kielen sentimentin mukaan, jotka antaisivat selityksen asenteille ja kiinnostukselle ESG:tä kohtaan. Tämä tutkimus hyödyntää OLS regressiomalleja selvittääkseen ESG-tekijöiden sekä kontrollimuuttujien vaikutusta kahteen riippuvaan muuttujaan: alihinnoitteluun ja koko pääoman tuottoasteeseen (ROA), joka toimii operatiivisen suorituskyvyn mittarina.

Tutkimustuloksena havaittiin, että yritykset, joilla on vahva hallinnointikäytäntö kohtaavat korkeampaa alihinnoittelua, ja ne mielletään laadukkaiksi liikkeeseenlaskijoiksi. Yritykset, joilla on korkeampi ympäristösentimentti, on taipumus korkeampaan alihinnoitteluun, kun taas yritykset, joilla on korkeampi sosiaalinen ja hallinnollinen sentimentti kokevat matalampaa alihinnoittelua. Tutkimustulokset osoittavat myös, että negatiiviset sentimenttisävyt ympäristökysymyksissä ovat yhteydessä alhaisempiin alihinnoittelutasoihin listautumisannissa, kun tarkastellaan yhdessä muiden ESG-muuttujien kanssa. Toisaalta korkeammat negatiiviset sentimenttisävypisteet sosiaalisissa ja hallinnollisissa kysymyksissä johtavat usein korkeampiin alihinnoittelutasoihin, erityisesti kun niitä testataan ympäristökysymysten negatiivisen pistemäärän muuttujalla. Kuitenkin näiden negatiivisten sentimenttimuuttujien merkitys vähenee, kun niitä arvioidaan yksittäisinä ESG-muuttujina joissakin regressiomalleissa. Lisäksi tutkimus osoittaa, että ympäristöterminologian käytöllä on positiivinen vaikutus operatiiviseen suorituskykyyn, kun taas sosiaalisten termien käyttö vaikuttaa negatiivisesti. Tulokset viittaavat siihen, että sidosryhmät arvostavat enemmän ympäristökontekstia, koska se voidaan kokea edistyksellisenä. Sosiaalisten termien käyttö saattaa puolestaan heikentää yrityksen arvoa listautumisannin yhteydessä. Nämä tulokset ovat merkityksellisiä yrityksille, jotka pyrkivät parantamaan operatiivista suorituskykyään sekä viestimään tehokkaasti sidosryhmilleen listautumiskontekstissa. Tutkimustulokset kertovat ESG-termien ja sentimenttisävyjen merkittävistä vaikutuksista listautumisesitteissä. Näiden pohjalta sidosryhmät saavat tietoa sijoituspäätösten ja ESG-käytäntöjen kehittämisen tueksi. Tutkimusmenetelmän rajoitteista huolimatta tutkimus tarjoaa uusia näkökulmia ESG-tekijöiden suhteesta listautumisannin alihinnoitteluun sekä operatiivisen suorituskykyyn. Lisäksi tutkimus korostaa ESG-kontekstin terminologian ja sävyn merkitystä listautumisesitteissä.

AVAINSANAT: listautumisanti, luonnollisen kielen prosessointi, tekstianalyysi, ympäristövastuu, yhteiskuntavastuu, hyvä hallintotapa, operatiivinen suorituskyky, alihinnoittelu

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1 Introduction

The phenomenon of sustainability and socially responsible investments has gained momentum worldwide. According to the Forum for Sustainable and Responsible Investment (2020), sustainable investing assets reached 17.1 trillion dollars in the United States. In Europe, the European Fund and Asset Management Association (2021) reported that at the end of the first quarter of 2021, the asset management industry applied an environmental, social and governance (ESG) investment strategy to about 11 trillion euros of assets. In addition, a study by Amel-Zadeh and Serafeim (2018) shows that around 82% of 650 global institutional investors used ESG information when making investment decisions. The trend shows a shift towards sustainable investments and deeper investments in ESG integration.

In many aspects, sustainability and responsible investing are megatrends in the research department of scholars. Mainly the research is done on public data disclosed by the companies or sustainability rating agencies. The disclosure in question raises concerns about private companies, which are not required to be as transparent as publicly listed companies. This, in turn, highlights the issue of information asymmetry. How does an investor know how responsible and sustainable a company is? The information is provided by companies or rating agencies primarily using publicly disclosed company data. Companies are private before listing in an initial public offering (IPO) process. Thus, corporate social responsibility (CSR) or ESG information is only available if private companies have disclosed their information of free will. When a company lists in the market, the IPO S-1 filings and prospectus can be useful for analysis. These documents serve as investment materials, providing investors with a preliminary understanding of the company's business model and financial performance, and explaining why investing in the company may be an optimal decision. (Loughran & McDonald, 2013). The disclosures can also provide insight towards the ESG and CSR practices of the listing firms.

Investors are growingly more socially aware of their investment decisions; thus, IPOs might have to integrate ESG and CSR strategies into the business plan to gain new owners

from the market. S-1 filings have many intangible details, which assist the investor see the future of the business and possible risks related to its activities. IPO filings and disclosures can characterise the position of a company in its industry, confidence in the business strategy and message of positive financial outcomes. However, uncertainty can raise risk levels, making the IPOs risky investments and bringing many challenges for the investors to evaluate the hazards around the IPOs and their potential developments.

1.1 Purpose of the Study

The objective of this thesis is to examine whether there is a relationship between the language and tone of S-1 filings regarding ESG practices and the performance and underpricing of IPOs. The study will use a natural language processing (NLP) approach with textual analysis that will be less prone to human error and less time-consuming than going through the filings individually. To supplement this study, a term vocabulary of ESG and CSR-related terms will be generated by analysing other relevant studies. This approach will enable the identification of the frequency with which such terms are used in S-1 filings. Additionally, sentiment analysis will be conducted on the filings to ascertain whether the sentiment expressed towards ESG is positive or negative. Subsequently, the paper aims to examine whether there exist any relationships among dependent variables, such as the frequency or the sentiment of ESG terms, with respect to the underpricing and firm performance of IPOs. The obtained information can help determine the extent to which investors prioritise ESG-related aspects of a firm during the IPO disclosure processing stage.

The study by Beatty and Ritter (1986) demonstrated a dependence between uncertainty about the value of IPOs and their expected initial returns. Uncertainty can depend on the language used in the prospectus and the message the IPO sends investors about the company. Loughran and McDonald (2013) use the previously mentioned finding in their study; they analyse the language of S-1 forms and filings of firms from the United States planning to go public in the market. They use natural language processing (NLP) methods to determine if the tone of S-1 filings influences the valuation of IPOs. The study by Ferris,

Hao, and Liao (2013) also uses similar methods in natural language processing method on IPO prospectuses. These previous studies open a framework for using NLP to create more studies analysing languages' sentiments and seeing their impact on financial markets.

Since sustainable and responsible investing has been a growing trend, as mentioned earlier, the previous studies open a lane where the language related to ESG, and CSR issues can be analysed to benefit investors. Currently, analysing a company's stance on sustainability is a priority in many investment strategies. Therefore, it is crucial to investigate how IPOs handle sustainability issues and what message they may be sending. Studies related to CSR/ESG and IPO links, such as Bollazzi, Risalvato, and Zanatta (2017), analysed the Italian IPOs' reports by manually collecting and scoring different ESG and CSR activities of firms. Huang, Xiang, Liu, Su, and Qiu (2019) conducted a similar investigation by gathering CSR data from Chinese IPOs through manual means and subsequently subjecting them to a scoring procedure. Nevertheless, such approaches are uncommon in contemporary research methodologies due to being prone to human errors, thus possibly producing bias in the data collection and scoring processes. There are also studies related to the IPO and sustainability field where Reber, Gold and Gold (2021) analyse the firm-specific risk with ESG disclosure information comparing voluntary and non-voluntary ESG disclosure companies, while Baker, Boulton, Braga-Alves, and Morey (2021) analyse the ESG governmental risk, through ESG governmental ratings and its effect on international IPO underpricing.

Previous studies by Ferris et al. (2013) also Loughran and McDonald (2013) have investigated the effects of the tone of S-1 filings and prospectuses on the pricing, volatility, and IPO performance. Guldiken, Tupper, Nair, and Yu (2017) analyse the tone of media coverage's impact on the IPO market performance and its implications. The studies perform the research through natural language methods of textual analysis. The previous studies have provided a framework for future research on the uncertainty of initial public offerings. Nevertheless, there has yet to be much research on IPOs relating to ESG/CSR

sentiments using these methods in the IPO disclosures, even in the fast-growing environment of the sustainability and responsibility issues for firms. Studies like Reber et al. (2021) show that the more ESG disclosures, the lower risk of an IPO. This can be interpreted as lowering uncertainty relating to information asymmetry; less information makes it difficult for an investor to estimate if an IPO is a high or low value (Kao & Chen, 2020). Therefore, more ESG disclosures would give the investor additional information for determining whether to invest in a distinct IPO.

S-1 filings and prospectuses can be a vital tool for investors to perform due diligence on the background of sustainable and responsible activity of these companies before investing in them. This study will contribute to the IPO and sustainable and responsible investing field of research. The paper sees natural language processing as an essential tool for processing significant amounts of data for analysis, constructing themes and trends, information that investors can use and possibly mitigating information asymmetry between stakeholders. The current possibilities are only the tip of the iceberg with the rapid growth of data. This study does not behave as an alternative for measuring the effectiveness of a company's sustainability and responsibility due to the qualitative nature of the problem and the data collection method. There is not enough thorough information from most companies on their activities previously and currently, thus raising difficulties in completing the most optimum "metric".

1.2 Hypothesis Development

This study has developed four hypotheses and a research question through the conducted literature review, which draws on relevant previous research. The research question focuses on whether investors truly value ESG issues when considering a company. Specifically, the study seeks to explore the following question, based on the findings from the literature review:

“Do the investors care about ESG topics in initial public offerings?”

To develop the hypotheses, the thesis commences by referring to the work of Ferris, Hao, and Liao (2013), as well as that of Loughran and McDonald (2013). These studies are some of the earliest to utilise text analysis algorithms in analysing the language sentiment present in prospectuses that could potentially impact the performance of IPOs.

According to Ferris et al. (2013), conservatism exhibits a positive relationship with the underpricing of IPOs. However, it is inversely associated with the ability to predict the longer-term operating performance of the firm. Conservatism measures negative words over total words taken from different dictionaries. The study by Loughran and McDonald (2013) confirms that negative words produce higher first-day returns and higher after-market volatility. This study suggests that negative words increase uncertainty about an IPO's prospect. Reber et al. (2021) found that a company that completes a more robust voluntary ESG disclosure lower the risk levels related to the IPO's performance. The previous research extends the studies by Beatty and Ritter (1986) and Beatty and Welch (1996), investigating voluntary disclosures' effects on earnings forecasts. The study by Baker et al. (2021) finds that underpricing tends to be lower in countries with higher ESG governmental ratings. In this thesis, the utilisation of textual analysis, specifically with sentiment analysis related to ESG terms, can reveal the degree of uncertainty regarding a firm's sustainability and responsibility. Prior research suggests that such ESG-related uncertainty could lead to significant implications for the underpricing of IPOs. Furthermore, another viewpoint can be formulated on how ESG terms are presented in a prospectus. For instance, do a greater number of ESG terms alleviate the uncertainty surrounding an IPO? Does more information related to ESG reduce associated risk? Or does the frequency of such terms indicate the quality of the firm being listed? Does the tone of the language in ESG practices signal caution? The results of the study will help identify which ESG-related terms are more important for investors, specifically whether those pertaining to environment, social or governance issues. With the previous research and discussion, this study provides two hypotheses that the research for underpricing will be based on:

H_1: “The frequency of ESG terms in a firm’s S-1 filings affects the underpricing of an IPO.”

H_2: “The sentiment of ESG-context in a firm’s S-1 filings affects the underpricing of an IPO.”

The thesis presents a robust analysis of post-IPO financial performance by measuring the effects on operating performance, providing a comprehensive outlook on the implications of ESG terms and sentiment scores derived from NLP. A study by Platonova, Asutay, Dixon and Mohammad (2018) found a positive correlation between CSR disclosure and Gulf Cooperation Council (GCC) Islamic banks' future financial performance. Reber et al. (2021) find a better risk performance in IPOs with higher disclosure of ESG. When dividing CSR information into social and environmental information, they see the significant positive market effect on the social information with the holding period returns. The previous works of literature led to the that this thesis could implicate more robust evidence on the post-IPO performance by creating a hypothesis related to the operating performance of IPOs with relation to the sentiment tone of ESG-context. This study will extend the use of operating performance measures from Ferris et al. (2013), as they find that conservatism is inversely related to operating performance. Nirino, Santoro, Miglietta, and Quaglia's (2021) find that controversies towards that would lower financial performance. However, the adverse effects can be lowered by activities which protect the environment and community. With the previously discussed studies, the study constructs the following third and fourth hypotheses, which are like the first two hypotheses, however, with the focus on return on assets (ROA):

H_3: “The frequency of ESG terms in a firm’s S-1 filings affects the post-IPO operating performance.”

H_4: “The sentiment of ESG-context in a firm’s S-1 filings affects the post-IPO operating performance.”

1.3 Possible Contribution

The contribution of this thesis to literature has multiple implications; as investors are growing their interest towards sustainable and responsible investing, this raises demand for additional disclosures and information about investment instruments. In addition, the effects of ESG and CSR on IPOs have not been studied extensively; thus, this study will complement the finding of limited previous studies that examine the impact of ESG and CSR disclosure on IPO pricing and performances (see Huang et al., 2019; Baker et al., 2021; Reber et al., 2021; Fu, Yu, & Zhou, 2022).

The approaches and determinations of the study will also complement the results and NLP methods of Ferris et al. (2013), where the methods coincide with the study of Loughran and McDonald (2013). Furthermore, this thesis will extend the studies with a different viewpoint by analysing the impact of ESG frequency and sentiment in S-1 filings on IPO performance and underpricing. Finally, the thesis provides a framework and motivation for future finance and accounting studies to use NLP and additional algorithmic-based tools in respective examinations to handle and process large datasets.

Finally, the research in this study has constructed an ESG term list vocabulary for text mining within the NLP methods of extracting data. This vocabulary includes terms and keywords complying with multiple literature sources (see Baier, Berninger & Kiesel, 2020; Silvola & Landau, 2021; Cochardt, Heller & Orlov, 2022; Loughran, McDonald & Otteson, 2022). The assembled terminology can be used in future research and further developed for sustainable and responsible investing purposes.

1.4 Structure of Study

The study will first review the theoretical background and the main topics and concepts continuously discussed while addressing earlier empirical findings. The second chapter will discuss the theory behind initial public offerings for motivation, process, performance, and related seasonality. The third chapter goes through the idea behind

sustainable and responsible investing, first explaining the concepts of corporate social responsibility and ESG. Afterwards, associated strategies, regulatory framework, stakeholder, and shareholder theories will be discussed. The fourth chapter will review the literature on the impact and relation of ESG and CSR towards firm performance with positive and negative relationships highlighted. In the fifth chapter, previous research focused on ESG and CSR relations towards IPOs will be presented, which behave as fundamentals for this study. The data and methodology are introduced and argued in the sixth chapter, while the empirical research is discussed in the seventh with the results provided. Finally, the last chapter will conclude the thesis with conclusions and future research proposals.

2 Initial Public Offerings

This section of the thesis provides an overview of theories and concepts related to initial public offerings. Firstly, the motivations behind companies going public are explained, along with the benefits and drawbacks discussed in previous literature. Next, the process of listing companies on the stock market is outlined, including the critical factors that must be considered. The underpricing phenomenon is then examined, with supporting literature presented to explain its key aspects and concepts. Additionally, the seasonality of IPOs is observed, where economic situations and cycles influence the timing of IPOs. Finally, a review of previous literature analysing IPO performance is presented, which will serve as a framework for this study's empirical analysis of IPO performance.

2.1 Motivation

The motivation to go public through initial public offerings requires a motive derived from raising capital or additional incentives. Why would a company go public? There are multiple reasons, which is stated by Celikyurt, Sevilir and Shivdasani (2010), as going public would increase the company shares' liquidity and allow continuous access to capital through capital markets, which helps the financing of the growth of the company. IPOs also allows insiders, venture capitalist and other investors to an exit plan or diversification of risk in selling the company. From a compliance point of view, the company will a subject to the market-related rules and laws that are to be obeyed accordingly as a member of its respective stock exchange and market. Many theories behind motivation in the academic literature will be discussed in this chapter.

Earlier literature related to the cost of capital, such as Modigliani and Miller (1963) and Scott (1976), find that firms will host an offering if there is an incentive to lower the capital costs, increasing the firm's value. A scientific article by Pagano, Panetta and Zingales (1998) finds through Italian initial public offerings that firms go public to address the balance sheet's restructuring and use the mispricing to their advantage. The study by Kim and Weisbach (2008) confirms that IPOs attempt to take advantage of the high

valuation of IPOs and are likely to keep the raised capital as cash in the balance sheet. The study also finds that equity is likely raised for investment capital, as seen through increased R&D expenditures. Additionally, Boehmer and Ljungqvist's (2004) research finds that German companies tend to proceed with an IPO when they have an attractive valuation point and further investment opportunities. Venture capitalists (VC) that have invested early-stage for growth also seek to exploit the IPO opportunity when their invested company has a high equity valuation to cash out from the market (Lerner, 1994). Insiders such as the previously mentioned VC opportunistically attempt to cash out for personal gain, demonstrated in the insider research by Ang and Brau (2003).

A survey for three years of 2000-2002 by Brau and Fawcett (2006) finds that at that time, the greatest desire for an IPO has been to facilitate future acquisitions, which is consistent with the findings by Brau, Francis and Kohers (2003). The survey by Brau and Fawcett (2006) finds that private companies aim to continue their ownership and have more robust control over decisions. Brau et al. (2003) argue that listing might be necessary because the shares can be used in acquiring companies or being acquired in a mutual stock deal between the parties. Bank-related M&A and IPO research by Rosen, Smart and Zutter (2005) find that private banks are less likely to be in M&A deals if they have not performed an IPO process. This study theme of IPO and M&A is continued by Celikyurt et al. (2010) study, where the M&A activity of companies seems to have increased post-IPO, providing continuing improved access to financing through the capital markets. They continue to argue that the IPO process and acquisition of companies link up together to grow newly listed companies.

IPOs can also be incorporated with various strategic moves as Chemmanur and Fulghieri (1999) report that when the shares of a company are publicly traded, the ownership base is spread. The study by Bradley, Jordan and Ritter (2003) finds a particular bias towards analyst recommendations post-IPO. Furthermore, Maksimovic and Pichler (2001) claim that IPOs might bring out good publicity and image of a company, showcasing its

ambitions. The previous evidence can be related to the market "hot issue" seasonality; IPOs start being in a trend; thus, the bias grows towards the public offerings.

2.2 Process

Initially, a company in its early period looking towards growth would have multiple options to raise its capital. Traditionally a company can issue debt or sell their respective shares to other stakeholders to gain financing for future endeavours and investments for possible growth (Bodie, Kane, & Marcus, 2021, p. 59). Issuing shares to the public for capital happens through an initial public offering, where the company issues share to the public in a stock market. After the IPO, the firm's shares are traded between investors in the secondary market. However, if the company decides it needs more capital through equity, it can sell more shares in the market; this is called the seasoned equity offering, performed after an IPO (pp. 60-61). For example, a firm can repurchase its shares to improve the shareholder relationship by boosting the equity value.

For the initial public offering arrangement, the management will select underwriters who work in between the arrangement (Bodie et al., 2021, p. 61). Underwriters, usually investment banks, purchase the shares from the to-be-listed company and re-sell them to the public. However, they purchase the shares at a discount because they take the risk if the initial public offering fails, whereas if the investors are interested in the company's shares offered to the public (p. 61). The company and underwriter will promote the company's share through information production with different strategies, such as building up the firm's prospectus through filings and having roadshows. Through the interest, the parties will evaluate the pricing of the IPO and the number of shares to be issued. Ritter (1987) found that the contract types with underwriters will significantly affect the capital raised and costs in IPOs. Therefore, they are showcasing the importance of underwriters in an IPO for providing financial assistance and guidance on the IPO procedure.

2.3 Underpricing

Assessing the value and volume of shares during an IPO can be a complex task, leading to the emergence of a common phenomenon: underpriced offerings. This trend has become increasingly prevalent as companies navigate the challenges of going public. As Li, Wang, and Wang (2019) explain, this occurrence is described as the increase in the first-day closing price of the offer price of IPOs. The percentage is the leftover pricing that could have been priced on the issued shares. Loughran and Ritter (2002) imply that this is money left over that the companies have not raised the maximum amount of equity that could have been possible. They explain that the new shareholders get a premium for buying these issued shares through IPO underpricing. **Figure 1** demonstrates the waves of underpricing, average first-day return, and aggregate money being left on the table defined according to Ritter (2022a) as the closing market price on the first day of trading subtracted by the offer price and multiplied by the shares offered.

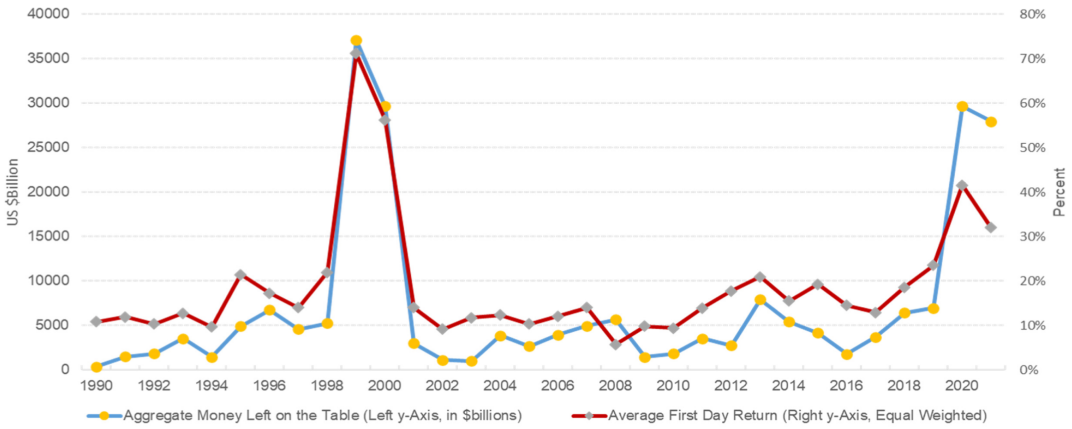

Figure 1. US Yearly First-Day Return and Money Left on the Table (Ritter, 2022a).

Two of the earliest studies related to underpricing are by Logue (1973) and Ibbotson (1975). Both studies find that shares tend to be sold underpriced to the public, which can be considered investors getting a premium or a discount through the underpricing. Brennan and Franks's (1997) focus on the IPOs from the United Kingdom and find an underpricing average of 9,42% for UK firms during the 1986-1989 period. Loughran and

Ritter (2002) find that the premium from underpricing in the United States 1990s was 14,8% when it surged to 65% during the internet bubble during 1999-2001 and dropped to 11,7% in 2001-2003. Baker et al. (2021) analyse the underpricing of 36 various countries for the 2008-2018 period. They find that all of the countries in the research sample exhibited positive first-day returns except for four countries, Austria, Israel, Norway and Portugal, all having negative values of percentage. They also find notable countries, which are from Asia with significant underpricing, like Japan (67,90%), Thailand (52,38%), South Korea (32,72%) and Thailand (52,38%)—indicating that there is quite significant underpricing in the Asian continent and that the phenomenon is spread worldwide.

Many pricing theories of IPOs are based on asymmetrical information, where the behaviour of investors and issuers is run through the information of each other. One is through signalling models, where high-quality firms are believed to demonstrate their quality by putting their offer price under the price the market believes in, winning investors' trust (Ritter & Welch, 2002). In addition, firms try to use their advantage of having more dominant information compared to the investors, a costly method to showcase the firm's robustness to the public. Welch (1989) finds significant evidence that these companies tend to issue more equity in the future. Michaely and Shaw (1994) reject this; they find no linkage between high underpricing and seasoned equity offerings in the future post-IPO.

Another proposed model is the winner's curse, which was hypothesised by Rock (1986). The study emphasises that the underpricing of IPOs results from the winner's curse, in which it is assumed that there are informed and uninformed investors. The companies want the latter uninformed investors to participate in purchasing new issues by lowering the offering value, which causes underpricing. On the other hand, the informed investors already have information on the IPO, which they find attractive. Loughran and Ritter (2004) continue by stating that it was evident during the 1980s that the winner's curse hypothesis and acquisition of dynamic information were the main reasons for the IPOs that underpriced an average of 7% in the United States. However, Habib and Ljungqvist

(2001) argue that some owners want to minimise the wealth losses related to companies that are being listed by reducing the information asymmetry, where they want to inform investors to lower uncertainty. Thus, the motive for underpricing and minimising their losses by giving out more information. Furthermore, they find that increased promotion costs and endogenous selection of high-quality underwriters tend to lower the underpricing of IPOs. This relates to how many shares are sold to the public, displaying how owners care about underpricing.

Loughran and Ritter (2004) introduce an agency-problem explanation for IPO underpricing. This spinning hypothesis derives from the interest conflicts between the lead decision-makers and other key shareholders before the public offering. The hypothesis implies that the lead decision-makers would hire investment banks, also known as underwriters, with experience in underpricing due to the incentive they might receive. Liu and Ritter (2010) classify spinning as a method where underwriters allocate the issuing shares of an IPO to company executives to motivate them to hire said underwriters and possibly affect the valuation of the IPO. The method is a way to gain profits if the IPO becomes popular; the shares are sold instantly in the aftermarket. Another hypothesis Loughran and Ritter (2004) proposed is the analyst lust, where publicly listed firms are willing to waive IPO proceeds to gain coverage from popular analysts working for the IPO's underwriter. The research by Liu and Ritter (2011) extends the topic by identifying the VC-backed issuers as particularly keen on high-quality analyst coverage for the IPO. They find that VC-backed IPOs are more underpriced when these high-quality analysts cover them.

2.4 Seasonality and Waves

The popularity of IPOs seems to fluctuate over time, going through popular and quiet periods, where the volume of IPOs is followed by the underpricing at specific periods; these are characterised as hot and cold issues, respectively by Ibbotson and Jaffe (1975) and Ritter (1984). The hot issue markets are well-known for their active IPO markets with a significantly high number of public offerings and glaring underpricing percentages.

Conversely, in cold issue markets, the situation is the opposite, with weaker underpricing as issue volumes tend to be lower and the IPO market is less active. Down below in **Figure 2** has an illustration of the volume of IPOs and underpricing throughout the years.

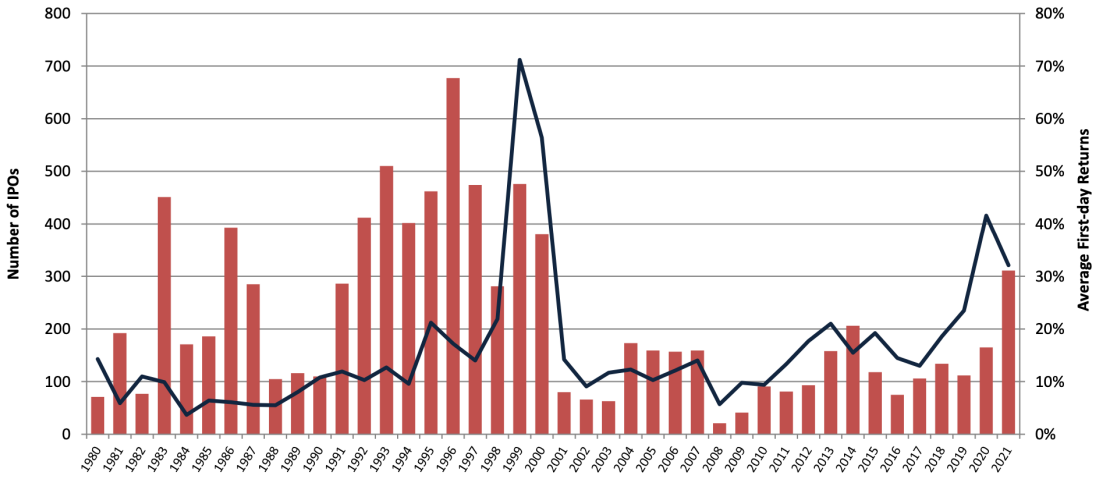

Figure 2. US Yearly Number of IPOs and Average First-Day Returns (Ritter, 2022b).

Ibbotson and Jaffe (1975) are among the first to find that the IPO volume grows when companies' underpricing is significant. It could be counterintuitive if one assumes it would be optimal for listing when the average market underpricing is the lowest, presuming that the company's best interest would be to raise as much money as possible from an issuance. The study by Lowry and Schwert (2002) claims that the seasonality is based on underpricing bubbles, and the serial correlation of the underpricing is driven by information gained through the registration periods of IPOs, which has also driven the IPO volume. They continue that underwriters seem not to incorporate complete information learned from recent IPOs and instead use the market valuation of these public listings. As remarked by Ritter and Welch (2002), the current market environment will play an essential role in listing in the market. This would imply that there would be vice-versa implications; in poor market environments, the IPO volumes and underpricing would drop, as confirmed in the research by Pástor and Veronesi (2005).

Previous evidence suggests that researchers should consider the seasonality of waves in IPOs, as it may be one of the reasons why the underpricing and volume of IPOs vary during different periods of hot and cold issues, depending on market conditions.

2.5 Performance

This thesis will finalise the theory behind IPOs with the related performances. What can an investor expect from IPOs in an operating or stock performance aspect? Ritter (1991) studied the long-run performance of IPOs, where he found that, on average, IPOs underperform in their first three years in the aftermarket, especially young firms, which are listed during hot issues known as high volume periods. The paper indicates that the pricing of the IPOs might not be wrong, but the initial returns or underpricing are too high. Ritter (1991) continues to explain that these underperformances are related to companies listing during the peaks of industries in hot markets; thus, the companies are taking advantage of the popularity of investing IPOs during these periods.

Jain and Kini (1994) find that post-IPO firms witness an increased decline in operating performance. However, they find a positive relationship between ownership retention and post-IPO operating performance. They continue confirming that they have not found evidence that high underpricing has implications for robust post-IPO operational performance. IPOs seem unable to sustain the pre-issue performance levels; even though the IPOs display sales and investment growth, the profitability decreases. The study by Coakle, Hadass and Wood (2007) examine the post-IPO operating performance of companies, comparing them with VC-backing. They find a significant under-performance during the bubble years, but for 1985-1997 and 2001-2003, the IPOs do not underperform. They find that venture capitalists harm long-run performance.

The study by Kao, Wu, and Yang (2009) discovers that on average Chinese IPOs have decreasing profitability and weak long-run stock market performance after the IPO issue. Furthermore, IPOs with a better accounting performance during the pricing period seemingly experience a decreasing effect on their profitability after the IPO issue, lower

underpricing, and weak stock market performance. Also, they find that regulations have a positive impact on the IPO performance due to stopping the firms from having over-optimistic earnings forecasted, and earnings management is controlled. From a strategic management point of view on IPO performance, Arend, Patel, and Park (2014) find in their research on IPOs that focused on internal knowledge development leads to more robust firm performance. The study uses Tobin's Q and ROA as measurement metrics and knowledge development is measured with intrafirm and interfirm patenting activities as proxies. Board diversity is also linked with IPO performance, as investigated by McGuinness (2018) finds that female director presence, which is untrammelled by family ties, has a positive relation towards post-IPO returns. However, if there are family ties, it seems detrimental to the positive effects. Furthermore, they find that family ties in boards harm ROA and asset sales.

These previous studies showcase how multidimensionally the IPO performance can be researched. Many aspects of the business environment can affect the trajectory of listings from different points of view related to market conditions, ownership structure, regulatory, strategic management, board diversity and more.

3 Sustainable and Responsible Investing

The neoclassical theory posits that firms' primary responsibility is to maximise owners' profits, as suggested by Friedman (1970) and Vance (1975). However, the emergence of sustainable and responsible investing has challenged this view. Traditionally, investing aimed to maximise the potential for a profit stream, but investors are becoming increasingly aware of the impact of companies on ESG issues. This shift in mentality has led to a growing interest in sustainable and responsible investing, which involves applying ethical criteria to investment decisions and engaging in shareholder activism to achieve sustainability goals (Renneboog, Ter Horst, & Zhang, 2008).

The roots of sustainable and responsible investing can be traced back to early religious guidance on ethical conduct, which excluded investment in certain activities. Modern roots date back to the 1960s when consumer and investor protests targeted historical events, such as the Cold War and the Vietnam War, as well as civil rights and women's equality (Schueth, 2003). Although the concept has been relevant for quite some time, it has only recently become a mainstream issue, with a growing number of stakeholders holding it in high demand.

On a global level, sustainable and responsible investing has become a significant factor, as evidenced by the 34% increase in international sustainable investing capital from 2016 to 2018 reported by the Global Sustainable Investment Alliance (2019). Additionally, a survey by the Morgan Stanley Institute (2018) found that 84% of managers are planning or have already invested in ESG issues. The COVID-19 pandemic further highlighted the resilience of sustainable companies, with a record-high capital flow into sustainable funds reported by Morningstar (2020).

This chapter will explore sustainable and responsible investing issues, including ESG and CSR-related concepts and strategies. It will also examine the regulatory framework that governs sustainable and responsible investing. Finally, the chapter will discuss the

stakeholder theory and its connections to sustainable and responsible investing, concluding that the concept is a promising field for further research.

3.1 Environmental, Social and Governance

As the screening and rules have grown for stakeholders for companies, the acronym of ESG has been developed to refer to how corporations, institutions and investors incorporate the related concerns of environmental, social and governance into the respective strategies for business and investment purposes (Silvola & Landau, 2021, pp. 3-4). ESG plays a significant role for many stakeholders in doing business and investing, as the world is becoming more socially aware, and communities are starting to commit to different goals. Sustainable Development Goals (SDGs) by the United Nations (UN) have 17 goals, which all UN member states adopted in 2015. Striving to reduce issues such as poverty and inequality and improve the climate change positions, health and education while improving economic growth (United Nations, 2022).

As classified by the European Commission (2022), the factors in ESG are separated into environmental, social and governance issues. The commission implies that the environmental aspect of issues touches on mitigating climate change, helping the environment and adapting more biodiversity, pollution prevention policies and having a more sustainable and circular economy with less waste. Social factors can be referred to issues related to society, inequality, human rights, workforce relations and different social trends. Governance includes issues on how different institutions and companies are run through decision-making from the management structure, which affects different stakeholders, such as investors, employees, and suppliers; the issues can be corruption, bribery, or executive compensation.

The previous factors all play a part in the possible social and financial impact of different parts of the communities of society. Many agencies provide their view on the ESG impact on issues through ratings, but there is no standardised measure, which brings a lack of comparability (Amel-Zadeh & Serafeim, 2018). Measuring ESG provides difficulties as

each factor has a qualitative nature, which is challenging to turn into numerical data. The ESG issues are a crucial research aspect for this thesis due to the different factors, which differ from each other but significantly provide implications to the social and economic world.

In the following subchapter, the concept of CSR will be explained. The concepts of ESG and CSR are both used in business environments, while the discrepancies between the two concepts often need to be clarified and are unknown. ESG supplies a proxy for estimating goals for various issues, while CSR provides a company framework to communicate with stakeholders. CSR can be used to drive different sustainable and responsible goals, and ESG can be used to measure the numbers behind them (Corporate Governance Institute, 2022). However, as explained previously, the need for standards by various agencies poses dilemmas as ESG and CSR are practised and measured differently.

3.2 Corporate Social Responsibility

The concept of sustainable and responsible investing encompasses a range of issues, including corporate social responsibility (CSR). While this thesis will focus on the use of the ESG concept, it is essential to acknowledge the significance of CSR in the literature, as many studies use it as a proxy (Godfrey, 2005; Brammer et al., 2007; Ramasamy et al., 2010; Oikonomou, Brooks & Pavelin, 2012; Di Giuli & Kostovetsky, 2014; Cheng et al., 2022).

CSR is defined differently in the literature, but many definitions agree with the McWilliams and Siegel (2001) definition, which suggests that CSR involves firms engaging in activities that benefit society beyond their financial motivations and legal requirements. Godfrey (2005) notes that philanthropic activities can improve a firm's CSR levels, as they can benefit shareholders. Brammer et al. (2007) highlight the impact of religious views on the perception of CSR, which reflects different norms and beliefs about what constitutes socially and morally good behaviour. This argument is further supported by the research of Ramasamy et al. (2010).

Numerous databases and agencies provide metrics related to different CSR issues. Among them, the Kinder, Lydenberg, and Domini (KLD) database, now known as MSCI, is widely used in CSR-related research. This database includes multiple attributes that measure various aspects of CSR issues such as community relations, diversity issues, employee programs, environmental issues, product safety and quality, corporate governance, and human rights, with different strengths and concerns scored separately. Oikonomou et al. (2012) and Giuli and Kostovetsky (2014) use the KLD database to examine corporate social performance and political affiliations of companies, respectively, demonstrating the versatility of studies that can be conducted using this database. Another database, Thomson Reuters' ASSET4 ratings, is also available, but Cheng et al. (2022) note that most CSR databases tend to cover large and mature companies, leading to a potential bias towards larger firms.

ESG and CSR overlap each other as they both are related to the way of doing business activities are connected. However, this study decided to use ESG as a proxy due to its regulatory implications; authorities such as the European Commission (2022) use it for its regulatory framework and common taxonomy. Thus, the interconnection with the prospectus related to IPOs must be filed by authorities such as SEC, making ESG a more optimal proxy for the thesis.

3.3 ESG and CSR Investment Strategies

It is essential to discover why and how investors use ESG and CSR information in their strategies. Bénabou and Tirole (2010) argue for three possible perspectives for CSR investing: firstly, a more long-term sustainable philosophy; secondly, delegated responsibility for philanthropy from the stakeholders; and finally, inner-company-initiated corporate philanthropy. However, Amel-Zadeh and Serafeim (2018) find that many investors from their survey are motivated by financial reasons rather than the ethics behind using ESG disclosure and information.

Amel-Zadeh and Serafeim (2018) find that their most influential group in the survey, the institutional investors, use ESG information in their strategies and products due to client demand. There are vast products related to ESG and CSR; they can use different strategies. As the previous study finds, the most common methods of sustainable investing from the survey are active ownership, integration of ESG into equity analysis, negative screening, and thematic screening.

Silvola and Landau (2021, pp. 17-19) demonstrate multiple screening methods; they explain one of the oldest methods is negative screening, which is a tool where some items are not included due to it being hostile towards achieving ESG and CSR goals. Such as the tobacco, gambling, and alcohol industries, which can be seen as "sin" stocks in the market. There is a vice-versa approach to the previous method, which is positive screening, investing in companies which are best in their class of solving ESG and CSR issues (p. 20), such as best in their industry; thus, there is no need to exclude some sectors. Another screening method is norm-based screening, where the investors follow if there has been any breach in a specific norm, such as the OECD guidelines (p. 20). Finally, another known method is thematic screening, where the investor is committed to a company that works around a particular theme, such as climate, water, or education (p. 21). The guidelines for thematic investing can be, for example, based on the earlier explained SGD-related goals. Furthermore, Silvola and Landau (2021, p. 19) explain that active ownership is a strategy related to the active owner's communication towards the company's management and monitoring if different ESG and CSRR issues are being addressed. Methods can be connected to attending meetings with the directors and management and attempting to collaborate to improve a company's ESG and CSR issues.

This chapter presents a few common standard methods of sustainable and responsible investing in CSR and ESG issues, as seen in Amel-Zadeh and Serafeim's (2018) survey. However, there are still many sustainable and responsible investing methods, such as ethical and impact investing, as mentioned by Silvola and Landau (2021, pp. 15-21).

3.4 Regulatory Framework

The current financial markets witness a substantial influx of capital, while society aims to transition towards sustainable and responsible practices. This situation poses challenges in assessing the applicable risks of the financial system. In this context, Silvola and Landau (2021) suggest that sustainability-focused regulatory frameworks aim to shift market perspectives and incentives towards supporting more sustainable and responsible investing. This involves considering environmental, social, and related issues when making investment decisions concerning capital flow. Despite the growth of sustainable and responsible investing, many disclosures provided by companies on these issues lack comprehensive information, limiting the comparability, harmonisation, and transparency of sustainable and responsible information (Amel-Zadeh & Serafeim, 2018).

To address these challenges, the European Commission has implemented its renewed sustainable finance strategy and action plan for financing sustainable growth since 2018. The action plan has three main objectives: reorienting capital flow towards sustainable investments, managing financial risks associated with climate change and environmental degradation, and promoting transparency and a long-term perspective in economic activity to achieve inclusive and sustainable growth.

To facilitate socially conscious investment decisions, the European Commission has introduced The EU Taxonomy, a member-state-wide classification system that allows allocating investment flows into environmentally sustainable assets (European Commission, 2022). The European Commission has also developed other standards, such as the European Green Deal, aimed at making the EU carbon-neutral by 2050 by improving and introducing new legislation related to climate, energy, logistics, and taxation.

During legislative actions like these attempts to address the challenges of sustainable and responsible finance, they are not without their difficulties. For instance, companies that combat climate change with forced labour or unequal rights challenge the European Commission's primary goal of mitigating climate change (Silvola & Landau, 2021). As ESG

and CSR issues are qualitative at their core, companies may engage in value-enhancing activities through environmental-related actions while neglecting social aspects, which may have negative impacts (Apergis, Poufinas & Antonopoulos, 2022).

Despite these challenges, the sustainable and responsible action plans implemented by intergovernmental organisations offer hope for addressing these issues, as the more capital is invested in sustainable and responsible development, the more innovation can be expected to address ESG and CSR-related concerns.

3.5 Stakeholder and Shareholder Theories

Firms are commonly viewed as entities whose primary objective is to maximise shareholder value through their operations. However, Friedman (1970) argues that a corporation's sole responsibility is to utilise its resources to maximise profits. The theory suggests that incorporating social responsibility may negatively impact the fundamental principles of a market society, as companies may suddenly allocate their resources to social causes instead of maximising profits. This notion is classified as the stakeholder theory, a normative hypothesis of business ethics proposed by Milton Friedman.

The shareholder hypothesis implies that when companies utilise their resources beyond profit maximisation, it raises concerns about agency costs. Corporate philanthropy, for instance, can improve a company's reputation, but it can also create an agency cost if it is not counterbalanced by appropriate compensation. Firms that engage in actions that contribute to social causes serve as justification that initially results in a potential loss for shareholders (Brown, Helland & Smith, 2006). Therefore, companies engaging in corporate social responsibility (CSR)-related activities would not be in the best interest of shareholders. McWilliams and Siegel (2001) suggest that managers are likely to dismiss any CSR activities as they perceive them as value-reducing activities for the company and shareholder value maximisation, and therefore, ESG can also be viewed from their perspective as value-deductive.

Another normative ethical theory related to business is the stakeholder theory, which can be considered an early modern adaptation of CSR. The idea behind this theory is to provide an alternative approach to the shareholder theory, which posits that the sole purpose of firms is to maximise shareholder wealth. According to the stakeholder theory, firms should find solutions and benefits for all stakeholders affected by their business decisions, as Freeman (1994) explains. Although shareholders are part of the stakeholders, they are not the sole focus when firms make decisions using the stakeholder theory.

Porter and Kramer (2006) propose through the stakeholder theory that ethical behaviour serves the best interest of all stakeholders and enhances corporate performance, ultimately benefiting shareholders. In the realm of ESG and CSR, numerous studies have shown that effective ESG planning and action can lead to improved corporate social responsibility and, consequently, better firm performance by enhancing the corporate image (Godfrey, 2005; Martínez-Ferrero, Banerjee & García-Sánchez, 2016). A positive corporate image leads to stakeholder satisfaction, customer loyalty, and trust in the firm, as demonstrated in the studies of Barney and Hansen (1994) and Fombrun, Gardberg and Barnett (2000). Furthermore, a favourable company image can attract more capital investments from stakeholders and exceptional talent to the firm (Fombrun et al., 2000; Branco & Rodrigues, 2006; Cheng, Ioannou & Serafeim, 2014).

4 ESG and CSR Relationship with Firm Performance

As companies grow and further seek strategies and actions related to sustainable and responsible topics, there should be an incentive for companies. Thus, attention is raised in literature of multiple types if the firm's choice and actions related to ESG/CSR have any implications towards the firm performance characteristics, such as the financial implications or stock development in the public market. This chapter will discuss and evaluate the relevancy of ESG and CSR with firm performance if the causal effect of the previously mentioned attributes on value is value-additive or value-deductive through previous literature.

4.1 Positive Relationship

From a positive relationship standpoint, several studies have found a significant relationship between ESG ratings, CSR, and firm performance. Gillan, Hartzell, Koch, and Starks (2010) find that companies with higher ESG ratings tend to have higher operating performance and Tobin's Q, which measures a company's stock market valuation. Borghesi, Houston, and Naranjo (2014) extend this argument by examining the relationship between KLD scores and firm performance. Their study suggests that companies with higher KLD scores have greater free cash flow and operating performance. Gao and Zhang (2015) and Ferrell, Hao, and Renneboog (2016) also examine the relationship between Tobin's Q and ESG/CSR ratings. Both studies find a positive relationship between these attributes. Servaes and Tamayo (2013) find that higher CSR advertising expenditures can create value for firms in their valuation. Liang and Renneboog (2017) find that corporate philanthropy can lead to higher valuation and more substantial return on assets and sales growth. Krüger (2015) studies the market reaction to positive or negative events related to CSR. The research suggests that investors respond more strongly to unfavourable events than to favourable ones. However, investors seem to value positive news from companies with a poor history of relations and CSR news with substantial legal and economic implications.

In conclusion, these studies prove a positive relationship between ESG/CSR ratings and firm performance. They highlight the importance of corporate social responsibility and good corporate citizenship for firms seeking to create value for their stakeholders.

4.2 Negative Relationship

Servaes and Tamayo (2013) have established a connection between the company's ESG/CSR activities and its advertisement strategy, concluding that companies that do not advertise their ESG/CSR initiatives tend to have a negative association with the valuation of the firm. On the other hand, firms that publicise their ESG/CSR activities tend to benefit from positive effects. In contrast, Di Giuli and Kostovetsky's (2014) research shows a negative correlation between a firm's ESG/CSR score and its ROA or market performance, suggesting that while stakeholders may benefit from ESG and CSR activities, they come at a direct expense of the firm value. Additionally, expanding ESG and CSR policies can lead to underperformance in the market and weaken the operating performance of ROA in the long run, as investors might delay learning about the policy expansions. Masulis and Reza (2015) found contradicting evidence to Liang and Renneboog's (2017) study, suggesting that investors do not highly value the philanthropic aspect related to ESG/CSR. This is because philanthropy often involves a direct hit on the valuation of a company as it is a donation to a cause. Further, Buchanan, Cao, and Chen's (2018) study found that agency costs become more evident during a crisis. Over-investment in ESG/CSR issues tends to adversely affect the firm's value if its ESG disclosures are of high quality.

The studies reveal that the implications of ESG and CSR activities on firm performance are not straightforward and depend on various factors. The growing awareness among institutional investors and adopting sustainable and responsible investing strategies may impact firm performance in the future. Standardisation and transparency of disclosures, along with a universal classification and common taxonomy by international authorities, can further increase investor awareness and impact the implications on firm performance.

5 ESG and CSR in Initial Public Offerings

For this part, the thesis will combine previously explained theories of sustainable and responsible investing and initial public offerings into one framework, where previous literature related to CSR and ESG links up with initial public offerings. First, the thesis will go through uncertainty studies related to IPOs and their effects on the performance and perception of IPOs. Secondly, there will be connections between how ESG and CSR can be connected to the uncertainty issues of IPOs and why they are essential. Finally, the thesis will examine literature that previously analysed the implications of ESG and CSR on the performances and perceptions of IPOs.

5.1 Uncertainty in IPOs

One of the critical aspects of topics related to IPOs and their related research aspects is related to the uncertainty of these companies. More precisely, much research remarks this as ex-ante uncertainty, where the ex-ante phrase is implied to be a Latin word before an event. Thus, in this context, ex-ante uncertainty is the pre-IPO uncertainty, where an investor cannot be confident of a valuation of an IPO until it starts trading in the secondary market (Beatty & Ritter, 1986). Increasing uncertainty can weaken the implications of the post-IPO performances of companies, such as the market and operating performance, thus being problematic for investment decisions. Previous studies (see Ritter, 1984; Beatty & Ritter, 1986) have implied that underpricing is a premium for the ex-ante uncertainty about the accurate IPO valuation.

Companies that are listing might have the incentive to lower the uncertainty through voluntary disclosures, as mentioned in the study by Beatty and Ritter (1986), where they also find a positive relation between pre-IPO uncertainty and the related valuation. Leone et al. (2007) provide evidence that IPOs that specify their use-of-proceeds tend to lower their underpricing, which lowers the ex-ante uncertainty. As the proceeds are disclosed in the filings of IPOs, thus it behaves as a common proxy for uncertainty. Studies by Carter and Manaster (1990) and Carter, Dark and Singh (1998) find that through the

choice of underwriters, the firms can lower the uncertainty, thus improving the valuation of IPOs. The study by Michaely and Shaw (1994) extends on the previous and shows that reputable underwriters lower ex-ante uncertainty for IPOs, thus leading to a decrease in underpricing. Megginson and Weiss (1991) find that venture capitalist-backed IPOs can reduce the ex-ante uncertainty by improving the information asymmetry by attracting reputational underwriters and auditors, which improves the valuation of IPOs. Firm age has been Loughran, and Ritter (2004) find that younger firms have more underpricing than older firms, most likely deriving from the fact that younger IPOs lack experience and robustness and thus might be more speculative offerings. The age of a company has been used as a proxy for ex-ante uncertainty, as Loughran and Ritter (2004) find older firms have more experience and are more robust through their business models. James and Wier (1990) find that the existing credit relationship of IPOs with creditors can be a crucial determinant in the uncertainty of IPOs, as robust relationships can imply quality by having access to credit.

This subchapter discusses the significance of ex-ante uncertainty in understanding the valuation and performance clustering of IPOs, an area that has been the subject of numerous studies. In addition, the existing robustly researched determinants are related to the information asymmetry problem, as some companies have different incentives for signalling uncertainties to investors. However, the sustainability and responsibility aspect when analysing related issues for IPOs has been relatively scarce, as there are not many studies analysing the uncertainty related to ESG and IPO issue relationship with the valuation and performance of IPOs.

5.2 ESG and CSR Association with Uncertainty

Uncertainty can be associated with the corporate image, where the firm's stakeholders will be pleased, thus leading to loyalty by customers, and corporate stakeholders will trust the firm due to the positive image, which becomes apparent in the studies of Barney and Hansen (1994) and Fombrun, Gardberg and Barnett (2000). In the field of ESG and corporate social responsibility, studies such as Godfrey (2005) have shown that

efficient ESG planning and action could lead to improved corporate social responsibilities, thus also helping the firms improve their performances by strengthening the corporate image. Intersecting these studies would raise questions related to the corporate image of companies and their uncertainty on CSR and ESG issues.

Avramov, Cheng, Lioui & Tarelli (2022) find that ESG rating uncertainty tends to reduce the demand for stocks, strongly related to ESG-oriented investors. They continue to find that brown stocks outperform green exclusively when rating uncertainty is absent. ESG uncertainty can have an impact on the decision-making of investors within the risk-return trade-off. One may associate this with IPOs, as explained previously within the information asymmetry issue. Greater ESG disclosure can have a significant impact on a firm's cost of capital and its attractiveness to investors, making it a highly impactful feature. Arouri, Gomes & Pukthuanthong (2019) researched the M&A uncertainty association with CSR; they found that deals conducted with strong CSR have a relationship with lower M&A uncertainty. Gomes (2019) extends this argument by finding that target firms, on average, have higher CSR scores related to non-target companies, thus increasing the likelihood of being acquired. He, Qin, Liu, and Wu (2022) find that increasing ESG and CSR disclosures improves the information asymmetry of the market and reduces firm-specific risk.

The previous studies are related to the uncertainty related to ESG and CSR, as information asymmetry is relevant for these topics and ex-ante uncertainty issues in IPOs. Therefore, examining how ESG and CSR intersect with IPOs and how investors perceive these issues is critical.

5.3 ESG and CSR Impact on IPOs

This subchapter will combine the theories between proxies ESG and CSR with IPO. Studies are very scarce on this matter; however, as previously discussed, one of the main components is ex-ante uncertainty. Firms do not always voluntarily disclose additional information about their action on ESG and CSR-related issues unless there is some

incentive. Studies such as Beatty and Ritter (1986) and Beatty and Welch (1996) study the uncertainty of IPOs through information asymmetry, thus the communication between parties through disclosures and additional information about issued shares.

Platonova et al. (2018) studied the impact of CSR disclosures on the profitability of Islamic banks. Their research found a significant relationship between CSR disclosure and ROA for Islamic banks located in the GCC region. Furthermore, they show the predictive power of their model, having a positive relationship with the future ROA. The study by Huang et al. (2019) extends the CSR disclosure topic on the IPOs from China. They find that corporate social performance (CSP) expenditure and textual prospectus-related information are significantly associated with post-market performance in holding period returns (HPR). However, the previous studies' method is prone to human error, as the construction is done through manual content analysis of CSR/CSP information following the study by Gao (2009).

From an ESG perspective, the research by Baker et al. (2021) analyses the ESG government risk with the underpricing related to IPOs. In that study, they find underpricing in IPOs tends to be lower in governments with higher ESG Government Ratings; thus, implying that lower information asymmetry and better transparency would lower the uncertainty and underpricing. Furthermore, the authors investigate each issue uniquely of ESG and find that better risk management of each issue tends to be associated with lower underpricing. Finally, they find that the most significant negative impact is in countries with transparent disclosures of information, more robust liability standards and shareholder protection. Another view on the issues is the ESG disclosures and firm-specific risks from the research by Reber et al. (2021). They find that additional voluntary ESG-related disclosures tend to lower the downside tail risk and firm-specific volatility. Furthermore, they find that better ESG ratings are also related to the same associations and additional ESG disclosures; however, the sample of these ESG-rated IPOs is limited and likely poses potential biases, as these companies might have incentives on why they disclose their ESG ratings voluntarily. Fu et al. (2022) study the aftermarket survival of

IPOs by analysing their relationship with voluntary ESG disclosures. They find that voluntary ESG disclosures reduce the failure risk of IPOs and improve long-term performance. The timetable of disclosure of ESG information after an IPO has implications for the risk of failure and long-term performance. Finally, they find that IPOs with better ESG scores are more likely to survive, where the main impact is from the social and governance scores.

These previous studies are vital for this thesis, as they provide a framework for the issues studied and the possibilities of ESG and CSR with IPOs. Voluntary disclosures and transparency would lower the information asymmetry between the company and investors, thus, impacting the ex-ante uncertainty.

6 Data and Methodology

In this chapter, the data and methodology of the empirical research are discussed and presented. This part of the thesis explains the data selection, mainly gained through the Refinitiv Eikon and Datastream databases for the IPO-related data and the EDGAR database for S-1 filings text data, chosen methodology and the background behind the decisions to use them. Finally, the possible limitations will be discussed at the end of the chapter.

6.1 Data

The current study employs a dataset of IPO data extracted from the Refinitiv Eikon and Datastream databases. The IPOs in the dataset have a live transaction status and are listed in Nasdaq and the New York Stock Exchange (NYSE). To ensure the dataset includes a recent set of companies, the study combines the initial IPO data with web-scraped filings disclosure data from 2015 to 2021. The combined dataset comprises 1578 distinct companies with legible S-1 filing documents for listing between 2016-2021, whereas companies that filed between 2015-2021 are matched using sets of rules for providing the textual data.

The study notes that matching companies using set rules has some limitations, mainly because some companies may be unable to list on the market. However, the algorithm matched most of the companies from each year. The study also indicates that the IPOs in the dataset are common stock, with private settlements and similar deal types removed from the sample to have a broader sentiment among the investors. While the issuer nations are from multiple countries, the current study focuses on the United States as the issuer nation. The study also shortened the listing period to 2016-2020, as 2020-2022 exhibited high growth in IPO, particularly with Special Purpose Acquisition Companies (SPAC). This could mix up the sentiment on the data, and all the robust performance measures are unavailable. Furthermore, the 2021 IPO accounted for 48.5% of the original data sample. The study removes the 2021 data to address bias concerns and

selects companies with existing correct variables, as many companies had missing values. The final data selection for the study includes 429 companies for the five years of 2016-2020, as illustrated in **Figure 1**. The data suggest some signs of cyclicality from 2020 onwards. Overall, the dataset used in the study offers a comprehensive view of IPO data. However, there are some previously mentioned limitations to the sample selection process that should be considered when interpreting the findings.

Table 1. Acquired IPO Data Listing Matrix.

Stock Exchange	2016	2017	2018	2019	2020	Total
Nasdaq	40	48	67	72	103	330
NYSE	17	25	23	13	21	99
Total	57	73	90	85	124	429

There are many methods of gaining textual data from various sources, but this thesis focuses on the data collection method from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. EDGAR collects the data of companies required by law to file their forms with the United States Securities and Exchange Commission (SEC). This research has exclusively selected the EDGAR database instead of other data-collecting methods due to similar forms in classification and standards. The common way of having standards for the data collected will provide a more reliable and unbiased approach due to the EDGAR database being run by the government of the United States. The data is also located in the same database of firms attempting a listing in the market of a US stock exchange, making the collection much more accessible and manageable to download using web-scraping methods.

6.2 Methodology

6.2.1 ESG Variables

The thesis seeks the SEC Form S-1, the initial registration a United States company must file before an IPO. The S-1 text data can be extracted directly from the EDGAR database by a few natural language processing steps. The data is first scraped from the database

and downloaded into a folder. Afterwards, the data is processed into an acceptable form for analysis, removing different tags left over from the web scraping process, as described in the Loughran and McDonald (2011) study. This study has created an ESG term vocabulary for text mining purposes adapted by using previous literature (see Baier, Berninger & Kiesel, 2020; Silvola & Landau, 2021; Cochardt, Heller & Orlov, 2022; Loughran, McDonald & Otteson, 2022) which can be found in the first appendix. This vocabulary aims to pinpoint terms and sentences related to ESG issues in the S-1 filings. Unfortunately, there is no common ESG vocabulary that can be used for research purposes. From the previous literature, this thesis finds ESG combined terms of 661, dominated by governance terms of 399, with social terms second at 166 terms and environmental terms at 96.

With the term vocabulary assistance, term mining will be completed by getting the frequency of environmental, social and governance terms separately. Independent variables will be created for the frequencies of terms for environmental, social and governance issues separately. Alternatively, Loughran and McDonald (2011) suggest using a weighted frequency tf-idf method rather than mining for raw terms. They argue that term weighting recognises that raw word counts are not the best measure of a word's information content. This method has three major components: the importance of a term in a document, normalisation for the document length and the importance of the term within the whole document corpus, meaning that it would display the term's importance across all documents. The weighting scheme is shown below in an equation form.

$$w_{i,j} = \begin{cases} \frac{1+\log(tf_{i,j}))}{1+\log(a_j))} \log\frac{N}{df_i} & if\ tf_{i,j} \geq 1 \\ 0 & otherwise \end{cases} \quad (1)$$

Where

$w_{i,j}$: the weighted term frequency of term i in document j

$tf_{i,j}$: the unweighted term frequency of term i in document j

a_j: the average term frequency in document j

N: the complete number of S-1 Filings

df_i: the number of S-1 Filings used the term i at least one time

After getting the data from the previously mentioned extraction and processing methods, the study will use a sentiment analysis approach towards the terms to see if they are positive or negative. To begin the analysis, the text data from all prospectuses will be filtered to include only sentences that contain specific ESG-issue terms from the term vocabulary while excluding the rest. This process will help the model to generate a proper scoring system for ESG conditions. Then, the word frequencies will be calculated and compared to the Loughran and McDonald (2011) sentiment word list, also known as the LM Dictionary. This dictionary is a business communication designed dictionary, widely used in studies to analyse such as the tone of newspaper articles, CNBC transcripts and websites, but specifically designed for financial disclosures. The LM dictionary has obtained and updated its words used in financial disclosures, including sentiment words for categories such as negative, positive, uncertainty, litigious, strong modal, weak modal, and constraining. According to findings by Loughran and McDonald (2015) that having dictionaries specifically designed for business communication, in return, can be used in the account and finance field of research to gauge the tone of different documents. For the context of this study, the author will use the LM dictionary's negative and positive sentiment words to calculate the score. There will be independent variables created for the positive and negative sentiment scores, separately for environmental, social and governance issues individually to see if there are any links and relations. Finally, the ESG sentiment score will be gathered by a simple mathematical equation of positive sentiment subtracted by negative sentiment. However, there is a high correlation between social and governance contexts as terms seem to share many sentences together. This indicates that the terms are similar in context, thus combining social and environmental context might benefit the regression studies to alternate variables of interest for the ESG sentiment regression analysis, to reduce multicollinearity problems. After applying the adjustments, the sentiment analysis will produce separate environmental and social-

governance scores. The sentiment scores for the social and governance context will be denoted as S_G variables in the regression models.

Previous studies on ESG topics use ratings from agencies such as Thomson Reuters, RobecoSAM and additional sources to analyse their research problems. However, many firms do not disclose information related to ESG due to not being a compulsory requirement for private companies to disclose the information. This raises the concern of adequately scoring the companies on ESG-related issues. Therefore, the thesis finds the previously proposed data collection solution as an alternative way to have an outlook on the perception of ESG on IPOs by investors and stakeholders, which is displayed the **Figure 3** down below.

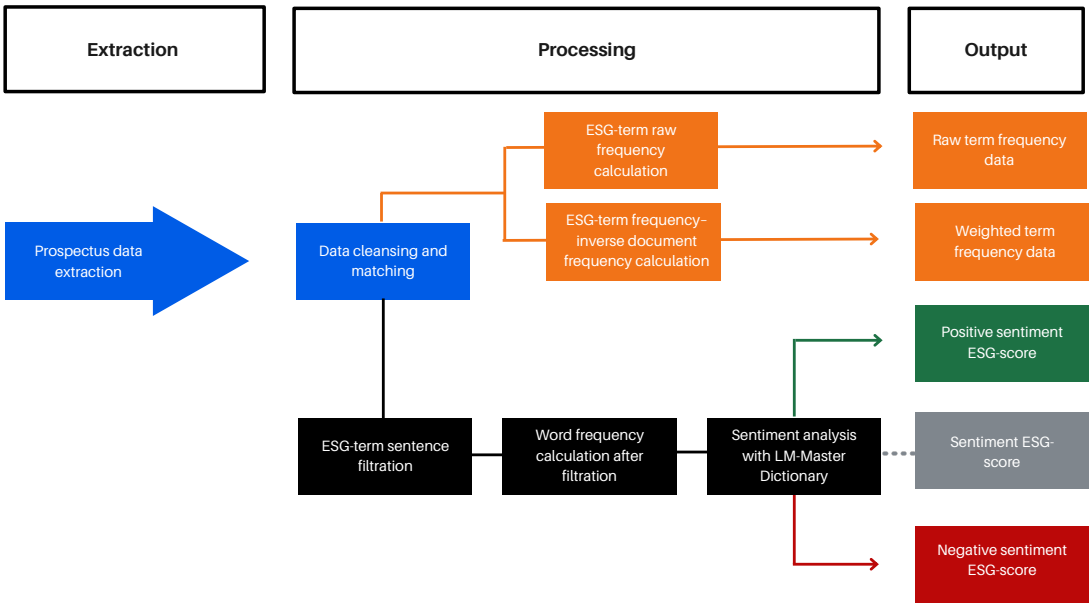

Figure 3. Simplified Filings Data Processing Map.

6.2.2 Dependent Variables

The dependent variables are constructed through the discussion of the developed hypothesis and literature review related to the underpricing and performance of IPOs. The underpricing of IPOs will be examined in the first and second hypotheses. The figure for underpricing is gained through the percentage difference between the final price of the

IPO from the offering price during the first trading day (Chan, Wang & Wei, 2004). This is displayed in the equation below.

$$Underpricing\ (\%) = \frac{Closing\ price\ of\ the\ first\ day - Offer\ Price}{Offer\ price} * 100 \quad (2)$$

For the operating performance measure, this thesis will use return on assets as a dependent variable for the regressions. The study will use the definition of ROA that is consistent with previous studies (see Jain & Kini, 1994; Core, Guay & Rusticus, 2006; Ferris et al., 2013), where it is defined as the firm's operating income before the depreciation, which is divided by the previous year's total assets.

$$ROA(\%) = \frac{Operating\ Income\ Before\ Depreciation}{Total\ Assets} * 100 \quad (3)$$

6.2.3 Control Variables

The control variable selection for this study is adapted from similar textual analysis studies of IPOs, such as Ferris et al. (2013) and Loughran and McDonald (2013). The goal of the control variables in this study is to consider other explanatory variables that might affect the predicted results; thus, having enough explanatory regressors in the model is sufficient and helps avoid the omitted variable bias. The bias implicates the problem of not including relevant variables or underspecifying the regression model from other regressors with explanatory power (Wooldridge, 2013, pp. 88-92).

Studies have used the sales of IPOs (Ritter, 1984; Aruğaslan, Cook & Kieschnick, 2004; Loughran & McDonald, 2013) as a proxy for the asymmetric information risk related to initial public offerings. Aruğaslan et al. (2004) explain that the metric can address both the asymmetric information problem and uncertainty related to IPOs. The variable is usually defined as the last fiscal year, trailing 12-month annual sales, denoted as Sales in this thesis. Butler, Keefe and Kieschnick's (2014) study find that sales are among the strongest predictors in IPO research.

Ritter (1991) finds that the firm's age is a strong proxy for risk, finding a relationship between age and aftermarket performance. He states that older firms tend to perform better than younger firms. Hensler, Rutherford and Spring (1997) indicate that age increases the firm survival time for IPOs in the aftermarket. They define survival as companies that continue to be listed in the market or transferred to another exchange or an M&A deal, while a failure is delisting from the stock exchange for reasons other than the previous. Finally, Loughran and Ritter (2004) find that younger firms have more underpricing than older firms, most likely deriving from the fact that younger IPOs lack experience and robustness and thus might be more speculative offerings.

Megginson and Weiss's (1991) study found that VCs attempt to certify the value of an offering, thus allowing more information to the public, which decreases underpricing. Therefore, the previous study implies that venture capitalists are predicted to lower the money left on the table phenomenon, reducing the underpricing due to active investors unwilling to sell the shares in the IPOs. However, Bradley and Jordan (2002) find that venture capitalists choose firms within riskier industries, as seen in the growing underpricing. The previous research showcases the importance of including a venture capital-backing variable, which is denoted as VC in this thesis.

Carter and Manaster (1990) and a later study by Carter et al. (1998) imply that IPOs taken by high-quality underwriters tend to lower the uncertainty of listings. Thus, the investors do not demand a significant discount; the underpricing would be lower, and the issuers would maximise their proceeds. Gompers (1996) finds that underwriter quality is related to the capital raising procedure, relating that high-quality underwriters tend to seek more extensive and robust IPOs. However, as explained by Loughran and Ritter (2004), over time, high-quality underwriters have taken young and unprofitable companies and the high underpricing during the 1990s and tech bubble times which inconsistent with the earlier evidence. The previous authors explain that their analyst lust hypothesis, as mentioned in the earlier chapters of the thesis, is the cause of the changes over time.

This study uses the IPO underwriter reputation ranking provided by Jay R. Ritter, retrieved from his IPO data website, denoted as UnderRep.

Offer price revisions have been selected for this paper due to their high predictive power of implications in IPO research, where it was ranked in the study of IPO determinants by Butler et al. (2014) as among the strongest predictors for underpricing or clustering, same as the previously mentioned sales control variable. A similar study to this thesis by Loughran and McDonald (2013) only used a simple form of the highest price in the offering from the midpoint, or else the value is zero. This thesis decided to adopt the method by Hanley (1993) to see if the percentage difference from the expected price more implications for the whole dataset has so that all IPOs have offer price revision values. Ibbotson, Sindelar and Ritter (1988) find that high initial returns related to IPOs and positive revisions in the final offer prices have been regarded as the "partial adjustment" phenomenon by the previous authors. Hanley (1993) shows that final offer prices that go over the limits of the offering range tend to have larger underpricing than other IPOs and possibly increase the shares being sold. The offer price revision equation can be found down below, which has been adapted from the previous author's research article:

$$OfferRev = \frac{P_0 - P_e}{P_e} \quad (4)$$

Where

P_e: the expected offer price, derived from $\frac{(P_H + P_L)}{2}$

P_H: the highest price in the offering range

P_L: the lowest price in the offering range

P_0: the final offering price

As a company registers with SEC-regulated rules, the disclosure or use of proceeds must be included (Leone, Rock & Willenborg, 2007). Ferris et al. (2013) use IPO proceeds in their regression analysis as a control variable in their textual sentiment analysis relation with IPOs, which previous studies justify the use (see Beatty & Ritter, 1986; Leone et al., 2007). Leone et al. (2007) study the gross proceed relation to underpricing. They find a

robust negative relation between proceeds and underpricing, especially IPOs with high-quality underwriters. The authors find that the increased disclosure of the use of these proceeds will reduce the uncertainty that the IPOs have and, in return, help investors estimate the risk. As uncertainty is a crucial point of view in this thesis, adding gross proceeds as a control variable enhances the validity of the variables of interest.

In addition to the control variables, the study finds that controlling for IPOs from high-technology industries might improve implications. Lowry, Officer, and Schwert (2010) find that the initial return variability is higher with technology firms, which are classified as problematic to value. These companies have high underpricing on average due to high uncertainty and risk, which was evident during the tech bubble in earlier years; as reported by Loughran and Ritter (2004), companies saw a higher proportion of young tech and internet firms, which had a change of risk compositions, due to optimistic sentiment from an investor that they had for these companies. Furthermore, Lowry et al. (2010) define high industries as biotech, computer equipment, electronics, communications, and general technology derived from SDC as high-tech industries, which was also previously used in the research by Lowry and Schwert (2004). This thesis will adopt the exact definition of high technology industries for this study.

The study will use the total liabilities to total assets ratio as a risk parameter and will be denoted as Leverage in this study. The research by Butler et al. (2014) finds that total liabilities to total assets are a robust and significant predictor for clustering IPOs and underpricing. Previous studies (see James & Wier, 1990; Habib & Ljungqvist, 2001) find that the existence and scope of earlier credit relationships robustly decrease the underpricing of IPOs. The studies find that pre-existent credit relationships signal a more high-quality issue, which would reduce the uncertainty of IPOs.

As previously discussed in the literature review related to IPOs, there seems to be seasonality with IPOs. With the current dataset, there is an upshift in initial public offerings for 2020 and beyond, which can be seen as visualised previously in **Figure 2**. The year

dummy control variable will be used to help assist with the economic interpretation as used in the study by Chambers and Dimson (2009). The current times include COVID-19, officially declared as an outbreak on the 11th of March 2020, according to the World Health Organization (2022). The pandemic is seemingly an ongoing problem worldwide for the period, which is good to consider when performing research for this study.

Table 2. Control Variable Interpretation.

Control Variables		
Variable	**Interpretation**	**Source**
Sales	Log of firm's trailing 12-month annual sales prior IPO.	Ritter, 1984; Aruğaslan et al., 2004; Loughran & McDonald, 2013
Age	Log of firm's age plus one.	Ritter, 1991; Carter & Manaster, 1990; Carter et al., 1998; Habib & Ljungqvist, 2001
VC	A dummy variable for venture-capital backing. Set to one if the IPO is backed by venture capital, else zero.	Megginson & Weiss, 1991; Hensler et al., 1997; Bradley & Jordan, 2002; Loughran & McDonald, 2013
UnderRep	The reputation ranking of underwriter.	Carter & Manaster, 1990; Gompers, 1996; Carter et al., 1998
OfferRev	Offer price revision is the change in the offer price and price range.	Hanley, 1993
GrossProc	Log of gross proceed of the offering.	Beatty & Ritter, 1986; Leone et al., 2007; Ferris et al., 2013
Tech	A dummy variable for technologically intensive industries. Set to one if the IPO is in a tech-intensive industry.	Aggarwal et al., 2002; Lowry & Schwert, 2004; Lowry et al., 2010
Leverage	Log of the ratio of total liabilities to total assets reported 12 months prior to IPO.	James & Wier, 1990; Habib & Ljungqvist, 2001; Butler et al., 2014
2020_Year	The dummy variable for indicating the 2020 issuing year of IPOs is set to one.	Chambers & Dimson, 2009

6.2.4 Regression Models

For the regression models, the paper will combine collected data for constructing regression models to solve the hypotheses explained earlier in the hypothesis development. The thesis will measure the performance relations to the ESG issues the means multiple regression analysis models, which have been used in many previous IPO-related studies (see Loughran & Ritter, 2004; Ferris et al., 2013; Loughran & McDonald, 2013; Guldiken et al., 2017; Kao & Chen, 2020). The scientific tool is standard to see the relationship between the dependent variable and individual or multiple independent variables.

Adding previously defined control variables with the variables of interest might explain even more of the variation of the dependent variables, as Wooldridge (2013, p. 97) explained.

The fourth equation below will attempt to solve the first hypothesis, where the study tries to find if the frequency of ESG terms would lower or increase the underpricing; as discussed in earlier chapters, previous studies have shown have demonstrated the relationship between uncertainty and underpricing.

$$UndPri_{i,t} = \alpha_{0,i,t} + \beta_1 ESGFrq_{i,t} + \gamma X_{i,t} + \mu_{i,t} \quad (4)$$

For the second hypothesis, the thesis will attempt to solve the impact of the tone of S1-filings on underpricing to see if positive or negative sentiment scores will have some effects on the pricing of the IPO, which can be found in the fifth equation down below.

$$UndPri_{i,t} = \alpha_{0,i,t} + \beta_1 SentESG_{i,t} + \gamma X_{i,t} + \mu_{i,t} \quad (5)$$

For the operating performance, the regression models for the term frequency analysis will be like the fifth equation. However, the sixth equation will switch the dependent variable with ROA. The same goes for sentiment analysis; the seventh equation will be like the fourth equation except having ROA as the dependent variable. Both operating performance regression models can be found below:

$$ROA_{i,t} = \alpha_{0,i,t} + \beta_1 ESGFrq_{i,t} + \gamma X_{i,t} + \mu_{i,t} \quad (6)$$

$$ROA_{i,t} = \alpha_{0,i,t} + \beta_1 SentESG_{i,t} + \gamma X_{i,t} + \mu_{i,t} \quad (7)$$

The initial variable of interest ESGFrq means the term frequency found in the S-1 filings; this is measured with the raw count method, denoted as R_Freq and the Loughran and McDonald (2011) weighted term frequency method, denoted W_Freq. The technique will analyse different combinations of environmental, social and governance variables in

the regression models. SentESG will separately include positive and negative scores for environmental and social-governance perception. The dependent variable UndPri is the underpricing; the formula can be found in equation 2, while ROA is the return on the asset; the formula can be found in equation 3. The X in the regression is interpreted as the control variables used in the regression from **Table 2**. Finally, where α denotes the regression constant, μ denotes the model's error term. The i in the equation denotes the firm in question (i = 1…x), and t in the equation. denotes year in question (t = x…x).

6.3 Limitations

As with all studies, there are limitations to the methods and data collection. This study acknowledges its limitations, thus trying to find the most advanced and optimal ways to undergo said study theme with the available processes. Especially with ESG, since it is a relatively young and rapidly growing theme yet to be perfected, it has been so prevalent in recent decades as authors continuously attempt to contribute. ESG is a qualitative measure; only so much can be quantified in the sustainability and responsibility area. One drawback is the lack of reporting standards for CSR and ESG, which leads to a lack of comparability with other agencies with their own CSR or ESG ratings (Amel-Zadeh & Serafeim, 2018). Most of the faults are due to the core of the problem. One is not dealing with only numbers but with collective issues related to environmental and social factors. Not having an internationally known standard for sustainability classification poses potential biases associated with evaluating pre-IPO processes. Eventually, there might be a proper framework for these problems, such as more disclosures related to ESG and CSR issues.

The dataset used in this study contained missing data, which resulted from the unavailability of first-time listers in the sample. Additionally, some of the data could not be merged due to missing information for certain companies when combining join keys obtained from the EDGAR database with Refinitiv Eikon and Datastream databases. Furthermore, the study encountered difficulties in obtaining complete data for all firms with respect to the independent, control, and dependent variables required for the

regression analysis. To address these issues and maintain a robust sample size, the study imputed missing values with the means of the sample.

In this study, an alternative approach is proposed for examining related issues by analysing term frequencies and sentiment using the ESG word list developed by Loughran and McDonald (2011). However, this methodology has its limitations. Since there is no common ESG context in IPO disclosures, the text mining and analysis methods may not accurately reflect the ESG issues of interest. Moreover, the ESG term vocabulary is dominated by governance terms, which is expected given that firms typically include such terms in their disclosures. Consequently, using this ESG term vocabulary to mine the text for related issues could lead to differing conclusions, as the results may not be related to ESG but instead reflect other issues that are present in the text data pool. Additionally, IPO-related information can be obtained from other sources, such as publications and media, which may provide a more comprehensive picture of the ESG issues related to a company undergoing an IPO process. Therefore, it can be argued that using the EDGAR database may not be the most relevant or comprehensive way to obtain ESG information that is of interest to investors.

This thesis recognises that the ESG context has not been extensively studied and therefore utilises the sentiment word list developed by Loughran and McDonald (2011) to analyse IPO prospectuses, as used in prior research on IPOs (Ferris et al., 2013; Loughran & McDonald, 2013). This contrasts with Huang et al. (2019), who manually collected and analysed data, which could introduce human error and biases. In the future, the LM word list could be extended to include scoring for ESG-related terms. However, this thesis does not claim to thoroughly evaluate the sustainability and responsibility of companies, as textual analysis can be a conflicting measure of these issues. Therefore, this methodology should not be viewed as an alternative way of accurately handling ESG and CSR impact. However, textual analysis of disclosures and documentation can provide insight into the perception related to these issues.

7 Empirical Results

This chapter presents an empirical investigation of the relationship between ESG variables and IPO performance, specifically examining the impact of S-1 filings communication on IPO performance and investor perception towards ESG considerations. The study utilises underpricing and return on assets as dependent variables to gauge the robustness of ESG variables in IPOs. The research employs descriptive statistics and regression analysis to provide insights into the relationship between ESG and IPO performance, intending to contribute to the existing body of knowledge on the significance of ESG considerations in the context of IPO performance and their potential to influence investor behaviour.

7.1 Descriptive Statistics

In this part of the results chapter, the study will go through different descriptive statistics of variables that will be used; these variables are not yet winsorised nor turned into log variables to showcase the variation in the values. The three following tables provide information related structure of the dataset, where the mean and standard deviation provide information on the central tendency and dispersion of the data, respectively. The 25th percentile, median, and 75th percentile provide information on the data distribution across quartiles. The maximum and minimum values indicate the range of the data.

Table 3. Descriptive Statistics for Dependent Variables.

Dependent Variables	Mean	Std Dev	25th Pctl	Median	75th Pctl	Max	Min
Underpricing	21.564	31.212	0	12.500	37.894	111.190	-22.184
ROA	-19.636	33.925	-41.346	-17.265	7.056	46.319	-101.956

Table 3 presents descriptive statistics for the dependent variables used in a regression analysis examining IPOs. The first dependent variable, underpricing, which is in percentage, has a mean of 21.564 and a standard deviation of 31.212, indicating a relatively high degree of variability in the underpricing of IPOs. The minimum value of

the variable is negative, indicating that some IPOs may be overpriced. The second dependent variable, ROA, also in percentages, has a negative mean of -19,636 and a standard deviation of 33.925, suggesting that the sample of 429 IPO firms has generally low profitability.

Table 4. Descriptive Statistics for ESG Variables

ESG Variables	Mean	Std Dev	25th Pctl	Median	75th Pctl	Max	Min
E_R_Freq	158.781	244.188	37	79	199	2,505	0
S_R_Freq	667.718	498.139	254	587	1,001	2,780	0
G_R_Freq	4,018.788	2,576.896	1,907	4,261	5,843	13,200	14
E_W_Freq	8.446	7.951	3.363	6.001	10.983	46.706	0
S_W_Freq	17.224	8.529	11.514	16.831	22.731	51.851	0
G_W_Freq	36.120	15.720	27.222	39.134	46.590	91.436	0.190
E_Sentiment_Score	-0.039	0.034	-0.057	-0.043	-0.025	0.167	-0.182
E_Positive_Score	0.027	0.018	0.019	0.025	0.032	0.167	0
E_Negative_Score	0.066	0.029	0.053	0.067	0.081	0.227	0
S_G_Sentiment_Score	-0.023	0.013	-0.031	-0.027	-0.021	0.044	-0.047
S_G_Positive_Score	0.028	0.007	0.024	0.026	0.031	0.064	0.015
S_G_Negative_Score	0.052	0.010	0.047	0.053	0.057	0.090	0.015

The study finds that that the text mining of the terms to construct from the ESG term list, the method managed to match 78.1% of environmental terms, 91.6% of social terms and 84.9 of governance terms. **Table 4** presents descriptive statistics of various ESG variables. The results indicate that the raw frequency of environmental and social terms (E_R_Freq and S_R_Freq, respectively) varies widely, with means of 158.781 and 667.718, respectively. The governance raw frequency (G_R_Freq) has the highest mean frequency at 4,018.788. The mean frequency of weighted frequencies (E_W_Freq, S_W_Freq, and G_W_Freq) are relatively lower than the raw frequency terms due to the tf-idf calculation method, with values of 8.446, 17.224, and 36.120, respectively. Regarding sentiment analysis, the environmental sentiment score (E_Sentiment_Score) is negative, with a mean of -0.039, indicating a generally negative sentiment towards environmental issues. The positive and negative scores (E_Positive_Score and E_Negative_Score) show that negative sentiment is larger than positive sentiment, with mean scores of 0.027 and 0.066, respectively. The social and governance sentiment scores (S_G_Sentiment_Score) exhibit a negative sentiment, with a mean value of -0.023. The S_G_Positive_Score

averages 0.028, while the S_G_Negative_Score is comparatively higher with an average of 0.052. This trend is consistent with the environmental sentiment scores, as the social and governance sentiment scores provide a similar scoring. These results suggest considerable variations in the ESG variables, with potential implications for environmental, social sustainability and corporate governance. The findings also suggest that negative sentiment dominates positive sentiment towards ESG issues, indicating potential areas for improvement in the communication of sentiment in S-1 filings for the ESG context.

Table 5. Descriptive Statistics for Control Variables.

Control Variables	Mean	Std Dev	25th Pctl	Median	75th Pctl	Max	Min
Sales	552,634.200	1,854,469.000	0	52,776	316,861	22,918,808	0
Age	15.152	22.443	5	8	15	150	0
VC	0.571	0.495	0	1	1	1	0
UnderRep	8.090	1.866	8.001	9.001	9.001	9.001	0
OfferRev	-0.007	0.141	-0.067	0	0.086	0.350	-0.533
GrossProc	292.112	588.088	75.000	138	264.500	8,100	4.675
Tech	0.688	0.464	0	1	1	1	0
Leverage	1.300	6.495	0.269	0.622	0.944	119.158	-0.112

The previous table presents descriptive statistics for the control variables used in the regression analysis of IPOs. The mean sales value for the sample firms is 552,634.200, with a standard deviation of 1,854,469.000, indicating a large variation in the sales revenue of the firms. The average age of firms is 15.152 years, and the majority are relatively young, with 75% of firms aged 15 years or less. The variable VC, a dummy variable indicating whether the IPO is venture-backed or not, has a mean of 0.571, indicating that more than half of the IPOs in the sample are venture-backed. The variable UnderRep, which measures the reputation of the underwriters, has a mean of 8.090, indicating that the underwriters have a relatively high reputation. The variable OfferRev, which measures the change in the offer price, has a negative mean of -0.007, indicating that the offer price is usually revised downwards before the IPO. The mean GrossProc is 292.112, with a large standard deviation of 588.088, indicating that there is a significant variation in the size of the IPOs. The variable Tech, which is a dummy variable indicating whether the firm is in a technologically intensive industry, has a mean of 0.688,

indicating that a significant proportion of the firms are in the technology sector. Finally, the variable Leverage, which measures the firm's leverage, has a mean of 1.300 and a standard deviation of 6.495, indicating a large variation in the debt-to-asset ratio of the firms. Overall, these control variables provide a comprehensive overview of the characteristics of the sample firms in the IPO market.

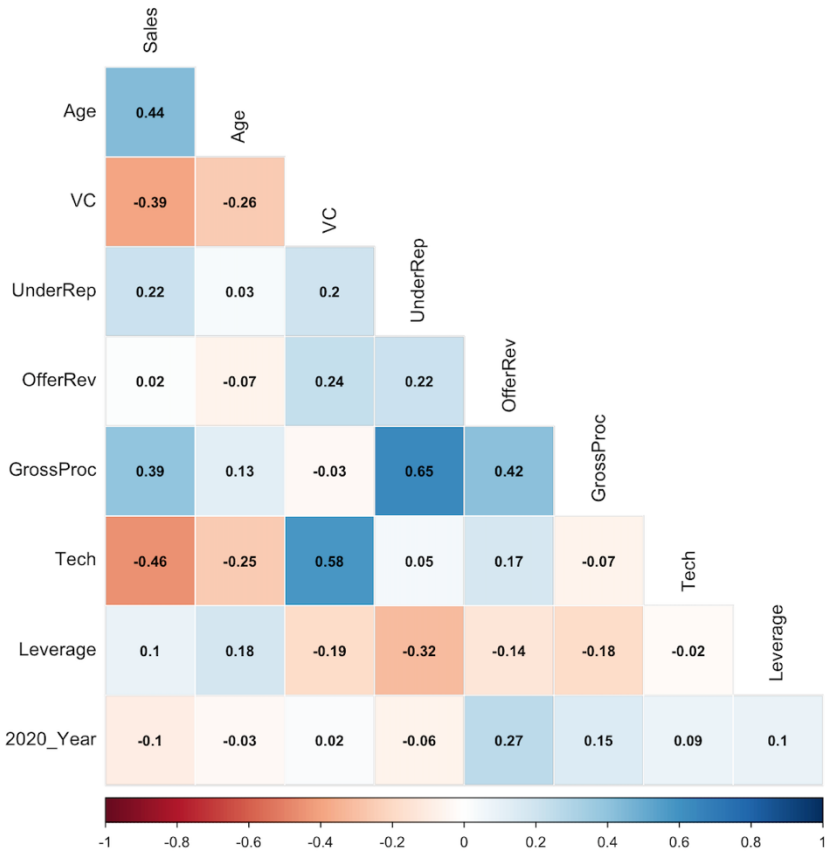

Figure 4. Control Variables Correlation Matrix.

The correlation matrix of control variables used in an IPO context indicates relationships between the control variables, which provide insights into IPO underpricing. Generally, the variables are weakly correlated with each other. The results show that sales have a positive correlation with age and gross proceeds, indicating that firms with higher sales tend to have higher gross proceeds from IPOs and be older. Conversely, sales have a negative correlation with technology. This suggests that firms with higher sales are less likely to be in technologically intensive industries. The matrix also suggests a correlation

between VC-backing and technologically intensive industries; thus, VCs are more likely to back tech IPOs.

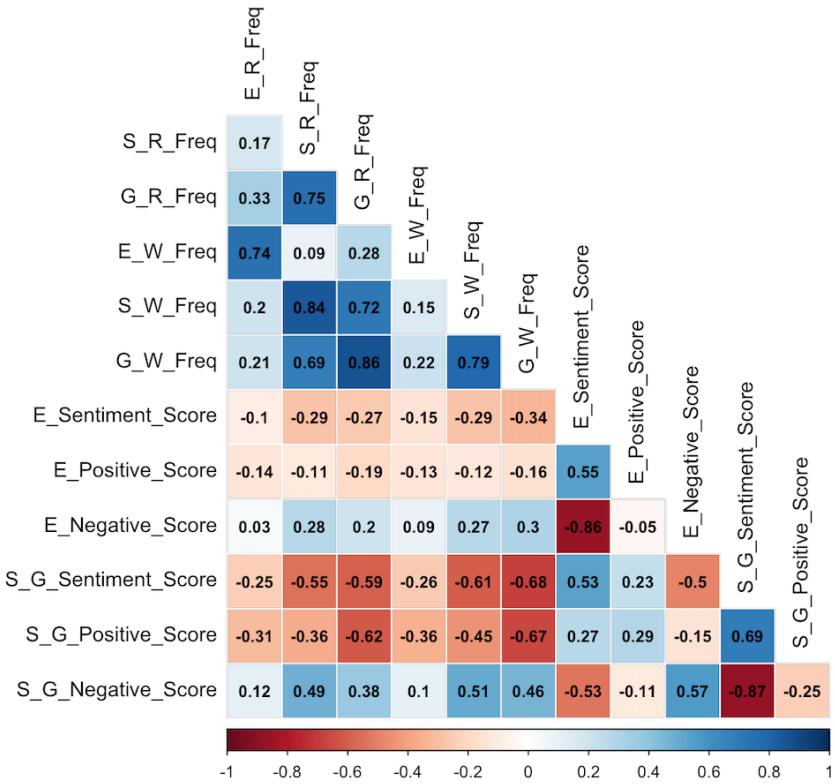

Figure 5. ESG Variables Correlation Matrix.

It is evident that the correlation between raw frequencies (R_Freq) and weighted frequencies (W_Freq) are strong as these variables are measuring similar aspects of ESG terms. Still, with different methods of calculations, however, they are not perfectly correlated, which would imply that they might have different types of impact on the dependent variables. The Sentiment_Score variables are very highly correlated with the Negative_Score variables; it would be wise not to measure Sentiment_Score with Positive_Score and Negative_Score variables as it might pose a multicollinearity problem. A significant correlation exists between the frequency of social and governance terms, which is why they are combined in sentiment analysis to combat multicollinearity problems. These terms tend to appear together in sentences, indicating a contextual relationship.

7.2 Regression Results

The objective of this section in the thesis is to test four hypotheses using OLS regression models. The dependent variables will be changed from underpricing to ROA, and the ESG variables will be modified from term frequency to sentiment variables. However, it is essential to consider various factors to ensure transparency and impartiality in the OLS regression results.

The regression models that have been tested exhibit normality and heteroskedasticity issues, which were identified through data analysis and statistical tests, such as the Shapiro-Wilks test for normality and the Breusch-Pagan test for heteroskedasticity. To address these issues, this thesis employs the winsorising method to limit the effects of outliers and have a more normally distributed set of variables by restricting continuous variables to the 1st and 99th percentile, as demonstrated in the study by Cheng (2022) and is a common technique in finance as mentioned by Adams, Hayunga, Mansi, Reeb, and Verardi (2019). Additionally, the thesis uses robust standard errors in regression models to combat heteroskedasticity problems, and these robust standard errors are presented in parentheses in the regression tables instead of the standard errors; additionally, the usual test for F Statistics for regression models would fail; thus this thesis will use robust Wald statistics for testing as the F Statistics in regression tables as it is better fitted for the robust standard errors (Wooldridge, 2010, pp. 60-62).

Moreover, to test for multicollinearity issues, the thesis conducted a further analysis using variance inflation factors (VIF) and the previously discussed correlation matrix. The results indicate that the data does not suffer from any significant multicollinearity issues.

7.2.1 Underpricing Regressions

In this study, the thesis aims to identify the factors that influence IPOs underpricing, with underpricing being the dependent variable. To investigate, a regression analysis was conducted to test this study's hypotheses 1 and 2, and the analysis results are presented in

this subchapter. For the first regression **Table 6**, ESG frequency values of E_R_Freq, S_R_Freq, G_R_Freq, E_W_Freq, S_W_Freq, and G_W_Freq, which are variables of interest, are being analysed and related to the first hypothesis. These variables represent the total raw calculation of the frequency of terms as R_Freq related to specific ESG issues in S-1 filings, with W_Freq calculated through the term weighting tf-idf method.

The regression results showed that several variables are significant in explaining underpricing. Only the governance variables G_R_Freq and G_W_Freq were significant at the 5% level in the ESG context, along with other variables of interest. The coefficient for the governance variables was positive, suggesting that an increase in G_R_Freq and G_W_Freq is associated with an increase in underpricing. Additionally, the results showed that firms with higher sales, offer revisions, venture capital backing, and being listed in 2020 tend to experience higher levels of underpricing during their IPO. However, independent control variables, including Age, UnderRep, GrossProc, Tech and Leverage, did not significantly impact underpricing. The regression model had limitations, such as not capturing all relevant variables that may impact underpricing in IPOs, which can be measured through the R squared and adjusted R squared ratios. Nevertheless, the most potent models, 5 and 8 from **Table 6**, had R squared values of 0.329 and 0.326, respectively, with identical adjusted R squared values of 0.310.

Based on the finding that the presence of more governance terms in S-1 filings by IPOs increases underpricing, which can be concluded that investors perceive firms with superior governance as high in quality and bid up the IPO prices, leading to underpricing. This suggests that investors view the inclusion of governance terms in the S-1 filing as a signal of the quality and trustworthiness of the firm's management, which leads to increased demand for the IPO shares. This finding can be traced to previous studies, such as Ritter and Welch (2002), which explain that high-quality issuers might want to signal their quality to distinguish themselves by selling their shares lower on the market than their actual worth. Another explanation is based on agency theory, which suggests that governance-related terms may signal that the company is trying to mitigate agency conflicts between

managers and shareholders. This may lead investors to believe the company is less likely to engage in opportunistic behaviour, such as over-pricing the shares. However, this may also lead to higher underpricing if investors are more likely to bid up the price of shares if they perceive that the company has strong governance practices. As previously discussed in the theory of IPOs study by Habib and Ljungqvist (2001), some owners want to minimise wealth losses by reducing information asymmetry. The results are not straightforward; however, governance terms seem more important than environmental and social terms for investors in explaining the underpricing effects.

Table 6. Underpricing with Term Frequency.

	Dependent variable:							
	Underpricing							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
E_R_Freq	−0.003	−0.0001						
	(0.004)	(0.004)						
S_R_Freq	−0.004		0.001					
	(0.005)		(0.003)					
G_R_Freq	0.001**			0.001**				
	(0.001)			(0.001)				
E_W_Freq					0.124	0.188		
					(0.156)	(0.155)		
S_W_Freq					−0.393		0.153	
					(0.287)		(0.156)	
G_W_Freq					0.336**			0.184**
					(0.157)			(0.087)
Sales	0.884**	0.987**	1.006**	0.953**	0.785**	0.941**	0.995**	0.905**
	(0.411)	(0.393)	(0.392)	(0.388)	(0.396)	(0.393)	(0.388)	(0.386)
Age	0.848	0.916	0.916	0.933	1.086	1.288	0.984	0.967
	(1.438)	(1.425)	(1.377)	(1.377)	(1.492)	(1.483)	(1.371)	(1.368)
VC	12.813***	13.465***	13.342***	12.988***	13.159***	13.688***	13.168***	12.799***
	(3.473)	(3.413)	(3.425)	(3.462)	(3.429)	(3.387)	(3.422)	(3.448)
UnderRep	−0.369	−0.248	−0.283	−0.383	−0.298	−0.308	−0.261	−0.271
	(1.037)	(1.038)	(1.050)	(1.042)	(1.013)	(1.037)	(1.048)	(1.034)
OfferRev	94.185***	94.253***	94.633***	94.785***	95.005***	95.254***	94.681***	94.903***
	(11.227)	(11.192)	(11.197)	(11.136)	(11.103)	(11.236)	(11.138)	(11.047)
GrossProc	−0.132	−0.073	−0.066	−0.057	−0.280	−0.174	−0.118	−0.215
	(2.083)	(2.063)	(2.053)	(2.060)	(2.047)	(2.046)	(2.054)	(2.055)
Tech	2.239	2.643	2.340	2.150	2.924	3.441	2.255	1.958
	(3.955)	(3.826)	(3.765)	(3.706)	(4.044)	(3.932)	(3.722)	(3.701)
Leverage	0.022	0.509	0.375	0.114	0.184	0.672	0.086	−0.323
	(3.583)	(3.632)	(3.645)	(3.589)	(3.540)	(3.639)	(3.658)	(3.490)
2020_Year	14.606***	14.240***	14.183***	14.368***	15.517***	14.507***	13.885***	14.342***
	(3.851)	(3.800)	(3.807)	(3.793)	(3.875)	(3.807)	(3.815)	(3.778)
Constant	1.566	0.625	0.215	0.144	−3.253	−1.296	−1.152	−3.277
	(10.721)	(10.844)	(10.587)	(10.552)	(10.779)	(10.888)	(10.574)	(10.677)
F Statistic	13.282***	15.18***	15.193***	15.57***	13.448***	15.209***	15.412***	15.925***
Observations	429	429	429	429	429	429	429	429
R^2	0.322	0.319	0.319	0.321	0.329	0.320	0.320	0.326
Adjusted R^2	0.303	0.303	0.303	0.305	0.310	0.304	0.304	0.310
Residual Std. Error	27.845	27.849	27.843	27.806	27.701	27.816	27.821	27.705

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

To test the second hypothesis, the study will use two regression tables, namely **Table 7** and **Table 8**. The variables of interest in the regressions were E_Sentiment_Score, S_G_Sentiment_Score, E_Positive_Score, E_Negative_Score, S_G_Positive_Score, and S_G_Negative_Scores. As explained earlier, the positive and negative scores are derived from positive and negative terms in S-1 filings with environmental and social-governance contexts separately. Afterwards, the sentiment score is gained through an equation of the positive score minus the negative score.

The thesis found in **Table 7** that the E_Sentiment_Score was significant, along with S_G_Sentiment_Score on model 9, implying that a higher sentiment score in the environmental section of an S-1 filing is associated with a higher degree of underpricing in IPOs. Although the environmental sentiment variable did not prove to be significant in regression model 10, the S_G_Sentiment_Score on models 9 and 11 had a negative and significant coefficient when evaluated alone, as well as in conjunction with the E_Sentiment_Score. This suggests that a higher sentiment score in the social and governance section of an S-1 filing is linked to a lower level of underpricing in IPOs. In regression model 12, the only significant ESG variable was E_Negative_Score, which had a negative and marginally significant coefficient. This suggests that a higher level of negative sentiment in the environmental section of an S-1 filing is associated with a lower degree of underpricing in IPOs.

Moreover, the coefficients for the control variables Sales, VC, OfferRev, and 2020_Year were positive and significant, indicating that extensive sales, venture capital backing, higher offer revisions, and going public in 2020 are associated with higher underpricing in IPOs. Overall, the results suggest that sentiments in the environmental, social, and governance sections of an S-1 filing are associated with the underpricing of IPOs. The regression models have similar explanatory power of the underpricing as in **Table 6**. The findings suggest that investors are willing to pay a premium for firms with positive environmental performance and are likely to be wary of firms with poor social and governance practices

Table 7. Underpricing with Sentiment Scores.

	Dependent variable:			
	Underpricing			
	(9)	(10)	(11)	(12)
E_Sentiment_Score	89.685**	22.352		
	(41.449)	(32.826)		
S_G_Sentiment_Score	−329.753***		−206.333**	
	(114.578)		(100.261)	
E_Positive_Score				41.686
				(69.818)
S_G_Positive_Score				−332.855
				(224.560)
E_Negative_Score				−110.884*
				(58.333)
S_G_Negative_Score				341.178
				(216.664)
Sales	0.981**	0.985**	0.986**	0.974**
	(0.386)	(0.388)	(0.386)	(0.391)
Age	1.392	0.840	1.418	1.484
	(1.380)	(1.387)	(1.392)	(1.406)
VC	12.492***	13.440***	12.925***	12.618***
	(3.367)	(3.411)	(3.408)	(3.418)
UnderRep	−0.486	−0.254	−0.389	−0.522
	(1.033)	(1.035)	(1.046)	(1.035)
OfferRev	95.125***	94.393***	94.454***	94.781***
	(11.050)	(11.258)	(11.005)	(11.137)
GrossProc	0.189	−0.103	0.176	0.267
	(2.034)	(2.051)	(2.055)	(2.053)
Tech	2.707	2.745	2.461	2.774
	(3.621)	(3.697)	(3.691)	(3.677)
Leverage	−0.429	0.476	0.014	−0.519
	(3.699)	(3.638)	(3.652)	(3.684)
2020_Year	13.601***	14.055***	14.311***	13.596***
	(3.790)	(3.832)	(3.783)	(3.788)
Constant	−2.790	1.878	−4.750	−0.895
	(10.900)	(10.978)	(10.923)	(15.959)
F Statistic	14.451***	15.24***	15.506***	12.338***
Observations	429	429	429	429
R^2	0.331	0.319	0.325	0.332
Adjusted R^2	0.314	0.303	0.309	0.311
Residual Std. Error	27.625	27.839	27.716	27.674

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

Based on the second hypothesis and the results presented in **Table 8**, sentiment analysis continues. The first variable of interest, E_Positive_Score, was statistically insignificant in all the models employed. However, S_G_Positive_Score was statistically significant and negative when used alone and with E_Positive_Score in regression models, although it did not show significance in the regression model 12. The results indicate that companies with higher scores for positive sentiment in their S-1 filings for social and governance practices tend to have lower levels of underpricing in their IPOs.

The coefficients for E_Negative_Score and S_G_Negative_Score on model 16 were negative and positive, respectively, and statistically significant when used together. This implies that companies with higher scores for negative sentiment in their environmental issues tend to have lower levels of underpricing in their IPOs. In contrast, companies with higher scores for negative sentiment in their social and governance issues tend to have higher levels of underpricing in their IPOs. However, the significance of the negative sentiment variables turns into insignificant coefficients when tested as a single ESG variable in regressions 17 and 18. Nevertheless, the negative sentiment score for environmental issues appears significant in regression model 12 when all the positive and negative sentiment variables are used collectively in the regression. The variables Sales, VC, OfferRev, and 2020_Year continue to display significant levels of explanatory power in all the regression models presented in **Table 8**, demonstrating their robustness in explaining underpricing.

Table 8. Underpricing with Positive and Negative Scores.

	Dependent variable:					
	Underpricing					
	(13)	(14)	(15)	(16)	(17)	(18)
E_Positive_Score	33.847	−8.472				
	(66.842)	(64.365)				
S_G_Positive_Score	−394.147*		−369.619*			
	(209.331)		(203.290)			
E_Negative_Score				−111.253**	−34.887	
				(56.061)	(44.811)	
S_G_Negative_Score				401.184**		209.070
				(191.798)		(158.842)
Sales	0.943**	0.985**	0.943**	1.016***	0.981**	1.011***
	(0.388)	(0.389)	(0.387)	(0.388)	(0.388)	(0.389)
Age	1.176	0.939	1.228	1.391	0.870	1.251
	(1.419)	(1.410)	(1.401)	(1.382)	(1.377)	(1.379)
VC	13.594***	13.490***	13.672***	12.356***	13.519***	12.803***
	(3.467)	(3.438)	(3.451)	(3.347)	(3.414)	(3.397)
UnderRep	−0.293	−0.253	−0.302	−0.524	−0.269	−0.362
	(1.028)	(1.039)	(1.030)	(1.051)	(1.034)	(1.053)
OfferRev	95.285***	94.198***	95.006***	93.759***	94.234***	94.032***
	(11.203)	(11.217)	(11.127)	(11.040)	(11.232)	(11.070)
GrossProc	0.214	−0.057	0.243	0.068	−0.070	0.002
	(2.069)	(2.064)	(2.064)	(2.042)	(2.047)	(2.052)
Tech	2.924	2.655	2.906	2.450	2.794	2.317
	(3.761)	(3.722)	(3.759)	(3.621)	(3.692)	(3.708)
Leverage	0.167	0.507	0.172	−0.326	0.437	0.200
	(3.560)	(3.622)	(3.543)	(3.758)	(3.620)	(3.714)
2020_Year	14.428***	14.264***	14.496***	13.448***	14.038***	14.168***
	(3.776)	(3.802)	(3.769)	(3.808)	(3.832)	(3.788)
Constant	9.462	0.736	9.447	−11.126	3.189	−9.829
	(11.131)	(10.429)	(11.147)	(13.390)	(11.269)	(13.406)
F Statistic	14.219***	15.237***	15.575***	14.322***	15.196***	15.326***
Observations	429	429	429	429	429	429
R^2	0.325	0.319	0.324	0.328	0.320	0.322
Adjusted R^2	0.307	0.303	0.308	0.311	0.303	0.306
Residual Std. Error	27.764	27.849	27.737	27.686	27.831	27.778

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

7.2.2 ROA Regressions

In this subchapter, a regression analysis is presented to examine the factors that impact the ROA of IPOs. More precisely, the thesis shifts the focus of the dependent variable from underpricing to ROA. The regression tables provided in this subchapter display the outcomes of this analysis.

In **Table 9**, the thesis tests the third hypothesis, which has the same variables of interest as in **Table 6**. The results indicate that all the variables have some significance levels. When E_R_Freq and S_R_Freq are regressed with G_R_Freq on model 19, environmental and social measures are highly significant at the 1% level; the governance measure is not significant, however, becomes significant at the 10% level when measured alone on model 22. Furthermore, the significance level of E_R_Freq diminishes to the 5% level, but S_R_Freq remains highly significant when regressed alone. These findings suggest that an increase in E_R_Freq is associated with an increase in ROA, while an increase in S_R_Freq is associated with a decrease in ROA. Additionally, an increase in G_R_Freq has adverse effects on ROA, meaning that an increase in the governance raw word frequency would lower the profitability in ROA. The findings from the weighted frequency variables E_W_Freq, S_W_Freq, and G_W_Freq are consistent with the raw frequency results, as they are highly significant on all levels. However, the results for the governance variables are mixed when regressed alone. Together with other weighted term variables, the G_W_Freq has an increasing effect on ROA but is not significant when regressed alone on model 26.

Regarding the control variables, Sales, Age, GrossProc, and Tech are highly significant in most models and are influential variables in explaining the shift in ROA. The evidence indicates that companies with high sales, older age, more significant gross proceeds, and not tech companies have an increasing impact on ROA. In addition, compared to the previous models that focused on underpricing, the models that explain the impact of the frequency of terms on ROA show a higher R squared, with the highest R squared being 0.494 and adjusted R squared (0.479) on model 23. These results suggest that the frequency of terms can significantly implicate a company's future operating performance.

Table 9. ROA with Term Frequency.

	Dependent variable:							
	ROA							
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
E_R_Freq	0.0001***	0.0001**						
	(0.00004)	(0.00004)						
S_R_Freq	−0.0002***		−0.0001***					
	(0.00005)		(0.00003)					
G_R_Freq	0.00001			−0.00001*				
	(0.00001)			(0.00001)				
E_W_Freq					0.006***	0.004**		
					(0.002)	(0.002)		
S_W_Freq					−0.014***		−0.006***	
					(0.003)		(0.002)	
G_W_Freq					0.004***			−0.001
					(0.001)			(0.001)
Sales	0.017***	0.021***	0.020***	0.022***	0.017***	0.021***	0.021***	0.022***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Age	0.052***	0.049***	0.047***	0.046***	0.054***	0.054***	0.044**	0.046***
	(0.018)	(0.018)	(0.017)	(0.017)	(0.018)	(0.019)	(0.017)	(0.017)
VC	−0.055	−0.064	−0.054	−0.058	−0.046	−0.061	−0.053	−0.061
	(0.045)	(0.046)	(0.045)	(0.047)	(0.045)	(0.046)	(0.046)	(0.047)
UnderRep	0.022	0.021	0.025	0.025	0.021	0.021	0.023	0.023
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
OfferRev	−0.042	0.002	−0.033	−0.007	0.008	0.021	−0.017	−0.003
	(0.117)	(0.117)	(0.120)	(0.119)	(0.117)	(0.117)	(0.119)	(0.119)
GrossProc	0.057***	0.056***	0.054***	0.054***	0.052**	0.052**	0.056***	0.055***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)
Tech	−0.152***	−0.194***	−0.173***	−0.194***	−0.154***	−0.185***	−0.185***	−0.197***
	(0.041)	(0.044)	(0.041)	(0.043)	(0.041)	(0.044)	(0.041)	(0.043)
Leverage	−0.045	−0.059	−0.048	−0.055	−0.035	−0.058	−0.043	−0.056
	(0.045)	(0.047)	(0.045)	(0.047)	(0.043)	(0.047)	(0.046)	(0.048)
2020_Year	0.013	0.001	0.005	−0.003	0.044	0.005	0.014	−0.001
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.037)	(0.036)	(0.036)
Constant	−0.728***	−0.760***	−0.707***	−0.734***	−0.728***	−0.779***	−0.669***	−0.718***
	(0.142)	(0.142)	(0.139)	(0.138)	(0.140)	(0.143)	(0.139)	(0.139)
F Statistic	44.428***	46.274***	49.952***	46.895***	42.949***	47.037***	48.641***	46.671***
Observations	429	429	429	429	429	429	429	429
R^2	0.483	0.456	0.472	0.457	0.494	0.459	0.471	0.455
Adjusted R^2	0.468	0.443	0.459	0.444	0.479	0.446	0.458	0.442
Residual Std. Error	0.281	0.288	0.283	0.287	0.278	0.287	0.284	0.288

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

Table 10 employs sentiment measures to estimate the impact on ROA. However, all the models that utilise sentiment scores ranging from 27 to 29 do not yield statistically significant implications. On the other hand, model 30, which collectively regresses positive and negative scores, substantially affects the positive social and governance score

S_G_Positive_Score, with a significant negative coefficient. Thus, an increase in the positive score would lead to a 3.946 decrease in the ROA measure. The control variables, Sales, Age, GrossProc, and Tech, remain robust in explaining the influence on ROA as they are significant in all models.

Table 11 measures the positive and negative scores relationships ROA, a continuation of the fourth hypothesis from **Table 10.** The ESG measures show no considerable significance. Nonetheless, the positive sentiment score for environmental issues E_Positive_Score has mildly significant effects on ROA when paired with the positive score for social and governance issues on model 31. An increase in positive sentiment for environmental issues would lead to increased profitability. The control variables' results remain robust, like the previous models for estimating ROA.

All models used for estimation possess significant F statistics in conventional levels, indicating that the regression models fit the data well. However, compared to underpricing models, their R-squared is relatively lower than the ones for ROA regression models, suggesting that the models do not explain a large proportion of the variation in underpricing, implying that the ROA models are more powerful in that sense for explanatory power. Nevertheless, ESG issues have implications towards the development of ROA, as there is evidence in the previous **Table 9** conclusions related to the frequency of terms. Social terms are seen as diminishing and environmental terms as strengthening factors. At the same time, governance is weakly significant; the positive sentiment on the social and governance variable has a lowering effect on the ROA, as seen on model 30, which is mildly significant, and the positive score on environmental issues on model 31 is a positive factor, which would implicate an increase ROA, the previous results on frequency on environmental terms has an increasing factor for ROA.

Table 10. ROA with Sentiment Scores.

	Dependent variable:			
	ROA			
	(27)	(28)	(29)	(30)
E_Sentiment_Score	0.578	0.548		
	(0.482)	(0.414)		
S_G_Sentiment_Score	−0.145		0.650	
	(1.232)		(1.080)	
E_Positive_Score				1.215
				(0.775)
S_G_Positive_Score				−3.946*
				(2.135)
E_Negative_Score				−0.011
				(0.589)
S_G_Negative_Score				−2.745
				(1.701)
Sales	0.021***	0.021***	0.021***	0.021***
	(0.004)	(0.004)	(0.004)	(0.004)
Age	0.045**	0.045**	0.045**	0.043**
	(0.018)	(0.017)	(0.018)	(0.018)
VC	−0.066	−0.066	−0.064	−0.058
	(0.046)	(0.046)	(0.046)	(0.046)
UnderRep	0.022	0.022	0.023	0.024
	(0.016)	(0.016)	(0.016)	(0.016)
OfferRev	0.004	0.004	0.0001	0.020
	(0.119)	(0.119)	(0.119)	(0.119)
GrossProc	0.053**	0.053**	0.053**	0.055***
	(0.021)	(0.021)	(0.021)	(0.021)
Tech	−0.199***	−0.199***	−0.201***	−0.194***
	(0.043)	(0.043)	(0.043)	(0.042)
Leverage	−0.062	−0.062	−0.059	−0.060
	(0.047)	(0.047)	(0.047)	(0.047)
2020_Year	−0.005	−0.005	−0.001	−0.0001
	(0.037)	(0.037)	(0.037)	(0.037)
Constant	−0.711***	−0.709***	−0.724***	−0.529***
	(0.139)	(0.139)	(0.140)	(0.159)
F Statistic	42.56***	45.956***	46.139***	36.368***
Observations	429	429	429	429
R^2	0.456	0.456	0.454	0.462
Adjusted R^2	0.442	0.443	0.441	0.445
Residual Std. Error	0.288	0.288	0.288	0.287

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

Table 11. ROA with Positive and Negative Scores.

	Dependent variable:					
	ROA					
	(31)	(32)	(33)	(34)	(35)	(36)
E_Positive_Score	1.270*	0.964				
	(0.764)	(0.709)				
S_G_Positive_Score	−2.857		−1.937			
	(2.162)		(2.146)			
E_Negative_Score				0.003	−0.419	
				(0.602)	(0.513)	
S_G_Negative_Score				−2.218		−2.213
				(1.700)		(1.458)
Sales	0.021***	0.022***	0.021***	0.021***	0.021***	0.021***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Age	0.046***	0.044**	0.048***	0.043**	0.046***	0.043**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.017)	(0.018)
VC	−0.067	−0.068	−0.064	−0.058	−0.065	−0.058
	(0.046)	(0.046)	(0.046)	(0.047)	(0.046)	(0.047)
UnderRep	0.023	0.023	0.022	0.024	0.022	0.024
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
OfferRev	0.015	0.007	0.005	0.003	0.0004	0.003
	(0.118)	(0.118)	(0.118)	(0.119)	(0.118)	(0.120)
GrossProc	0.055***	0.053**	0.056***	0.053**	0.054***	0.053**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Tech	−0.199***	−0.201***	−0.200***	−0.198***	−0.200***	−0.198***
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
Leverage	−0.063	−0.060	−0.063	−0.057	−0.062	−0.057
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)
2020_Year	−0.002	−0.003	0.001	0.0001	−0.003	0.0001
	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)	(0.037)
Constant	−0.694***	−0.757***	−0.694***	−0.630***	−0.709***	−0.630***
	(0.147)	(0.140)	(0.148)	(0.150)	(0.142)	(0.150)
F Statistic	42.038***	46.432***	45.669***	42.751***	45.809***	46.252***
Observations	429	429	429	429	429	429
R^2	0.458	0.456	0.455	0.457	0.455	0.457
Adjusted R^2	0.444	0.443	0.442	0.442	0.442	0.444
Residual Std. Error	0.287	0.288	0.288	0.288	0.288	0.287

Significant levels: *** at 1% (p<0.01), ** at 5% (p<0.05), and * at 10% (p<0.10).

8 Conclusion

This thesis aims to provide a framework for assessing the perception of ESG issues in IPOs. Despite extensive research on IPOs, the intersection between ESG and IPOs has yet to be widely researched due to the relatively new and growing nature of ESG issues. Moreover, evaluating ESG issues in IPOs is challenging since non-listed companies need proper standards and frameworks for assessment, and reporting and discussions related to these issues are voluntary. However, the importance of ESG and CSR-related issues has increased, making disclosures of company information more relevant.

The study presents evidence that ESG perception matters in IPO disclosures. Results show that different ESG measures influence underpricing and ROA in IPOs. Companies with solid governance practices reflected in the frequency of governance terms experience higher levels of underpricing and are perceived to have higher-quality issuers. The evidence can be related to the findings by Michaely and Shaw (1994), as firms with better information choose to underprice their IPOs to signal their quality to investors. The thesis also finds that companies with higher environmental sentiment tend to have higher levels of underpricing, while those with higher social and governance sentiment tend to have lower levels. However, the environmental sentiment score is only significant when tested with social and governance sentiment scores, as the high significance of environmental sentiment scores diminishes when tested as lone ESG variables in regression models.

The thesis further finds that companies with higher scores for negative sentiment in their environmental issues tend to have lower levels of underpricing when tested with other ESG scores. In comparison, those with higher scores for negative sentiment in their social and governance issues tend to experience higher levels of underpricing, mainly when tested with the negative score variable of environmental issues. These findings can be related to Michaely and Shaw's (1994) finding as the adverse selection is shown to affect the pricing of less successful IPOs, as investors require a higher return to compensate for

the risk of investing in these firms. However, the significance of these negative sentiment variables diminishes when tested as lone ESG variables in regression models.

From the operating performance perspective, environmental terms positively influence ROA, whereas social terms have a negative impact. This suggests that investors value environmentally responsible companies, which can lead to better operating performance and attract environmentally conscious customers and investors. However, social terms can increase social costs and risks, indicating a potentially riskier relationship with labour disputes, consumer boycotts, or reputational damage. The previous can be related to the study by Nirino et al. (2021), which finds that shareholders appreciate ESG practices due to the possibility of increasing the company's reputation and adopting sustainable and responsible practices, mitigating controversies in the future, thus increasing financial performance. The evidence related to corporate image can be seen as an extension to previous studies finding corporate image as a significant factor (see Barney & Hansen, 1994; Fombrun et al., 2000; Godfrey, 2005; Branco & Rodrigues, 2006; Cheng et al., 2014; Martínez-Ferrero et al., 2016). Governance terms have mixed implications, with weak significance, but overall, using ESG terms has significant implications for ROA. Sentiment scores showed mild impacts on ROA, with positive sentiment scores on environmental issues mildly impacting ROA positively and social and governance issues mildly negatively impacting ROA.

The study has limitations due to the need for more common frameworks for analysing the sentiment or relevancy of ESG and CSR issues in IPOs. However, the study provides robust evidence that ESG issues should be considered when researching IPOs and provides extensive methodologies for analysing IPO filings' sentiment. In addition, future studies could analyse the impact of voluntary ESG and CSR-related disclosures on future financial performance and valuation of companies in different markets and geographical locations. Overall, the study contributes to the relatively new research on ESG and IPOs and highlights the importance of considering ESG issues in IPO disclosures.

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Appendices

Appendix 1. ESG Term List

Environmental

agriculture, air, atmosphere, biodiversity, biofuel, biofuels, biosphere, biphenyls, carbon, carbon footprint, carbon handprint, carbon risk, circular, clean, cleaner, cleanup, climate, climate change, climate risk, coal, conservation, contamination, conversion factor, deforestation, durable, durables, eco, ecosystem, emission, emissions, emit, environment, environmental, environmentally, epa, food, footprint, fossil, fossil free, freshwater, fuel screened, ghg, ghg protocol, ghgs, global warming, green, greenhouse, groundwater, hazardous, householding, intergovernmental panel on climate change, ipcc, low carbon, materiality, natural resource, natural resources, new energy, nitrogen, nutrition, ocean, pesticide, pesticides, pollutant, pollutants, pollution, printing, recycle, recycled, recycling, renewable, resource, smart energy, smart food, solar, species, stewardship, superfund, sustainability, sustainable, sustainably, task force on climate-related financial disclosures, tcfd, toxic, warming, waste, wastes, water, water risk, waste electrical and electronic equipment, weee, wetlands, wilderness, wildlife, wind, wwf, zoning

Social

alcohol, bargaining, bisexual, bugs, charities, charity, charitable, childbirth, children, citizen, citizens, communities, community, conformance, conscious, courses, covid, covid-19, csr, defects, dignity, disabilities, disability, disabled, discriminate, discriminated, discriminating, discrimination, discriminatory, diverse, diversity, donate, donated, donates, donating, donation, donations, donors, drinking, drug, educate, educated, educates, educating, education, educational, eeo, eicc, employ, employment, endowment, endowments, epidemic, equality, ethnic, ethnically, ethnicities, ethnicity, expression, fairness, fda, female, females, fla, foundation, foundations, freedom, future cities, gay, gays, gender, genders, gift, gifts, harassment, headcount, health, healthy, hire, hired, hires, hiring, hiv, homosexual, human, human rights, humanity, ill, illness, ilo, immigration, injury, inspection, inspections, labor, labour, learning, lesbian, lesbians, lgbt, marriage, medicaid,

medicare, medicine, medicines, mentoring, minerals, minorities, minority, ms, nations, nondiscrimination, nonprofit, occupational, oncology, overtime, pandemic, peace, people, philanthropic, philanthropy, planet, poverty, privacy, race, racial, recreation, religion, religious, ruggie, safe, safely, safety, scholarships, sex, sexual, sick, slave, slavery, social, socially, societal, society, staffing, standardization, teach, teacher, teachers, teaching, the un guiding principles on business and human rights, tolerance, trafficking, training, transgender, un, unemployment, veteran, veterans, vulnerable, wage, wages, warranty, welfare, woman, women, workplace

Governance

abusing, abusive, active investing, active ownership, aggressive tax planning, align, aligned, aligning, alignment, aligns, announce, announced, announcement, announcements, announces, announcing, annual meeting, antibribery, anticorruption, appreciation, approval, approvals, approve, approved, approves, approving, asc, assess, assessed, assesses, assessing, assessment, assessments, attract, attracting, attracts, audit, audited, auditing, auditor, auditors, audits, award, awarded, awarding, awards, backgrounds, ballot, ballots, best-in-class, bonus, bonuses, bribe, bribery, bribes, bribing, brother, bully, bullying, bylaw, bylaws, cast, cd, charter, charters, clicking, cobc, code of conduct, coercion, communicate, communicated, communicates, communicating, compact, compensate, compensated, compensates, compensating, compensation, compliance, conduct, conflict, conflicts, conformity, consent, control, controls, corrupt, corruption, coso, crime, crimes, criminal, criminally, criminals, culture, data privacy, death, deceive, deception, deceptive, detect, detected, detecting, detection, development, disclose, disclosed, discloses, disclosing, disclosure, disclosures, dishonest, dishonesty, duly, eip, elect, elected, electing, election, elections, elects, embezzlement, engage, engagement, engagements, environmental, social and governance, erm, esg, esg score, ethic, ethical, ethical investing, ethically, ethics, eu sustainable finance, evaluate, evaluated, evaluates, evaluating, evaluation, evaluations, evolution, examination, examinations, examine, examined, examines, examining, exclusion, extortion, fair, fair invest, fairly, family, fasb, feedback, financial costs, forgery, fraud, fraudulent, fraudulently, gaap, gdpr, gender harassment,

general data protection regulation, general meeting, governance, grandchildren, grandparent, grandparents, grassroots, groping, harassing, harassment, hedge fund, honesty, hostile, hotline, impact, inappropriate, inappropriately, incentive, incentives, independence, independent, influence, influences, influencing, inform, innovative, insider, insiders, inspector, inspectors, integration, integrity, interlocks, interview, interviews, intimidate, intimidating, intimidation, investor, invite, invited, irs, iso, isos, kickback, kickbacks, leadership, liaison, lobbied, lobbies, lobby, lobbying, lobbyist, lobbyists, mail, mailed, mailing, mailings, misconduct, motivate, motivated, motivates, motivating, motivation, negative screening, neoclassical economic theory, nephews, nepotism, net sales, nieces, nominate, nominated, nomination, nominations, nominee, nominees, non-financial information, notice, objectivity, oecd, offensive, operating costs, organization for economic cooperation and development, oversee, overseeing, oversees, oversight, parachute, parachutes, parents, passive investing, payout, payouts, pension, perquisites, perspectives, plane, planes, plurality, poison, pornographic, pornography, positive, positive screening, posting, presentation, presentations, press, prevention, pri, principles for responsible investment, problem, profitability, proponent, proponents, proposal, proposals, protection, proxies, prsu, prsus, qualifications, quid pro quo, quorum, rape, recoupment, recruit, recruiting, recruitment, refreshment, relations, relatives, remuneration, responsibility, responsible, retain, retainer, retainers, retaining, retention, retirement, review, reviewed, reviewing, reviews, reward, rewarding, rewards, risk-to-return ratio, rotation, rsu, rsus, salaries, salary, sarbanes, sasb, sdg, sdgs, security, severance, sex, sexual, sexual assault, sexual harassment, shareholder, shareholder proposal, shareholder's rights directive, siblings, sister, skill, skills, soft law, solution, son, spousal, spouse, spouses, sri, stakeholder, stakeholder theory, stakeholders, stepchildren, stepparents, stereotypes, stewardship code, strategy, succession, supply chain, sustain, sustainability, sustainability accounting standards board, sustainability development goals, sustainability index, sustainability investing, sustainability rating, sustainable, talent, talented, talents, tax avoidance, tax planning, tenure, test, tested, testing, tests, thematic investing, transition, transparency, transparent, treadway, ungc, ungc compliance, unwanted advances, vacancies, vacancy, value creation, values, vest, vested, vesting, vests,

visit, visiting, visits, vote, voted, votes, voting, webpage, website, well-being, whistle-blower, wrongdoing