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# ESG RATINGS AND THEIR IMPACT ON THE UNDERPRICING EFFECT. COMPARISON OF THE EUROPEAN AND US CAPITAL MARKETS

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**Abstract:** *The aim of this paper is to examine the extent to which ESG ratings can influence the underpricing effect. It will be investigated to what extent the level of ESG ratings can have an effect on a rated sample. It will also be investigated whether the existence of a neutral to positive rating in the entire sample can have a significant effect on underpricing. A comparison of two large capital markets (USA and Europe) will also be used to analyze whether there are differences in terms of possible effects. The aim is to make a contribution that can create more transparency on the capital markets. Furthermore, this paper should provide conclusions on different investor behavior on the capital markets.*

*The RepRisk rating of approx. 360 sub-frames is used to determine the influence of these variables on underpricing using linear regression. Control variables are used to take into account influencing factors that have already been researched. The influence of these variables on underpricing is then determined in a linear regression analysis.*

*A comprehensive statement on the question of whether ESG ratings can lead to a reduction of information asymmetries in the IPO process or represent a qualitative signal in the sense of signaling theory.*

**Keywords:** *ESG; sustainability; underpricing; IPO; Signaling Theory*

**JEL Classification:** *G11; Q56*

## 1. INTRODUCTION

Major social and geopolitical challenges of our time are influenced by social inequality, advancing climate change and political conflicts. Fear of an uncertain future is increasing, particularly among the younger generation, and is changing their consumer behavior as a result (Boluda-Verdú, Senent-Valero, Casas-Escolano, Matijasevich, & Pastor-Valero, 2022). Sustainable products are increasingly on offer and in demand. Financial instruments are also affected by this trend, which has

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increased the supply of sustainable products in this area in recent years (Driessen, 2021). The importance of how companies structure their business model sustainably is therefore also becoming increasingly important for investors and influences their investment decisions (Sciarelli, Cosimato, Landi, & Iandolo, 2021).

The capital market on which the IPO takes place also has a major influence on the importance of ESG aspects, as the European market is more heavily regulated by the Corporate Sustainability Reporting Directive (CSRD) and EU taxonomy than the US market, which is largely determined by SEC proposals (Lombardi, 2024).

Obtaining information on ESG criteria in the context of an IPO presents challenges for investors, as there are limited reliable sources available to conduct a thorough risk assessment before a company goes public (Ilhan, Krueger, Sautner, & Starks, 2023) In addition to the voluntary disclosure of ESG data in IPO prospectuses, ESG ratings serve as a crucial tool for evaluating a company's sustainability efforts. These ratings are issued by various agencies and can be commissioned by companies themselves, allowing them to voluntarily communicate ESG-related information. While ESG ratings aim to provide an objective assessment of corporate sustainability, complete neutrality in scoring cannot be (Jámbor & Zanócz, 2023). Variations in ratings from different agencies are common, as the importance assigned to different sustainability factors may vary, leading to differing results (Escrig-Olmedo, Fernández-Izquierdo, Ferrero-Ferrero, Rivera-Lirio, & Muñoz-Torres, 2019).

The growing importance of ESG ratings and sustainability strategies is increasingly shaping investors' decision-making, while academic and scientific interest in these topics has also risen significantly in recent years. This development has prompted a reassessment of established economic concepts, such as market efficiency and regulatory mechanisms (Friede, Busch, & Bassen, 2015). Investors now incorporate ESG criteria into their investment strategies, either to steer clear of businesses that do not align with their sustainability values or to seek out companies with strong ESG performance that fit their financial objectives (Nakajima et al., 2021).

In the context of Initial Public Offerings (IPOs), ESG factors and ratings play a vital role in shaping corporate communication strategies throughout the IPO process, ensuring that investors receive relevant data for informed decision-making (Zumente & Lāce, 2021). Transparent and effective communication is crucial for both the success of an IPO and the company's ability to strengthen its capital structure. The phenomenon of IPO underpricing—where the initial share price is set lower than the market value—often signals communication inefficiencies, contributing to information imbalances in financial markets (Rock, 1986). While

short-term fluctuations occur, the persistent gap between offering prices and subsequent market valuations is a widely observed trend across stock exchanges (Rehkugler & Schenek, 2001). This suggests a potential link between ESG ratings and the extent of underpricing in IPOs.

This study focuses on analyzing the influence of ESG ratings prior to an IPO and the correlation between the publication of this information and the underpricing effect. Differences between the European and US capital markets will also be examined in more detail.

## 2. RESEARCH HYPOTHESIS

To evaluate the proposed effects on the dependent variables, an Ordinary Least Squares (OLS) regression is employed, as this approach is particularly well-suited for analyzing IPO-related data. A linear regression model is then utilized to explore the relationship between the dependent variable and the independent variables in the study. One section of the analysis focuses on companies with an ESG rating, examining whether the extent of ESG scoring influences underpricing (H1). Subsequently, the entire set of IPOs is analyzed to determine whether the presence of a neutral or positive ESG rating affects underpricing (H2). ESG ratings of BB or higher are considered at least neutral to positive. The following regression equation is formulated to test the hypothesis:

$$\textbf{H1}: IR_{ad} = \alpha + ESG_{rating} + \ln(\text{Assets}) + \ln(\text{revenues}) + \ln(\text{offer price}) + \ln(age) + VC_{dummy} + UW_{ranking}$$

$$\textbf{H2}: IR_{ad} = \alpha + ESG\ Rating_{dummy} + \ln(\text{Assets}) + \ln(\text{revenues}) + \ln(\text{offer price}) + \ln(age) + VC_{dummy} + UW_{ranking}$$

Both models are used for the different capital markets so that they can then be compared with each other.

## 3. METHODOLOGY AND DATA

This study examines the influence of ESG ratings on IPO underpricing, using a sample of IPOs from the European and US capital markets. The dataset includes IPOs issued between 2013 and 2022, with Refinitiv Eikon selected as the primary data source. This database provided essential details such as the issuance date, stock exchange, economic sector, offer price, first closing price, and other financial metrics.

Companies in the banking, insurance, and utilities sectors were excluded from the sample. This exclusion is justified by the fact that banks and insurance companies operate under strict capital requirements, while utilities are significantly affected by regulatory interventions. These factors create distinct incentives for these firms to access capital markets (Kennedy, Sivakumar, & Vetzal, 2006). Additionally, companies that did not successfully complete their IPOs or failed to disclose financial ratios were removed from the dataset, as these ratios are crucial for analyzing control variables.

To ensure the ESG rating remains as objective as possible and is not influenced by company-reported information, this study utilizes ratings from the RepRisk ESG database. RepRisk primarily evaluates ESG risk, relying on external and publicly available data for its analysis. The database collects information daily using machine learning tools to generate a quantifiable score, known as the RepRisk Index (RRI), which subsequently determines the RepRisk Rating (RRR) on a scale from AAA to D, facilitating comparability and benchmarking.

Through access to WRDS (Wharton Research Data Services), daily ESG ratings for the years 2013 to 2022 were retrieved for all ISINs identified in the Refinitiv Eikon dataset.

## 1.1. Variables

### *1.1.1. Dependent variables*

In formulating the research hypothesis, it has been established that the primary objective is to identify the key factors influencing the extent of corporate disclosure, making information disclosure the dependent variable in this study. Before being introduced as a variable, absolute disclosure values will undergo a logarithmic transformation to better approximate a normal distribution. However, this variable will also be used as an independent variable to examine whether it negatively impacts underpricing.

In addition to voluntary ESG information disclosure, underpricing serves as a dependent variable, acting as a proxy for the level of uncertainty. Measuring underpricing and evaluating the potential opportunity costs for issuers requires a quantitative approach, with initial return (IR) as the primary metric. The unadjusted initial return is calculated as follows:

$$IR = \frac{(P_{o,t} - E_i)}{E_i}$$

Since the unadjusted initial return (IR) offers limited insight for analyzing excess returns, it is adjusted by referencing an approximate market portfolio (Beatty & Ritter, 1985). Given that there is no historical price data available at the time of an IPO, a beta of one is assumed. While a market portfolio could theoretically be constructed using companies with similar characteristics, such as size, sector, or price-to-book ratio, this method is not applied here due to the high data demands and resource-intensive nature of the approach.

Instead of comparing with peer companies, an equity market adjustment will be made using the S&P 500 Index as the benchmark. This index, which includes the 500 largest U.S.-listed companies based on market capitalization as determined by Standard & Poor's Corp., serves as a reliable proxy for overall market performance. Using the S&P 500 as a benchmark provides a broader market perspective and improves the accuracy of the IR analysis. For IPOs on the European market, the IR was adjusted using the EURO STOXX 50, which contains the 50 largest listed companies in the eurozone and can be seen as a proxy for European market development (Feder-Sempach & Miziołek, 2023).

With this benchmark adjustment, the IR formula is modified as follows:

$$IR_{ad} = \frac{(P_{o,t} - E_i)}{E_i} - \frac{(M_{t0} - M_{t-1})}{M_{t-1}}$$

### *1.1.2. Independent variables*

The primary variable in this research is the ESG rating prior to the first IPO. As mentioned earlier, the rating, in the form of the RepRisk rating, serves as an indicator of a company's sustainability quality. Since the ordinal structure of the rating scale does not permit a quantitative assessment, the individual rating scores were converted into an ESG quotient:

*Table 1*. ESG Ratings – Value

| Rating Score | Value |
|---|---|
| AAA | 0.9 |
| AA | 0.8 |
| A | 0.7 |
| BBB | 0.6 |
| BB | 0.5 |
| B | 0.3 |
| CCC | 0.2 |
| CC | 0.1 |
| C | 0.001 |
| Not rated | 0.0 |

### *1.1.3. Control variables*

The control variables are grouped into three main categories: firm characteristics, offer characteristics, and market characteristics.

Firm characteristics include proxies for company size, such as revenues, which can influence investor decisions. Typically, larger firms are viewed as lower-risk investments, so it is expected that companies with higher revenues will experience less underpricing (Leone, Rock, & Willenborg, 2007). Another important factor in this category is total assets, which, like revenues, can help reduce uncertainty and is therefore included as a control variable. Additionally, firm age—calculated as the difference between the company's founding year and the IPO year—tends to reduce IPO underpricing, as older firms generally have more extensive financial histories and publicly available information, thus lowering ex-ante uncertainty (Engelen & van Essen, 2010).The control variables are organized into three main categories: firm characteristics, offer characteristics, and market characteristics.

Market characteristics are represented by factors such as the involvement of venture capital (VC). IPOs that receive VC backing generally exhibit higher levels of underpricing compared to those without such backing, likely due to the increased perceived risk associated with VC-supported firms (Lowry & Schwert, 2004). Additionally, IPOs listed on the NASDAQ often experience more underpricing, as the exchange tends to feature smaller, newer, and more technology-focused companies (Corwin, 2003).

Offer characteristics are exemplified by the reputation of the bookrunner managing the IPO process. Companies partnered with well-established underwriters typically experience lower levels of underpricing, as the reputation of a respected bookrunner can signal greater reliability and trustworthiness to investors. In this study, particular focus is placed on the underwriter ranked highest in the dataset, using a scale from 0 to 9.1 based on Ritter's underwriter ranking.

## 1.2. Descriptive statistics

The total sample size is 2,547 observations, of which 902 (35.41%) are attributable to the US capital market and 1,645 (64.59%) to Europe. Over the 10-year period, the number of IPOs is distributed almost equally compared to the entire period, with 2021 being an outlier. Here, the proportion of European IPOs was significantly higher compared to other years. **Error! Reference source not found.** shows a slight negative trend in the number of IPOs per year.

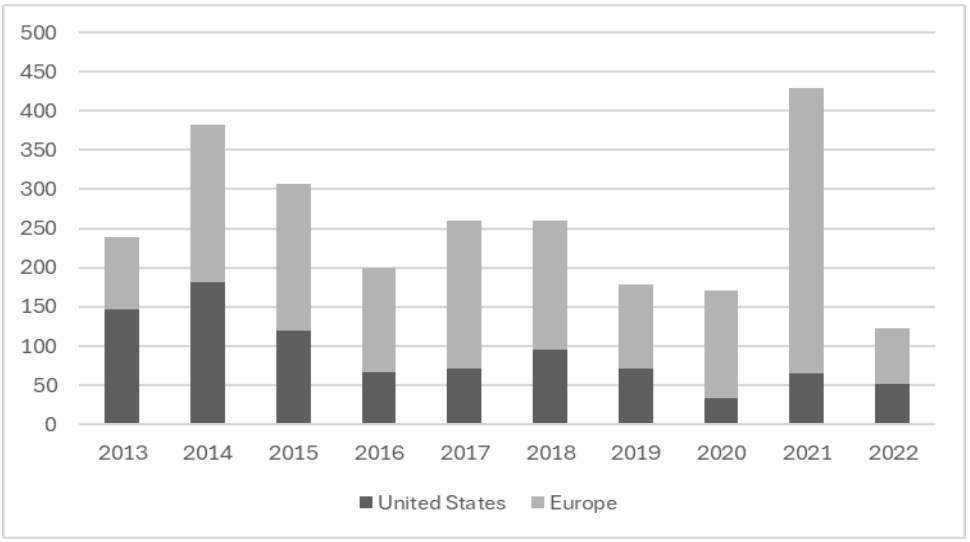


*Figure 1.* IPOs between 2013 and 2022 – rated and unrated

The observations in the sample are significantly reduced if only companies that have received a RepRisk rating are included. Taking this into account, the total sample size is 552 observations, with the USA accounting for 32.79% and Europe 67.21%. It can be concluded from this that the proportion of rated companies remains the same regardless of the capital market. However, Figure 2 below shows a downward trend starting in 2012, after which the proportion of rated companies falls almost continuously and reaches its lowest point in 2022, when only 5.74% of the total sample received an ESG rating.

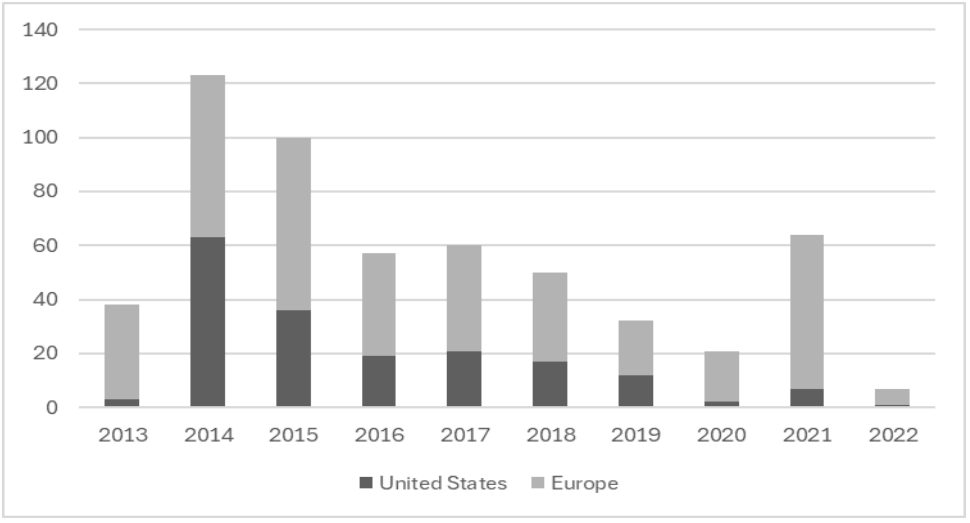


*Figure 2.* IPOs between 2013 and 2022 – rated

The table below (Table 2) shows an overview of the desciptive statistics clustered by ESG rating, transaction characteristics and firm and market characteristics for the IPOs on the European market whether there rated or not:

*Table 2.* Summary Statistics – Europe: ESG Dummy

| | n | mean | sd | IQR | Min | p25 | Median | p75 | Max |
|---|---|---|---|---|---|---|---|---|---|
| **ESG rating characteristics** | | | | | | | | | |
| ESG Rating Dummy | 1,645 | 0.217 | 0.412 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| **Transaction characteristics** | | | | | | | | | |
| Underpricing | 1,645 | 0.351 | 5.495 | 0.185 | -1.000 | -0.007 | 0.049 | 0.178 | 167.323 |
| Underpricing adjusted | 1,645 | 0.351 | 5.496 | 0.188 | -1.009 | -0.011 | 0.049 | 0.177 | 167.335 |
| Bookrunner ranking | 1,645 | 2.924 | 3.176 | 5.000 | 1.001 | 1.001 | 1.001 | 6.001 | 9.001 |
| Total Assets | 1,645 | 1,186.816 | 11,689.612 | 192.506 | 0.000 | 7.200 | 34.485 | 199.706 | 412,863.073 |
| Total Revenues | 1,645 | 338.941 | 1,628.780 | 114.152 | 0.000 | 0.737 | 17.388 | 114.888 | 41,810.467 |
| Offer Price | 1,645 | 7.192 | 11.387 | 7.762 | 0.010 | 1.488 | 3.613 | 9.250 | 240.300 |
| **Firm and market characteristics** | | | | | | | | | |
| Company age | 1,645 | 19.326 | 28.283 | 16.000 | 0.000 | 6.000 | 12.000 | 22.000 | 494.000 |
| VC Dummy | 1,645 | 0.045 | 0.207 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

The above table shows that there is no difference between the unadjusted and adjusted underpricing. In both cases, the mean value is 35.1% This suggests that the sample was not exposed to any strong market influences. The average amount of assets is EUR 1,186.816 million and the average revenues are EUR 338.941 million. Looking at the bookrunner rating, this averages 2.92. This suggests that a large proportion of the bookrunners do not have a positive rating, as the range of ratings is 0 to 9.1 and a value of 0 was assumed in the absence of a rating. Only 4.5% of the companies were backed by venture capital. The average age of the companies at the time of the IPO was 19.32 years. The evaluation also shows that around 20% have a neutral to positive rating.

Similar to Table 2, Table 3 summarises the statistics described for the US market:

*Table 3.* Summary Statistics – USA: ESG Dummy

| | n | mean | sd | IQR | Min | p25 | Median | p75 | Max |
|---|---|---|---|---|---|---|---|---|---|
| **ESG rating characteristics** | | | | | | | | | |
| ESG Rating Dummy | 902 | 0.200 | 0.400 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| **Transaction characteristics** | | | | | | | | | |
| Underpricing | 902 | 0.076 | 0.492 | 0.276 | -1.000 | -0.023 | 0.016 | 0.252 | 5.330 |
| Underpricing adjusted | 902 | 0.075 | 0.492 | 0.278 | -1.017 | -0.024 | 0.020 | 0.254 | 5.337 |
| Bookrunner ranking | 902 | 7.392 | 2.070 | 2.518 | 1.001 | 6.482 | 8.334 | 9.001 | 9.001 |
| Total Assets | 902 | 627.966 | 2,390.501 | 259.775 | 0.000 | 1.800 | 54.800 | 261.575 | 33,440.000 |
| Total Revenues | 902 | 491.174 | 2,873.463 | 149.075 | 0.000 | 0.000 | 7.000 | 149.075 | 66,468.300 |
| Offer Price | 902 | 13.907 | 5.827 | 7.000 | 4.000 | 10.000 | 13.500 | 17.000 | 49.000 |
| **Firm and market characteristics** | | | | | | | | | |
| Company age | 902 | 10.433 | 15.090 | 10.000 | 1.000 | 2.000 | 7.000 | 12.000 | 187.000 |
| VC Dummy | 902 | 0.612 | 0.488 | 1.000 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |

Like in the European sample, there is hardly any difference between the adjusted and unadjusted underpricing. However, the underpricing here is significantly lower on average at 7.6%. The higher average book runner ranking of 7.39 suggests that the ranking used is more focussed on the US market. It is also noticeable that a significantly larger proportion of the sample has a VC background (61.2%). In direct comparison, at 10.43 years, US companies are somewhat younger at the time of the IPO. Furthermore, the relative number of companies with a neutral to positive rating is almost identical to the European market at 20%.

*Table 4.* Underpricing by ESG Score

| | **USA** | | **EUROPE** | |
|---|---|---|---|---|
| | n | in % | n | in % |
| AAA | 14 | 1.55% | 194 | 11.79% |
| AA | 144 | 15.96% | 72 | 4.38% |
| A | 17 | 1.88% | 54 | 3.28% |
| BBB | 4 | 0.44% | 23 | 1.40% |
| BB | 1 | 0.11% | 14 | 0.85% |
| B | 0 | 0.00% | 8 | 0.49% |
| CCC | 1 | 0.11% | 6 | 0.36% |
| CC | 0 | 0.00% | 0 | 0.00% |
| C | 0 | 0.00% | 0 | 0.00% |
| not rated | 721 | 79.93% | 1274 | 77.45% |

Table 4 shows the distribution of ratings based on the rating classes AAA to C. It should be noted that the ratings of both capital markets are similar, although a difference can be seen between the highest rating classes AA and AAA. The sample of the European market is slightly better rated.

If the two capital markets are considered in such a way that only companies that have received an ESG rating are analyzed, the following can be determined:

For the European capital market, the underpricing increases slightly to 37.9% The average assets and revenues are significantly higher at EUR 3,846.324 and EUR 976.049, which indicates larger and more established companies (Table 5). This is supported by the higher average age of the companies (26.35 years). The bookrunner ranking of 4.69 is also slightly higher compared to the overall sample. At 8.1%, the relative proportion of IPOs backed by VC is around twice as high as the total number of all companies, regardless of whether they have received a RepRisk rating.

*Table 5.* Summary statistics – Europe: ESG rated

| | n | mean | sd | IQR | Min | p25 | Median | p75 | Max |
|---|---|---|---|---|---|---|---|---|---|
| **ESG rating characteristics** | | | | | | | | | |
| ESG Rating | 371 | 0.794 | 0.154 | 0.200 | 0.200 | 0.700 | 0.900 | 0.900 | 0.900 |
| **Transaction characteristics** | | | | | | | | | |
| Underpricing | 371 | 0.379 | 5.399 | 0.156 | -1.000 | -0.008 | 0.043 | 0.148 | 103.944 |
| Underpricing adjusted | 371 | 0.379 | 5.398 | 0.158 | -0.996 | -0.013 | 0.045 | 0.145 | 103.931 |
| Bookrunner ranking | 371 | 4.699 | 3.746 | 7.857 | 1.001 | 1.001 | 3.001 | 8.858 | 9.001 |
| Total Assets | 371 | 3,846.324 | 23,622.422 | 1,613.979 | 0.000 | 75.385 | 384.780 | 1,689.364 | 412,863.073 |
| Total Revenues | 371 | 976.049 | 2,344.586 | 794.436 | 0.000 | 33.054 | 219.331 | 827.490 | 18,446.285 |
| Offer Price | 371 | 10.502 | 16.252 | 10.894 | 0.013 | 2.810 | 5.740 | 13.704 | 240.000 |
| **Firm and market characteristics** | | | | | | | | | |
| Company age | 371 | 26.536 | 38.493 | 25.000 | 1.000 | 7.000 | 15.000 | 32.000 | 494.000 |
| VC Dummy | 371 | 0.081 | 0.273 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

The situation is similar in the US market. Table x shows that the assets and revenues here are on average around 2.5 to 2.7 times higher than the overall sample. The age of the companies is also somewhat higher at 14.8 years. In addition, the proportion of companies that are VC backed is significantly higher at 82.3%. The higher bookrunner ranking of 8.34 should also be noted, which is around 12% better than the sample, which also includes the unrated companies.

*Table 6.* Summary statistics – USA: ESG rated

| | n | mean | sd | IQR | Min | p25 | Median | p75 | Max |
|---|---|---|---|---|---|---|---|---|---|
| **ESG rating characteristics** | | | | | | | | | |
| ESG Rating | 181 | 0.789 | 0.071 | 0.000 | 0.200 | 0.800 | 0.800 | 0.800 | 0.900 |
| **Transaction characteristics** | | | | | | | | | |
| Underpricing | 181 | 0.198 | 0.385 | 0.334 | -1.000 | 0.000 | 0.133 | 0.334 | 1.741 |
| Underpricing adjusted | 181 | 0.199 | 0.385 | 0.345 | -1.007 | -0.002 | 0.133 | 0.343 | 1.730 |
| Bookrunner ranking | 181 | 8.340 | 1.054 | 1.000 | 2.858 | 8.001 | 8.987 | 9.001 | 9.001 |
| Total Assets | 181 | 1,600.062 | 4,221.491 | 1,047.900 | 0.000 | 69.900 | 339.000 | 1,117.800 | 33,440.000 |
| Total Revenues | 181 | 1,324.115 | 5,331.302 | 838.700 | 0.000 | 37.600 | 196.000 | 876.300 | 66,468.300 |
| Offer Price | 181 | 17.403 | 6.233 | 6.000 | 4.500 | 14.000 | 16.000 | 20.000 | 49.000 |
| **Firm and market characteristics** | | | | | | | | | |
| Company age | 181 | 14.834 | 19.994 | 12.000 | 1.000 | 4.000 | 9.000 | 16.000 | 145.000 |
| VC Dummy | 181 | 0.823 | 0.383 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## 4. RESULTS

The two tables below (Table 7, Table 8) show the results of the correlation calculations between the dependent and independent variables for the EUORPA and US samples, regardless of whether or not they have received an ESG or RepRisk rating:

*Table 7,* Summary Correlations – EUROPE: rated and unrated

| | Estimate | Std. Error | t value | Pr(>\|t\|) | |
|---|---|---|---|---|---|
| (Intercept) | 0.52868 | 0.34025 | 1.554 | 0.1204 | |
| Bookrunner.ranking | 0.01514 | 0.0519 | 0.292 | 0.7705 | |
| ln_age | 0.09833 | 0.29272 | 0.336 | 0.737 | |
| ln_assets | 0.39819 | 0.19397 | 2.053 | 0.0402 | * |
| ln_offer.price | -1.46994 | 0.25424 | -5.782 | 8.84E-09 | *** |
| ln_revenues | -0.11767 | 0.15468 | -0.761 | 0.4469 | |
| Rating_dummy | -0.22641 | 0.36693 | -0.617 | 0.5373 | |
| VC.Dummy | 0.03142 | 0.65938 | 0.048 | 0.962 | |

*Table 8.* Summary Correlations – USA: rated and unrated

| | Estimate | Std. Error | t value | Pr(>\|t\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.31302 | 0.113443 | -2.759 | 0.005912 | ** |
| Bookrunner.ranking | -0.01487 | 0.01026 | -1.449 | 0.147726 | |
| ln_age | 0.057828 | 0.037962 | 1.523 | 0.128041 | |
| ln_assets | 0.005208 | 0.007134 | 0.73 | 0.465609 | |
| ln_offer.price | 0.322644 | 0.116561 | 2.768 | 0.005756 | ** |
| ln_revenues | 0.003251 | 0.004325 | 0.752 | 0.452394 | |
| Rating_dummy | 0.059606 | 0.042541 | 1.401 | 0.161518 | |
| VC.Dummy | 0.145347 | 0.04033 | 3.604 | 0.000331 | *** |

For the European market, a strong significance (confidence level of 99%) in the correlation between the underpricing and the offer price can be recognized. Contrary to the assumption of the signalling theory, in which the offer price can be seen as a positive signal of the company value, there is no positive but a negative relationship here. However, if the US market is considered, a significant correlation can also be seen here, although this is in line with other research results with a positive relationship between the variables (Mark Grinblatt & C. Hwang, 1989).

In **Error! Reference source not found.**, only one further significance can be recognized. This is somewhat weaker with a confidence level of 90%, which is why this observation will not be examined more closely. However, it should be noted that a positive relationship between the assets of a company before the IPO and the underpricing indicates a signalling effect and would be consistent with other underestimations in the area of signalling theory (Boudriga, Ben Slama, & Boulila, 2009). In addition to the offer price on the US market, venture capital backing also has a positive influence on underpricing. This observation is also consistent with the assumption that VC-backed IPOs have a higher underpricing compared to companies without VC backing (Elston & Yang, 2010). In principle, the signalling theory is

more strongly supported in the US market and is therefore consistent with other research.

It can be seen in both samples that, contrary to expectations, the bookrunner ranking has no (positive) influence on underpricing. Other research has found that companies underprice more when the bookrunner is rated higher, as this can be a quality characteristic of a company (Liu & Ritter, 2011).

Finally, it must be mentioned that in neither of the two samples did the presence of a neutral to positive ESG rating led to the underpricing being influenced by this. This is contrary to the assumption that an ESG rating would lead to a reduction in information asymmetries and thus have a negative impact on underpricing (Horn, 2023).

It should also be noted that other research on the US market has found a positive influence of an ESG rating dummy (Schmunkamp, 2025).

If the perspective of this research is expanded by focusing on the rated companies, the following correlations can be identified:

*Table 9.* Summary Correlations – EUROPA: rated

| | **Estimate** | **Std. Error** | **t value** | **Pr(>\|t\|)** | |
|---|---|---|---|---|---|
| (Intercept) | 4.368766 | 1.666692 | 2.621 | 0.00913 | ** |
| Bookrunner.ranking | -0.0042 | 0.086441 | -0.049 | 0.96129 | |
| ln_age | -0.18498 | 0.528958 | -0.35 | 0.72677 | |
| ln_assets | 0.804442 | 0.367492 | 2.189 | 0.02923 | * |
| ln_offer.price | -3.17995 | 0.579622 | -5.486 | 7.71E-08 | *** |
| ln_revenues | 0.141055 | 0.250036 | 0.564 | 0.57301 | |
| Rating_value | -4.68098 | 1.769573 | -2.645 | 0.00852 | ** |
| VC.Dummy | 0.364872 | 0.995708 | 0.366 | 0.71425 | |

*Table 10.* Summary Correlations – USA: rated

| | **Estimate** | **Std. Error** | **t value** | **Pr(>\|t\|)** | |
|---|---|---|---|---|---|
| (Intercept) | -0.67938 | 0.469933 | -1.446 | 0.1501 | |
| Bookrunner.ranking | -0.02038 | 0.030285 | -0.673 | 0.5018 | |
| ln_age | 0.002648 | 0.05961 | 0.044 | 0.9646 | |
| ln_assets | -0.0119 | 0.014809 | -0.804 | 0.4226 | |
| ln_offer.price | 0.548993 | 0.211566 | 2.595 | 0.0103 | * |
| ln_revenues | -0.00806 | 0.009055 | -0.89 | 0.3748 | |
| Rating_value | 0.17412 | 0.399693 | 0.436 | 0.6636 | |
| VC.Dummy | 0.329342 | 0.073054 | 4.508 | 0.000012 | *** |

In the subset of rated companies in Europe, two main strong correlations can be identified. Similar to the previous observation on the US market, the offer price is highly significant here. However, the influence of this variable is negative in contrast to the expected effect. The situation is different with the level of the ESG rating (RepRisk rating), where a strong significance with a negative influence on the underpricing can also be seen. This supports the thesis that ESG ratings lead to a reduction in information asymmetry and is in line with other research findings (Ferri, Tron, Colantoni, & Savio, 2023).

If the rated set of US companies is considered, there is no significance between the RepRisk rating and underpricing. Analogous to the overall sample, companies with a VC background are also more underpriced here than companies without. It can therefore be concluded that an ESG rating has no influence on the VC effect.

### 1.3. Robustness check

Appendix 1 summarizes the results of the statistical tests performed. Tests for autocorrelation and model specification were conducted first. The Durbin-Watson (DW) test for autocorrelation produced values of are close to the ideal value of 2.0, indicating no significant autocorrelation. The Ramsey RESET test examined model specification are sufficiently high to dismiss concerns about specification error.

Additionally, multicollinearity was assessed using the Variance Inflation Factor (VIF), with a threshold of 5 or 10 typically considered critical (Cleff, 2012). Since all VIF values remain below this threshold, no multicollinearity is present.

## 5. CONCLUSION

This paper has examined the impact of ESG ratings prior to an IPO as part of the analysis of the underpricing effect in order to determine whether ESG ratings in the form of the RepRisk rating can help to reduce information asymmetries in order to provide a further explanation for the underpricing effect. Different markets should also be analysed in order to determine whether there are differences in terms of determinants. With the European and US IPO markets, markets were chosen that have a high level of development compared to a global view regarding the implementation of ESG measures.

The results of this research are largely consistent with other research findings. However, it should be noted that some variables yielded the opposite result compared to the expected value. In part, the hypothesis that its higher transparency through ESG ratings results in a reduction of information asymmetry can be confirmed. In

addition, some established variables, such as the inclusion of venture capital, could further support the signalling theory.

It is important to pay close attention to the respective market view. For example, a continuous confirmation of the signalling theory in relation to VC could only be analysed in the US market. One possible background could be the partial lack of ratings for European bookrunners.

Hypothesis 1 can therefore only be accepted to a limited extent for the European capital market and cannot be accepted here due to the lack of significance on the US market. It can therefore be said that ESG ratings only influence underpricing for submarkets in the observation set of rated companies.

Hypothesis 2 must be completely rejected. No significant relationship between underpricing and the presence of ESG ratings could be proven. However, already established explanatory approaches in relation to the signalling theory could be confirmed (VC as a quality feature). In principle, these studies contribute to a better understanding of the interactions between ESG information and the underpricing effect. The effect depends on which submarket is analysed. The period of observation also plays a role. Future research should focus more on the growing interest of investors in ESG aspects and the relationship between market effects and the provision of ESG information. One possible explanation for the different results between the USA and Europe may lie in the different strict legal requirements with regard to sustainability information. Here, too, researchers should look more closely at the legal correlations and market effects in further studies.

It should also be noted with regard to the methodology that only ratings from one rating agency were used. It would make sense to expand the model to include other agencies. Furthermore, not all IPOs were included in the analyses, as some companies withdrew from the market at the time of the respective IPO or provided too little financial information to be included in the model.

Furthermore, the European capital market should not be regarded as a single market, as there are different regulations in the individual countries. For this reason, it seems a logical step to focus on the European capital market in order to analyse the differences between the individual submarkets. In addition, emerging markets and possible differences should also be analysed more closely in this context.

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# LIST OF SYMBOLS

| | |
|---|---|
| α | Interference term |
| age | Age of the company at the time of the IPO in years |
| Assets | Reported assets before IPO in million USD |
| Ei | Issue price of the share (i) |
| ESG_rating | Decimal value of the rating from AAA to CCC |
| ESG Rating_daummy | Dummy whether firms have a neutral/positive ESG rating |
| IR | Initial Return |
| Mt0 | Market opening price (S+P 500) first trading day |
| Mt-1 | Closing price market (S+P 500) previous day first trading day |
| N | Number of IPO prospectuses in the sample |
| Po,t | First offerprice (o) on first trading day (t) |
| Revenues | Reported revenues before IPO in million USD |
| StockExchange_dummy | Dummy whether IPO was published on NASDAQ |
| UW_ranking | Ranking of the first-named underwriter of an IPO |
| VC_dummy | Dummy whether IPO is supported by venture capital |

# APPENDIX 1: STATISTICAL TESTS

## EUROPE: RATED AND UNRATED:

**Variance Inflation Factor (VIF) - Europe ESG rated and unrated**

| | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_dummy | VC.Dummy |
|---|---|---|---|---|---|---|---|
| | 1.505726 | 1.232986 | 2.646543 | 1.348654 | 2.076352 | 1.268448 | 1.035597 |

| | (Intercept) | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_dummy | VC.Dummy |
|---|---|---|---|---|---|---|---|---|
| (Intercept) | 1 | -0.297 | -0.716 | -0.197 | 0.032 | 0.119 | 0.059 | 0.023 |
| Bookrunner.ranking | -0.297 | 1 | 0.281 | -0.291 | -0.249 | 0 | -0.129 | -0.056 |
| ln_age | -0.716 | 0.281 | 1 | -0.138 | -0.147 | -0.173 | -0.008 | -0.057 |
| ln_assets | -0.197 | -0.291 | -0.138 | 1 | -0.232 | -0.583 | -0.179 | -0.053 |
| ln_offer.price | 0.032 | -0.249 | -0.147 | -0.232 | 1 | 0.067 | -0.008 | -0.063 |
| ln_revenues | 0.119 | 0 | -0.173 | -0.583 | 0.067 | 1 | -0.104 | 0.094 |
| Rating_dummy | 0.059 | -0.129 | -0.008 | -0.179 | -0.008 | -0.104 | 1 | -0.06 |
| VC.Dummy | 0.023 | -0.056 | -0.057 | -0.053 | -0.063 | 0.094 | -0.06 | 1 |

**Durbin-Watson Test - Europe ESG rated and unrated**

| DW | p-value |
|---|---|
| 2.0091 | 0.5701 |

**RESET Test - Europe ESG rated and unrated**

| | |
|---|---|
| RESET | 0.094408 |
| df1 | 1 |
| df2 | 1636 |
| p-value | 0.7587 |

## USA: RATED AND UNRATED:

**Variance Inflation Factor (VIF) - USA ESG rated and unrated**

| Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_dummy | VC.Dummy |
|---|---|---|---|---|---|---|
| 1.792724 | 1.318357 | 1.627838 | 1.860178 | 1.838052 | 1.149652 | 1.536049 |

| | (Intercept) | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_dummy | VC.Dummy |
|---|---|---|---|---|---|---|---|---|
| (Intercept) | 1 | -0.032 | -0.318 | 0.005 | -0.778 | 0.384 | 0.115 | 0.131 |
| Bookrunner.ranking | -0.032 | 1 | 0.03 | 0.008 | -0.532 | -0.068 | -0.022 | -0.202 |
| ln_age | -0.318 | 0.03 | 1 | 0.015 | 0.092 | -0.224 | -0.069 | -0.344 |
| ln_assets | 0.005 | 0.008 | 0.015 | 1 | -0.062 | -0.483 | -0.002 | -0.174 |
| ln_offer.price | -0.778 | -0.532 | 0.092 | -0.062 | 1 | -0.138 | -0.141 | -0.103 |
| ln_revenues | 0.384 | -0.068 | -0.224 | -0.483 | -0.138 | 1 | -0.134 | -0.025 |
| Rating_dummy | 0.115 | -0.022 | -0.069 | -0.002 | -0.141 | -0.134 | 1 | -0.037 |
| VC.Dummy | 0.131 | -0.202 | -0.344 | -0.174 | -0.103 | -0.025 | -0.037 | 1 |

**Durbin-Watson Test - USA ESG rated and unrated**

| DW | p-value |
|---|---|
| 1.9033 | 0.07056 |

**RESET Test - USA ESG rated and unrated**

| | |
|---|---|
| RESET | 6.6556 |
| df1 | 1 |
| df2 | 893 |
| p-value | 0.01004 |

## EUROPE: RATED:

**Variance Inflation Factor (VIF) - Europe ESG rated**

| Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_value | VC.Dummy |
|---|---|---|---|---|---|---|
| 1.469486 | 1.152808 | 2.133024 | 1.359154 | 1.606022 | 1.044338 | 1.03554 |

| | (Intercept) | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_value | VC.Dummy |
|---|---|---|---|---|---|---|---|---|
| (Intercept) | 1 | -0.026 | -0.314 | -0.305 | 0.066 | 0.081 | -0.869 | 0.058 |
| Bookrunner.ranking | -0.026 | 1 | 0.263 | -0.356 | -0.26 | 0.035 | -0.069 | -0.03 |
| ln_age | -0.314 | 0.263 | 1 | -0.16 | -0.16 | -0.084 | 0.056 | -0.026 |
| ln_assets | -0.305 | -0.356 | -0.16 | 1 | -0.236 | -0.537 | 0.153 | -0.072 |
| ln_offer.price | 0.066 | -0.26 | -0.16 | -0.236 | 1 | 0.029 | -0.096 | -0.062 |
| ln_revenues | 0.081 | 0.035 | -0.084 | -0.537 | 0.029 | 1 | -0.101 | 0.129 |
| Rating_value | -0.869 | -0.069 | 0.056 | 0.153 | -0.096 | -0.101 | 1 | -0.087 |
| VC.Dummy | 0.058 | -0.03 | -0.026 | -0.072 | -0.062 | 0.129 | -0.087 | 1 |

**Durbin-Watson Test - Europe ESG rated**

| DW | p-value |
|---|---|
| 2.0398 | 0.6425 |

**RESET Test - Europe ESG rated**

| | |
|---|---|
| RESET | 1.5729 |
| df1 | 1 |
| df2 | 362 |
| p-value | 0.2106 |

## USA: RATED:

**Variance Inflation Factor (VIF) - USA ESG rated**

| | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_value | VC.Dummy |
|---|---|---|---|---|---|---|---|
| | 1.399038 | 1.038394 | 1.634624 | 1.400853 | 1.739933 | 1.093696 | 1.071926 |

| | (Intercept) | Bookrunner.ranking | ln_age | ln_assets | ln_offer.price | ln_revenues | Rating_value | VC.Dummy |
|---|---|---|---|---|---|---|---|---|
| (Intercept) | 1 | -0.264 | -0.255 | -0.044 | -0.504 | 0.19 | -0.811 | -0.04 |
| Bookrunner.ranking | -0.264 | 1 | 0.035 | 0.077 | -0.426 | -0.194 | -0.033 | -0.198 |
| ln_age | -0.255 | 0.035 | 1 | 0.048 | 0.097 | -0.133 | 0.104 | -0.051 |
| ln_assets | -0.044 | 0.077 | 0.048 | 1 | -0.032 | -0.603 | -0.039 | -0.11 |
| ln_offer.price | -0.504 | -0.426 | 0.097 | -0.032 | 1 | -0.067 | 0.262 | 0.015 |
| ln_revenues | 0.19 | -0.194 | -0.133 | -0.603 | -0.067 | 1 | -0.02 | 0.035 |
| Rating_value | -0.811 | -0.033 | 0.104 | -0.039 | 0.262 | -0.02 | 1 | 0.035 |
| VC.Dummy | -0.04 | -0.198 | -0.051 | -0.11 | 0.015 | 0.035 | 0.035 | 1 |

**Durbin-Watson Test - USA ESG rated**

| DW | p-value |
|---|---|
| 1.8263 | 0.1171 |

**RESET Test - USA ESG rated**

| | |
|---|---|
| RESET | 1.3727 |
| df1 | 1 |
| df2 | 172 |
| p-value | 0.243 |