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**SUSTAINABLE INVESTING:
ESG GOVERNMENT AND COMPANY RATINGS ON IPO
UNDERPRICING**

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ABSTRACT

Environmental, social and governance risk exposure and management are becoming increasingly important in investing decisions. The new trend of sustainable investing pressures investors towards stocks listed by high ESG companies and countries. This thesis studies the combined effect of ESG government and company ratings on IPO underpricing. A sample of 661 IPO deals listed from 2010 to 2023 in 23 different countries for which ESG government and company ratings were available at the issue date is used to perform an OLS regression analysis. The same analysis is repeated on a restricted sample of only developed countries. I find that ESG government ratings have a significantly positive effect on IPO underpricing due to the increasing investor demand in high ESG stocks. Additionally, due to a massive reduction in asymmetric information, the combination of high ESG government and company scores results in significantly lower IPO underpricing in developed countries. These findings underline the importance of detailed and comprehensive ESG strategies, which can significantly affect IPO returns.

Keywords: Underpricing, IPO, ESG, Sustainable Investing

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CHAPTER 1 Introduction

Environmental, social, and governance (ESG) ratings evaluate a company's or financial institution's sustainability profile and risk exposure. Companies and governments worldwide are increasingly undergoing ESG examinations to demonstrate their risk management ability.

The phenomenon of initial public offerings (IPO) underpricing is affected by various variables. Although it is one of the most discussed topics in corporate finance, the complete and exact drivers of IPO underpricing still need to be discovered.

The EY EMEA IPO Leader Martin Steinbach (2022) predicts that ESG rating disclosure will become mandatory for companies willing to list their IPO on European stock exchanges. A company's strategic decisions before, during, and after its IPO significantly influence its underpricing. Moreover, investing money in ways that benefit the environment and support a sustainable economic transition is becoming increasingly popular. This new trend is called sustainable investing and is an important component in discussing the effect of ESG ratings on IPO underpricing.

Researchers, particularly in corporate finance and governance, have examined this relationship. Baker et al. (2021) study the effects of ESG government ratings on firm-level IPO underpricing between 2008 and 2018, focusing on 7446 IPOs issued in 36 countries. To estimate the results, the authors used two-level hierarchical linear modelling. They find that IPO underpricing is lower in countries with high ESG ratings due to their negative effect on asymmetric information. These findings are consistent when analysing the environmental, social and governance pillars separately. Ferri et al. (2023) study the impact of ESG company rating disclosure on IPO underpricing using multiple linear regression (MLR) analysis based on 100 European IPOs from 2017 to 2021. Their findings show that companies that disclose their ESG rating experience less underpricing than the ones that do not. Companies disclosing their ESG score are perceived to be less risky and experience less information asymmetry between the parties involved in an IPO. Giese et al. (2019) analyse the effect of ESG company ratings on the performance and valuation of a company by showing the distribution of financial variables across five size-adjusted ESG score quintiles using data on 1600 stocks from January 2007 to May 2017. They find that higher ESG company scores lead to higher profitability and valuations. The authors argue that ESG characteristics are thus a useful financial indicator which could be effectively incorporated into policy decisions.

Numerous researchers have explored the topic of sustainable investment, with most focusing on the effect of ESG company ratings on a company's performance rather than ESG government ratings. Gillan et al. (2021) review articles that studied the relationship between ESG and CRS performance and various financial indicators measuring companies' profitability, success, and value worldwide. They confirm that ESG and CRS strategies can significantly influence a company's structure and results.

Building upon Macher et al. (2011) theory on the influence of firms' characteristics on their government, I suppose that the ESG company and ESG government ratings are strongly correlated. ESG company ratings could play a moderating role in the relationship between IPO underpricing and ESG government ratings. Inversely, ESG government ratings could moderate the relationship between ESG company ratings and IPO underpricing. Therefore, the research question that this thesis aims to answer is: How does the combination of ESG company ratings and ESG government ratings affect IPO underpricing? To my knowledge, this is the first time these topics are linked together.

To study this research question, I will focus on international IPO events between 2010 and 2023 retrieved from the LSEG Workspace Deal Screener database listed in countries where MSCI ESG government ratings and LSEG ESG company ratings are available on the issue date. Only IPOs trading ordinary and common shares will be included in the sample. I will perform an Ordinary Least Squares (OLS) regression with IPO underpricing as the dependent variable and ESG government scores, ESG company scores and the interaction between the two as the independent variables. Additionally, I will control for a range of important firm and country characteristics.

I hypothesise a negative effect of the combination of ESG government and ESG company ratings on IPO underpricing. Asymmetric information is known to be one of the main drivers of IPO underpricing. The combination of high ESG government and company scores provides investors with more information and is thus expected to reduce IPO underpricing. The hypothesis of an overall negative effect of the combination of ESG government and company ratings on IPO underpricing should be reflected in a significantly negative coefficient of the interaction term.

Building upon past research on this topic, this thesis aims to integrate relationships that were previously discussed separately. Companies intending to enter the stock markets can utilise this research to formulate an efficient ESG strategy by combining the ESG government rating of their listing country and their personal ESG company rating. Since these are the only two dimensions of ESG ratings, this study may contribute to concluding the research on ESG scores' impact on IPO underpricing. Nonetheless, the broader topic of the determinants of IPO underpricing can be expanded infinitely, as every economic, social, and environmental variable could affect it.

CHAPTER 2 Theoretical Framework

2.1 Environmental, Social and Governance Risk

It is essential to precisely define environmental, social, and governance (ESG) risk as it is widely used in economic literature. For this paper, I will rely on the definition provided by the Cambridge Dictionary: “ESG is a set of standards for measuring a business’s impact on society and the environment, as well as its transparency and accountability.” (Cambridge Dictionary, 2024) ESG ratings have evolved significantly as an overall measure of a country or company's environmental, social, and governance risk exposure and risk management. They rate the sustainability, socioeconomic, and political characteristics of the subject under analysis. The range of ESG rating agencies and methodologies has been expanding each year. This paper will focus on the ESG government and company ratings.

The exploration of ESG matters predates the existence of ESG scores. Bowen's (1953) seminal study was the first to delve into business ethics and corporate social responsibility (CSR). It advocated for managers to consider these factors in strategic planning and decision-making. Before this, researchers actively separated the discussion of financial topics from any social, environmental, or governance factors. The seminal study poses a question that continues to be debated today: “What are the social responsibilities which businessmen may be expected to assume?” (Bowen, 1953)

The answer to this question has changed over the last decade. In the 1970s, Friedman (1970) argued that any social responsibility would decrease financial returns and should thus not be considered by business people. Twenty years later, Coleman (1988) first introduced social capital in measuring value and economic thought shifted away from Friedmans’ rational and self-centred opinions. Specifically, researchers such as Elkington (1998) have started to include financial, environmental, and social factors in the calculations of equity value. Elliott (2005) found a close link between sustainability and economic growth, which fuels the idea that ESG risk can be considered a dimension of economic development. At the beginning of the 21st century, the first concrete rankings based on ESG were published. Fortune’s “100 Best Companies to Work For” started to include the social responsibility of the companies as a valuation factor. Based on this, Edmans (2011) showed a positive relationship between being listed in the “100 Best Companies to Work For” and companies’ stock return. This marked the beginning of the research on ESG factors, as it objectifies an abstract variable until now. Barnett & Salomon (2006) combined Friedman (1970) and Coleman's (1988) views. They found a curvilinear relationship between the number of social screens and financial returns. A low number of social screens results in decreasing financial returns. Once the number of screens reaches the maximum, they significantly increase a company’s financial returns. This signals an increasing need for different and specific social screening methods. Accordingly, the range of ESG scores and ESG subcategories increased over the years.

The influential article written by Giese et al. (2019) finds a positive relationship between ESG ratings and financial performance, specifically through a lower cost of capital, higher valuations, higher profitability, and lower tail risk exposure. Interestingly, Crifo et al. (2015) find that negatively valued ESG practices have a more substantial impact on the firm value than positively valued ESG practices. Indeed, private equity firms pay less for firms with low ESG company ratings. This could motivate companies only to disclose their ESG ratings if they are sufficiently high. Other literature searches for explanations of the positive effect of ESG company ratings on firm performance. Dimson et al. (2015) argue that high ESG scores enhance customer and employee loyalty and corporate governance, increasing firm value. Similarly, performing an event study on the 2008-2009 financial crisis, Lins et al. (2017) find a positive effect of high ESG scores on social trust, particularly in times of economic downturn. High ESG scores improve people's opinion of the respective company or institution and thus enhance its value.

This leads to the emerging trend of sustainable investment. When comparing two companies or countries, the ESG score can make a difference in the investment decision. A company with an ESG strategy might appear more valuable in the future, even though it is less profitable. A country with a high ESG government score has significantly lower government bond spreads and sovereign borrowing costs, as found by Crifo et al. (2017). Social factors play an increasingly important role in investment decisions. Consistent with this, Hong & Kacperczyk (2009) find that so-called "sin stocks" are often avoided by institutional investors. Notably, companies that operate in the alcohol, tobacco, and gaming industries are considered to violate social norms. This shows a shift from purely profit-driven investment decisions to more ethical choices. When it comes to times of financial crises, Brown (2015) finds a reduction in the effect of social norms on investment decisions. Intuitively, during an economic downturn, the purpose of a country is to save the economy regardless of any social norm. Shifting to times of economic blooming, Cahan et al. (2017) study if the positive effect of social norms affects investment decisions. They find that stocks with superior CSR performance have more norm-constrained institutional investors due to social pressure. Social norms must thus be included in a company's strategy to ensure competitiveness in the stock markets. Similarly, the interest in borrowing from or investing in countries with high ESG scores is rising.

Although different agencies use different methods to assign a rating to each firm or institution, the underlying approach is very similar between all these methods: the first step is identifying industry-specific ESG risks that are relevant to the analysed company or institution; the second and most crucial step is to weight the subject's exposure to the different risks identified in step one and evaluate its risk management about it; the third and last step is the aggregation of all weights and risk management evaluations into a numerical or alphabetical score, which is known as the ESG score (*MSCI, Refinitiv, Sustainalytics ESG Ratings for Top Companies, 2023*).

2.1.1 MSCI ESG Government Rating

The most influential provider of ESG Government ratings is Morgan Stanley Capital International (MSCI). Kearns (2024) explains that the MSCI ESG Research divides risk factors into different categories. The three pillars of environmental, social, and governance risk are split into two risk factors, resulting in a total of six. For these six risk factors, 27 sub-factors are defined and weighted accordingly. Two groups divide these sub-factors into risk management and risk exposure-related factors. Moreover, a weight of 50% is assigned to the governance pillar, considered the most influential pillar in risk management. The environmental and social pillars both weigh 25%. A table showing the detailed division of the sub-factors and their weights is represented in Appendix A. MSCI converts 99 data points into country-level ratings between 0 and 10 for each sub-factor. The higher the rating, the lower the risk exposure and the better the country's risk management. After that, the arithmetic average of the data point ratings is taken to derive each sub-factor score. Every other section and group score is calculated based on the weights assigned in the first step.

2.1.2 LSEG ESG Company Rating

Several agencies focus on rating the ESG performance of different companies. The London Stock Exchange Group (LSEG) is among the most influential. As explained in the LSEG ESG Research methodology (*LSEG ESG Scores*, 2023), calculating LSEG ESG company ratings starts with identifying a subset of 186 industry-relevant ESG measures out of 630 company-level ESG measures. These 186 data points are divided into ten risk factors representing the divisions of the three main pillars: environmental, social, and governance. These risk factors are further divided into risk sub-factors. Companies are then ranked in their industry based on the data points measuring each sub-factor. Boolean values influence the ranking by the number of companies with a worse value. Numeric values are ranked only if all companies in that industry report that data point. Specific weights for each category are derived with the LSEG ESG materiality matrix. They are calculated based on the relative importance of each theme to the analysed industry. A table showing the detailed division of the categories and their weighting method is defined in Appendix B. Finally, the total ESG score and the three pillar scores of a company are calculated by taking the weighted average of the category scores.

2.2 Initial Public Offering Underpricing

Issuing a company's shares on the public market for the first time, also known as an initial public offering (IPO), is often motivated by factors such as facilitated acquisitions, market conditions, and signalling. Stock markets and the variables affecting them changed significantly through the years. The first IPO in world history was held by the Dutch East India Company in 1602. It enabled the company to trade exclusively in Asia and increased its profit exponentially (Martins, 2023). The concept of underpricing was experienced for the first time there and has been studied until now. Ritter's (1987) seminal study on the issue price of an IPO quantifies the costs incurred by a firm when going public.

His work is the first proof of the difference between the issue and the closing price of an IPO, thus of underpricing. Moreover, other relevant costs, such as legal fees and ongoing compliance costs, are discussed. Although not explained in detail, this study also acknowledges information asymmetry between investors and the issuing firm.

Other early studies have already pointed to the role of asymmetric information in underpricing an IPO. Beatty & Ritter's (1986) find that greater information asymmetry results in a larger disparity between the IPO offer price and the actual value of a stock, leading to a significant difference between the first-day secondary market closing price and the IPO offer price, also known as the primary determinant of underpricing. Assuming that investors actively base their decisions on the amount of information they have, Merton (1987) suggests that the issue price will be affected by information asymmetry to compensate investors for their risk. The impact of asymmetric information is amplified because it can happen between multiple parties, such as issuers and underwriters (Baron, 1982), issuers and investors (Welch, 1989), and different investors (Rock, 1986). Furthermore, asymmetric information influences underpricing also through its effect on firm size (Ritter, 1984), industry (Ljungqvist & Wilhelm Jr., 2003), and financial intermediaries (Barry et al., 1990; Carter & Manaster, 1990). Benveniste & Spindt (1989) focus on the crucial role of underwriters in an IPO. They are the financial intermediaries between the investors and the issuing firm and are thus closely related to information asymmetry. The authors describe them as the designers of underpricing as they base their pricing and allocation schedule on the interests and information of their client investors. Moderating this finding, Hanley (1993) argues that shares in an offering are rationed and prices only partially adjust to new information depending on the investors' demand. Michaely & Shaw (1994) summarise this discussion by finding a joint agreement that less information asymmetry and a more reputable underwriter are the key ingredients to avoid underpricing.

2.3 Relationship Between: ESG Government Rating and IPO Underpricing

Until now, only one reliable academic paper has studied the effect of ESG government ratings on IPO underpricing. Baker et al. (2021) study this relationship through two-level hierarchical linear modelling and find a significant negative relationship between IPO underpricing and the ESG government ratings of the listing country. A higher ESG government rating of the listing country of the IPO leads to lower asymmetric information and, thus, lower underpricing. Consequently, the authors argue that IPO underpricing is primarily driven by asymmetric information.

Further research explains how ESG ratings decrease asymmetric information, decreasing IPO underpricing. El Ghouli et al. (2011) show that higher ESG ratings reduce information asymmetry between investors and issuers. ESG score disclosure signals trust and attracts analysts' interest in the company or government. Consequently, information about them is more publicly accessible. Similarly,

Dhaliwal et al. (2012) find the same relationship but motivate it through the effect of ESG strategies on a company's or government's financial performance. ESG disclosure enhances financial performance, which in turn decreases asymmetric information. Successful companies might be more confident in sharing information. When looking at times of economic downturn, Lins et al. (2017) find that stocks with high ESG ratings have more information credibility and are thus preferred over others. This underlines the negative relationship between high ESG risk management and asymmetric information. The recently published paper written by Kim & Park (2023) adds to the existing literature by proving the moderating role of assurance services in this relationship. Likewise, Bilyay-Erdogan (2022) further investigate the negative relationship between ESG traits and information asymmetry and conclude that this effect is more evident in civil law than in common law countries. The government in which an IPO is incorporated influences the degree to which asymmetric information is reduced through ESG performance.

This research points to an adverse effect of ESG ratings on information asymmetry. As information asymmetry is proven to be the primary driver of IPO underpricing, I expect a negative relationship between IPO underpricing and the ESG government ratings of the issuing country. This leads to my asymmetric information hypothesis:

H1.1: ESG Government Ratings are negatively correlated with firm-level IPO Underpricing

A different string of academic papers advocates for the opposite. Sustainable investing is increasingly gaining popularity, shifting investors' attention to stocks listed in sustainable countries. As shown in the World Investment Report 2010 (Zhan, 2010), foreign direct investments started to move towards low-carbon emission countries. This trend has continued and is also represented in the World Investment Report 2023 (Giroud, 2024). Investing in a sustainable economy that manages its ESG risks accordingly results in many benefits for the investors, such as investment stability and safety through its regulatory environment. The increase in investors' attention to sustainable investments also affects IPO underpricing. Barber & Odean (2008) study the investment decisions of individual and institutional investors. They find that the attention-grabbing effect of a stock highly influences the investment decision. Publicly discussed stocks, stocks with unusual returns, or stocks with unique qualities attract the interest of investors and are traded more frequently. High ESG scores are an extraordinary characteristic and thus fuel the investment decision process. Da et al. (2011) measure investors' attention with the Google Search Volume Index (SVI) and find a significant positive relationship between the frequency of Google searches of a stock and its IPO closing price. More investors' attention leads to a more substantial difference between the IPO offer and closing price, thus increasing IPO underpricing. The same results were found by Liu et al. (2014) when using media coverage and by Zhao et al. (2018) when using the Baidu Index as a proxy of investors' attention.

This research points to an enhanced effect of investors' attention on IPO underpricing. As sustainable investment is gaining more popularity and investors' attention is driven toward high ESG scores, I expect a positive relationship between IPO underpricing and the ESG government ratings of the issuing country. This leads to my investors' attention hypothesis:

H1.2: ESG Government Ratings are positively correlated with firm-level IPO Underpricing

2.4 The Role of ESG Company Rating

Like ESG government ratings, ESG company ratings play an important role in IPO performance. Giese et al. (2019) study the overall effect of ESG company ratings on a company's performance. They prove that ESG company ratings negatively impact risk and are thus important financial indicators. The more financial indicators a company has, the less asymmetric information between the issuer and the investors. Lopez et al. (2020) find that companies with higher ESG ratings are more likely to disclose them, which explains the negative relationship between ESG ratings and information asymmetry.

Similarly, Fenili & Raimondo (2021) find that the more a company discloses its ESG performance, the less underpriced its stocks are on the first day of trading. ESG disclosure is thus negatively related to IPO underpricing due to its effect on information asymmetry. Additionally, Ferri et al. (2023) underline the trust enhancement effect of ESG disclosure between investor and issuer. Feng et al. (2018) focus on seasoned equity offerings (SEO) and conclude that firms' corporate social responsibility is negatively related to SEO's underpricing. Regarding the specific score of ESG company ratings, Reber et al. (2022) further analyse the effect of high ESG ratings compared to low ESG ratings on IPO performance. Higher ESG company ratings lead to lower risk during the first year of trading. This signals lower IPO underpricing for stocks with higher ESG scores.

Considering the literature discussed, IPO underpricing is negatively affected by any ESG disclosure and ESG company scores due to their softening effect on asymmetric information and risk. I expect a negative relationship between IPO underpricing and ESG company ratings, as pointed out in my second asymmetric information hypothesis:

H2.1: ESG Company Ratings are negatively correlated with firm-level IPO Underpricing

Similarly to the discussion on the effect of ESG government ratings on IPO underpricing, other research shows evidence for the opposite effect. In addition to Da's et al. (2011), Liu's et al. (2014) and Zhao's et al. (2018) findings, Boulton et al. (2021) find that IPOs with a Wikipedia article about them attract more investors' attention and experience significantly higher IPO underpricing. This adds to the evidence that investors' attention increases first-day returns. Cao et al. (2023) prove that investors are

shifting from quantitative to qualitative signals. Abnormal returns associated with ESG mispricing signals are greater for stocks held by socially responsible investors. This shows an increasing interest in stocks with high ESG scores. In line with the sustainable investment trend, stocks with higher ESG firm scores receive greater attention and are, therefore, invested in more frequently.

Considering this literature, IPO underpricing is positively affected by ESG company scores due to their increasing effect on investors' attention. I expect a positive relationship between IPO underpricing and ESG company ratings, as pointed out in my second investor's attention hypothesis:

H2.2: ESG Company Ratings are positively correlated with firm-level IPO Underpricing

Macher et al. (2011) study the extent to which companies influence the government of the country in which they are listed, thus impacting government rules, laws, and regulations. The firm characteristics that affect the government the most are the number of competitors in the industry, firm size, and age. Translating this theory to the ESG environment, I assume a positive relationship between ESG company and ESG government scores. If firms with high ESG scores are listed in a country, the respective government might consider improving their ESG performance to keep up with the increasingly widespread interest of firms in sustainability.

As pointed out in my previous hypotheses, significant arguments point to both a positive and a negative relationship between ESG scores and IPO underpricing. On the one hand, higher ESG scores reduce asymmetric information between investors and issuers and decrease underpricing. On the other hand, higher ESG scores fuel investors' attention and thus lead to more significant first-day returns and underpricing.

When combining the effect of ESG government and company scores, I hypothesise that the asymmetric information hypothesis will overrule the investors' attention hypothesis. Given high ESG government and ESG company scores, the decrease in asymmetric information will be higher than the increase in investors' attention to the stock. I thus expect ESG company ratings to increase the negative effect of ESG government ratings on IPO underpricing and vice versa. This leads to my third hypothesis.

H3: The interaction between ESG Company Ratings and ESG Government Ratings is negatively correlated with firm-level IPO Underpricing

CHAPTER 3 Data

3.1 Sample Description

I construct a sample of IPO new issues of exclusively common and ordinary shares retrieved from the LSEG Workspace Deal Screener database that took place from 2010 to 2023 listed in countries with MSCI ESG Government Ratings and for which the LSEG ESG Company Rating is available at the issue date. The offer and closing prices of each observation in my sample are set to higher than zero, and duplicates are removed. I use the ISIN identifier to match the IPO deals to Datastream to retrieve the corresponding LSEG ESG Company Ratings. Following Baker's et al. (2021) approach, I delete possible outliers by eliminating the top and bottom 1% of my observation based on underpricing. This results in a final sample of 661 IPOs listed in 23 countries.

All IPO deals in my sample are bookbuilt offerings listed in Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Mexico, Netherlands, Norway, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States. Most of the IPOs in the sample are listed in the United States. The USA has the world's most prominent and influential stock exchanges on which most companies want to be issued. Besides that, many observations in the other countries did not have all the required data for my analysis. Nevertheless, my sample is representative worldwide as it contains IPOs issued in at least one country on every continent, as shown in the country's descriptive statistics in Table 1.

Table 1. Descriptive Statistics by Country

Country	N	IPO underpricing	ESG government score	ESG company score
Argentina	1	-0.027	5.921	53.540
Australia	16	0.143	7.400	27.294
Austria	1	0.142	7.634	41.540
Belgium	1	0.073	6.441	57.460
Brazil	7	0.096	5.739	27.214
Canada	9	0.035	7.890	31.724
China	1	0.624	5.131	22.840
Denmark	6	0.141	8.043	48.368
Finland	1	0.174	7.802	57.300
France	5	0.122	6.551	47.492
Germany	11	0.048	7.431	48.708
Hong Kong	12	0.563	7.034	41.458
Italy	6	0.077	5.408	43.848
Japan	1	0.291	6.447	45.410
Mexico	2	0.023	5.199	38.590
Netherlands	12	0.140	7.045	41.558
Norway	7	0.067	8.690	32.193
Spain	9	0.055	5.711	30.091
Sweden	15	0.191	8.304	35.777
Switzerland	8	0.142	8.055	37.785
Turkey	5	0.045	4.754	52.803
United Kingdom	61	0.081	6.558	27.824
United States	466	0.254	6.908	23.503

Note. Descriptive statistics of IPO underpricing, ESG government score, and ESG company score. The table shows the number of observations and the mean for each country included in the sample. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing prices with LSEG Datastream and MSCI data on ESG company and government scores. The total sample consists of N=661 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing price with the offer price. ESG government and company scores range from 1 to 10 and 1 to 100, respectively.

3.2 Analysed Variables

The offer and closing prices of the 661 IPOs in my sample were retrieved from the LSEG Workspace Deal Screener database and are the main components of my dependent variable IPO underpricing. IPO underpricing measures the difference between the IPO offer price and the stock price at the closing of the IPO issue date in terms of the offer price. If it is negative, the closing price is lower than the offer price, and first-day returns are negative. If it is positive, the closing price is higher than the offer price, and first-day returns are positive. Dawson (1987) illustrates the standard approach for calculating IPO underpricing by taking the difference between the first-day secondary market closing price and the IPO offer price divided by the IPO offer price. The mathematical formula used in every research study on IPO underpricing is as follows:

$$IPO\ underpricing = \frac{Closing\ Price - Offer\ Price}{Offer\ Price}$$

IPO underpricing is thus measured as a proportion of the offer price. As shown in Table 2, my sample has an average IPO underpricing of 0.217, which means that the closing price is, on average, 21.7% higher than the issue price. The highest observation of IPO underpricing in my sample is 166.1% and is observed for the healthcare company Nkarta Inc., listed in the United States in 2020.

The MSCI ESG Government Score retrieved from the MSCI ESG website is my primary independent variable measuring a country's environmental, social, and governance risk exposure and management. It is calculated at a country level, and its goal is to objectify a government's social responsibility to compare, evaluate, and improve the countries. The scores range from 0 to 10, with 0 signalling very low-risk management and very high-risk exposure, whereas 100 signalling very high-risk management and very low-risk exposure. For the scope of my analysis, I used the ESG government score of the listing country. Dyck et al. (2019) find that institutional regulations and investors positively influence firms' decisions and policies. Moreover, Baker et al. (2021) argue that many stock markets are increasing their ESG disclosure recommendations and requirements. If a company wants to list on a particular stock exchange, it must follow the regulations of that market and is thus affected primarily by that country's ESG government score. As shown in Table 1, the country with the highest ESG government rating in my sample is Norway, which scored 8.69. Turkey is at the opposite end, with the lowest score of 4.754. The mean ESG government score of all IPOs in the sample is 6.926 (see Table 2), which signals relatively high ESG government scores. The fact that most data points are from the US does not significantly bias the average ESG government score of the countries in the sample, as it also represents the median value of 6.908.

The LSEG ESG Company Score retrieved from the LSEG Workspace Datastream database is my secondary independent variable measuring a company's environmental, social, and governance risk

exposure and management. It is calculated at the company level and objectifies corporate social responsibility. The scores range from 0 to 100, with 0 signalling very low-risk management and a very high-risk exposure, whereas 100 signalling very high-risk management and very low-risk exposure. As shown in Table 2, the average ESG company score in my sample is 26.829, which signals overall high-risk exposure and relatively low-risk management of the companies in my sample. The company with the highest ESG company score is listed in Turkey in 2021 and has a score of 83.110. Although Turkey has the lowest ESG government score, it listed the IPO with the highest ESG company score. Additionally, the ESG government scores are, on average, relatively higher than the ESG company scores in my sample. This signals that in this sample, governments focus relatively more on ESG strategies than companies.

Table 2. Descriptive Statistics of All Study Variables

Variable	N	Mean	Std.Dev.	Min	Max
IPO underpricing	661	0.217	0.297	-0.263	1.661
ESG government score		6.926	0.485	4.754	8.690
ESG company score		26.829	13.018	1.390	83.110
Common law		0.853	0.354	0	1
Shareholders' rights		2.938	1.506	2	6
Market integration		82.44	4.296	64	91
Corporate transparency		5.286	0.571	3	7
Managers		3.943	2.190	1	15
Ln(Proceeds)		5.179	1.129	0.188	9.872
Underwriter fee		1.135	3.013	0	28.675
VC backed		0.415	0.493	0	1
Lockup length		179.932	80.834	0	730
Firm commitment		0.439	0.497	0	1
Equity carveout		0.245	0.430	0	1
High tech firm		0.539	0.499	0	1
Developed country		0.946	0.227	0	1

Note. Descriptive statistics of IPO underpricing, ESG government score, and ESG company score and all control variables indicating the number of observations, mean, standard deviation, minimum and maximum for each variable. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing prices with LSEG Datastream and MSCI data on ESG company and government scores. The total sample consists of N=661 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing price with the offer price. ESG government and company scores range from 1 to 10 and 1 to 100, respectively. Common law, VC backed, firm commitment, equity carveout, and high tech firm are dummy variables that take the value one if the attribute described in the variables' name holds. Shareholders' rights, corporate transparency, and market integration are index values ranging from 0 to 6, 0 to 7 and 0 to 100, respectively. Managers measure the number of lead managers in the company. Proceeds indicated the total proceeds of each deal in million EUR. The logarithmic transformation is applied to alleviate skewness. The underwriter fee is measured in EUR per share, and the lockup length is measured in days from the issue date to the expiration date of the lockup period.

3.3 Control Variables

Following Baker's et al. (2021) the approach, I selected a range of variables that control for country-level, firm-level, and deal-level characteristics. They are essential to include to avoid distortion in the estimates of the effect of my independent variables. The described mean values, number of observations, and minimum and maximum values relate to Tables 1 and 2.

The first category contains variables regarding the country's regulatory environment in which the IPO was listed. La Porta et al. (2008) find a significant effect of a country's historical regulatory and economic system on its rules and regulations nowadays. I include the legal system applied and the degree of shareholders' rights to measure a country's regulatory system.

The two central legal systems countries apply are common and civil law. In common law countries, judges decide and create laws, and legal decisions are based on court rulings. Civil law is based on written regulations and legislation that judges have to apply. Liang & Renneboog (2017) state that common law countries are more shareholder-oriented than civil law countries. I thus expect common law countries to have higher investor demand and a positive influence on IPO underpricing. The dummy variable common law was retrieved from the World Bank database and takes the value one if the listing country of the respective IPO event applies a common law legal system and zero if it applies a civil law legal system. 85.3% of the IPO events in our sample are listed in countries with common law legal systems. This is given by the fact that 466 data points are from the US, which applies common law.

Following the expectations about the effect of common law legal systems, shareholders' rights most likely increase IPO underpricing. To measure shareholders' rights in each country in my sample, I retrieve the Shareholders Rights Index from the World Bank Doing Business Business Ready Report (2019). This index examines the strength of shareholders' role in major corporate decisions. It takes values from 0 to 6, with 6 signalling the highest shareholders' rights. The mean shareholder's rights index value of my sample is 2.938. The US has the lowest shareholder rights in my sample, with an index value of 2. This means it is not sufficient to own a high stake in a company in the US to play a decision-making role in a corporation. The opposite is true for countries such as Turkey (6), Spain (6), and the United Kingdom (6). My sample does not contain countries with very low shareholder rights.

The second category of control variables measures the market integrity and corporate transparency of the countries in my sample. Marcato et al. (2018) find that market integration simplifies financial intermediation and thus has a negative impact on IPO underpricing. Similarly, Akyol et al. (2014) find that corporate governance codes such as the corporate transparency index significantly decrease IPO underpricing in EU member states. Moreover, corporate transparency is a close measure of asymmetric information, one of the main drivers of IPO underpricing. As a country's economic integration and transparency are proven to affect IPO underpricing negatively, I include these variables in my analysis.

To measure market integration, I use the Economic Globalization Index reported by the KOF Swiss Economic Institute (2023). This index assigns a value from 0 to 100 based on each country's economic, social, and political dimensions of globalisation. The greater the number, the more globalised and economically integrated the country. My sample's market integration index values range from 64 to 91, with a mean of 82.44. My sample consists primarily of very globalised and economically integrated countries. The most integrated countries in my sample are Switzerland and the Netherlands, whereas the least integrated countries are China and Brazil.

I retrieved the Corporate Transparency Index from the World Bank Doing Business database (Business Ready, 2019) to measure corporate transparency in each country. Its values range from 0 to 7, with seven signalling the highest corporate transparency. My sample does not contain countries with very low corporate transparency and has a mean value of 5.286. Australia has the highest corporate transparency, while Hong Kong has the lowest.

The most crucial firm-level characteristic relevant to our analysis is firm size. Haase & Franco (2011) find that more prominent firms have more credible and updated information. Consequently, firm size negatively affects information asymmetry and, thus, IPO underpricing. Cheng (2008) argues that larger firms' corporate performance is more stable because of the increased difficulty in making decisions among many board members. The number of managers can thus be used as a proxy for a firm's size. I retrieved the number of lead managers of each company of the IPOs in my sample from the LSEG Workspace Deal Screener database. The companies in my sample have four lead managers on average.

Lastly, including the deal-level characteristics of the IPO events in my sample is important. The data used to create the following variables was retrieved from the LSEG Workspace Deal Screener database. Ritter (1984) finds a positive relationship between IPO offer size and underpricing. I measure IPO size as the total proceeds made through the IPO in million EUR. This variable is subject to an \ln transformation to alleviate the skewness and to bring its distribution closer to normal. As more prominent IPOs increase underpricing, I expect a positive effect of the total IPO proceeds on IPO underpricing.

As Carter & Manaster (1990) pointed out, the underwriter's reputation plays a significant role in IPO underpricing. A good reputation signals the credibility, trust, and information availability of the company issuing the IPO, thus decreasing underpricing. Based on Fang's (2005) findings that more reputable banks charge higher underwriter fees, I use the underwriting fee of the IPO issues in my sample as a measure of underwriters' reputation. Underwriter fees are measured in EUR per sold share, and the average underwriter fee charged in my sample is 1.135 EUR per share.

Similar to the effect of underwriters' reputation on IPO underpricing, Barry et al. (1990) find a negative correlation between receiving venture capital (VC) funding and IPO underpricing. Conversely, Loughran & Ritter (2004) find the opposite relationship. It is thus essential to control for VC-backed

companies as it significantly influences underpricing. To do so, I created a dummy variable that takes the value one if the listing company of the IPO deal was VC backed and zero otherwise. In my sample, 41.5% of the companies were VC backed during their IPO.

Brav & Gompers (2003) find a significant negative effect of lockup periods after an IPO on moral hazard, thus reducing asymmetric information. As asymmetric information is one of the main drivers of IPO underpricing, a more extended lockup period most likely reduces IPO underpricing. Hence, it is essential to control for lockup length in my analysis. The lockup period is measured in days from the IPO issue date to the lockup period's expiration date, and the average lockup period lasted 180 days in my sample.

In a firm commitment deal, the underwriter purchases the issuer's securities and resells them to the general public, taking entire financial liability for unsold shares. Ritter (1987) finds that this type of deal is significantly less underpriced than other deal types. To control for this variable, I created a dummy variable for which firm commitment takes the value one if a deal included firm commitment and zero otherwise. 43.9% of my sample are firm commitment deals.

An equity carveout occurs when a company retains ownership of a subsidiary but sells a portion of it to outside investors through an IPO. Prezas et al. (2000) prove a significant negative relationship between equity carveouts and IPO underpricing. I built my equity carveout dummy that takes the value one if the IPO deal was an equity carveout and zero otherwise. 24.5% of the IPOs in my sample are equity carveouts.

Gao & Hou (2019) find that high-tech firms experience significantly higher IPO underpricing than other firms due to investors' increasing interest in this industry. This motivates my choice to include a dummy variable, taking the value one if the listing firm of the IPO in my sample operated in the high-tech industry and zero otherwise.

For my robustness check, I need a categorical variable signalling the most developed countries in my sample. As a measure of country development, I use the ranking of the Human Development Index (HDI) (2023). All the countries in my sample are categorised as very high or high human development countries. To select the most developed among them, I created a dummy variable that takes the value one if the listing country is ranked in the first 20 most developed countries worldwide and zero otherwise. The selected countries in my sample are, starting from the most developed: Switzerland, Norway, Hong Kong, Denmark, Sweden, Germany, Australia, Netherlands, Belgium, Finland, United Kingdom, Canada, and the US. They are the listing countries of 94.6% of the IPO events in my sample. My restricted sample will thus contain 625 of the 661 observations.

CHAPTER 4 Methodology

To analyse the effect of my independent variables on my dependent variable IPO underpricing, I will run an Ordinary Least Squares (OLS) regression. The estimates resulting from this method are calculated by minimising the sum of the squared difference between the observed and the predicted values. To ensure unbiased results, five assumptions must hold: zero mean errors, homoskedasticity, no correlated errors, endogeneity, and normally distributed errors. The first assumption ensures that the error terms have a mean of zero to avoid an incorrect interpretation of the constant of the regression. The second and third assumptions necessitate that the errors have the same variance for all values of the independent variables and that they are not correlated with each other to prevent the underestimation of the standard errors, thus falsely significant results. The fourth assumption ensures that the independent variables are not correlated with the errors to avoid omitted variable bias and, therefore, an alteration of the estimates. Lastly, the fifth assumption makes sure that the errors are normally distributed.

The visual inspection of the residuals in my model shows that the zero mean error assumption does not hold. Consequently, the constant of my regression results absorbs the non-zero mean and is thus not interpretable.

Since my sample is clustered at the country level, the homoskedastic and non-correlated error assumptions are most likely violated. The Breusch-Pagan heterogeneity test confirms the presence of heteroskedastic errors in my model. To solve this violation, I will control for heteroskedasticity and within-country correlated errors by using robust standard errors and clustering them by country. This adjustment ensures that the standard errors are not underestimated, thus reducing the risk of falsely significant results.

I control for endogeneity by including 12 relevant control variables in my full model to reduce the correlation between my independent variables and the error term. Omitting them would result in omitted variable bias and the violation of the endogeneity assumption.

Following the Central Limit Theorem (CLT), which states that the distribution will approximate normality in large samples, and given that my sample has 661 observations, I assume the normality assumption to hold. A histogram of the residuals of my regression confirms this.

After conducting all necessary steps to test the OLS assumptions and controlling for any possible violation, I am confident that my model provides the best unbiased linear estimators.

I will first run the model only with my primary independent variable, the ESG government score. Secondly, I will add the ESG company score and the interaction effect between the two independent variables. Lastly, I will run the full model with all the relevant control variables.

The general equation of my full model is:

$$\begin{aligned} IPO\ underpricing_i &= \beta_0 + \beta_1 ESG\ government\ score_i + \beta_2 ESG\ company\ score_i \\ &+ \beta_3 ESG\ government\ score_i \# ESG\ company\ score_i \\ &+ \beta_4 \mathbf{Control\ Variables} + u_i \end{aligned}$$

To check the robustness of my analysis, I will reduce the sample size by only including observations from countries among the 20 most developed in the world. The full model regression will be repeated with this restricted sample. This strategic approach will allow me to discern if and how results change in these economically significant regions.

CHAPTER 5 Results & Discussion

All the models were estimated using OLS and have IPO underpricing as the dependent variable. The coefficients can be interpreted as the percentage point change in underpricing after a 1-point increase in our independent variables ESG government and company score. The results of my analysis are shown in Table 3. Model 1 regresses IPO underpricing only on ESG government score. Model 2 adds the ESG company score and the interaction effect between the two. Model 3 represents my full model with all control variables. The R-squared increased from 0.0004 in the first model to 0.132 in the third model. The variables in my full model thus explain 13.2% of the variance in IPO underpricing. This relatively low R-squared can be explained by the fact that IPO underpricing is most likely correlated to firm characteristics, country characteristics and social aspects that cannot be measured or are beyond the scope of this analysis.

Looking at the first column of Table 3, which shows the first analysed model, I do not find a significant effect of ESG government scores on IPO underpricing. The same holds for the second column, indicating that ESG company scores and the interaction effect between the two scores do not significantly affect IPO underpricing. There is not enough statistical evidence to prove that the effect of my independent variables is different from zero. Models 1 and 2 most likely experience omitted variable bias given by the high correlation between IPO underpricing and the control variables VC backed and market integration shown in the correlation matrix in Appendix B. This bias is reduced in the third and final model, which includes all relevant control variables.

Accordingly, the findings change in the third column displaying the full model. The coefficient of the effect of the ESG government score on IPO underpricing is positive and significant at the 10% significance level. A 1-point increase in the ESG government score of the listing country results in an increase of 0.076 in the proportion of IPO underpricing relative to the offer price. This means that underpricing is, on average, 7.6 percentage points higher for IPOs listed in countries with 1-point higher ESG government scores *ceteris paribus*.

The coefficient of ESG company ratings and the interaction effect between the two ESG scores do not appear significant and are thus not proven to be different from zero.

Regarding the control variables, market integration, corporate transparency, the number of lead managers, and the underwriter fee significantly negatively affect IPO underpricing. Total IPO proceeds, being VC backed, and the length of the lockup period significantly positively affect IPO underpricing. Besides the positive effect of the lockup period length, these findings are consistent with prior research. This minimal positive effect can be explained by underwriters setting lower IPO prices to compensate for a more extended lockup period, increasing investor demand and underpricing.

Table 3. Main Analysis Regression Results

	IPO underpricing (1)	IPO underpricing (2)	IPO underpricing (3)
ESG government score	0.012 (0.034)	0.053 (0.065)	0.076* (0.039)
ESG company score		0.006 (0.008)	0.006 (0.005)
ESG government score x ESG company score		-0.001 (0.001)	-0.001 (0.001)
Common law			0.026 (0.029)
Shareholders' rights			0.008 (0.010)
Market integration			-0.010*** (0.003)
Corporate transparency			-0.035* (0.020)
Managers			-0.005** (0.002)
Ln(Proceeds)			0.007*** (0.002)
Underwriter fee			-0.006*** (0.002)
VC backed			0.153*** (0.024)
Lockup Length			0.0002** (0.0001)
Firm commitment			0.014 (0.010)
Equity carveout			-0.017 (0.012)
High tech firm			-0.012 (0.027)
Constant	0.137 (0.242)	-0.109 (0.463)	0.584 (0.369)
Number of observations	661	661	661
R²	0.0004	0.0058	0.132

Note. Regression results of the Ordinary Least Squares (OLS) regression with IPO underpricing as the dependent variable. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing prices with LSEG Datastream and MSCI data on ESG company and government scores. The total sample consists of N=661 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing price with the offer price. ESG government and company scores range from 1 to 10 and 1 to 100, respectively. The control variables common law, VC backed, firm commitment, equity carveout, and high tech firm are dummy variables that take the value one if the attribute described in the variables' name holds. Shareholders' rights, corporate transparency, and market integration are index values ranging from 0 to 6, 0 to 7 and 0 to 100, respectively. Managers measure the number of lead managers in the company. Proceeds indicated the total proceeds of each deal in million EUR. The logarithmic transformation is applied to alleviate skewness. The underwriter fee is measured in EUR per share, and the lockup length is measured in days from the issue date to the expiration date of the lockup period. Column (1) shows the simple model with the ESG government score as the independent variable. Column (2) adds ESG company scores and the interaction effect between the two to the model. Column (3) displays the full model, including all control variables. Columns (1), (2), and (3) show the estimated coefficients for each variable and the respective robust and country-clustered standard errors in parathesis. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

Based on these full model results, I can reject the asymmetric information hypothesis of a negative effect of ESG government ratings on IPO underpricing. However, the investors' attention assumption of a positive effect of ESG government ratings on IPO underpricing cannot be rejected. Due to the insignificant coefficients of both ESG company ratings and the interaction effect between the two scores, I reject the hypotheses of an effect of ESG company rating and its interaction effect with ESG government ratings on IPO underpricing.

To check these results further, I ran a robustness check using a restricted sample of IPOs issued in the most developed countries. The results change entirely when applying the third model to the restricted sample. This shows that my first findings are not robust to changes in the sample. The regression results of the robustness check are shown in Table 4. The coefficient of the ESG government score is insignificant in this regression. Contrary to my prior analysis, there is no evidence of an effect of the ESG government score on IPO underpricing in developed countries. Nevertheless, the ESG company score and the interaction effect between the two scores appear significant at a 10% level in this sample. A 1-point increase in the ESG company score of the listing country results in an increase of 0.014 in the proportion of IPO underpricing. This means that underpricing is, on average, 1.4 percentage points higher for IPOs listed in countries with 1-point higher ESG company scores *ceteris paribus*. The negative and significant coefficient of the interaction effect between the ESG government score and the ESG company score suggests that the combined effect of higher ESG scores decreases IPO underpricing by 0.2 percentage points. For each additional point increase in the ESG government score, the impact of the ESG company score on IPO underpricing decreases on average by 0.002 percentage points *ceteris paribus*.

Table 4. Robustness Check Regression Results

	IPO underpricing
ESG government score	0.030 (0.060)
ESG company score	0.014* (0.007)
ESG government score x ESG company score	-0.002* (0.001)
Common law	-0.121* (0.057)
Shareholders' rights	0.014 (0.008)
Market integration	-0.019*** (0.003)
Corporate transparency	-0.034 (0.022)
Managers	-0.006* (0.003)
Ln(Proceeds)	0.007** (0.002)
Underwriter fee	-0.006*** (0.002)
VC backed	0.151*** (0.025)
Lockup length	0.0001 (0.000)
Firm commitment	0.016 (0.011)
Equity carveout	-0.012 (0.010)
High tech firm	-0.013 (0.027)
Constant	1.665** (0.549)
Number of observations	625
R²	0.135

Note. Regression results of the Ordinary Least Squares (OLS) regression with IPO underpricing as the dependent variable using observations only from developed countries. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing prices with LSEG Datastream and MSCI data on ESG company and government scores. For the scope of the robustness check, only observations of IPOs listed in countries ranked in the 20 most developed countries in the world (Human Development Index) were included in this analysis. This restricted sample consists of N=625 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing price with the offer price. The analysed independent variables ESG government and company scores range from 1 to 10 and 1 to 100, respectively. The control variables common law, VC backed, firm commitment, equity carveout, and high tech firm are dummy variables that take the value one if the attribute described in the variables' name holds. Shareholders' rights, corporate transparency, and market integration are index values ranging from 0 to 6, 0 to 7 and 0 to 100, respectively. Managers measure the number of lead managers in the company. Proceeds indicated the total proceeds of each deal in million EUR. The logarithmic transformation is applied to alleviate skewness. The underwriter fee is measured in EUR per share, and the lockup length is measured in days from the issue date to the expiration date of the lockup period. The table shows the estimated coefficients for each variable and the respective robust and country-clustered standard errors in parathesis. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

Figure 1 visually represents these results. The marginal effects of ESG company scores on IPO underpricing by ESG government scores show that the impact of ESG company scores is positive if the listing country has an ESG government rating below 6.5 (dark blue and brown line) and negative otherwise. A combination of high ESG government and company scores thus decreases IPO underpricing.

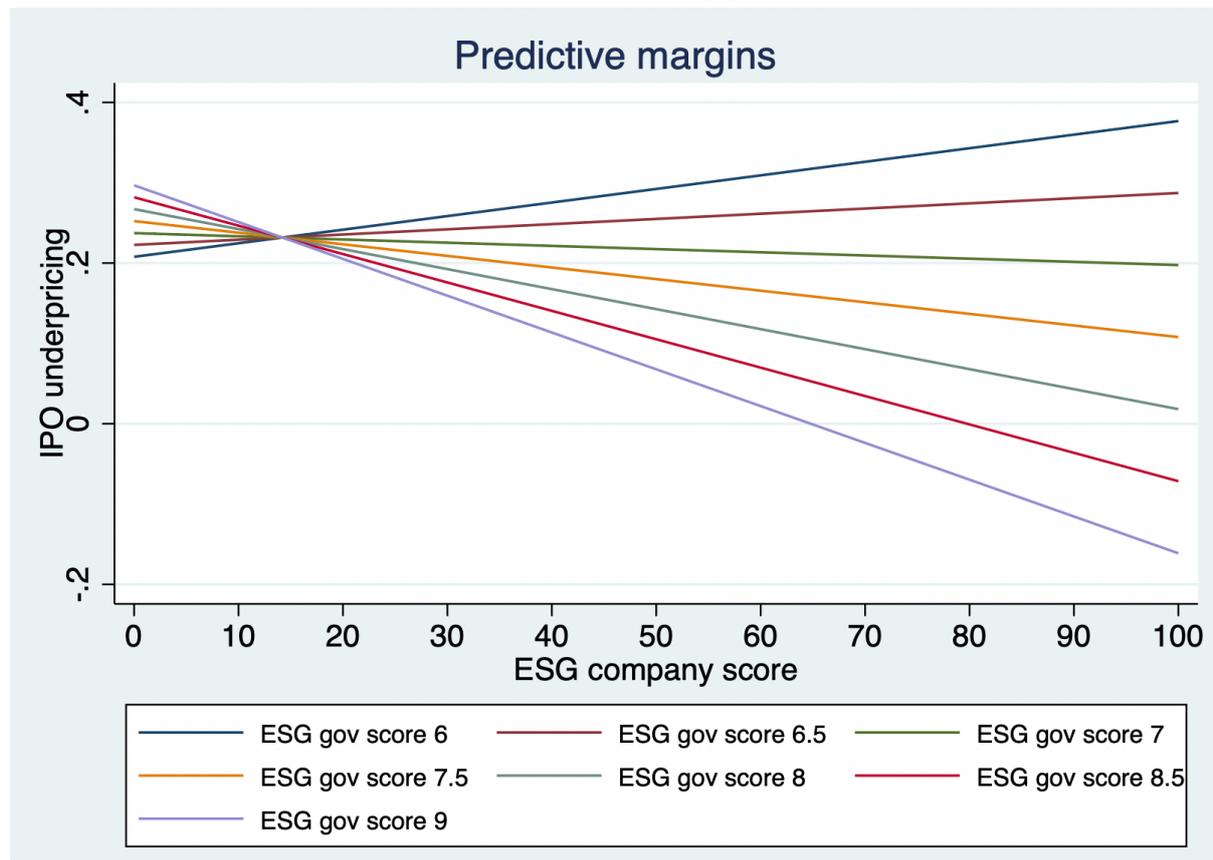


Figure 1. Margins Plot of ESG Company Score on IPO Underpricing by ESG Government Scores

Note. Predictive margins of ESG company score on IPO underpricing by ESG government scores. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing prices with LSEG Datastream and MSCI data on ESG company and government scores. For the scope of the robustness check, only observations of IPOs listed in countries ranked in the 20 most developed countries in the world (Human Development Index) were included in this analysis. This restricted sample consists of N=625 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing price with the offer price. The analysed independent variables ESG government and company scores range from 1 to 10 and 1 to 100, respectively. The y-axis measures IPO underpricing, whereas the x-axis measures ESG company scores. The different colours represent the effect of ESG company score on IPO underpricing for seven different fixed values of ESG government scores: 6, 6.5, 7, 7.5, 8, 8.5, and 9.

This robustness check sheds a different light on my hypotheses. Considering this second analysis, both asymmetric information and investors' attention assumptions of negative and positive effects of ESG government ratings on IPO underpricing are rejected. There is no significant effect of ESG government ratings on underpricing in developed countries. This is most likely because ESG company ratings play a bigger role in more developed countries and thus absorb the effect of government ratings. For ESG government ratings below 6.5, I cannot reject the investors' attention hypothesis of a positive effect of

ESG company ratings on IPO underpricing in developed countries. For ESG government ratings above 6.5, I cannot reject the asymmetric information hypothesis of a negative effect of ESG company ratings on IPO underpricing in developed countries.

Regarding my third and last assumption, I cannot reject that the combined effect of the two scores significantly decreases IPO underpricing in developed countries.

The results of my second and third hypotheses combine the effect of an increase in investors' demand and a decrease in asymmetric information on IPO underpricing due to high ESG scores in developed countries. For a combination of low ESG government and company ratings, the increase in investors' demand overcomes the decrease in asymmetric information, resulting in a positive effect on IPO underpricing. If the ESG government and company ratings are high enough, their combined effect reduces asymmetric information more than it increases investors' demand for the respective stock, resulting in a decrease in IPO underpricing.

My first analysis shows that ESG government scores positively affect IPO underpricing. This finding is different from Baker's et al. (2021) paper that found a significant negative relationship between IPO underpricing and the ESG government scores of the listing country. They argue that a higher ESG government score of the listing country leads to lower asymmetric information and, thus, lower underpricing. Nevertheless, they recognise the possibility of an opposite effect due to investors' increasing interest in high ESG score securities. The authors find proof for the asymmetric information hypothesis, whereas I find evidence for the investors' attention hypothesis.

Literature about the drivers of underpricing finds arguments supporting both analyses. El Ghouli et al. (2011) support the asymmetric information hypothesis and show that higher ESG ratings reduce information asymmetry between investors and issuers. ESG score disclosure signals trust and attracts analysts' interest in the company or government. Following this line of thought, higher ESG government ratings decrease IPO underpricing. Barber & Odean (2008) provide an opposite argument. They find that the attention-grabbing effect of a stock highly influences the investment decision. Publicly discussed stocks, stocks with unusual returns, or stocks with unique qualities attract the interest of investors and are traded more frequently. Consequently, high ESG government scores increase the attention on a stock and thus its underpricing. My first analysis is consistent with Barber & Odean's (2008) findings, whereas Baker et al. (2021) agree with El Ghouli et al. (2011). Regarding my reduced sample containing only developed countries, I do not find a significant effect of ESG government ratings on IPO underpricing. The effect of ESG government ratings on IPO underpricing remains ambiguous as there is no common agreement.

The same holds for the effect of ESG company ratings on IPO underpricing. Both the asymmetric information and the investors' attention hypothesis have supporting literature.

Giese et al. (2019) find a negative correlation between ESG company ratings and risk, which underlines the importance of ESG ratings as financial indicators. The more financial indicators a company has, the less asymmetric information between the issuer and the investors. Conversely, Cao et al. (2023) prove that investors are shifting from quantitative to qualitative signals. High ESG scores increase the quality of a stock and thus increase investors' interest in these stocks. My first analysis using the full model finds no significant effect of ESG company scores on underpricing. The model in my robustness check supports both Giese's et al. (2019) and Cao's et al. (2023) research by finding a positive relationship between ESG company scores and IPO underpricing in developed countries for IPOs listed in countries with ESG government scores below 6.5 and a negative relationship otherwise.

The regression results of my full model show no significant effect of the combination of ESG company and government scores on IPO underpricing. For the reduced sample, higher ESG government scores lead to a significantly more negative effect of ESG company scores on IPO underpricing in developed countries. The combined effect of ESG company and government scores decreases IPO underpricing. Fenili & Raimondo (2021) and Ferri et al. (2023) analyse the effect of ESG disclosure on IPO underpricing. Due to the trust-enhancing effect of ESG disclosure, information asymmetry and IPO underpricing decrease significantly. This is in line with my findings. Although higher ESG company and government scores independently increase investors' attention in the IPO and can thus have a positive effect on underpricing, the combination of the two scores decreases asymmetric information to the extent that it has a negative effect on IPO underpricing.

CHAPTER 6 Conclusion

This study investigates how ESG ratings influence IPO underpricing, mainly focusing on the interplay between ESG company and ESG government ratings. I studied this topic because of the recently expanding trend of sustainable investments. As ESG strategies are becoming essential for a company's success, they also are a possible driver of IPO underpricing. Companies should know if and how an ESG strategy can significantly enhance their profit and thus be applied. Moreover, although IPO underpricing remains a pivotal topic in corporate finance, the combined effect of ESG company and government scores has never been studied.

Therefore, the research question that this thesis aims to answer is: How does the combination of ESG company ratings and ESG government ratings affect IPO underpricing?

To answer this question, I used a sample of only common and ordinary shares IPOs between 2010 and 2023 listed in 23 countries with an ESG government score, for which the ESG company score was accessible on the issue date. I performed an OLS regression using IPO underpricing as my dependent variable, ESG company score, and ESG government score, as well as an interaction effect between the two as independent variables. A robustness test including only IPOs issued in countries listed in the 20 most developed countries was run.

The full model shows a positive effect of ESG government scores, whereas there is no effect of ESG company scores and the interaction of the two scores on IPO underpricing. The model, including only developed countries, finds no effect of ESG government scores on IPO underpricing. It finds a positive effect of ESG company scores given low ESG government ratings, a negative effect of ESG company scores otherwise, and a negative interaction effect on IPO underpricing.

This study concludes that the positive effect of high ESG scores on investors' attention leads to an increase in IPO underpricing. Specifically, this relationship is significant for ESG government scores when analysing the whole sample and for ESG company scores combined with low ESG government scores when analysing only developed countries. Furthermore, higher ESG government scores of the listing country increase the negative effect of ESG company scores on underpricing in developed countries. The combined effect of high ESG government and company scores thus results in a decrease in underpricing. This is given by the reduced asymmetric information that comes with the combination of high ESG government and company scores.

Combined with findings from previous studies on the effect of ESG scores on IPO underpricing, this suggests that this relationship remains ambiguous. While some literature supports a positive relationship given by increased investors' attention, many studies advocate for a negative relationship provided by decreased asymmetric information. My thesis finds evidence for both views depending on the context

and level of ESG scores. This points to a broader research topic: the drivers of IPO underpricing. The literature has not yet agreed on the different drivers of IPO underpricing and their respective importance.

This thesis is also helpful for managers interested in applying their ESG strategy as an essential value driver. First, they should consider that their ESG strategy significantly influences their success and, more specifically, the underpricing related to their IPO. Secondly, they should know how to apply their ESG strategies to manage the underpricing related to their IPO. If their ESG strategy reaches the maximum, thus a high ESG company rating, and is listed in a country with a high ESG government rating, the decrease in asymmetric information will most likely decrease first-day returns and IPO underpricing. For low- to middle-ranked ESG practices, an improvement in ESG practices most likely increases first-day returns and IPO underpricing due to increased investors' interest.

A potential limitation of this study is that many data points had to be deleted because of missing values for either the ESG company or the government score. Consequently, my sample contains primary US data, as the companies listed in US stock markets are more inclined to disclose their ESG scores. If the stock markets would introduce ESG disclosure as a mandatory requirement, this analysis would be much more accurate.

My analysis shows that the results differ significantly between high and low ESG practices. Future research could test the curvilinearity of the relationship between ESG scores and IPO underpricing. This could be done by dividing the sample into low and high ESG practices and testing if the positive effect of investors' attention on IPO underpricing is overcome by the negative effect of less asymmetric information when ESG practices and disclosure are high.

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APPENDIX A MSCI ESG Government Ratings Framework

Table 5. MSCI ESG Government Risk and Sub-Risk Factors

Pillar	Risk Factor	Risk Exposure Sub-factor	Risk Management Sub-factor
Environmental (25%)	Natural Resource Risk (10%)	Energy Security (2%)	Energy Resource Management (2%)
		Productive Land and Mineral Resources (2%)	Resource Conservation (2%)
		Water Resource Exposure (2%)	Water Resource Management (2%)
	Climate Change and Natural Hazards (15%)	Biodiversity Exposure (2%)	Biodiversity Management (2%)
		Pollution and Waste Exposure (2%)	Pollution and Waste Management (2%)
		Physical Risk Exposure (7.5%)	Physical Risk Management (7.5%)
		Transition Risk Exposure (7.5%)	Transition Risk Management (7.5%)
Social (25%)	Human Capital Risk (15%)	Basic Human Capital (5%)	Basic Needs (5%)
		Higher Education and Technology Readiness (6%)	Human Capital Infrastructure (3%) Human Capital Performance (3%)
		Knowledge Capital (4%)	Knowledge Capital Management (4%)
	Economic Environment Risk (10%)	Economic Environment (10%)	Wellness (10%)
Governance (50%)	Financial Governance Risk (20%)	Financial Capital and Trade Vulnerability (20%)	Financial Management (20%)
		Institutions (10%)	Stability and Peace (10%)
	Political Governance Risk (30%)	Judicial and Penal System (10%)	Corruption Control (10%)
		Governance Effectiveness (10%)	Political Rights and Civil Liberties (10%)

Note. The table shows the MSCI ESG government risk and sub-risk factors with their respective weights in parentheses. Source: Kearns (2024)

APPENDIX B LSEG ESG Company Ratings Framework

Table 6. LSEG ESG Company Risk and Sub-Risk Factors

Pillar	Risk Factor	Risk Sub-factor	Weight method
Environmental	Emissions	Emissions	Quant industry median
		Waste	Quant industry median
		Biodiversity	
		Environmental Management Systems	
	Innovation	Product Innovation	Transparency weights
		Green Revenues, Research and Development (R&D) and Capital Expenditure (CapEx)	Quant industry median
	Resource use	Water	Quant industry median
		Energy	Quant industry median
		Sustainable Packaging Environmental Supply Chain	
Social	Community		Equally important to all industry groups
	Human Rights Product Responsibility	Human Rights	Transparency weights
		Responsible Marketing	Transparency weights
		Product Quality	Transparency weights
	Workforce	Data Privacy	Transparency weights
		Diversity and Inclusion	Quant industry median
		Career Development and Training	Transparency weights
Working Conditions		Quant industry median	
	Health and Safety	Transparency weights	
Governance	CSR Strategy	CSR Strategy	Count of data points in each governance category/all data points in government pillar
		ESG Reporting and Transparency	
	Management	Structure (independence, diversity, committees)	Count of data points in each governance category/all data points in government pillar
		Compensation	
	Shareholders	Shareholders Rights	Count of data points in each governance category/all data points in government pillar
Takeover Defenses			

Note. Table showing the LSEG ESG company risk and sub-risk factors with their respective weighting method. Source: *LSEG ESG Scores (2023)*

APPENDIX C Correlation Matrix of All Study Variables

Table 7. Correlation Matrix of All Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. IPO underpricing	-														
2. ESG government rating	0.019	-													
3. ESG company rating	-0.066	0.062	-												
4. Common law	0.145	-0.118	-0.425	-											
5. Shareholders' rights	-0.195	-0.043	0.359	-0.566	-										
6. Market integration	-0.190	0.317	0.104	-0.224	0.405	-									
7. Corporate transparency	-0.195	0.096	0.254	-0.444	0.712	0.325	-								
8. Managers	-0.039	-0.046	-0.002	0.042	0.008	-0.014	-0.044	-							
9. Ln(Proceeds)	-0.008	0.020	-0.015	-0.024	0.046	0.048	0.017	0.574	-						
10. Underwriter fee	-0.081	-0.035	0.040	-0.049	0.016	-0.024	-0.021	0.073	0.003	-					
11. VC backed	0.311	-0.022	-0.128	0.314	-0.394	-0.214	-0.368	-0.064	-0.018	-0.063	-				
12. Lockup length	0.051	0.116	0.013	-0.117	0.115	0.139	-0.056	0.057	0.007	-0.016	0.002	-			
13. Firm commitment	0.054	0.020	0.006	0.039	-0.150	-0.092	-0.128	-0.019	-0.071	-0.076	0.036	-0.011	-		
14. Equity carveout	-0.176	0.024	0.136	-0.320	0.360	0.257	0.319	0.049	0.043	-0.010	-0.394	0.006	-0.015	-	
15. High tech firm	0.181	0.066	-0.093	0.208	-0.250	-0.158	-0.244	-0.088	-0.038	-0.054	0.569	-0.005	0.011	-0.277	-

Note: Correlation matrix of IPO underpricing, ESG government score, and ESG company score and all control variables indicating the degree of correlation between the variables. The dataset of IPO deals, spanning from 2010 to 2023, was retrieved by merging LSEG Workspace Deal Scanner data on IPO offer and closing price with LSEG Datastream and MSCI data on ESG company and government scores. The total sample consists of N=661 observations. IPO underpricing was calculated by dividing the difference between the IPO offer and closing prices with the offer price. ESG government and company scores range from 1 to 10 and 1 to 100 respectively. The variables common law, VC backed, firm commitment, equity carveout, and high tech firm are dummy variables that take the value one if the attribute described in the variables' name holds true. Shareholders' rights, corporate transparency, and market integration are index values ranging from 0 to 6, 0 to 7 and 0 to 100, respectively. Managers measure the number of lead managers in the company. Proceeds indicated the total proceeds of each deal in million EUR. The logarithmic transformation is applied to alleviate skewness. The underwriter fee is measured in EUR per share, and the lockup length is measured in days from the issue date to the expiration date of the lockup period. Values close to 1 indicate a strong positive correlation. Values close to -1 indicate a strong negative correlation. Values close to 0 indicate a weak correlation.