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# The Impact of National SDG Progress on IPO Underpricing: Evidence from European Markets

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# Abstract

This thesis explores how national SDG progress affects IPO underpricing outcomes, using a sample of 1,233 IPOs across 27 European countries between 2018 and 2023. We use OLS regression to analyze whether firms going public in countries with higher SDG scores, particularly in areas related to economic and social development experience lower underpricing. The effect is most pronounced for smaller firms, which typically face greater information asymmetry. However, we find no significant variation across ESG-sensitive industries. The results support the hypothesis that SDG performance serves as a macro-level signal of institutional quality and transparency, helping reduce investor uncertainty and improve pricing efficiency. Our findings are relevant for investors and market participants, as they highlight the potential of national sustainability indicators to influence capital market outcomes. This suggests that country-level progress on sustainable development can increase institutional credibility and improve access to capital, particularly for smaller firms.



**Key words**: IPO underpricing; SDG progress; Market Capitalization; ESG sensitive industry

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# 1. Introduction

## 1.1 Background

This research investigates how national progress toward the United Nations Sustainable Development Goals (SDGs) affects IPO underpricing across 27 European countries. Understanding this relationship is important because the SDGs, adopted by all UN member states in 2015, serve as a global indicator for economic, social, and environmental development. Despite their broad implementation, progress has been uneven, with only 16% of SDG targets currently on track. Many countries remain stagnant or are regressing, often due to economic instability, geopolitical conflict, or environmental crises (Sachs et al., 2024). The SDG Index, which tracks country-level progress, provides insight into national institutional strength, policy effectiveness, and development orientation. Countries with higher SDG Index scores tend to demonstrate stronger governance, institutional transparency, and regulatory frameworks, which are important for promoting economic stability and investor confidence (Medina-Hernández et al., 2023). Failing to achieve the SDGs by 2030 could have profound economic repercussions globally and contribute to higher macroeconomic uncertainty (United Nations, n.d.).

Investors are increasingly factoring sustainability risks into their decisions, treating environmental and social performance as financial risks rather than secondary concerns (Griffin et al., 2017). Eccles and Klimenko (2019) note that ESG issues are now “top of mind” for leading investment firms, with executives increasingly viewing them as financially material and holding companies accountable for ESG performance. This shift suggests that a country's progress on the SDGs could influence how firms operate within its financial markets. Stronger sustainability performance may help businesses attract investment under better terms, while weaker performance could signal higher risks and costs. As financial markets place greater weight on sustainability, national SDG progress may start shaping corporate financing, affecting how firms access and price capital. In Europe, sustainability policies and regulatory frameworks are among the most advanced globally. The Capital markets have seen a substantial increase in sustainability driven investment strategies, with stronger regulatory initiatives aimed at integrating ESG considerations into financial decision-making (Van den Hurk & Van der Klooster, 2024). These regulatory efforts influence market participants by shaping disclosure standards, investor expectations, and corporate governance practices.

This is particularly relevant for IPOs, where newly listed firms undergo close scrutiny from investors. IPOs remain one of the most effective ways for companies to raise capital and transition to public markets. Since 1980, over 11,000 IPOs have taken place in the United States alone (Stock Analysis, 2023). In Europe, IPO activity has experienced significant

fluctuations over the years. Between 2009 and 2023, the value of IPOs ranged from a low of 7.1 billion euros in 2009 to a record breaking 75 billion euros in 2021 (Statista, 2023), demonstrating the varying influence of market conditions and investor sentiment. The number of IPOs also varied greatly, peaking at 457 IPOs in 2011, and another upswing in 2021 where 422 IPOs took place in Europe (PwC, 2021).

However, the process of going public is costly. Ritter (1987) demonstrates that the average cost includes both direct expenses, such as underwriting fees, and the indirect cost of underpricing, which together can amount to as much as 21% of the firm's realized market value. IPOs are often marked by underpricing, where the initial offer price is set lower than the first-day closing price. This practice, which has been widely studied, derives from challenges like information asymmetry and the need to signal quality to investors (Rock, 1986; Hughes & Thakor, 1992). Healy and Palepu (2001) highlight that smaller firms face heightened levels of information asymmetry due to their limited visibility in capital markets and reduced analyst coverage. This asymmetry often leads to investor uncertainty, requiring firms to adopt proactive measures such as voluntary disclosures to close information gaps.

## 1.2 Problematization

Previous research has demonstrated that country-level ESG factors, including governance risk and financial disclosure, influence IPO underpricing by mitigating information asymmetry (Baker et al., 2021). However, much of the literature has either examined ESG in the context of mature, publicly traded firms (Friede et al., 2015) or focused on firm-level sustainability disclosures. At the IPO stage, firms may already have internal sustainability practices, but many do not yet disclose this information in a standardized manner. This means they might lack an established ESG score. Unlike mature publicly traded firms that report ESG metrics through sustainability disclosures, IPO-stage companies typically have less comprehensive ESG data available in databases such as MSCI or LSEG compared to more mature firms. While some ESG information may be disclosed, it is often limited in scope and consistency. In this context, country-level SDG progress may serve as a more reliable macroeconomic indicator, offering insights into regulatory quality, economic resilience, and institutional transparency.

From a practical standpoint, investors seeking to incorporate sustainability factors into their decisions may look at this as an indicator of investment risk. If a country demonstrates high SDG progress, its regulatory environment is likely more transparent, reducing the uncertainty surrounding newly listed firms. This information advantage could lead to lower IPO underpricing. Conversely, firms in countries with weak SDG progress may face greater information asymmetry, requiring higher levels of underpricing to attract investors (Rock, 1986).

Prior research suggests that national sustainability performance can reduce investor uncertainty and lower IPO underpricing. Boulton (2024a) finds that progress toward the SDGs is negatively associated with IPO underpricing, particularly in countries advancing economic and social SDGs. The study suggests that higher SDG progress signals reduced macroeconomic uncertainty, which may lower the capital costs for firms at the IPO stage. Similarly, Baker et al. (2021) highlight that stronger ESG-related governance and financial disclosure at the country level reduce information asymmetry in IPO pricing.

There are few studies investigating how the relationship between IPO underpricing and SDG score varies across different firm sizes and industries, specifically in Europe, where SDG progress is relatively high. Given that smaller firms face higher information asymmetry (Healy & Palepu, 2001), they may benefit more from a strong national sustainability framework as it helps reduce investor uncertainty. Conversely, larger firms, which already have greater market visibility and institutional backing, may experience a weaker effect of SDG progress on IPO underpricing. Additionally, industry characteristics may further influence this relationship. Firms in ESG-sensitive industries are likely to be more affected by national SDG progress, given that sustainability regulations and consumer expectations differ across sectors. The dataset of Boulton et al. (2024a) ends in 2018, leaving unexplored effects of more recent developments in sustainable finance and policies. This is particularly significant given the surge in IPO activity in recent years, with record- breaking IPO volumes and valuations (Statista, 2024), driven by factors such as low interest rates, increased investor demand for sustainable investments, and post-pandemic effects.

## 1.3 Purpose

This study examines the relationship between country-level SDG scores, market capitalization, industry and IPO underpricing in European markets, focusing on how national sustainability performance impacts underpricing. Since firm-level ESG data is typically unavailable at the IPO stage, this study utilizes SDG Index scores as a broader proxy for institutional quality, economic stability, and regulatory transparency. Building on Boulton (2024a), the study explores whether firms in high-SDG countries experience different levels of IPO underpricing compared to those in lower SDG environments in Europe and analyzes how this relationship varies across firm sizes and industries.

**Research Question:**

> *How do country-level SDG scores influence IPO underpricing in European markets, and does firm size and industry affect this relationship?*

# 2. Theoretical Framework

## 2.1 Asymmetric Information

Asymmetric information, introduced by Akerlof (1970), occurs when one party possesses more or better information than the other, leading to uncertainty and inefficiencies. In financial markets this imbalance increases risks for investors who may undervalue high-quality offerings or choose not to participate. Building on the role of asymmetric information in IPO underpricing, the dynamics of information imbalances become particularly apparent in the process of going public. Rock's (1986) model offers a foundational perspective, suggesting that IPO underpricing serves as a way to compensate uninformed investors for the risks they face from adverse selection. Since informed investors are better at identifying underpriced offerings, they are more likely to bid for underpriced shares, crowding out uninformed participants.

Firms with greater information asymmetry, such as smaller companies or those underwritten by less reputable banks, tend to experience higher levels of underpricing (Hoque, 2014). Similarly, underpricing increases with the degree of ex-ante uncertainty about a firm's value, as highlighted by Beatty and Ritter (1986). Healy and Palepu (2001) further highlight that firm size plays an important role in this process. Larger firms generally suffer from less information asymmetry due to greater analyst coverage, more consistent financial reporting, and stronger visibility in capital markets. Smaller firms, by contrast, face heightened skepticism and often lack the reputational capital to reassure investors. These firms are more reliant on mechanisms such as underpricing or voluntary disclosure to bridge credibility gaps.

However, reliance on underpricing as a signaling mechanism is not without critique. Alternative tools such as lockup agreements, which restrict insiders from selling shares immediately after an IPO, and the presence of reputable underwriters are commonly employed to reduce perceived risk and convey firm quality (Hoque, 2014). These mechanisms, like voluntary disclosure, serve to mitigate information asymmetry and enhance investor confidence during the IPO process.

## 2.2 Signaling theory

While asymmetric information explains why underpricing exists, signaling theory explains how various actors can actively mitigate information gaps. Signaling theory, first introduced by Spence (1973) in the context of job market signaling, has become fundamental for understanding information asymmetry in financial markets. The theory explains that parties with better information can convey their quality to less-informed parties through signals. Regarding IPOs, firms often use signals to mitigate information asymmetry between themselves and potential investors, thereby reducing uncertainty and attracting investment. Further, Certo et al. (2001) discuss the role of signaling in IPO markets, emphasizing how signals such as the reputation of underwriters, the presence of prestigious venture capitalists,

and the composition of the board of directors help firms reduce uncertainty and attract investors. Their study found that firms with high-quality signals, particularly those with reputable underwriters and well-structured boards, experienced lower levels of IPO underpricing. These results suggest that effective signaling mechanisms can enhance investor confidence and reduce the costs associated with information asymmetry. In some theories, underpricing itself is viewed as a deliberate signal of firm quality. High-quality firms are willing to leave more "money on the table" during their IPO to create strong investor interest and generate early market buzz. This initial sacrifice is seen as a strategic move to distinguish themselves from lower-quality firms with the expectation of recouping these costs through higher valuations and more favorable terms in future seasoned offerings (Allen & Faulhaber, 1989; Welch, 1989). By signaling confidence in their long-term prospects, firms aim to build credibility in the eyes of the market. However, signaling through underpricing is inherently costly, and its reliability as an indicator of firm quality remains debated in both theory and practice.

## 2.3 Winner's Curse

The winner's curse is a concept originating from auction theory, describing the tendency of the winning bidder in an auction to overpay due to incomplete information or overly optimistic valuations. Applied in IPO context, the winner's curse showcases the challenges faced by uninformed investors. Rock (1986) explains that in cases of underpricing, uninformed investors are at a disadvantage compared to informed investors, who possess superior knowledge about the firm's true value. As a result, uninformed investors are more likely to receive allocations of overpriced or lower-quality IPOs, discouraging their participation. To incentivize uninformed investors and mitigate the adverse selection problem, issuing firms deliberately underprice shares during the IPO process. This underpricing compensates uninformed investors for the higher risk of obtaining suboptimal allocations

## 2.4 Sustainable Development Goals

The SDGs are a set of 17 global goals adopted to address economic, social, and environmental challenges worldwide. These goals aim to eliminate poverty, promote sustainable economic growth, reduce inequalities, and protect the planet by 2030 (United Nations, n.d.). The SDG Index was developed to track national progress on these goals, offering a quantitative measure of sustainability performance to institutional quality, policy effectiveness, and economic resilience. Lafortune et al. (2018) identify four main categories based on statistical analysis of SDG indicators. The first factor includes SDGs 1 through 11 and captures economic and social outcomes such as poverty reduction, health, education, gender equality, access to clean water and energy, economic growth, and sustainable cities. The second factor includes SDG 10 and SDG 16, which are associated with reducing inequalities and fostering strong institutions. The third factor, SDG 12 and SDG 13 includes

climate action and sustainable consumption and production. Finally, the fourth factor SDG 14 and SDG 15, focus on the protection of marine and terrestrial biodiversity. This ecological dimension emphasizes the importance of preserving natural ecosystems as a foundation for long-term sustainability.

Recent research has explored how national-level sustainability progress influences financial outcomes. Boulton (2024a) studied 12,471 IPOs across 35 countries between 2000 and 2018 and found a significant negative association between country-level SDG Index scores and IPO underpricing. The study suggests that stronger national progress toward the SDGs reduces information asymmetry by signaling institutional quality and policy effectiveness, thereby lowering IPO-related costs. Boulton shows that economic and social SDGs, the first cluster by Lafortune et al. (2018), have a stronger influence on underpricing than environmental or governance-related goals. The study also shows that the institutional environment plays a moderating role. Countries with higher levels of financial disclosure transparency and stronger liability standards exhibit amplified effects of SDG progress. Similarly, Baker et al., (2022) finds that higher national ESG governance ratings are associated with lower IPO underpricing, emphasizing the role of governance mechanisms in mitigating agency problems and reducing perceived risk among investors.

Other research examines how firms that align with the SDGs achieve competitive advantages through the triple bottom line, ultimately enhancing financial performance (Lassala et al., 2021). Their study employs a qualitative comparative analysis to identify configurations of conditions that lead to high or low financial performance. The findings suggest that companies incorporating sustainability considerations into their strategies can create long-term economic and social value, reinforcing the financial benefits of SDG integration. The motivations behind ESG investing have also been studied, particularly the distinction between two main approaches. The first Value-driven investing which involves using ESG factors to manage financial risk and enhance returns. The other values-driven investing is guided by ethical or moral beliefs, where investment decisions are made regardless of financial performance (Starks, 2023). Starks argues that much of the confusion in the ESG debate arises from a misunderstanding between these two perspectives, which can lead to conflicting views on the purpose and value of ESG in financial markets.

The relationship between SDG adoption and financial performance remains debated. Ramos, et al., (2022) analyzed SDG coverage across firms in six industries using content analysis of annual and sustainability reports. Their study found no significant impact of SDG coverage on firm performance, as measured by Return on Equity. Despite the growing pressure on firms to align with sustainability goals, their results suggest that SDG adoption does not necessarily lead to improved financial outcomes. Their findings indicate that SDGs 5 (Gender Equality), 8 (Decent Work and Economic Growth), and 13 (Climate Action) are the most widely adopted SDGs, while SDGs 2 (Zero Hunger), 6 (Clean Water and Sanitation), and 14 (Life Below Water) receive the least attention from firms. Shen et al., (2024) extend this research by analyzing how firms international experience influences their SDG commitments and financial performance. Using the Uppsala internationalization framework combined with

upper level and institutional theory, their study finds that top management team international experience is positively associated with firms SDG-related activities. However, the impact on financial performance varies. SDG commitments related to innovation (SDG 9) show a positive financial effect, while environmental SDGs (SDG 13) are linked to a negative short-term impact. Their findings suggest that while SDG adoption may increase long-term strategic positioning, the immediate financial effects depend on the nature of the SDG activities pursued.

Schramade (2017) provides an investor-oriented perspective, emphasizing that SDG adoption presents both risks and opportunities for firms and their stakeholders. He argues that firms must carefully assess their SDG exposures, set measurable goals, and develop KPIs to track progress. The study highlights that while firms increasingly reference SDGs in investor communications, concrete metrics and structured reporting remain underdeveloped. As data availability improves, Schramade predicts that SDG reporting will become a norm, shaping investor expectations and influencing financial decision-making. This underscores the need for firms to integrate sustainability into their strategic planning to maximize both financial and societal benefits.

***H1**: Firms in European countries with higher national SDG scores experience lower IPO underpricing than firms in European countries with lower national SDG scores.*

## 2.5 IPO Underpricing

IPOs are often characterized by the phenomenon of underpricing, where the offering price of shares is set below their market value at the close of the first trading day. This discrepancy has been widely studied in financial literature, with several theories proposed to explain its persistence across markets and periods. One of the foundational explanations is based on information asymmetry between different market participants. Rock (1986) suggests that informed investors, who possess superior knowledge about the firms value, crowd out uninformed investors by bidding aggressively for underpriced shares. To incentivize uninformed investors to participate, issuing firms price their shares at a discount to the expected market value, thereby compensating them for the adverse selection bias they face due to potential allocation of overpriced issues.

In addition to information asymmetry, market dynamics and issuer motivations also play significant roles. Loughran & Ritter (2004) identify several factors contributing to changes in IPO underpricing over time. They suggest that issuers may prioritize other objectives, such as securing analyst coverage or benefiting from "spinning," over maximizing IPO proceeds. Ownership structures and the involvement of venture capitalists also influence underpricing levels. For example, CEOs with smaller equity stakes in the company may have weaker incentives to negotiate higher offer prices, leading to greater underpricing. Loughran and Ritter (2004) also note that underwriters with influential analysts were often selected by issuers, even if these underwriters had a history of severe underpricing, as the promise of ongoing analyst coverage was perceived as a valuable trade-off. While underpricing has been

widely documented, the degree to which it is influenced by firm characteristics remains debated. Daily et al. (2003) provides a study on IPO underpricing, using findings from multiple studies to identify common patterns. Their study finds that IPO underpricing is highly variable and influenced by multiple moderating factors, including firm size, retained equity, and market conditions. Interestingly, their analysis contradicts some predictions of signaling theory, showing that retained equity, typically considered a positive signal of firm quality, is often correlated with higher underpricing rather than lower. This suggests that underpricing may be more complex than traditional models predict, with factors like investor sentiment and cyclical market conditions playing a significant role. The authors highlight the cyclicality of IPO underpricing, where periods of heightened IPO activity are often followed by fluctuations in underpricing levels.

Recent research discusses the role of sustainability related transparency in reducing IPO underpricing. Boulton (2024b) investigates the impact of mandatory ESG disclosure regulations across 36 countries and finds that such mandates significantly improve the information environment, lowering both uncertainty and litigation risks for issuers. The study shows that mandatory ESG disclosures reduce first-day IPO returns by approximately 15.9 percentage points. An effect that is especially strong in countries with strict liability standards or heightened environmental and social concerns. These findings suggest that improved institutional disclosure frameworks can reduce the costs associated with going public, offering issuers considerable capital-raising advantages. Similarly, Fenili and Raimondo (2021) examine the ESG content of IPO prospectuses in the United States and report a negative association between ESG disclosure and underpricing. Their textual analysis of S-1 filings reveals that governance related disclosures have the most pronounced impact, followed by environmental and social components. By increasing transparency, such disclosures help reduce investor uncertainty and enable more accurate pricing, thereby minimizing the indirect costs of IPOs.

Beyond the initial pricing phase, the long-term performance of IPOs also varies by firm characteristics. Empirical research suggests that firm age and size significantly affect post-IPO stock performance. Siev & Qadan (2022) find that smaller IPO firms tend to underperform their larger counterparts, and younger firms exhibit greater long-term underperformance. Their study indicates that larger and older firms generally experience less negative cumulative abnormal returns (CAAR).

***H2**: The negative relationship between SDG score and IPO underpricing is weaker for European firms with high market capitalization compared to European firms with low market capitalization.*

## 2.6 ESG-Sensitive Industries

The financial impact of ESG performance is not similar across industries. Firms operating in sectors with high environmental and social exposure are more likely to experience direct financial consequences from their sustainability strategies. These industries are often classified as ESG sensitive, are subject to stricter regulations, higher reputational risks, and increased investor scrutiny, making ESG engagement a particularly relevant factor in their financial success. Chen et al. (2023), in a global analysis of 3,332 firms found that ESG performance is more strongly associated with financial success in sectors such as energy, real estate, and pharmaceuticals. The authors suggest that firms in these industries face higher exposure to regulatory and operational risks, and that ESG practices serve as a strategic instrument for risk mitigation and long-term value creation. Their findings support the proposition that ESG can enhance access to capital, reduce volatility, and improve firm reputation, particularly in high-risk sectors.

In contrast, Garcia et al. (2017) adopt a more institutionally grounded perspective in their study of emerging market firms operating in sectors such as mining, energy, steel, and chemicals. They observe that firms in these industries demonstrate comparatively higher ESG performance, but interpret this as a response to external pressure rather than internal strategic orientation. Notably, their findings point to firms responsible for greater environmental harm often contributing the least to broader social initiatives. Moreover, the study suggests that leading ESG performers in these industries are not necessarily the most financially successful, thereby challenging the assumption that ESG is always value enhancing. Other research examines 383 firms across six environmentally intensive sectors and explicitly differentiate between developed and emerging markets (Naeem et al, 2022). Their results provide robust support for the financial relevance of ESG in developed economies, where ESG performance is positively and significantly associated with return on equity and Tobin's Q. However, no such relationship is observed in emerging markets. This finding suggests that institutional context, particularly the presence of formal ESG regulation, enforcement mechanisms, and investor expectations plays a critical role in determining the extent to which ESG initiatives translate into financial returns. Importantly, Naeem et al. (2022) also find that ESG controversies have a more pronounced financial impact in emerging markets, where negative events attract stronger investor reactions, indicating that firms in these contexts may face greater downside risk from ESG failures than upside from ESG excellence.

***H3**: The negative relationship between SDG score and IPO underpricing is stronger for firms in European ESG-sensitive industries compared to firms in less ESG-sensitive sectors.*

# 3. Methodology and Research Design

We investigate our hypotheses by employing a quantitative research design, utilizing secondary data sources to construct a dataset of IPOs and their corresponding country-level SDG rankings, alongside market capitalization and relevant control variables.

The analysis is structured to address three main objectives: (1) determine the relationship between country-level SDG rankings and IPO underpricing, (2) assess how this relationship varies by firm size categories, and (3) examine whether the relationship between SDG rankings and IPO underpricing differs across industries with varying degrees of sustainability sensitivity.

By applying regression analysis, this study aims to identify significant patterns and contribute to the existing literature on the role of sustainability-related factors in IPO performance within European markets.

## 3.1 Data

### 3.1.1 Data Collection

Data was collected from two primary sources. SDG rankings were collected from the UN Sustainable Development Goals (The Sustainable Development Report, 2024) and S&P Capital IQ for IPO pricing and market capitalization data.

The dataset includes IPOs conducted between January 2018 and December 2023, restricted to firms listed in European markets, covering 27 countries. IPO-specific data was collected from S&P Capital IQ, which provides detailed transaction-level information on public offerings. The following variables were retrieved: offering price per share, first-day closing price per share, total shares outstanding at IPO, geographic location, industry classification, and market capitalization at the time of IPO. This is calculated as the product of price per share and total shares outstanding. IPO underpricing was computed as the percentage change between the offering price and the first-day closing price.

The SDG Index quantifies national progress toward the United Nations Sustainable Development Goals (2024). It aggregates multiple indicators across 17 SDGs, providing a standardized measure of sustainability progress at the country level. Higher scores indicate stronger institutional quality, policy effectiveness, and economic resilience, which are relevant to financial market stability and investor confidence.

This study utilizes country-level SDG Index scores from the UN Sustainable Development Goals (2024) database for the period 2018–2023. Following Baker et al. (2021), we assign annual SDG scores based on the listing country of the IPO and the corresponding year of issuance. Only primary market IPOs were included, while secondary offerings were excluded to ensure consistency in the dataset.

### 3.1.2 Sample Selection

The sample consists of 1233 IPOs conducted in European markets between January 2018 and December 2023. The study includes only firms in countries with continuous SDG Index reporting throughout the sample period. IPO data was sourced from S&P Capital IQ, which provides comprehensive information on IPOs, including offering price, first-day closing price, total shares outstanding, industry and market capitalization at IPO. Throughout the data collection process, all SPACs (special purpose acquisition companies) have been excluded. Although these firms undergo an IPO, they are not relevant to this study due to their primary function of facilitating reverse mergers rather than operating as independent firms. The exclusion process was done by identifying and removing all companies with "SPAC" in their name and was further maintained by consistently filtering out such entities across the data sample. Additionally, firms in the financial services industry were removed, consistent with prior literature (e.g., Boulton, 2024). This is due to their distinct regulatory environment and financial structure. Further, to enhance the robustness of the regression analysis, all variables have been winsorized at the 1st and 99th percentiles to reduce the impact of extreme outliers.

The final dataset consists of IPOs across multiple industries and market capitalizations, allowing for a broad examination of the relationship between SDG progress and IPO underpricing.

**Table 1. Description of Main Independent and Dependent Variables**

| Variable | Description | Source | Expected Sign |
|---|---|---|---|
| Underpricing | (1st day close - offer) / offer price | S&P Capital IQ | - |
| SDG Score | Country-level SDG Index progress | UN SDG Index | Negative |
| Market Cap | Offer Price × Shares | S&P Capital IQ | Negative |
| Industry | Industry classification | S&P Capital IQ | Negative |

***Note**: This table presents key variables used in the analysis, including their definitions, data sources, and expected signs of association with IPO underpricing based on theory and prior research.*

## 3.2 Variables

This section outlines the variables used in this quantitative study, which examines the impact of country-level SDG rankings on IPO underpricing across different market capitalizations and industries in European markets.

### 3.2.1 Dependent Variables

IPO Underpricing (%)

Following prior research, this study adopts IPO underpricing as the dependent variable, which is widely used to assess market reactions to newly issued stocks. Underpricing measures the extent to which the IPO is priced below its first-day market value, reflecting investor demand and information asymmetry.

Defined as the percentage difference between the first-day closing price and the offer price of the IPO, calculated as:

$$Underpricing = \frac{First\text{-}day\ closing\ price - Offer\ price}{Offer\ price} \times 100$$

### 3.2.2 Independent Variables

*SDG Score*

The SDG rankings is used as an independent variable in this study. It provides a composite score (0–100) measuring a country's progress toward the UN SDG goals. SDG Index scores were collected for the years 2018–2023 from the UN Sustainable Development Goals database (2024). Each IPO was then assigned an SDG score based on its country of listing and the exact year of issuance, ensuring consistency between the institutional environment and IPO pricing conditions at the time of market entry. The matching process was conducted in multiple steps. First, the IPO's listing country was identified using S&P Capital IQ, which provides exchange and geographic data. Next, the IPO's offer year was determined based on its first trading date. The corresponding SDG Index score for that country and year was then assigned to the IPO.

*Market Capitalization*

Market capitalization is included as a continuous variable to capture firm size at the time of the IPO. It is calculated as the product of offer price and the number of shares offered, and is log-transformed to reduce skewness and the influence of extreme values.

$$Market\ Capitalization = Offer\ Price \times Shares\ Offered$$

Prior literature shows that firm size is closely linked to information asymmetry and larger firms tend to benefit from greater visibility, analyst coverage, and institutional backing (Healy & Palepu, 2001), potentially moderating the impact of country-level SDG progress on IPO underpricing.

*Industry*

To account for industry-specific effects, this study incorporates industry classification as an independent variable. Industry categories were assigned based on the Global Industry Classification Standard (GICS), a globally recognized framework developed by S&P Dow Jones Indices and MSCI (S&P Global, n.d.). The GICS structure is designed to ensure universality, reliability, flexibility, and adaptability by reflecting the evolving composition of global equity markets.

Industry classifications were retrieved from S&P Capital IQ, where each firm's industry was determined based on its primary business activity. To ensure granularity while maintaining analytical consistency, this study employs the second-level industry classification, corresponding to the Industry Group level in the GICS framework. This level presents a balance between broad sectoral trends and specialized sub-industry distinctions.

The inclusion of industry as an independent variable allows for an empirical assessment of sector-specific ESG sensitivity, enabling a direct comparison with prior research. Studies suggest that industries such as energy, mining, chemicals, pharmaceuticals, real estate development, and transportation tend to exhibit heightened ESG sensitivity due to their environmental and social impact (Garcia et al., 2017; Naeem et al., 2022).

### 3.2.3 Control Variables

*IPO Year*

The year of an IPO is a common control variable in studies of IPO underpricing, as market conditions, regulatory environments, and investor sentiment fluctuate over time. This study retrieves IPO year data from S&P Capital IQ, using the Offer Date to determine the timing of each IPO. The Offer Date represents the exact date when shares begin trading, making it the most relevant measure for capturing market conditions at the time of public listing. Previous research has established that IPO activity and initial returns are highly correlated with stock market cycles, with firms strategically timing their offerings during periods of high market valuations (Loughran et al., 1994). As IPO waves occur in response to favorable economic and financial conditions, failing to account for IPO year may introduce bias into the estimated relationship between ESG scores and IPO underpricing. Additionally, regulatory frameworks governing IPO pricing and disclosures evolve over time, impacting the level of underpricing

observed in different periods. For example, Loughran et al. (1994) highlight that changes in regulatory constraints and auction mechanisms have influenced IPO pricing across markets. By including IPO year as a control variable, we account for macroeconomic trends, stock market fluctuations, and changes in IPO-related policies that could otherwise distort our results.

### *Firm Age (Years)*

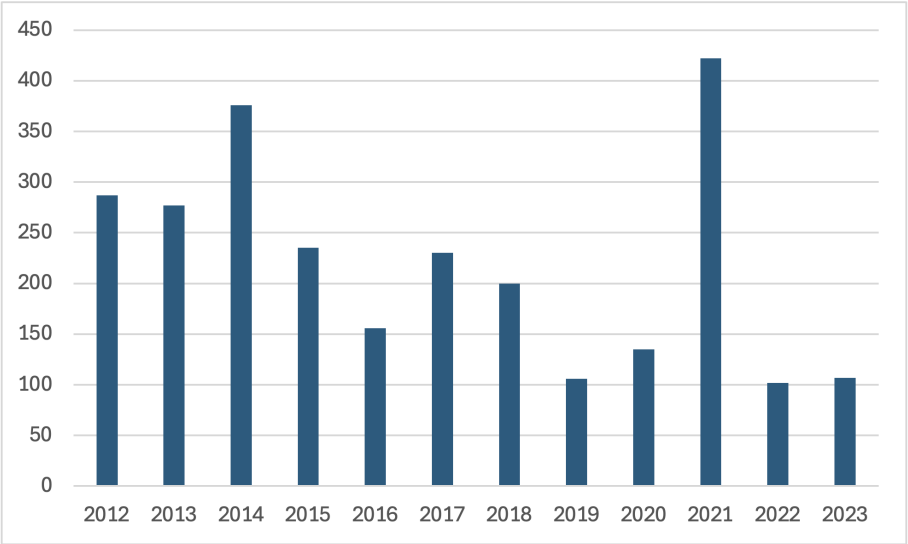
Firm age is an essential control variable in IPO underpricing research, as it influences information asymmetry, investor uncertainty, and pricing mechanisms. To account for these effects, firm age is calculated as the difference between the IPO year and the year the company was founded. The data for firm age is retrieved from S&P Capital IQ, using the variables "Year Founded" and "Public Offerings Offer Date". Prior literature finds that younger firms tend to experience higher levels of underpricing compared to older firms due to greater uncertainty and less established financial histories (Loughran et al., 1994). The study highlights that firms with less than ten years of operating history exhibit significantly higher initial returns, whereas older firms experience lower underpricing. This is attributed to the fact that more mature firms have greater transparency and reputational advantages, reducing the need for excessive discounts at the IPO stage.

*Firm Age = IPO Year - Year Founded*

### *IPO Activity*

According to Ritter & Welch (2002), periods of high IPO activity tend to coincide with higher underpricing. During the dot-com bubble (1999-2000), IPO underpricing surged to 65.0% while IPO volume peaked with over 450 IPOs in 1999. In contrast, during low-IPO years such as the early 1980s and 2001, underpricing was significantly lower. We have included IPO activity per year as a control variable, using data from Statista (2024) covering 2018 to 2023. Since the amount of IPOs vary significantly each year we apply a logarithmic transformation (log). This ensures a more normal distribution, reducing skewness caused by extreme values. Logging also improves interpretation, allowing us to measure the impact of percentage changes in IPO activity rather than absolute differences.

**Figure 1. Annual Number of Initial Public Offerings in Europe (2012–2023)**




***Note**: This bar chart illustrates the annual volume of IPOs across European markets based on data from Statista (2024).*

### *Offer Price*

Loughran & Ritter (2004) analyze changes in IPO underpricing across different time periods, highlighting the role of investor sentiment, institutional participation, and offer price levels. They find that higher-priced IPOs tend to experience lower underpricing, as they are more likely to attract institutional investors who conduct thorough due diligence, reducing information asymmetry. Conversely, lower-priced IPOs are more underpriced due to heightened speculation and participation from uninformed retail investors. Their study supports the inclusion of Offer Price as a control variable, as it reflects market expectations and influences first-day returns. The data for offer price is obtained from S&P Capital IQ, specifically using the variable "Price Per Share Offered".

### *Market Integration*

We follow Boulton et al., (2024a) and use the KOF Financial Globalisation Index to measure country-level market integration and to control for cross-country differences in financial openness. This index captures actual financial flows such as foreign assets, liabilities, and portfolio investment, reflecting a country's exposure to global capital markets (Gygli et al., 2019). Marcato et al. (2018) show that higher market integration is associated with lower IPO underpricing, as integration improves financial intermediation, reduces uncertainty, and limits the influence of weak domestic institutions. Their study finds that in more integrated markets, IPOs benefit from greater efficiency and competition, which lowers the need for large initial

returns to attract investors. The financial integration scores from the KOF Index were collected annually for each European country in the sample period (2018–2023). Each IPO observation was then assigned a country-year specific integration score based on the firm's location and year of listing.

*Economic freedom*

Miller and Holmes (2010) emphasizes in the 2010 Economic Freedom Index that countries with higher economic freedom have more efficient capital markets, allowing capital to flow seamlessly into the most productive sectors. Government interventions in financial markets can lead to inefficient capital allocation, distorting stock pricing during initial public offerings. Hopp and Dreher (2013) provide cross-country evidence showing that IPO underpricing is influenced by legal and institutional factors. Their study finds that countries with stronger legal enforcement and greater financial transparency tend to have lower IPO underpricing, as these factors reduce information asymmetry and the private benefits of control. The Heritage Foundation's Index of Economic Freedom (Heritage Foundation, 2024) is used to measure the level of economic freedom in each European country. The index includes 10 sub-categories, for instance financial freedom, property rights, and trade openness, which provides a comprehensive measure of a country's economic environment. Chen et al. (2017) indicate that IPO underpricing tends to be lower in countries with higher economic freedom, as stronger institutional frameworks, reduced bureaucracy, and enhanced investor protections mitigate information asymmetry and investment risks.

## 3.3 Regression Analysis

To analyze the relationship between country-level sustainability score and IPO underpricing, this study employs an Ordinary Least Squares (OLS) regression model with robust standard errors. OLS is widely used in financial research due to its efficiency, interpretability, and suitability (Brooks, 2019). The model controls for firm and market-level factors to ensure that the estimated effect of SDG scores on IPO pricing is not biased by omitted variables.

### 3.3.1 Regression Models

To empirically test the hypotheses, the following regression models were estimated. Each model controls for firm-level and macro-level variables, as well as IPO year and industry fixed effects.

Hypothesis 1 (H1)

$$Underpricing = \beta_0 + \beta_1 SDGScore + \beta_2 MarketCap + \beta_3 FirmAge + \beta_4 IPOActivityLog + \beta_5 EconomicFreedom + \beta_6 MarketIntegration + \beta_7 OfferPrice + YearFE + IndustryFE + \varepsilon$$

Hypothesis 2 (H2)

$$Underpricing = \beta_0 + \beta_1 SDGScore + \beta_2 LargeFirmDummy + \beta_3 (SDGScore \times LargeFirmDummy) + \beta_4 FirmAge + \beta_5 IPOActivityLog + \beta_6 EconomicFreedom + \beta_7 MarketIntegration + \beta_8 OfferPrice + YearFE + IndustryFE + \varepsilon$$

Hypothesis 3 (H3)

$$Underpricing = \beta_0 + \beta_1 SDGScore + \beta_2 ESGSensitive + \beta_3 (SDGScore \times ESGSensitive) + \beta_4 MarketCap + \beta_5 FirmAge + \beta_6 IPOActivityLog + \beta_7 OfferPrice + \beta_8 EconomicFreedom_i + \beta_9 MarketIntegration + YearFE + IndustryFE + \varepsilon$$

### 3.3.2 OLS

Since IPOs occur within different countries and years, a hierarchical linear model (HLM) was initially considered as an alternative to OLS. HLM is often applied when observations are nested within higher-level groups, such as firms within industries or IPOs within countries as it accounts for dependencies that could violate OLS assumptions (Baker et al., 2021; Boulton, 2024a). To assess whether country-level random effects improved model fit, we followed the approach of Baker et al. (2021) and Boulton (2024a) by estimating a HLM with random intercepts for country. We conducted a likelihood ratio test which compares the goodness of fit between a nested and a reference model by evaluating the ratio of their likelihoods (West et al., 2014). This was used to assess whether the inclusion of random effects significantly improved the model. Comparing the HLM to an OLS-equivalent model without random effects yielded a non-significant result ($X^2 = 2.456$, $p = 0.117$), indicating that the inclusion of random intercepts does not significantly improve model fit. Therefore, in contrast to Baker and Boulton who proceeded with HLM due to stronger country-level variance in their samples we continue with an OLS regression. Due to the high variance in IPO first-day returns and the influence of non observable factors like investor sentiment and media hype, relatively low R-squared values are expected in IPO studies. Our focus is therefore on the statistical and directional significance of the SDG variables, rather than full variance explanation.

**Table 2. Likelihood Ratio Test**

| Model | Log Likelihood | X^2 (LR Test) | p-value |
|---|---|---|---|
| OLS (no random effects) | -11434.919 | - | - |
| HLM (random intercepts for country) | -11433.691 | 2.456 | 0.117 |

***Note**: This table presents the results of a likelihood ratio (LR) test comparing an OLS model with no random effects to a HLM including random intercepts at the country level. The p-value indicates that adding random effects for countries does not significantly improve model fit at conventional significance levels.*

Since industry classifications are categorical, they were numerically encoded before being added into the regression. By accounting for industry-level differences, the model isolates the impact of SDG scores on IPO underpricing from industry-related influences. While Prior literature (e.g., Baker et al., 2021) has raised concerns about the potential endogeneity of sustainability metrics such as ESG scores, we argue that this is less likely to be a significant issue in our data. First, we use country-level SDG Index scores which are relatively stable, externally constructed, and less likely to be influenced by short-term IPO market activity. Second, we control for key institutional and macroeconomic factors that may otherwise influence the relationship, including economic freedom index, market integration data, and IPO year fixed effects. Although country-level SDG scores are externally constructed and stable, we acknowledge that endogeneity remains a concern. High-SDG countries may also attract higher-quality IPOs or underwriters.

### 3.3.3 Statistical Strategy

To ensure the reliability and confidence of our findings, we conducted additional robustness checks. First, we tested for multicollinearity using variance inflation factors (VIF) (Appendix C), which remained well below conventional thresholds, suggesting that multicollinearity is not a concern. Second, we re-estimated our models using robust standard errors to account for potential heteroskedasticity. Third, we conducted a winsorization of key variables at the 1st and 99th percentiles to reduce the influence of outliers, with results remaining consistent in direction and significance. While our main analysis is based on OLS, we also compared model fit against HLM (Table 2) with random intercepts by country. Likelihood ratio tests indicated that the HLM would not increase model fit.

### 3.3.3 Interaction Variables

Interaction terms were constructed to examine whether the relationship between country-level SDG progress and IPO underpricing is moderated by firm size and ESG-sensitive industry classification.

To test Hypothesis 2, a dummy variable was created called "LargeFirmDummy" and coded as 1 if a firm's market capitalization at the time of the IPO was above the sample median, and 0 otherwise. This threshold was chosen to distinguish larger firms, which are generally characterized by lower levels of information asymmetry due to greater institutional visibility, more robust financial disclosure, and enhanced access to professional networks.

To assess whether the relationship between national SDG progress and IPO underpricing differs by firm size, we constructed the interaction term SDG_LargeFirm by multiplying the standardized SDG score with the LargeFirmDummy. This specification enables a clearer interpretation of moderation effects by comparing the marginal effect of SDG progress between distinct firm size groups. Aiken and West (1991) emphasize that using an interaction between a continuous variable and a binary moderator facilitates more meaningful comparisons across categories. Similarly, Hayes (2018) argues that such models are especially useful when the moderator is naturally categorical, as they allow for straightforward estimation and communication of conditional effects

The same approach was used for Hypothesis 3. We created a dummy variable called ESGSensitive, coded 1 if the firm operates in an industry classified as ESG-sensitive, and 0 otherwise. Industries were classified based on prior research (Garcia et al., 2017; Naeem et al., 2022; Chen et al., 2023), and include sectors such as energy, mining, chemicals, real estate, and transportation. We then constructed an interaction term called SDG_ESGSensitive to examine whether the relationship between SDG progress and IPO underpricing is strengthened in industries with greater sustainability exposure. A significant negative coefficient would support the hypothesis that ESG-sensitive industries benefit more from strong national sustainability performance.

**Table 3. ESG-Sensitive Industries in the Dataset**

| ESG-Sensitive Industries |
|---|
| Real Estate Management and Development |
| Energy Equipment and Services |
| Health Care |
| Chemicals |
| Metals and Mining |
| Paper and Forest Products |
| Oil,Gas and Consumable Fuels |
| Construction Materials |

***Note:*** *The table lists the industries in the dataset that are considered, based on prior literature (Garcia et al., 2017; Naeem et al., 2022; Chen et al., 2023), more exposed to environmental and social risks.*

### 3.3.4 SDG Clustering

In addition to testing the overall relationship between the total SDG Index score and IPO underpricing in Hypotheses 1 through 3, this study also includes an exploratory extension to assess whether different dimensions of the SDGs exhibit varying relationships with underpricing outcomes. While the primary analysis remains focused on the aggregated SDG score, we use a secondary set of variables based on the factor groupings of the 17 Sustainable Development Goals to investigate whether certain categories of goals are more significant in reducing IPO-related information asymmetry.

To construct the variables, we follow the classification proposed by Lafortune et al. (2018) who identify four statistically derived clusters of SDGs based on global co-variation patterns. The first cluster, labelled Economic and Social Outcomes, includes SDG 1 through 11 and captures a wide range of development areas such as poverty reduction, education, health, energy access, infrastructure, and sustainable cities. The second cluster, Inequalities and Strong Institutions, includes SDG 10 and SDG 16 which focus on reducing inequality and promoting effective, transparent governance. The third cluster, Climate Action and Sustainable Consumption and Production includes SDG 12 and SDG 13 and addresses sustainable resource use and climate change mitigation. The fourth and final cluster, Biodiversity Protection, includes SDG 14 and SDG 15, relating to marine and terrestrial ecosystem conservation.

For each country and year in the sample, we calculate the average SDG score for each of the four clusters based on the underlying component goals. These values are then matched to each IPO observation based on its country of listing and year of issuance, resulting in four additional variables representing country level progress within each SDG category. The clustered SDG variables are analyzed in a separate regression model, run independently from the primary hypothesis tests.

**Table 4. SDG clustering categories based on Lafortune et al. (2018)**

| Cluster Name | Included SDGs |
|---|---|
| **Economic and Social Outcomes (1 - 9, 11)** | SDG 1: No Poverty, SDG 2: Zero Hunger, SDG 3: Good Health and Well-being, SDG 4: Quality Education, SDG 5: Gender Equality, SDG 6: Clean Water and Sanitation, SDG 7: Affordable and Clean Energy, SDG 8: Decent Work and Economic Growth, SDG 9: Industry, Innovation and Infrastructure, SDG 10: Reduced Inequalities, SDG 11: Sustainable Cities and Communities |
| **Inequalities and Strong Institutions (10, 16)** | SDG 10: Reduced Inequalities, SDG 16: Peace, Justice and Strong Institutions |
| **Climate Action & Sustainable Production (12, 13)** | SDG 12: Responsible Consumption and Production, SDG 13: Climate Action |
| **Biodiversity Protection (14, 15)** | SDG 14: Life Below Water, SDG 15: Life on Land |

## 3.4 Use of Artificial Intelligence

Generative AI tools, specifically ChatGPT (OpenAI), were used during the thesis process to support grammar refinement, and improve overall readability. Additionally, the tool assisted in the troubleshooting of selected STATA code sequences. The use of AI was consistent with the academic guidelines of the program. All analytical reasoning, interpretations, and conclusions presented in the thesis are the authors own.

# 4. Results & Analysis

## 4.1 Descriptive Statistics

Table 5 presents summary statistics for the IPO sample (2018–2023), including the dependent variable (Underpricing), the main independent variable (SDG Score), and controls. The mean first-day return is about 16.3%, with a standard deviation of about 60%, indicating extremely wide variation in IPO underpricing outcomes. This average initial return is lower than the 27% reported by Baker et al. (2021) and 30.1% by Boulton (2024a) for broader global IPO samples, likely reflecting our sample's focus on more developed markets. The average country SDG Score in our sample is around 79.3 (on a 0–100 scale), suggesting that most IPOs occurred in countries with relatively strong progress on sustainable development. The sample is concentrated in European markets, which typically exhibit strong progress on SDG indicators

Firm-level characteristics also exhibit considerable dispersion. Market capitalization (log) ranges from about 10.9 to 22.2 (mean 16.9), indicating the sample spans from very small to very large IPO firms. Firm age varies from 1 year up to 163 years (mean 21 years), highlighting that while many issuers are young companies, some have long operating histories. The offer price shows a mean of $7.72 (USD) per share, with values between $0.05 and $57.72, reflecting substantial variability in how IPOs are priced. For contextual controls, the average IPO market activity (log of IPO count in the issuance month) is 1.17, and the sample means for Economic Freedom and Market Integration indices are 71.6 and 79.8, respectively. These figures suggest a mix of macroeconomic environments across the IPOs, though generally leaning toward open, well-integrated markets.

***Table 5***. *Descriptive Statistics*

Table 5 includes all the variables used in the regression models in this study. The dependent variable is IPO Underpricing. The independent variables consist of the SDG Score, Market Capitalization, and Industry, while the control variables include Firm Age, Offer Price, IPO Activity, Economic Freedom Score, and Market Integration Index. Underpricing is calculated as a percentage, and Market Capitalization is expressed as a logarithmic term.

| VARIABLES | Mean | Sd | Min | Max | Count |
|---|---|---|---|---|---|
| Underpricing | 16.3302 | 59.9501 | -99.94 | 900 | 1233 |
| SDG Score | 79.3070 | 7.1329 | 40.2304 | 86.4180 | 1233 |
| SDG: Economic and Social Outcomes | 88.2277 | 2.9098 | 76.9505 | 91.9301 | 1233 |
| SDG: Inequalities and Strong Institutions | 85.3030 | 7.7114 | 60.3103 | 97.2950 | 1233 |
| SDG: Climate action & sustainable consumption and production | 62.7398 | 10.4267 | 32.959 | 88.6322 | 1233 |
| SDG: Biodiversity Protection | 72.0107 | 9.8122 | 29.9803 | 87.6274 | 1233 |
| Market Capitalization | 16.9244 | 1.9257 | 10.9297 | 22.2273 | 1233 |
| Firm Age | 21.4574 | 26.9738 | 1 | 163 | 1233 |
| Offer Price | 7.7236 | 10.1518 | 0.05 | 57.72 | 1233 |
| IPO Activity | 1.1721 | 0.8823 | 0 | 2.9444 | 1233 |
| Economic Freedom Score | 71.6344 | 6.8003 | 60.9 | 83.7 | 1233 |
| Market Integration Index | 79.7651 | 7.1955 | 62.3526 | 86.7512 | 1233 |
| Observations | 1233 | | | | |

## 4.2 OLS Regression Results

To test the hypotheses, three multivariate OLS regressions were conducted using IPO underpricing as the dependent variable. Each model includes year and industry fixed effects, as well as robust standard errors to address potential heteroskedasticity. Control variables such as firm age, IPO activity, economic freedom, market integration, and offer price are consistently included. Below, each regression model is presented with a summary of the key findings.

### 4.2.1 SDG Score on Underpricing (H1)

The results strongly support Hypothesis 1. We find a negative and statistically significant relationship between a country's SDG Score and IPO underpricing. In Model 1, the coefficient on SDG Score is negative (-1.6) and significant at the 5% level. This implies that firms going public in countries with higher sustainable development progress tend to experience lower first-day returns. The estimated coefficient suggests that a 10-point increase in a country's SDG (for example, from 75 to 85) is associated with roughly a 16 percentage-point decrease in IPO underpricing, all else equal. These findings align well with prior literature. Boulton (2024a) argues that strong progress on the SDG acts as a credible macro-level signal of institutional quality. Investors seem to interpret a high national SDG Score as a signal of a more stable, transparent, and well-governed environment, which reduces information asymmetry and the perceived risk of IPO investments. In established IPO underpricing theory, greater uncertainty or information gaps lead investors to demand larger discounts (Rock, 1986). Thus, a high SDG Score can help fill those information gaps, reducing the need for a steep IPO discount. This interpretation is in line with signaling theory (Spence, 1973), whereby external signals (in this case, country-level sustainability performance) could reassure investors in the absence of complete firm-level information. These findings also align with the broader role of sustainability in investor decision-making. Fenili and Raimondo (2021) suggest that when ESG-related information is communicated clearly, particularly around governance, it can help reduce pricing uncertainty at the IPO stage. While their study focuses on firm-level disclosure, it supports the notion that investors respond to transparent environments, which a high SDG Score may signal on a macro level. Similarly, Starks (2023) argues that many investors are not only driven by risk-adjusted returns but also by value-based considerations. A strong national commitment to sustainable development may be perceived as aligning with investor preferences, further reducing the discount required to attract interest in an IPO.

Looking at the control variables in Model 1, the results are generally intuitive. Firm age has a negative and significant coefficient ($p < 0.05$) suggesting that older companies experience lower underpricing. This makes sense as mature firms have established track records and financial histories, making them easier for investors to evaluate. Older IPO firms are perceived as less risky, hence requiring a smaller return premium (Loughran et al. 1994). Similarly, offer price is negatively associated with underpricing at the 1% significance level. IPOs with higher offering prices tend to have lower first-day returns. This is consistent with the idea that high offer prices attract a greater proportion of informed institutional investors who conduct thorough due diligence, thereby reducing uncertainty and the need for a large discount (Loughran & Ritter, 2004).

The model's R-squared is about 7%, which is slightly below the explanatory power reported in comparable studies (Boulton, 2024a; Baker et al., 2021) but is reasonable given the volatility of IPO returns. As prior research notes, firm specific and market timing factors contribute to underpricing noise (Daily et al., 2003), so a relatively low R-squared is expected in these regressions.

***Table 6***. *Results H1*

Table 6 presents the results of an OLS regression testing the relationship between country-level SDG scores and IPO underpricing. The correlation on SDG Score is negative and statistically significant at the 5% level, with a coefficient of -1.586, supporting Hypothesis 1.

| VARIABLES | UNDERPRICING |
|---|---|
| SDG Score | -1.586** |
| | (0.711) |
| Market Capitalization | -1.000 |
| | (0.833) |
| Firm Age | -0.0989** |
| | (0.0413) |
| IPO Activity | -1.688 |
| | (1.620) |
| Economic Freedom Score | 0.263 |
| | (0.217) |
| Market Integration Index | -0.0943 |
| | (0.234) |
| Offer Price | -0.292** |
| | (0.120) |
| Constant | 129.9** |
| | (52.23) |
| Observations | 1233 |
| R-squared | 7.3% |
| Year effects | Yes |
| Industry effects | Yes |

Standard errors in parentheses
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

### 4.2.2 SDG Score and Market Capitalization (H2)

Hypothesis 2 proposed that the impact of country-level SDG progress on IPO underpricing is moderated by firm size. The regression evidence supports this hypothesis. In Model 2, which adds an interaction between SDG Score and a large-firm dummy variable. The SDG Score main effect remains negative and significant ($p < 0.05$), reaffirming the H1 result that sustainable development progress generally lowers underpricing. Importantly, the interaction term (SDG Score × Large Firm) is positive and significant ($p < 0.05$). This positive interaction indicates that the underpricing-reducing effect of SDG progress is weaker for larger firms. In other words, smaller firms appear to benefit more from a high SDG country context than larger firms. For a given 10 point rise in SDG Score, the regression coefficients suggest that a small firm would see roughly double the reduction in underpricing compared to a large firm. For example, using the Model 2 estimates, an increase in SDG Score from 75 to 85 might reduce underpricing by about 20 percentage points for a small issuer, whereas the same SDG improvement might yield only about a 9 - 10 percentage point reduction for a large issuer. This divergence is consistent with the idea that firm size alters how much external environment signals matter in the IPO pricing process.

One explanation for this pattern is that large firms already possess alternative credibility signals that reassure investors, thereby lessening their reliance on country-level signals. Larger firms tend to receive more analyst coverage, maintain consistent financial reporting, and enjoy stronger visibility in capital markets (Healy & Palepu, 2001). These characteristics reduce information asymmetry and help investors better assess firm value, diminishing the need for additional signals from the broader institutional environment. Smaller firms, by contrast, often lack these internal sources of legitimacy and are more exposed to investor skepticism. They may therefore rely more heavily on external signals, such as the national SDG progression, to mitigate perceived risk and attract demand. This is in line with Loughran and Ritter's (2004) argument that more established firms face lower information uncertainty in capital markets. Another explanation could be that IPO firms lacking internal legitimacy signals rely more on external ones (Certo et al. 2001). A favorable SDG environment can serve as an important external credibility mechanism, particularly for smaller issuers. The finding also relates to Siev & Qadan (2022) observation that smaller companies tend to underperform larger ones after going public, suggesting that investors price in higher risk for smaller firms from the start.

The control variables in Model 2 show effects very similar to the first model. Firm age remains negatively related to underpricing ($p < 0.05$), and offer price continues to have a strongly negative effect ($p < 0.01$), reinforcing the earlier interpretations that older, more established firms and higher priced offerings incur less underpricing. The model's explanatory power improves slightly with the inclusion of the interaction. The R-squared rises to about 8.5%. This modest increase in R-squared suggests that accounting for firm size heterogeneity adds some explanatory value to the model, although a large portion of underpricing variation still remains beyond our observable factors.

***Table 7**. Results H2*

Table 7 presents the results from an OLS regression model examining the relationship between SDG Score and IPO underpricing, including an interaction with firm size. The coefficient for SDG Score is –2.082 and statistically significant at the 5% level. The interaction term has a positive coefficient of 1.141 and is also significant at the 5% level.

| VARIABLES | UNDERPRICING |
|---|---|
| SDG Score | -2.082** |
| | (0.908) |
| LargeFirmDummy | -3,941 |
| | (2.854) |
| SDG_LargeFirm | 1,141** |
| | (0.540) |
| Firm Age | -0.111** |
| | (0.0413) |
| IPO Activity | -2.661 |
| | (1.769) |
| Economic Freedom Score | 0.379 |
| | (0.252) |
| Market Integration Index | -0.150 |
| | (0.251) |
| Offer Price | -0.357*** |
| | (0.124) |
| Constant | -12.97 |
| | (24.03) |
| Observations | 1233 |
| R-squared | 8.5% |
| Year effects | Yes |
| Industry effects | Yes |

Standard errors in parentheses
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

### 4.1.3 SDG Score and ESG-Sensitive Industries (H3)

In Hypothesis 3, we posited that the underpricing effect of SDG performance might be stronger for IPOs in ESG-sensitive industries (sectors with high environmental or social risk exposure). The result however, finds no significant support for H3. In Model 3, the interaction term between SDG Score and the ESG-sensitive industry dummy is negative as expected but not statistically significant ($p > 0.05$). This indicates that the underpricing-reducing influence of a country's SDG progress does not differ in a meaningful way across industry types, at least not between highly ESG-sensitive sectors and others. Even in industries like energy, utilities, transportation, or mining, which we classified as ESG-sensitive based on prior research (Garcia et al., 2017; Naeem et al., 2022), a strong national SDG performance seems to provide no additional reduction in underpricing beyond the general effect observed in all industries. Thus, there is no evidence that investors grant a special pricing premium (in terms of lower underpricing) to IPO firms in heavy polluting or socially sensitive sectors when those IPOs occur in countries with better sustainability records.

Nonetheless, Model 3 yields one noteworthy result. The main effect of SDG Score remains negative and significant ($p < 0.05$) even with the interaction, reinforcing the overall conclusion from H1 that higher country-level sustainability performance is associated with less IPO underpricing across the board.

The control variable impacts in Model 3 are again in line with earlier models. Older firms continue to show significantly lower underpricing ($p < 0.05$), and offer price remains a strong negative predictor ($p < 0.01$) of first-day returns. The overall fit of Model 3 (R-squared = 7.6%) is slightly lower than that of Model 2, but is comparable to Model 1 and in line with expectations from prior studies of IPO underpricing (Boulton, 2024a; Baker et al., 2021). While a strong national SDG performance generally leads to lower IPO underpricing, our evidence indicates this effect does not significantly depend on industry sustainability sensitivity. However, we do observe that IPOs in ESG-sensitive sectors incur higher underpricing on average.

***Table 8***. *Results H3*

Table 8 presents the results from an OLS regression model examining the relationship between SDG Score and IPO underpricing, including an interaction with ESG industry sensitivity. While the coefficient for SDG Score remains negative and significant, the interaction term is not statistically significant.

| VARIABLES | UNDERPRICING |
|---|---|
| SDG Score | -1.314** |
| | (0.637) |
| ESGSensitiveDummy | 35.17 |
| | (62.52) |
| SDG_ESGSensitive | -0.283 |
| | (0.773) |
| Market Capitalization | -1.481 |
| | (0.915) |
| Firm Age | -0.0996** |
| | (0.0440) |
| IPO Activity | -2.893 |
| | (1.777) |
| Economic Freedom Score | 0.313 |
| | (0.241) |
| Market Integration Index | -0.200 |
| | (0.252) |
| Offer Price | -0.330** |
| | (0.133) |
| Constant | 123.0** |
| | (49.92) |
| Observations | 1233 |
| R-squared | 7.6% |
| Year effects | Yes |
| Industry effects | Yes |

Standard errors in parentheses
** $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

### 4.1.4 SDG Clustering

The SDG clustering analysis provides an exploratory extension to the main findings by examining whether specific categories of SDGs drive the underpricing effect. We replace the aggregate SDG Index with four cluster scores (Economic & Social Outcomes, Inequalities & Institutions, Climate & Resource, and Biodiversity) as defined by Lafortune et al. (2018). The regression results indicate that only the Economic & Social Outcomes cluster (SDGs 1–11) has a significant impact on IPO underpricing. The coefficient on this cluster is negative and statistically significant ($p < 0.05$), suggesting that stronger country-level performance in areas like poverty reduction, education, health, infrastructure, and inclusive growth is associated with lower first-day IPO returns. These results imply that investors differentiate among dimensions of sustainability, responding most to improvements in socio-economic outcomes, while signals related to governance, climate, or biodiversity alone appear insufficient to materially affect IPO pricing in this. This finding highlights which aspects of national sustainability performance investors deem most relevant at the IPO stage. The dominance of the Economic & Social Outcomes cluster in reducing underpricing aligns with the idea that fundamental development indicators support investor confidence by enhancing institutional quality and economic resilience. Investors need clearer, goal-specific metrics to evaluate sustainability (Schramade, 2017), due to the fact that progress on certain SDGs may serve as more credible signals than others.

The regression results indicate that IPO year was statistically significant for both 2019 and 2020 ($p < 0.05$ and $p < 0.01$, respectively). While 2020's spike is likely attributable to the COVID-19 pandemic's economic shock and uncertainty (Ritter & Welch, 2002), the result in 2019 is less immediately explainable. One potential explanation may lie in broader market volatility driven by geopolitical developments such as Brexit. As Loughran et al. (1994) argue, periods of elevated uncertainty often prompt issuers to offer greater pricing discounts, which may in turn diminish the signaling effect of institutional quality at the time of listing.

The explanatory power of the clustering model is slightly higher than the main models, with an R-squared of 9.6%. However, the added explanatory power appears concentrated in the economic and social domain, supporting the idea that investor perceptions are most responsive to development related signals. Control variables follow similar trends as in previous models.

***Table 9***. *Results SDG Clustering*

Table 9 presents the results from an OLS regression examining how different SDG clusters relate to IPO underpricing. The results show that the cluster capturing economic and social SDG outcomes is negatively and significantly associated with underpricing at the 5% level.

| VARIABLES | UNDERPRICING |
|---|---|
| SDG: Economic and Social Outcomes | -2.645** |
| | (1.044) |
| SDG: Inequalities and Strong Institutions | -0.442 |
| | (0.431) |
| SDG: Climate action & sustainable consumption and production | 0.136 |
| | (0.191) |
| SDG: Biodiversity Protection | -0.0429 |
| | (0.162) |
| Market Capitalization | -0.839 |
| | (0.860) |
| Firm Age | -0.0644* |
| | (0.0344) |
| IPO Activity | 5.721 |
| | (6.657) |
| Economic Freedom Score | 1.065** |
| | (0.482) |
| Market Integration Index | 0.0727 |
| | (0.318) |
| Offer Price | -0.249** |
| | (0.122) |
| Constant | 152.5** |
| | (70.68) |
| Observations | 1233 |
| R-squared | 9.6% |
| Year effects | Yes |
| Industry effects | Yes |

Standard errors in parentheses
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

# 5. Discussion

This thesis set out to investigate whether country-level sustainability performance measured by SDG indices, influences IPO underpricing in Europe, and whether this relationship is moderated by firm size and industry sustainability sensitivity. The empirical results provide evidence that national SDG progress is a significant factor in IPO pricing. The negative association between national SDG scores and IPO underpricing suggests that investors use country-level sustainability performance as a proxy for institutional trustworthiness. This aligns with the signaling framework, where macro-level signals substitute for firm-specific ESG disclosure at the IPO stage. Particularly in Europe where formal sustainability frameworks are well developed, SDG performance may reduce perceived market uncertainty and promote more accurate pricing. This suggests that investors interpret national SDG progress not simply as a development indicator but as a signal of regulatory effectiveness, policy stability, and governance quality. In the absence of firm-level ESG data, national SDG performance may serve as a credible external signal that reduces investor uncertainty. This aligns with theories of information asymmetry (Akerlof, 1970; Rock, 1986), where investors seek reliable indicators to assess risk. High SDG scores can lower perceived uncertainty around newly listed firms, helping narrow the gap between informed and uninformed investors and contributing to more accurate pricing at the IPO stage.

The analysis revealed an important finding, that the SDG-underpricing relationship is weaker for large firms. The negative impact of SDG progress on IPO underpricing becomes less pronounced for firms with larger market capitalization and confirms our hypothesis that smaller firms benefit more from strong country-level sustainability signals. Larger firms tend to have lower baseline information asymmetry due to their established reputations, greater analyst coverage, and extensive disclosure practices. Thus, they rely less on external country-level signals to assure investors. In contrast, smaller firms are more sensitive to the quality of their macro institutional environment, leveraging it as an external signal to overcome the challenges associated with being newly established. That smaller firms benefit more strongly from SDG progress may indicate that macro-institutional signals are especially important where firm-level transparency is lacking. This raises policy questions about the need for standardized ESG disclosures at the IPO stage to establish credibility through traditional channels. Therefore, country-level SDG progress seems to particularly matter for IPOs of smaller companies, where it can substitute for the credibility that larger firms already possess.

The lack of a significant interaction between SDG performance and ESG-sensitive industries indicates that national sustainability progress does not differentially impact IPO underpricing across sectors. This result may reflect limitations in the industry-level ESG classification which groups firms with potentially very different sustainability profiles. For example, a clean energy firm and a coal producer might both fall under the energy sector and thus receive the same classification despite facing very different ESG risks. If investors focus on firm-specific ESG risks rather than sector labels, the broad categorization used here may fail to capture what actually drives pricing behavior.

It is also possible that firms in ESG-sensitive industries are already expected to meet higher standards of transparency and compliance, making country-level SDG progress less informative to investors in these sectors. Where ESG regulation is embedded in industry norms, the marginal signaling value of national SDG performance may be limited. Alternatively, the result may suggest that national sustainability progress is interpreted by investors as a general signal of institutional strength, relevant across all industries, rather than something that enhances investor confidence specifically in high-impact sectors.

Although the R-squared values in our models are modest and ranging from 7% to 9.6% this is common in IPO underpricing research due to the inherently high volatility in first-day returns. These results suggest that while country-level SDG progress helps explain part of the variation, IPO pricing remains heavily influenced by firm-specific, behavioral, and market-timing factors that are difficult to fully capture in cross-sectional models.

The exploratory SDG clustering analysis provided additional insight into which aspects of sustainability investors respond to. The fact that only the Economic and Social SDG cluster had significant impact on reducing underpricing suggests that investors place greater weight on improvements in human and economic development as signals of a favorable investment environment. This while viewing environmental progress as lacking immediate impact on IPO risk pricing. This finding complements the aggregate results and highlights an important point that not all sustainability signals are equal in the eyes of investors. Clearer and more tangible sustainability metrics are needed for markets to price information efficiently as noted by Schramade (2017).

## 5.1 Academic and Practical Implications

This study contributes to the literature on sustainability and capital markets by providing updated evidence on how national SDG performance influences IPO pricing outcomes in Europe. By demonstrating a negative association between country-level SDG progress and IPO underpricing, particularly among smaller firms, the findings extend the work of Boulton (2024a) and reinforce the relevance of macro-level sustainability indicators as proxies for institutional quality. Additionally, the SDG clustering analysis contributes to the literature by suggesting that investors respond selectively to different sustainability domains, with economic and social development goals being more influential than environmental or governance-related goals. Methodologically, the study addresses a gap by using a post-2018 European IPO sample, capturing the effects of more recent sustainable finance regulations and extending prior findings into a newer regulatory and market context.

For investors and market participants, national SDG performance may serve as a useful proxy for institutional strength and policy transparency in the IPO pricing process. This is particularly relevant for smaller and younger companies, which typically face higher levels of information asymmetry and may benefit disproportionately from operating in strong sustainability environments. For firms preparing to go public, the findings suggest that

issuing in a high-SDG country may reduce underpricing-related capital costs, while those in lower-SDG contexts may need to compensate through enhanced voluntary disclosure or underwriter reputation. Policymakers should note that national progress on the SDGs is not only relevant from a societal perspective but could also improve the functioning of capital markets by lowering uncertainty and facilitating more efficient capital allocation. Although the study is focused on European markets, the findings may have broader relevance for other developed regions with comparable sustainability frameworks.

## 5.2 Limitations and Future Research

This study is not without limitations. There is a scope limitation in geography and time. Our sample is restricted to IPOs in European markets between 2018 and 2023. Focusing on Europe presents a relatively homogeneous setting with mature institutional frameworks, which helped in isolating the effect of SDG performance. However, this also means the findings may not generalize to emerging markets or earlier periods. European countries tend to have high and relatively less variable SDG progress and well-developed financial systems, replicating this analysis in regions where sustainability performance varies more widely or where institutional quality is lower could reveal different results. For example, in emerging economies or markets with less ESG integration, the impact of SDG signals might be stronger (if those signals stand out more) or weaker (if investors place less trust in reported sustainability metrics).

The industry sustainability sensitivity was measured using a dummy variable for ESG-sensitive sectors based on GICS industry classification, which captures broad differences but cannot account for within industry variance in ESG performance. In reality, firms in the same industry can have very different environmental and social practices. Our approach treated all companies in a sector as equally "sensitive," which might oversimplify the investor's viewpoint. The lack of significant interaction in H3 could be partly due to this measurement approach. A firm with strong individual ESG commitments in a traditionally sensitive industry might be viewed more favorably by investors, but we could not observe that because we lacked firm-specific ESG data. This points to a limitation, the absence of firm-level ESG metrics in our IPO dataset. At the IPO stage, firm-level ESG disclosures tend to vary in quality and consistency, which led us to focus on country-level and industry-level proxies. While this approach captures broader institutional signals, it may not reflect firm-specific sustainability practices that could interact with the macro environment.

Another limitation concerns the endogeneity and omitted variables. We controlled for many known drivers of underpricing (firm size, age, market conditions, offer price, etc.), but IPO underpricing is a complex phenomenon. There could be other confounding factors we did not include for instance, investor sentiment or underwriter reputation. These might correlate with both a country's sustainability profile and IPO pricing. It is possible that countries leading in SDG performance also host more IPOs by high-quality firms or attract more reputable underwriters. This may indirectly cause lower underpricing and may bias our results.

Building on the above limitations, we see several topics for future research. Incorporating firm-level ESG data at the IPO stage would be a logical next step. As sustainability reporting becomes more common even for private companies (especially under regulations like the EU's CSRD), future IPO studies could include metrics such as a company's carbon footprint, sustainability ratings, or ESG disclosure score in the analysis. This would allow researchers to examine how country-level and firm-level sustainability signals interact. Firm-level data could also address whether investors at IPO are indeed waiting for company specific information before pricing in sustainability. In addition, future research could also extend the analysis beyond the short-run focus of IPO underpricing to examine the longer-term value implications of sustainability. Specifically, studies could investigate post-IPO stock performance to assess whether the initial pricing effects observed in high-SDG countries persist, diminish, or reverse over time. Such research could explore whether sustainability signals contribute to stronger long-term returns or reduced volatility.

Another research area could be to explore SDGs at a more granular level. While we used Lafortune's (2018) clusters, analyzing individual goals or tailoring clusters to specific industries may reveal which SDGs drive investor behavior. For example, climate related goals might matter more for energy IPOs, while health related ones could be key in healthcare. Interacting industry types with specific SDG indicators could uncover material, sector-specific patterns our broader approach may have overlooked.

# 6. Conclusion

As sustainability becomes a mainstream concern, understanding its role in investment outcomes becomes important. We contribute to this understanding by examining how country-level progress on the Sustainable Development Goals relates to the first-day performance of IPOs in European markets and how it varies between firm size and industry.

We find that IPO underpricing is significantly lower in countries with higher SDG performance. When breaking down the SDGs into clusters, we observe that the negative association with underpricing is primarily driven by progress on goals related to economic and social development. Our analysis further shows that this relationship is more pronounced for smaller firms, which typically face greater information asymmetry. However, we find no consistent evidence that the effect differs across ESG-sensitive industries. These findings suggest that national SDG progress serves as a macro-level signal of institutional quality and transparency, which lowers perceived risk and enables IPO firms, especially smaller ones, to access capital under more favorable conditions.

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# Appendix

## Appendix A: Regression Outputs

*This shows the full OLS regression output tables supporting the main hypotheses tested in the study. It includes detailed coefficients and significance levels for each variable, including all industries and IPO years. The regressions explore the relationship between SDG scores and IPO underpricing, including interaction effects with firm size and industry classifications.*

## OLS Regression Model 1

| | (1)<br>Underpricing |
|---|---|
| SDG Score | -1.586** |
| | (0.711) |
| MarketCap | -1.000 |
| | (0.833) |
| Firm Age | -0.0989** |
| | (0.0413) |
| IPOActivity | -1.688 |
| | (1.620) |
| Economic freedom score | 0.263 |
| | (0.217) |
| Market Integration | -0.0943 |
| | (0.234) |
| Offer Price | -0.292** |
| | (0.120) |

| | |
|---|---|
| IPO Year=2018 | 0 |
| | (.) |
| IPO Year=2019 | 8.743* |
| | (4.942) |
| IPO Year=2020 | -12.76 |
| | (11.90) |
| IPO Year=2021 | 4.182 |
| | (3.067) |
| IPO Year=2022 | -0.0796 |
| | (5.487) |
| IPO Year=2023 | -4.018 |
| | (4.181) |
| Constant | 129.9** |
| | (52.23) |
| Observations | 1233 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## OLS Regression Model 2

| | (1)<br>Underpricing |
|---|---|
| SDGScore | -2.082** |
| | (0.908) |
| LargeFirmDummy | -3.941 |
| | (2.854) |
| SDG_LargeFirm | 1.141** |
| | (0.540) |
| Firm Age | -0.111** |
| | (0.0431) |
| IPOActivity | -2.661 |
| | (1.769) |
| Offer Price | -0.357*** |
| | (0.124) |
| Economic freedom score | 0.379 |
| | (0.252) |
| Market Integration | -0.150 |
| | (0.251) |
| IPO Year=2018 | 0 |
| | (.) |
| IPO Year=2019 | 11.48** |
| | (5.788) |
| IPO Year=2020 | -12.50 |
| | (12.84) |
| IPO Year=2021 | 3.698 |
| | (3.434) |
| IPO Year=2022 | -2.878 |
| | (5.444) |
| IPO Year=2023 | -4.604 |
| | (4.588) |

| | |
|---|---|
| Constant | -12.97 |
| | (24.03) |
| Observations | 1233 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## OLS Regression Model 3

| | (1) |
|---|---|
| | Underpricing |
| SDG Score | -1.314** |
| | (0.637) |
| ESGSensitiveDummy | 35.17 |
| | (62.52) |
| SDG_ESGSensitive | -0.283 |
| | (0.773) |
| MarketCap Log | -1.481 |
| | (0.915) |
| Firm Age | -0.0996** |
| | (0.0440) |
| IPOActivity | -2.893 |
| | (1.777) |
| Offer Price | -0.330** |
| | (0.133) |
| Economic freedom score | 0.313 |
| | (0.241) |
| Market Integration | -0.200 |
| | (0.252) |
| IPO Year=2018 | 0 |

| | (.) |
|---|---|
| IPO Year=2019 | 11.05* |
| | (5.724) |
| IPO Year=2020 | -10.71 |
| | (12.23) |
| IPO Year=2021 | 4.020 |
| | (3.429) |
| IPO Year=2022 | -4.265 |
| | (5.263) |
| IPO Year=2023 | -5.770 |
| | (4.491) |
| Constant | 123.0** |
| | (49.92) |
| Observations | 1233 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## OLS Regression model SDG Clustering

| | (1)<br>Underpricing |
|---|---|
| SDG: Economic and Social Outcomes | -2.645** |
| | (1.044) |
| SDG: Inequalities and Strong Institutions | -0.442 |
| | (0.431) |
| SDG: Climate action & sustainable consumption and production | 0.136 |

| | |
|---|---|
| | (0.191) |
| SDG: Biodiversity Protection | -0.0429 |
| | (0.162) |
| MarketCap Log | -0.839 |
| | (0.860) |
| Firm Age | -0.0644* |
| | (0.0344) |
| IPO Activity Log | 5.721 |
| | (6.657) |
| Economic freedom score | 1.065** |
| | (0.482) |
| Market Integration | 0.0727 |
| | (0.318) |
| Offer Price | -0.249** |
| | (0.122) |
| IPO Year=2018 | 0 |
| | (.) |
| IPO Year=2019 | 12.93** |
| | (5.112) |
| IPO Year=2020 | 19.52*** |
| | (4.697) |
| IPO Year=2021 | 0.686 |
| | (7.306) |
| IPO Year=2022 | 3.922 |
| | (5.196) |
| IPO Year=2023 | 0 |
| | (.) |

| | |
|---|---|
| Constant | 152.5** |
| | (70.68) |
| Observations | 1233 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## Appendix B: Country-Level Data

*Appendix B presents the country-level macroeconomic indicators used in our regression models, matched to each IPO by country and year. These include:*

*SDG Score: Annual SDG Index scores from the Sustainable Development Report (2024), capturing national progress toward the United Nations Sustainable Development Goals.*

*Economic Freedom Score: Taken from the Heritage Foundation (2024), this index shows the degree of regulatory efficiency, property rights protection, and financial freedom.*

*Market Integration: Sourced from the KOF Financial Globalization Index (Gygli et al., 2019), measuring the extent of each country's financial openness and global capital flows.*

*Each IPO in our sample is assigned the appropriate country-level score based on its country of listing and the year of issuance. These variables are included as controls to account for institutional, economic, and financial market conditions that may affect IPO underpricing.*

| Index of Economic Freedom IPO Year | | | | | | |
|---|---|---|---|---|---|---|
| Country | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| Austria | 71.8 | 72 | | | | |
| Belgium | 67.5 | 67.3 | 68.9 | 70.1 | 69.6 | |
| Bulgaria | 68.3 | 69 | 70.2 | 70.4 | 71 | |
| Croatia | | | 62.2 | 63.6 | | |
| Denmark | 76.6 | 76.7 | 78.3 | 77.8 | 78 | 77.6 |
| Estonia | 78.8 | 76.6 | 77.7 | 78.2 | 80 | 78.6 |
| Finland | 74.1 | 74.9 | 75.7 | 76.1 | 78.3 | |
| France | 63.9 | 63.8 | 66 | 65.7 | 65.9 | 63.6 |
| Germany | 74.2 | 73.5 | 73.5 | 72.5 | 76.1 | 73.7 |
| Greece | 57.3 | | | | 61.5 | 56.9 |
| Iceland | | | 77.1 | 77.4 | 77 | 72.2 |
| Ireland | 80.4 | 80.5 | | 81.4 | 82 | |
| Italy | 62.5 | 62.2 | 63.8 | 64.9 | 65.4 | 62.3 |
| Latvia | | | | 72.3 | 74.8 | 72.8 |
| Lithuania | 75.3 | 74.2 | 76.7 | 76.9 | | |
| Luxembourg | 76.4 | 75.9 | 75.8 | 76 | 80.6 | |
| Netherlands | 76.2 | 76.8 | 77 | 76.8 | | 78 |
| Norway | 74.3 | 73 | 73.4 | 73.4 | 76.9 | 76.9 |
| Poland | 68.5 | 67.8 | 69.1 | 69.7 | | 67.7 |
| Portugal | | | | 67.5 | 70.8 | |
| Romania | | | 69.7 | 69.5 | | |
| Serbia | 62.5 | | | | | |
| Slovenia | 64.8 | 65.5 | | | | |
| Spain | 65.1 | 65.7 | | 69.9 | 68.2 | 65 |
| Sweden | 76.3 | 75.2 | 74.9 | 74.7 | 77.9 | 77.5 |
| Switzerland | 81.7 | 81.9 | 82 | 81.9 | 84.2 | |
| United Kingdom | 78 | 78.9 | 79.3 | 78.4 | 72.7 | 69.9 |

| KOF Index IPO Year | | | | | | |
|---|---|---|---|---|---|---|
| Country | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| Austria | 79,41 | 79,55 | | | | |
| Belgium | 85,49 | 85,89 | 85,85 | 85,81 | 85,80 | |
| Bulgaria | 66,42 | 63,95 | 63,72 | 62,79 | 62,35 | |
| Croatia | | | 64,03 | 64,10 | | |
| Denmark | 82,75 | 82,85 | 82,79 | 82,73 | 82,69 | 83,17 |
| Estonia | 84,27 | 84,34 | 84,31 | 84,28 | 84,27 | 84,75 |
| Finland | 84,58 | 84,68 | 84,63 | 84,58 | 84,56 | |
| France | 82,15 | 82,28 | 82,19 | 82,10 | 82,05 | 82,53 |
| Germany | 80,02 | 80,17 | 80,05 | 79,93 | 79,86 | 80,34 |
| Greece | 64,29 | | | | 66,44 | 66,92 |
| Iceland | | | 58,25 | 59,00 | 58,80 | 59,28 |
| Ireland | 83,66 | 84,01 | | 83,98 | 83,98 | |
| Italy | 67,55 | 67,81 | 67,54 | 67,24 | 67,06 | 67,54 |
| Latvia | | | | 75,92 | 75,83 | 76,31 |
| Lithuania | 72,02 | 72,63 | 72,42 | 72,19 | | |
| Luxembourg | 91,01 | 91,11 | 91,03 | 91,45 | 91,40 | |
| Netherlands | 83,67 | 83,78 | 83,71 | 83,64 | | |
| Norway | 74,23 | 74,34 | 74,53 | 74,40 | 74,32 | 74,79 |
| Poland | 70,07 | 70,27 | 70,13 | 69,98 | | 0,48 |
| Portugal | | | | 80,56 | 80,51 | 80,98 |
| Romania | | | 75,39 | 74,44 | | |
| Serbia | 60,55 | | | | | |
| Slovenia | 61,25 | 61,52 | | | | |
| Spain | 78,50 | 78,65 | | 78,38 | 78,30 | 78,78 |
| Sweden | 84,58 | 84,68 | 84,63 | 84,58 | 84,56 | 85,03 |
| Switzerland | 85,19 | 85,29 | 85,24 | 85,19 | 85,17 | |
| United Kingdc | 86,10 | 86,15 | 86,14 | 86,75 | 86,75 | 87,23 |

| SDG Score Summary IPO Year | | | | | | |
|---|---|---|---|---|---|---|
| Country | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| Austria | 82,96 | 83,41 | | | | |
| Belgium | 78,42 | 79,11 | 73,93 | 79,72 | 79,98 | |
| Bulgaria | 74,31 | 74,88 | 40,23 | 75,33 | 75,15 | |
| Croatia | | | 65,54 | 82,35 | | |
| Denmark | 83,32 | 84,09 | 68,26 | 84,67 | 84,80 | 85,00 |
| Estonia | 78,65 | 79,74 | 56,79 | 79,88 | 80,51 | 80,46 |
| Finland | 85,02 | 85,66 | 78,40 | 86,13 | 86,42 | |
| France | 81,68 | 82,26 | 59,18 | 82,61 | 82,91 | 82,76 |
| Germany | 82,06 | 82,56 | 52,22 | 83,02 | 83,35 | 83,45 |
| Greece | 77,13 | | | | 78,44 | 78,71 |
| Iceland | | | 79,28 | 78,68 | 79,46 | 79,54 |
| Ireland | 77,63 | 77,12 | | 78,14 | 78,66 | |
| Italy | 78,29 | 78,85 | 61,73 | 79,27 | 79,43 | 79,29 |
| Latvia | | | | 80,48 | 80,85 | 80,99 |
| Lithuania | 76,23 | 76,72 | 71,22 | 77,46 | | |
| Luxembourg | 75,45 | 75,65 | 57,20 | 76,72 | 77,50 | |
| Netherlands | 77,86 | 77,89 | 52,38 | 78,73 | | 79,21 |
| Norway | 81,20 | 81,63 | 68,19 | 81,79 | 82,02 | 82,23 |
| Poland | 79,84 | 80,63 | 60,63 | 80,85 | | 81,69 |
| Portugal | | | | 79,95 | 80,24 | |
| Romania | | | 56,71 | 76,73 | | |
| Serbia | 77,21 | | | | | |
| Slovenia | 79,60 | 80,57 | | | | |
| Spain | 79,10 | 79,66 | | 80,38 | 80,73 | 80,70 |
| Sweden | 84,60 | 85,45 | 64,51 | 85,45 | 85,82 | 85,70 |
| Switzerland | 78,64 | 78,76 | 72,54 | 79,48 | 80,06 | |
| United Kingdom | 81,20 | 81,41 | 65,69 | 82,16 | 82,19 | 82,16 |

## Appendix C: Variance Inflation Factor (VIF) Test

*Appendix C reports the results from a Variance Inflation Factor (VIF) test conducted to assess multicollinearity among independent variables in the regression models. High VIF values (> 10) indicate strong multicollinearity, which can distort regression coefficients and weaken inference. Our results show that most variables have VIF values well below the common threshold of 10. Some industry dummies exhibit higher VIFs, which is expected due to their categorical and mutually exclusive nature. The mean VIF across all variables is 3.7, suggesting that multicollinearity is not a significant concern.*

| Variable | VIF | 1/VIF |
|---|---|---|
| SDGScore | 1.2 | 0.83 |
| MarketCap | 1.3 | 0.8 |
| FirmAge | 1.3 | 0.78 |
| IPOActivity | 1.2 | 0.86 |
| Economicfreedom | 1.5 | 0.68 |
| MarketIntegration | 1.6 | 0.62 |
| IPOYear | 1.1 | 0.9 |
| IndustryCode 2 | 2.9 | 0.35 |
| IndustryCode 3 | 3 | 0.34 |
| IndustryCode 4 | 1.8 | 0.55 |
| IndustryCode 5 | 15.4 | 0.07 |
| IndustryCode 6 | 4 | 0.25 |
| IndustryCode 7 | 7.2 | 0.14 |
| IndustryCode 8 | 1.4 | 0.73 |
| IndustryCode 9 | 8.6 | 0.12 |
| IndustryCode 10 | 6.1 | 0.16 |
| IndustryCode 11 | 6.5 | 0.16 |
| IndustryCode 12 | 2.1 | 0.48 |
| IndustryCode 13 | 1.6 | 0.62 |
| IndustryCode 14 | 1.8 | 0.57 |
| IndustryCode 15 | 1.5 | 0.67 |
| IndustryCode 16 | 3.1 | 0.33 |
| IndustryCode 17 | 14.6 | 0.07 |
| IndustryCode 18 | 4.2 | 0.24 |
| IndustryCode 19 | 1.1 | 0.94 |
| IndustryCode 20 | 1.8 | 0.55 |
| IndustryCode 22 | 2.4 | 0.42 |
| IndustryCode 23 | 3.4 | 0.3 |
| IndustryCode 24 | 2.3 | 0.43 |
| IndustryCode 25 | 1.9 | 0.53 |
| IndustryCode 26 | 10.3 | 0.1 |
| IndustryCode 27 | 3.5 | 0.29 |
| IndustryCode 28 | 1.1 | 0.93 |
| IndustryCode 29 | 3.7 | 0.27 |
| IndustryCode 30 | 1.3 | 0.76 |
| IndustryCode 31 | 1.3 | 0.79 |
| IndustryCode 32 | 6.1 | 0.17 |
| IndustryCode 33 | 2.3 | 0.43 |
| IndustryCode 34 | 14.6 | 0.07 |
| IndustryCode 35 | 5.8 | 0.17 |
| IndustryCode 36 | 3 | 0.33 |
| IndustryCode 37 | 1.1 | 0.89 |
| IndustryCode 38 | 1.4 | 0.72 |
| IndustryCode 39 | 1.1 | 0.94 |
| **Mean VIF** | | **3.7** |