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Unveiling the Consequences of ESG Rating Disagreement: An Empirical Analysis of the Impact on the Cost of Equity Capital

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Unveiling the consequences of ESG rating disagreement: An empirical analysis of the impact on the cost of equity capital

Chiara Mio^a, Marco Fasan^a, Antonio Costantini^a, Francesco Scarpa^{a*}, and Aoife Claire Fitzpatrick^b

Abstract

Recent academic research exhibits considerable disagreement among ESG ratings from different agency providers. The consequences of this disagreement on the market are still under-explored; thus, we investigate whether this disagreement impacts the cost of equity capital. Using a sample of 23,201 firm-month observations from January 2019 to March 2021, we find that ESG disagreement positively moderates the negative relationship between the average ESG score and cost of equity. By disentangling the aggregate ESG score, we find that the moderating effect of this disagreement does not hold for any pillar. Furthermore, the association between ESG rating disagreement and cost of equity is more pronounced in the presence of high analyst information uncertainty. Overall, our findings highlight that ESG rating disagreement jeopardizes investors' confidence in ESG ratings and weakens the role of these ratings in reducing the cost of equity, pointing to the need to improve convergence across agency providers.

Keywords: ESG, rating, disagreement, information uncertainty, cost of equity capital

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1. Introduction

The rise of sustainable investments has led to an increased demand for and use of ESG ratings or scores (Abhayawansa & Tyagi, 2021; Widyawati, 2019). These ratings are formulated by agency providers by drawing on public and/or private data and information, and are widely regarded as a proxy for assessing a firm's ESG performance. Depending on the agency providers, ESG ratings are intended to assess the social and environmental impacts of companies or their exposure to sustainability-risk and opportunities. ESG ratings enable users, primarily investors, to make well-informed decisions regarding companies' capabilities in managing ESG-related risks, impacts, and opportunities (Christensen et al., 2022; Serafeim & Yoon, 2022).

In line with the growth of the ESG rating market, a large number of agency providers have emerged and established themselves as key players in the field (Avetisyan & Hockerts, 2017). While the abundance of ESG ratings is not per se a negative issue, academic research reveals the substantial divergence in the ESG scores provided by different agencies to the same firms (Billio et al., 2021; Capizzi et al., 2021; Chatterji et al., 2015; Dorfleitner et al., 2015; Gibson et al., 2021). This disagreement may have adverse consequences for users and rated companies. It complexifies integrating sustainability information into investment decisions, creates confusion, undermines confidence in ESG ratings, and decreases firms' incentives to become more sustainability reporting. Stolowy and Paugam (2023) note that the landscape of sustainability reporting is characterized by confusion and lack of compatibility, where the possibility of convergence is limited by the diversity of the definitions and concepts of sustainability, existence of competing standard-setting organizations, and organizations promoting sustainability practices.

While there are several studies documenting the lack of convergence in ESG ratings and examining the causes (e.g., Berg et al., 2022; Billio et al., 2021; Chatterji et al., 2015; Christensen et al., 2022; Kimbrough et al., 2022), the literature on the broader economic effects of ESG rating disagreement is still limited (Christensen et al., 2022; Gibson et al., 2021; Kimbrough et al., 2022; Serafeim & Yoon, 2022). Overall, existing evidence suggests that this disagreement is relevant to market participants. While Gibson et al. (2021) reveal that environmental rating disagreement is positively related to stock returns, Christensen et al. (2022) provide evidence that ESG disagreement is associated with higher stock return volatility and larger absolute price movements,

and Kimbrough et al. (2022) find that ESG disagreement is positively associated with disagreement and uncertainty in the capital market. Serafeim and Yoon (2022) find that the ability of ESG ratings to predict future ESG news is much weaker in the presence of significant ESG disagreement, which is consistent with disagreement hindering the predictive value and usefulness of ESG ratings. Despite this evidence, the consequences of ESG disagreement on the cost of equity are not fully understood. The cost of equity is the required rate of return given the market's perceptions of a firm's riskiness. If ESG ratings and the lack of convergence between ESG agency providers affect the perceived riskiness of the firms, then equity financing costs should be affected to the extent to which ESG ratings disagree.

This study contributes to the debate on the economic consequences of the lack of convergence among ESG ratings by examining the impact of ESG rating disagreement on the cost of equity. Previous studies have consistently documented that firms with better ESG performance face significantly lower constraints to obtaining financing in the capital markets (Cheng et al., 2014) and exhibit lower costs of equity capital (Dhaliwal et al., 2011; El Ghoul et al., 2011). Therefore, we hypothesize that the same relationship holds for firms scored by multiple ESG agency providers. We expect a negative relationship between a firm's average ESG rating and its cost of equity capital. Next, we conjecture that this relationship is contingent upon the level of ESG rating disagreement. Drawing on the literature on the influence of information uncertainty on investor risk perceptions (Erickson et al., 2012; He et al., 2013; Zhang, 2006), we hypothesize that the ESG rating and cost of equity capital. More specifically, we conjecture that the beneficial effects of the ESG ratings on the cost of equity capital are less pronounced in firms with higher ESG rating disagreement.

To test our hypotheses, we used a pooled panel regression with control variables, fixed effects, and standard errors clustered at the firm level. We conducted our analyses on a sample of 1,278 European firms that have ESG ratings from at least two of a pool of major rating agencies (i.e., Sustainalytics, RobecoSAM, Refinitiv, and Bloomberg) between January 2019 to March 2021, yielding a total of 23,201 firm-month observations.

Our focus on European firms has a twofold justification. First, we intend to fill a gap in the literature that is not addressed by the extant studies that examined similar questions related to ESG rating disagreement and cost of equity using the US samples (Avramov et al., 2021; Gibson et al.,

2021). Second, the EU is a unique research setting, due to the proliferation of regulation on ESGrelated issues — such as the Corporate Sustainability Reporting Directive (CSRD), EU Taxonomy for sustainable activities, and proposal of ESG rating regulation — which has contributed to increasing investors' attention on the ESG performance of European companies.

Our results corroborate existing evidence that firms with higher ESG scores have a lower cost of equity capital, even in the presence of multiple ESG ratings. We also find that ESG rating disagreement positively moderates the ESG rating-cost of equity relationship. As hypothesized, our results suggest that the negative relationship between the average ESG rating and cost of equity capital is weaker when firms have high ESG rating disagreement. In our additional tests, we find that the cost of equity has a negative relationship with the individual environmental, social, and governance scores and that the level of disagreement is not a significant moderator for any individual pillar. Furthermore, we find that the association between ESG rating disagreement and cost of equity is more pronounced in the presence of high analyst information uncertainty and that ESG disagreement is a significant moderator only for firms that operate in environmentally sensitive industries.

Overall, our study makes timely contributions to different streams of research. First, this study corroborates prior evidence on the value-relevance of ESG scores for market participants. We document that in the case of firms rated by multiple providers, the cost of equity is negatively related to the average ESG score. This implies that investors carefully consider the existence of multiple ratings for the same firm, and that they monitor and use the average score to assess a firm's level of risk. Second, we contribute to the academic debate on the economic consequences of ESG rating disagreement (Avramov et al., 2021; Christensen et al., 2022; Gibson et al., 2021; Kimbrough et al., 2022; Serafeim & Yoon, 2022). It reveals the moderating effect of the ESG rating disagreement on the relationship between the average ESG score and cost of equity; thus, our findings support the view that ESG disagreement is perceived by investors as valuable information on the uncertainty surrounding the measurement and value relevance of a firm's sustainability actions that leads to undermining their confidence in ESG ratings. Finally, our study has some implications for the recent debate on the lack of convergence in sustainability reporting (Stolowy & Paugam, 2023), providing evidence on the adverse consequences that may follow from the persistence of the state of confusion and incompatibility in the measurement of sustainability issues and supporting recent regulatory initiatives (e.g., the EU Corporate Sustainability Reporting Directive and the International Sustainability Standards Board) to strengthen standardization and comparability in sustainability reporting.

Our findings should be of interest to managers and policymakers as they highlight that solving the divergence among ESG rating providers is urgent to enable investors to make informed decisions in regards ESG-related risks, impacts, and opportunities. This disagreement may jeopardize a firm's efforts to achieve good ESG performance and compromise the usefulness of ESG scores; therefore, firms are suggested to care about and monitor the universe of ESG ratings, rather than engaging in cherry-picking strategies, while policymakers should more effectively regulate to improve the reliability, comparability, and convergence of ESG ratings.

The remainder of the paper is organised as follows. We review the literature and develop our hypotheses in Section 2 and present the research design in Section 3, and sample selection and descriptive statistics in Section 4. The main results are reported in Section 5, while Section 6 presents the additional analyses, and Section 7 presents the robustness checks. We discuss the contributions and implications for research and practice in Section 8.

2. Literature review and hypothesis development

2.1. ESG rating and cost of equity capital

There is a rich literature that examines the market reactions to ESG rating. Although exceptions exist (e.g., Gjergji et al., 2020; Nazir et al., 2022), most studies report a negative relationship between firms' ESG performance, proxied by ESG scores, and the cost of equity capital. Based on a number of theoretical models, there has long been speculation that ESG factors can affect risks, and ultimately, the cost of capital (Gillan et al., 2021).

For example, exploring the influence of ESG ratings on systematic risk, the cost of capital, and equity valuations, Giese et al. (2019) demonstrate that high ESG-rated firms experience lower levels of beta coefficient, and therefore, in the context of the Capital Asset Pricing Model (CAPM), lower the cost of equity. Gonçalves et al. (2022) argue that investors reward firms with higher corporate and social performance by requiring lower equity premiums. Similarly, based on a sample of Latin American firms, Ramirez et al. (2022) show that the greater the ESG performance the lower the economic price of the firm for attracting capital. The inverse relationship between

sustainability performance and cost of capital is corroborated by consistent evidence (Bhuiyan and Nguyen, 2020; El Ghoul et al., 2011; Gholami et al., 2022; Wong et al., 2021; Yilmaz, 2022).

Scholars (e.g., Breuer et al., 2018; El Ghoul et al., 2011; Gillan et al., 2021) suggest two main channels through which ESG performance influences the cost of equity: the perceived risk of the firm and investor base. The risk channel reflects the idea that firms with better ESG performance reduce investor risk perception, and consequently influence investment decision-making. According to the investor base channel, firms with poor ESG engagement have to offer their shareholders higher expected returns to compensate them for a narrow investor base.

We hypothesize that the same mechanisms hold valid even in the context in which a firm is rated by multiple ESG agency providers, with investors monitoring all the scores and requiring a lower (higher) rate of return to firms with high (low) average ESG ratings. Therefore, we establish the following baseline hypothesis:

H1: A firm's average ESG rating is negatively related to its cost of equity capital.

2.2. ESG rating disagreement and cost of equity capital

As a consequence of the growth of the ESG rating market, an emerging stream of research has devoted increasing attention to comparing different ESG models, revealing substantial disagreement across major agency providers (Billio et al., 2021; Capizzi et al., 2021; Chatterji et al., 2015; Dorfleitner et al., 2015; Gibson et al., 2021).

For instance, Gibson et al. (2021) find that the average pairwise correlation between the ESG ratings from seven providers (i.e., Asset4 (now Refinitiv ESG), Sustainalytics (now Morningstar), Inrate, Bloomberg, FTSE, KLD (now MSCI), and MSCI IVA) was only approximately 0.45 for firms in the S&P 500 Index between 2010 and 2017. Billio et al. (2021) find that only 24% of 1,049 companies listed in the MSCI World Index have the same score from Sustainalytics, RobeccoSAM, Refinitiv, and MSCI. Additionally, scholars document that the degree of ESG rating disagreement has been increasing over time, suggesting that rating agencies fail to reach convergence about what constitutes, and how to measure, good ESG performance (Christensen et al., 2022).

Various causes can explain the lack of agreement between ESG agency providers. The main reason is related to the different methodologies developed by agency providers; thus,

substantial heterogeneity exists in terms of theorization (i.e., disagreement in defining sustainability and its dimensions) and commensurability (i.e., disagreement in measuring the same construct) (Chatterji et al., 2015). Additionally, the ESG performance metrics, information sources, and weightings generally vary across agencies (Billio et al., 2021; Capizzi et al., 2021; Dimson et al., 2020). Berg et al. (2022) identify and quantify three distinct sources of disagreement among ratings: measurement divergence, scope divergence, and weight divergence. Measurement divergence (contributing 56% of ESG disagreement) refers to a situation where rating agencies measure the same attribute using different performance indicators. Scope divergence (contributing 38% of ESG disagreement) refers to the situation where ratings are based on different sets of attributes. Finally, weight divergence (contributing 6% of ESG disagreement) emerges when rating agencies take different views on the relative importance of ESG attributes. Billio et al. (2024) find that divergences in ESG ratings are primarily driven by differing accounting methods

Analyzing the role of firm-level characteristics, Gibson et al. (2021) find that ESG rating disagreement tends to be more prevalent for the largest firms and firms without credit ratings. Additionally, corporate ESG disclosure has an influence on ESG disagreement, but its role is still controversial: while Christensen et al. (2022) reveal that disagreement among ESG data providers is more pronounced for firms with high levels of ESG disclosure, Kimbrough et al. (2022) show that voluntary ESG disclosure, especially when of higher quality, is associated with reduced disagreement.

The lack of convergence between ESG agency providers challenges the usefulness and reliability of ESG scores, and may obfuscate investors' and other stakeholders' understanding of firm ESG performance (Berg et al., 2022). Since ESG rating disagreement reflects information uncertainty about ESG performance (Kimbrough et al., 2022), we expect the lack of convergence has the potential to jeopardize the value-relevance of ESG ratings in reducing the cost of equity capital. Thus, we propose ESG rating disagreement as a potential moderator of the relationship between a firm's average ESG rating and cost of equity capital.

Finance and accounting scholars have widely explored investor behavior under conditions of information uncertainty, generally conceived as 'ambiguity with respect to the implications of new information for a firm's value' (Zhang, 2006, p. 105). In general, investors tend to be averse to uncertainty, and this aversion grows with the level of uncertainty (Williams, 2009). For instance, previous studies suggest that investors demand a higher cost of capital in the presence of earnings

forecast dispersion (Erickson et al., 2012; He et al., 2013), accounting restatements (Hrinar & Jenkins, 2004), or accounting quality uncertainty (Larson & Resutek, 2017). Lambert et al. (2011) show that the cost of capital is driven solely by the average amount of uncertainty that investors assess and that this uncertainty is measured by the precision with which they can assess firm value. Zhang (2006) demonstrates that stocks with higher information uncertainty experience higher price drift. Furthermore, investors faced with uncertainty base their decisions on the worst-case scenario (i.e., following maximum expected utility) (Bird & Yeung, 2012). Therefore, an increase in information uncertainty about firm value causes investors to demand a higher premium (i.e., higher cost of capital) to compensate for the rise in uncertainty/risk in regards the firm's fundamentals.

Previous studies document that ESG rating disagreement is relevant for market participants, influencing stock prices (Gibson et al., 2021) and generating uncertainty in the capital market (Christensen et al., 2022; Kimbrough et al., 2022).

Collectively, all these arguments suggest that ESG rating disagreement is likely to jeopardize the value-relevance of ESG score. In the presence of high ESG rating disagreement investors are likely to perceive high information uncertainty on ESG performance, and consequently, to demand a higher rate of return. In summary, the ESG rating divergence can be interpreted as a source of information uncertainty about firm sustainability performance which prevents a precise understanding of firm value, especially in the long term, all of which affect the relationship between a firm's average ESG score and its cost of equity.

Therefore, we hypothesize and test the following:

H2: The level of ESG rating disagreement positively moderates the average ESG rating-cost of equity relationship. Specifically, the higher the ESG rating disagreement, the weaker the negative relationship between a firm's average ESG rating and its cost of equity.

3. Research design

3.1. Test of H1

We estimate a pooled panel Ordinary Least Square (OLS) regression model with control variables, fixed effects, and standard errors clustered at the firm level.

To test H1, which hypothesizes that greater average ESG rating leads to a lower cost of equity capital, we estimate the following main model:

$$AVE_COE_{i,t} = \beta_1 ESG_AVERAGE_{i,t} + \beta_2 \gamma_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} (1)$$

See Appendix A for variable definitions. $AVE_COE_{i,t}$ represents cost of equity capital for firm i at time t. $AVE_COE_{i,t}$ is a proxy for the cost of equity which is the average between the cost of equity obtained from the CAPM model and the implied cost of equity obtained from the Easton's (2004) model of the Earnings-price (EP) ratio. We use this proxy as a universally accepted measure of cost of equity capital does not exist. The CAPM (Lintner, 1965; Sharpe, 1964) equates the cost of equity of a firm to the risk-free interest rate plus the firm's beta times the market risk premium, while the EP ratio is given by the ratio between forecasted earnings per share and stock price. We capture the CAPM directly from Refinitiv. The average ESG rating ($ESG_AVERAGE_{i,t}$) is equal to the average of all the ESG scores for firm i at time t from the agency providers included in our analysis.

Control variables are denoted by $\gamma_{i,t}$; $X_{i,t}$ represents the fixed effects, while $\varepsilon_{i,t}$ is the error term. Specifically, we control for the level of ESG rating disagreement (*ESG_DISAGREEMENT*), number of ESG ratings (*ESG_NUM*), beta (*BETA*), book-to-market ratio (*BTM*), firm leverage (*LEVERAGE*), average long-term growth forecast (*LONGTERMGROWTH*), firm size (*SIZE*), analyst coverage (*ANALYSTCOVERAGE*), forecast dispersion (*FORECASTDISPERSION*) and mean earning per share forecast (*EPS*). We also employ fixed effects for time and firm level. Time fixed effects are taken at the monthly level as it is the frequency of the data as well as firm and industry fixed effects.

The number of ESG ratings is controlled because our dataset contains firms with varying numbers of ESG ratings (2, 3, or 4). The number of ESG ratings could act as an additional source of information uncertainty; therefore, disentangling this effect from ESG disagreement is important. Beta is used to control for a firm's sensitivity to market volatility; Sharpe (1964) and Lintner (1965) find that a firm's beta is positively associated with cost of equity. BTM is controlled for as firms with higher BTM are predicted to earn higher returns (Duong et al., 2021; El Ghoul et al., 2011; Fama & French, 1992), and if stocks with high BTM are mispriced below their true value, then they will earn an abnormally high implied risk premium (Gebhardt et al. 2001). We

subsequently control for firm leverage as leveraged firms earn higher stock returns, and thus, investors require a higher risk premium for firms with greater leverage (Duong et al., 2021; Fama & French, 1992; Gebhardt et al. 2001). Generally, larger firms can provide investors with more information than smaller firms, thus reducing information asymmetry and cost of equity; therefore, we control for firm size (El Ghoul et al., 2011; Gebhardt et al. 2001; Sharfman & Fernando, 2008). Analyst coverage is also controlled for as it reduces information asymmetry and thus cost of equity (Bowen et al., 2010; Gebhardt et al., 2001). We include forecast dispersion in our set of controls since firms with lower forecast dispersion generally have lower information asymmetry, and thus, lower cost of equity (Bowen et al., 2010; Dhaliwal et al., 2006). Finally, we control for long-term growth forecasts since firms with high expected forecasts can expect stock prices that are valued too high, and thus, low implied risk premium (Duong et al., 2021; Gebhardt et al., 2001).

We focus on β_1 to test H1. If the average ESG rating reduces a firm's cost of equity capital, then β_1 will be significantly negative.

3.2. Test of H2

To test H2, which hypothesizes that ESG rating disagreement moderates the relationship between average ESG score and cost of equity capital, we run a moderated regression analysis, which includes the interaction term (*ESG_INTERACTION*) between ESG rating disagreement (*ESG_DISAGREEMENT*) and average ESG rating (*ESG_AVERAGE*):

$$AVE_CoE_{i,t} = \beta_1 ESG_{AVERAGE_{i,t}} + \beta_2 ESG_{DISAGREEMENT_{i,t}} + \beta_3 ESG_AVERAGE_{i,t} *$$
$$ESG_DISAGREEMENT_{i,t} + \beta_4 \gamma_{i,t} + \beta_5 X_{i,t} + \varepsilon_{i,t} \quad (2)$$

In moderated regression analysis with continuous variables, as in Equation (2), the interpretation of coefficients significantly differs from that in purely additive multiple linear regression models (Jaccard et al., 1990). In Equation (2), the regression coefficients for *ESG_AVERAGE* and *ESG_DISAGREEMENT* reflect conditional relationships: β_1 reflects the influence of *ESG_AVERAGE* on *AVE_COE* when *ESG_DISAGREEMENT* equals zero, and β_2

reflects the influence of *ESG_DISAGREEMENT* on *AVE_COE* when *ESG_AVERAGE* equals zero.

The coefficient β_3 represents an interaction effect such that it estimates the change in the slope of cost of equity capital on average ESG rating given a one-unit change in ESG rating disagreement. Therefore, the interaction term allows to depict the marginal effect of average ESG rating on the cost of equity capital of a firm conditional on the level of ESG rating disagreement. In sum, we focus on β_3 to test H2. If the negative relationship between average ESG rating and cost of equity is less strong in the presence of a high level of ESG rating disagreement, then β_3 will be significantly positive.

4. Sample selection and descriptive statistics

4.1. Data and sample selection

To test our hypotheses, we use ESG data from four of the major rating agencies: Sustainalytics, RobecoSAM, Refinitiv, and Bloomberg. The initial dataset consisted of ESG data collected for 14,626 listed firms in 27 EU countries and the United Kingdom.

We focus on Europe because it is different from other institutional settings such as the USA in that there is more mandatory ESG disclosures — as requested by the Non-Financial Reporting Directive and the upcoming Corporate Sustainability Reporting Directive — and the EU has put in place the building blocks for a sustainable finance framework (2019). In this evolving regulatory landscape, ESG ratings have 'an increasingly important impact on the operation of capital markets and on investor confidence in sustainable products' (European Commission, 2023, p. 1).

To capture ESG rating divergence, we only included firms that have ESG ratings from at least two of the above-mentioned rating agencies, leaving a sample of 1,278 European firms. The dataset is an unbalanced panel dataset, taken at a monthly frequency between January 2019 to March 2021. This was done to capture the full scope of ESG rating divergence as Sustainalytics updates its ESG ratings on a monthly frequency and RobecoSAM makes sporadic quarterly updates.

We obtained financial and cost of equity data from Refinitiv while ESG ratings were collected from Refinitiv and Bloomberg.

Thus, the main sample with all necessary information includes 1,278 unique firms, with 23,201 firm-month observations from January 2019 to March 2021. Table 1 provides a breakdown of sampled firms by country (Panel A) and industry (Panel B).

Panel A: breakdown of companies by country						
Country	Number of firms					
Austria	36					
Belgium	54					
Czech Republic	4					
Denmark	52					
Finland	48					
France	159					
Germany	204					
Greece	24					
Hungary	5					
Ireland	24					
Italy	126					
Luxemburg	19					
Malta	1					
Netherlands	71					
Poland	31					
Portugal	16					
Spain	75					
Sweden	128					
United Kingdom	201					
Panel A: breakdown of companies by industry						
Global Industry Classification Standard (GICS)	Number of firms					
Communication						
services	82					
Consumer Discretionary	157					
Consumer Staples	78					
Energy	42					
Financials	180					
Health Care	108					
Industrials	270					
Information Technology	86					
Materials	99					
Real Estate	78					
Utilities	56					
Undisclosed	42					

Table 1. Sample composition

Notes: Table 1 provides a breakdown of the sampled companies by country and industry.

4.2. ESG rating disagreement and its drivers

An oversight of the most important features of the four ESG rating providers is available in Online Appendix A.

RobecoSAM and Refinitiv (Asset 4) are Swiss-based companies, Sustainalytics is based in the Netherlands while Bloomberg is a USA-based rating agency. Each rating agency uses a scale ranging from 0 (worst in class) to 100 (best in class) or in the case of Bloomberg 0–10. To address Bloomberg's different scale, we multiply each ESG score by 10, such that the final adjusted ESG score for Bloomberg is also a rating from 0 to 100. Typically, Sustainalytics uses an ESG risk score which is an inverted scale where 0 is the best in class and 100 is the worst, but to make all ratings comparable we use the Sustainalytics rank which ranks firms' ESG behavior from 0 (worst in class) to 100 (best in class). Refinitiv and RobecoSAM provide the highest firm coverage with 1,234 and 1,245 firms, respectively, whilst Sustainalytics has approximately half the coverage at 640 and Bloomberg has the lowest with just 200 firms. Regarding the data sources. Sustainalytics, Bloomberg, and Refinitiv use publicly available information, but Bloomberg also relies on direct contact with the firm. Although the sources of information can sometimes converge, how it is processed via weighting can also be very different. RobecoSAM uses a different approach that is entirely based on survey data.

Thus, by using different methodologies, the four rating agencies can disagree in scoring the same firm, as shown in Online Appendix B.

Panel A in Online Appendix B shows the ratings for the Finnish pharmaceutical company Orion in May 2020. RobecoSAM has rated Orion the poorest along all individual ESG pillars. Sustainalytics rates Orion as best in class in Governance with a score of 92, while RobecoSAM and Refinitiv rank it below average in Governance with the scores of 41 and 49, respectively.

Panel B in Online Appendix B reports the ESG rating for French Transportation company Bollore in March 2021. Although Bloomberg provides a score for each ESG pillar, an aggregate rating is not provided for Bollore¹. This table suggests that different E, S, and G weightings are used by rating agencies when calculating the combined ESG score. Had Sustainalytics equally

¹ Similar to the case of Bollore, for other firms in our database Bloomberg provides only the scores for the individual E, S, and G pillars, without giving the aggregate ESG score. For our analyses, we only used the ESG scores directly provided by Bloomberg since we did not deem it appropriate to manually calculate the missing scores.

weight E, S, and G the final rating would be approximately 23; however, the firm receives a final rating of 11 demonstrating a greater weighting of the social and governance pillars. Conversely, RobecoSAM and Refinitiv appear to have equally weighted each pillar in their aggregate score.

Table 2 reports descriptive statistics of the ESG ratings of the four agency providers for the sampled firms.

	(1) Mean	(2) StdDev	(3) Sustainalytics	(4) Bloomberg	(5) RobecoSAM
ESG Pillar					
Sustainalytics	70.465	24.611			
Bloomberg	42.800	10.993	0.350		
RobecoSAM	48.890	29.221	0.6	0.427	
Refinitiv	62.607	17.334	0.598	0.506	0.647
Average Correlation				0.522	
Environmental Pillar					
Sustainalytics	67.456	24.699			
Bloomberg	31.117	20.447	0.334		
RobecoSAM	51.629	27.877	0.571	0.379	
Refinitiv	58.995	24.729	0.565	0.434	0.577
Average Correlation				0.477	
Social Pillar					
Sustainalytics	70.152	24.902			
Bloomberg	29.868	17.615	0.280		
RobecoSAM	50.396	27.969	0.51	0.244	
Refinitiv	67.743	19.524	0.514	0.236	0.574
Average Correlation				0.393	
Governance Pillar					
Sustainalytics	66.368	26.783			
Bloomberg	60.816	12.425	0.271		
RobecoSAM	45.750	30.377	0.485	0.248	
Refinitiv	57.895	21.469	0.356	0.426	0.382
Average Correlation				0.361	

Table 2. Descriptive statistics of ESG ratings.

Notes: Table 2 presents descriptive statistics of the four agency providers' ESG ratings for our sample.

Columns (1) and (2) display the mean and standard deviation for each rating, whilst Columns (3), (4), and (5) show the pairwise cross-correlation between ratings. Statistics are presented for the aggregate ESG rating as well as the individual environmental, social, and governance pillars. Table 2 reveals how the level of divergence depends on the rating agencies. For the combined ESG score, Refinitiv and RobecoSAM have the highest correlation at 0.6476 whilst Sustainalytics and Bloomberg have the least at 0.3504. Subsequently, the combined ESG score has the highest average correlation, followed by environment, social, and governance with the lowest average correlation. A potential explanation for this phenomenon could be that social and governance are based on less objective measures than environment.

Thus, consistent with prior evidence, our data show a high level of ESG rating disagreement across all ESG pillars for European firms.

4.3. Descriptive statistics

In this section, we report descriptive statistics and correlations for all the variables used in testing our hypotheses.

Table 3 presents the descriptive statistics for the main sample, which consists of 23,201 firm-month observations. The mean and standard deviation of *ESG_AVERAGE* are 56.42 and 21.04, respectively, indicating considerable variation in firm ESG ratings. The disagreement among ESG ratings measured by *ESG_DISAGREEMENT* has a mean and median of 16.41 and 15.56, respectively, with a standard deviation of 9.03, indicating a substantial ESG disagreement across the entire dataset.

Table 4 presents the Pearson and Spearman correlations for the full sample. As expected *ESG_AVERAGE* is positively and significantly correlated with *ENV_AVERAGE*, *GOV_AVERAGE*, and *SOC_AVERAGE*. The results indicate that *ESG_DISAGREEMENT* is negatively and significantly associated with *AVE_CoE*. However, *ESG_DISAGREEMENT* is negatively and significantly correlated to *ESG_AVERAGE*, suggesting that firms with higher ESG rating dispersion have lower ESG scores.

Table 5 presents the mean values of our model variables per the number of ESG ratings a firm has. Of all, 762 firms have 2 ratings, 568 firms have 3 ratings, and 123 firms have 4 ratings. The cost of equity remains constant at approximately 7% across all three categories, while *ESG_DISAGREEMENT* and *ESG_AVERAGE* increase with the number of ratings.

	Ν	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
AVE_COE	23703	6.459591	51.28409	4.552526	6.331319	8.643405
ESG_AVERAGE	24342	56.42169	21.04338	40.31421	56.55104	73.65031
ENV_AVERAGE	24342	51.59491	21.40592	35.46564	52.46667	68.73383
SOC_AVERAGE	24342	54.44293	19.03062	40.59427	54.61197	69.40008
GOV_AVERAGE	24342	54.40338	19.97798	39.6046	55.16152	70.24426
ESG_DISAGREEMENT	24342	16.40814	9.03276	9.610312	15.5561	22.03649
SOC_DISAGREEMENT	24080	21.78089	10.58806	13.81115	21.98392	29.67825
ENV_DISAGREEMENT	24342	18.71449	10.10287	10.98934	17.93645	25.24089
GOV_DISAGREEMENT	24342	18.6211	9.493976	11.75656	17.74624	24.81556
ESG_NUM	24342	2.716909	0.653472	2	3	3
ENV_NUM	24342	3.119834	0.762916	3	3	4
SOC_NUM	24342	3.056363	0.799035	2	3	4
GOV_NUM	24342	3.119834	0.762916	3	3	4
BETA	22684	0.984455	0.4444536	0.6877637	0.9504887	1.232885
SIZE	23127	22.85811	1.829296	21.63656	22.72677	24.01513
LEVERAGE	23056	1.092197	6.247692	0.347327	0.699688	1.291122
BTM	23512	-13.0513	659.5266	0.284698	0.592012	1.075406
ANALYSTCOVERAGE	22329	13.78185	7.56783	7	13	20
FORECASTDISPERSION	22329	0.288269	1.099444	0.03431	0.098627	0.26243
EPS	22329	1.863664	4.259714	0.31208	0.966782	2.3909
LONGTERMGROWTH	13574	7.571259	17.45166	1.4	6.008875	10.8885

 Table 3. Descriptive statistics.

Notes: Table 3 presents the descriptive statistics of the variables used in the main analyses. The full sample consists of 23,201 firm-month observations during the period between January 2019 and March 2021.

 Table 4. Correlations (Spearman above/Pearson below).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) AVE_COE		0.01	0.02	0.00	0.00	-0.03	-0.02	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.00	0.01	-0.01	-0.01	0.03	0.03
(2) ESG_AVERAGE	0.17		0.88	0.89	0.84	-0.29	0.15	0.17	-0.25	0.31	0.37	0.35	0.37	0.1	0.52	0.14	0.14	0.5	0.12	0.11	-0.08
(3) ENV_AVERAGE	0.16	0.9		0.82	0.69	-0.21	0.02	0.01	-0.22	0.39	0.29	0.27	0.29	0.09	0.54	0.16	0.2	0.48	0.11	0.1	-0.11
(4) SOC_AVERAGE	0.19	0.9	0.84		0.71	-0.22	-0.05	0.07	-0.25	0.34	0.22	0.22	0.22	0.08	0.51	0.17	0.22	0.42	0.13	0.07	-0.09
(5) GOV_AVERAGE	0.08	0.86	0.69	0.71		-0.22	0.07	0.12	-0.26	0.34	0.32	0.31	0.32	0.12	0.44	0.11	0.13	0.43	0.02	0.04	-0.13
(6) ESG_DISAGREEMENT	-0.03	-0.24	-0.2	-0.19	-0.19		0.34	0.31	0.43	0.14	0.05	0.03	0.05	-0.03	-0.11	0.01	-0.02	-0.1	-0.08	-0.07	0.01
(7) SOC_DISAGREEMENT	-0.01	0.09	-0.01	-0.02	0.02	0.47		0.35	0.1	0.07	0.32	0.29	0.32	-0.02	0	-0.04	-0.18	0.1	0.02	0.1	0.07
(8) ENV_DISAGREEMENT	0.02	0.2	0.12	0.1	0.11	0.35	0.37		0.05	0.18	0.37	0.34	0.37	-0.02	0.05	-0.02	-0.04	0.08	0.04	0.02	0.02
(9) GOV_DISAGREEMENT	-0.03	-0.18	-0.2	-0.19	-0.07	0.47	0.11	0.04		-0.05	0	-0.02	0	0.02	-0.15	0.02	-0.06	-0.1	-0.05	-0.06	0.01
(10) ESG_NUM	0.05	0.39	0.41	0.35	0.41	0.02	0.08	0.19	-0.02		0.71	0.67	0.71	0.02	0.38	0.06	0.11	0.39	0.04	0.09	-0.1
(11) ENV_NUM	0.03	0.44	0.33	0.27	0.44	-0.03	0.24	0.32	-0.01	0.77		0.95	1	-0.01	0.24	0	-0.1	0.41	0.11	0.15	0
(12) SOC_NUM	0.01	0.4	0.29	0.24	0.4	-0.02	0.24	0.31	0	0.72	0.95		0.95	-0.01	0.24	0.02	-0.07	0.38	0.14	0.17	-0.01
(13) GOV_NUM	0.03	0.44	0.33	0.27	0.44	-0.03	0.24	0.32	-0.01	0.77	1	0.95		-0.01	0.24	0	-0.1	0.41	0.11	0.15	0
(14) BETA	0.54	0.12	0.09	0.09	0.15	-0.04	-0.04	0.01	-0.03	0.02	0.00	-0.01	0.00		0.15	0.04	0.12	0.08	0.09	-0.06	-0.04
(15) SIZE	0.29	0.5	0.5	0.47	0.44	-0.07	0	0.13	-0.08	0.4	0.34	0.33	0.34	0.16		0.29	0.46	0.55	0.18	0.15	-0.12
(16) LEVERAGE	0.12	0	0.02	0.01	-0.03	0.03	-0.02	0.04	-0.03	-0.03	-0.04	-0.03	-0.04	0.02	0.04		0.11	0.11	-0.01	-0.14	-0.08
(17) BTM	0.41	0.02	0.03	0.04	0.02	0	-0.03	-0.04	0	-0.03	-0.06	-0.05	-0.06	0.24	0.05	0.01		0	0.1	-0.12	-0.25
(18) ANALYSTCOVERAGE	0.08	0.57	0.51	0.46	0.55	-0.12	0.11	0.12	-0.11	0.48	0.55	0.54	0.55	0.11	0.56	0	0		0.17	0.15	-0.04
(19) FORECASTDISPERSION	0.27	0.04	0.04	0.03	0	-0.02	0.01	0.02	-0.03	0.02	0.06	0.07	0.06	0.15	0.08	0.01	0.09	0.06		0.57	0
(20) EPS	0.22	0.08	0.08	0.06	0.04	-0.05	0.04	0.06	-0.04	0.07	0.11	0.12	0.11	-0.08	0.16	-0.03	-0.02	0.13	0.41		0.13
(21) LONGTERMGROWTH	-0.02	-0.11	-0.12	-0.11	-0.13	0	0	-0.01	0	-0.08	-0.04	-0.04	-0.04	-0.1	-0.1	-0.08	-0.07	-0.06	0.05	0.1	

Notes: Table 4 presents the correlation matrix for the variables used in the main analyses. Correlations with significance levels < 0.05 are in bold.

	No. 2 ESG scores	No. 3 ESG scores	No. 4 ESG scores
Number of Firms	762	568	123
AVE_COE	6.97	6.12	6.27
ESG_AVERAGE	45.42	63.09	65.91
ENV_AVERAGE	40.83	57.31	64.41
SOC_AVERAGE	46.08	58.96	64.10
GOV_AVERAGE	44.06	60.01	66.20
ESG_DISAGREEMENT	17.10	15.09	19.76
SOC_DISAGREEMENT	16.70	19.43	22.67
ENV_DISAGREEMENT	20.88	22.12	23.35
GOV_DISAGREEMENT	18.71	18.77	17.65
BETA	0.96	1.01	0.95
SIZE	21.82	23.48	23.57
LEVERAGE	1.34	0.95	0.96
BTM	1.32	0.92	0.78
ANALYSTCOVERAGE	9.18	16.11	18.96
FORECASTDISPERSION	0.23	0.34	0.57
EPS	1.37	2.26	1.83
LONGTERMGROWTH	9.45	7.36	5.32

Table 5. Descriptive statistics per number of ESG rating.

Notes: Table 5 presents the descriptive statistics of the key variables used in the main analyses. The sample is split by the number of ESG ratings covering a firm (i.e., 2, 3 or 4). The mean value of each variable is presented in this table.

5. Results

5.1. Results for Tests of H1

We now turn to examining H1 regarding whether a firm's average ESG rating play a role in reducing the cost of equity capital. Table 6 present the results of our tests based on Equation (1) using two different specifications: with firm fixed effects² (column 1) and with firm and month fixed effects (column 2).

Consistent with our hypothesis, we find that the estimated coefficient on $ESG_AVERAGE$ is indeed negative and statistically significant across all the models (p < 0.001 in both column (1)

 $^{^{2}}$ We employ firm fixed effects to address some of the endogeneity prevalent when using ESG ratings; however, we acknowledge endogeneity cannot be entirely ruled out in our analysis.

and column (2)). These findings suggest that when a firm is rated by multiple ESG agency providers, the average ESG score reduces the cost of equity capital. In other words, investors monitor the ESG ratings provided by different agencies and use the average score to determine the riskiness of a firm. They perceived firms to be less risky, and thus assign a lower rate of return, when the average ESG score is higher.

In terms of the magnitude of this effect, the estimated coefficients of *ESG_AVERAGE* suggest that a one-unit increase in the *ESG_AVERAGE* is associated with 0.0524 to 0.0541 percentage points decrease in *AVE_COE*, depending on the model specification. Thus, a firm would lower its cost of equity by 1.75 to 1.80 percentage points or (based on a mean cost of equity of 6.46%) by 27.04% to 27.92% if a firm increases its average ESG score from the 25th to the 75th percentile. This appears to be an economically significant effect.

In terms of other factors that help explain the cost of equity, the results for the control variables corroborate prior studies. The estimated coefficient on *BETA* is positive and statistically significant (p < 0.001) across all specifications. In line with prior literature (Sharpe, 1964; Lintner, 1965), these findings suggest that a firm's sensitivity to market volatility is positively associated with cost of equity. Conversely, we find that the estimated coefficient on *ANALYSTCOVERAGE* is negative and statistically significant (p < 0.001) across all specifications. This is consistent with findings from prior literature (Bowen et al., 2010; Gebhardt et al., 2001), as analyst coverage enhances transparency, reduces information asymmetry and thus cost of equity. Most of the other characteristics in the model do not yield significant results. Finally, the *SIZE* is negative associated with the cost of equity (p < 0.05 in the model with firm and month fixed effects) suggesting that larger firms benefit from economies of scale and perceived stability, thus reducing the risk premium investors require.

5.2. Results for Tests of H2

Next, we examine whether the ESG rating disagreement has a moderation effect on the relationship between the average ESG score and the cost of equity capital. Specifically, we rerun our main analysis including the interaction term between the ESG rating disagreement and the average ESG score. The result of our tests based on Equation (2) are reported in Table 6 using two different specifications: with firm fixed effects (column 3) and with firm and month fixed effects (column 4).

	(1)	(2)	(3)	(4)
	AVE_COE	AVE_COE	AVE_COE	AVE_COE
ESG_AVERAGE	-0.0524***	-0.0541***	-0.0668***	-0.0696***
	(-0.00903)	(-0.00912)	(-0.0123)	(-0.0127)
ESG_DISAGREEMENT	-0.00274	-0.00139	-0.0527*	-0.0548*
	(-0.00581)	(-0.00578)	(-0.022)	(-0.0227)
ESG_INTERACTION			0.000904*	0.000966*
			(-0.00039)	(-0.0004)
ESG_NUM	0.333	0.285	0.341	0.294
	(-0.214)	(-0.216)	(-0.214)	(-0.216)
BETA	2.280***	2.326***	2.276***	2.322***
	(-0.24)	(-0.237)	(-0.24)	(-0.237)
BTM	0.309	0.303	0.303	0.297
	(-0.229)	(-0.232)	(-0.227)	(-0.23)
LEVERAGE	-0.0152	-0.0191	-0.013	-0.0167
	(-0.0551)	(-0.0541)	(-0.0551)	(-0.0542)
LONGTERMGROWTH	0.0257*	0.0237*	0.0256*	0.0236*
	(-0.0113)	(-0.0111)	(-0.0112)	(-0.0111)
FORECASTDISPERSION	-0.173	-0.2	-0.174	-0.201
	(-0.114)	(-0.121)	(-0.114)	(-0.121)
EPS	0.0746	0.0712	0.0752	0.0718
	(-0.0575)	(-0.0544)	(-0.0576)	(-0.0545)
ANALYSTCOVERAGE	-0.102***	-0.0624***	-0.104***	-0.0641***
	(-0.0183)	(-0.0184)	(-0.0184)	(-0.0185)
SIZE	-0.297	-0.656*	-0.278	-0.637*
	(-0.232)	(-0.259)	(-0.232)	(-0.26)
_cons	14.87**	22.75***	15.28**	23.21***
	(-5.521)	(-6.155)	(-5.607)	(-6.27)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	No	Yes	No	Yes
Clustered by firm	Yes	Yes	Yes	Yes
Ν	12722	12722	12722	12722
adj. R-sq	0.795	0.806	0.796	0.806

Table 6	. Test	of H1	and	H2.
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Notes: Table 6 reports the results of Equation (1) and (2). Columns (1) and (2) present the results of estimating Equation (1), which tests the association between average ESG score (*ESG_AVERAGE*) and cost of equity capital (*AVE_COE*). Columns (3) and (4) present the results of estimating Equation (2), which tests the effect of the interaction between average ESG score and ESG rating disagreement (*ESG_INTERACTION*) on cost of equity capital (*AVE_COE*). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

We find that the estimated coefficients on the interaction term (*ESG_INTERACTION*) are positive and statistically significant (p < 0.05) across the specifications. These findings suggest that, as predicted by H2, the negative relationship between the average ESG score and cost of equity is positively moderated by the level of ESG rating disagreement. As disagreement above ESG raters increases, the negative impact of the average ESG score on the cost of equity becomes less pronounced. In other terms, the lack of convergence between ESG raters impairs the valuerelevance of the ESG scores for investors. Thus, the beneficial effect of the average ESG score on the cost of equity is weaker in the presence of high ESG rating disagreement.

In terms of the magnitude of this effect, the estimated coefficients for ESG_INTERACTION indicate that a one-unit increase in ESG_DISAGREEMENT leads to a reduction in the negative impact of ESG_AVERAGE on AVE_COE by 0.000904 to 0.000966 percentage points, depending on the model specification. Increasing ESG_DISAGREEMENT from the 25th to the 75th percentile attenuates by 0.011 to 0.012 percentage points the reduction in the cost of equity associated with a one-unit increase in the average ESG score. Thus, increasing ESG_DISAGREEMENT from the 25th to the 75th percentile is associated with a 16 to 19 percent reduction in the impact of a one-unit increase in the average ESG score on the cost of equity, depending on the model specification. This appears to be an economically meaningful moderating effect.

In terms of other characteristics in the model, we find that the cost of equity has a positive and statistical significance with *BETA* and a negative and statistical significance with *ANALYSTCOVERAGE*.

Taken together, the results from Table 6 suggest that the average ESG score is associated with a reduction in the cost of equity capital and such association is weakened by ESG rating disagreement.

6. Additional analyses

6.1. Disentangling the individual ESG pillars

Previous literature shows that not all the ESG dimensions have the same impact on the cost of equity (El Ghoul et al., 2011). To advance our understanding of whether our main findings hold in each ESG pillar, we conduct an additional test to investigate whether the average score and disagreement on environmental, social, and governance can influence the cost of equity.

Then, we re-estimate Equations (1) and (2) using the average environmental (*ENV_AVERAGE*), social (*SOC_AVERAGE*), and governance (*GOV_AVERAGE*) scores. We calculate the rating disagreement separately for the environmental (*ENV_DISAGREEMENT*), social (*SOC_DISAGREEMENT*), and governance (*GOV_DISAGREEMENT*) pillars. The interaction term for each model (*SOC_INTERACTION*, *ENV_INTERACTION*, and *GOV_INTERACTION*) is obtained by multiplying the average score for each pillar with the corresponding standard

deviation.

Specifically, we run the following regressions:

$$AVE_CoE_{i,t} = \beta_1 ENV_AVERAGE_{i,t} + \beta_2 \gamma_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t}$$
(3)

 $AVE_CoE_{i,t} = \beta_1 ENV_AVERAGE_{i,t} + \beta_2 ENV_DISAGREEMENT_{i,t} + \beta_3 ENV_AVERAGE_{i,t} *$ $ENV_DISAGREEMENT_{i,t} + \beta_4 \gamma_{i,t} + \beta_5 X_{i,t} + \varepsilon_{i,t}$ (4)

$$AVE_CoE_{i,t} = \beta_1 SOC_AVERAGE_{i,t} + \beta_2 \gamma_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t}$$
(5)

 $AVE_CoE_{i,t} = \beta_1 SOC_AVERAGE_{i,t} + \beta_2 SOC_DISAGREEMENT_{i,t} + \beta_3 SOC_AVERAGE_{i,t} *$ $SOC_DISAGREEMENT_{i,t} + \beta_4 \gamma_{i,t} + \beta_5 X_{i,t} + \varepsilon_{i,t}$ (6)

$$AVE_CoE_{i,t} = \beta_1 GOV_AVERAGE_{i,t} + \beta_2 \gamma_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t}$$
(7)

$$AVE_CoE_{i,t} = \beta_1 GOV_AVERAGE_{i,t} + \beta_2 GOV_DISAGREEMENT_{i,t} + \beta_3 GOV_AVERAGE_{i,t} *$$

$$GOV_{DISAGREEMENT_{i,t}} + \beta_4 \gamma_{i,t} + \beta_5 X_{i,t} + \varepsilon_{i,t}$$
(8)

The empirical results are available in Online Appendix C (Equations (3) and (4)), Online Appendix D (Equations (5) and (6)), and Online Appendix E (Equations (7) and (8)). The coefficients of average ratings (*ENV_AVERAGE, SOC_AVERAGE*, and *GOV_AVERAGE*) are all negative and significant (p < 0.001). Therefore, H1 is confirmed also when the ESG pillars are separately examined. The results also suggest that the social score has a larger impact on decreasing the cost of equity than the environment and governance scores.

Finally, the interactions terms are not significant for any of the individual pillars. Therefore, H2 is not supported when the ESG score is disentangled into its components. This suggests that investors interpret the divergence in the score of individual ESG dimensions differently compared with the divergence at the level of the overall ESG score. While overall ESG rating disagreement is negatively perceived by investors, the lack of convergence may not affect investors' perceptions of firms' riskiness in case of individual pillars.

6.2. Analyst coverage uncertainty

Although investors and asset managers have recently placed a higher emphasis on ESG ratings, their decision-making process is also influenced by financial estimates, opinions, and projections provided by analysts. The analyst coverage may affect the level of information uncertainty in the landscape in which investors operate and impact investor risk perceptions. Information uncertainty is typically proxied by the dispersion in analysts' earnings forecasts (Barron & Stuerke, 1998), which is the standard deviation of one-year-ahead analysts' forecasts of earnings per share (EPS). Previous studies document a significant positive relation between the analyst earnings forecast dispersion and cost of equity capital (Barron & Stuerke, 1998; He et al., 2013) because the level of dispersion in earnings forecast is perceived by investors as valuable information about the level of uncertainty concerning firms' future economic performance.

To further understand the extent to which the level of ESG rating disagreement is perceived by investors as an additional source of uncertainty concerning the future performance of firms, we conduct an additional test to investigate whether ESG rating disagreement exacerbates the increase in the cost of equity due to analyst earnings forecast dispersion (*FORECASTDISPERSION*).

To do so, we perform an additional analysis using two interaction terms (Equation 9): $AVE_DISP_INTERACTION$ (the interaction between *FORECASTDISPERSION* and $ESG_AVERAGE$) and $SD_DISP_INTERACTION$ (the interaction between *FORECASTDISPERSION* and *ESG_DISAGREEMENT*). Our model thus becomes:

$$AVE_CoE_{i,t} = \beta_1 ESG_{AVERAGE i,t} + \beta_2 ESG_{DISAGREEMENT i,t} + \beta_3 ESG_AVERAGE_{i,t} *$$

$$ESG_{DISAGREEMENT i,t} + \beta_4 FORECASTDISPERSION_{i,t} * ESG_{DISAGREEMENT i,t} +$$

$$\beta_5 FORECASTDISPERSION_{i,t} * ESG_{AVERAGE i,t} + \beta_6 FORECASTDISPERSION_{i,t} + \beta_7 \gamma_{i,t} + \beta_8 X_{i,t} +$$

$$\varepsilon_{i,t} \qquad (9)$$

The empirical results are available in Online Appendix F. We find that the coefficients of $AVE_DISP_INTERACTION$ are not significant for both Columns (1) and (2) while the coefficients of $SD_DISP_INTERACTION$ are significantly positive (p < 0.05 for Column (1) and p < 0.01 for Column (2)).

These results suggest that ESG rating disagreement amplifies the increase in the cost of equity due to the uncertainty in forecasting EPS. Thus, firms with high levels of analyst earnings forecast dispersion suffer from a larger increase in the cost of equity in the presence of higher levels of ESG rating divergence.

6.3. The role of industry

Prior research shows that the market perceives controversial business sectors to be riskier and thus assigns a higher risk premium to firms involved in these industries (El Ghoul et al., 2011). To explore the industry effect in our study, we perform an additional analysis to investigate how the impact of ESG disagreement on cost of equity capital varies across industries with different ESG exposures. We hypothesize that investors have a higher sensitivity to ESG uncertainty if the firm operates in an industry with higher environmental footprints, labor/supply chain considerations, and regulatory stringency.

We draw on the EU Taxonomy for sustainable activities, which defines the criteria for economic activities that are aligned with broad environmental goals. Not all economic activities and sectors are covered (eligible) by the classification system introduced by the EU Taxonomy. In the first phase, the European Commission has prioritized the most environmentally sensitive industries, that is, those that mostly contribute to GHG emissions in the EU.

We then re-estimate Equation (2) by splitting our sample into two groups. One sub-sample includes firms that operate in EU Taxonomy-eligible industries (*Tax_Ind*), while the other includes firms that do not operate in EU Taxonomy-eligible industries (*Non_Tax_Ind*).

The empirical results are available in Online Appendix G. We find that for all industries the coefficient of average ESG score remains negative and significant, indicating that investors value the ESG performance of firms irrespective of industries' environmental sensitivity. This aligns with our main findings in Table 6. However, the coefficients of the interaction term between ESG rating disagreement and average ESG score is significant only for firms involved in industries that are eligible to the EU Taxonomy. This suggests that ESG disagreement has a moderating effect on the relationship between average ESG score and cost of equity capital only for firms that operate in environmentally sensitive industries.

7. Robustness checks

In this section, we report the results of some sensitivity analyses to test the robustness of our main results on the moderating role of the ESG rating disagreement.

A first potential concern about the robustness of our results is that firms with high levels of ESG rating disagreement may be systematically different from those with a low level of ESG rating disagreement, which could result in a potential endogeneity problem. To circumvent this bias, we perform propensity score matching (PSM). We match a group of control firms (those with low levels of disagreement, i.e., *ESG_DISAGREEMENT*<30) to a treated group (those with high levels of disagreement, i.e., *ESG_DISAGREEMENT*>30) with similar characteristics. We use k-nearest neighbor matching with a maximum of fifteen control firms for each treated firm and set a caliper width of 0.05 for the propensity score to ensure close matches. The observations are matched in a random sequence to prevent deterministic patterns based on the initial order. The firms where matched based on industry, book-to-market ratio, leverage, long term growth, size, beta, and year.

The matching results are available in Online Appendix H. The t-test shows that the difference in means between the treated and control group is non-significant, thus indicating a good match.

We then used the matched sample to estimate the effect of having high/low ESG rating disagreement on the cost of equity capital using a treatment variable equal to 1 if the firm is part of the treatment group and 0 if it is part of the control group.

$$AVE_CoE_{i,t} = \beta_1 Treatment * ESG_{AVERAGE_{i,t}} + \beta_2 Treatment_{i,t} + \beta_3 \gamma_{i,t} + \beta_4 X_{i,t} + \varepsilon_{i,t}$$
(10)

The empirical results of Equation (10) are available in Online Appendix I. We find that for firms with low level of ESG disagreement, the coefficient for average ESG score remains negative and significant, whilst for firms with high ESG disagreement the effect of the average ESG score remains significant but diminishes in magnitude. This corroborates our results showing that the relationship between ESG rating disagreement and a firm's cost of equity capital is conditional on the level of ESG score.

Second, to further corroborate our results, we split our data by the level of ESG rating

disagreement, to examine the effect of the average ESG score on the cost of equity in the presence of low and high levels of ESG rating disagreement. Since in our sample, the variable *ESG_DISAGREEMENT* ranges from 0 to 61, we created two groups of firms: firms with 'Low disagreement', with *ESG_DISAGREEMENT* ranging from 0 to 29, and firms with 'High Disagreement', with *ESG_DISAGREEMENT* ranging from 30 to 61. Our model thus becomes:

$$CoE_{i,t} = \beta_1 ESG_AVERAGE_{i,t} + \beta_2 \gamma_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t}$$
(11)

The empirical results of Equation (11) are available in Online Appendix J. We find that for firms with low levels of ESG disagreement, the coefficient of *ESG_AVERAGE* remains significantly negative, while for firms with high ESG disagreement, the coefficient of *ESG_AVERAGE* becomes non significant. This corroborates our results showing that the relationship between ESG score and cost of equity capital is conditional on the level of ESG rating disagreement.

8. Conclusion

This paper examines the consequences of ESG rating disagreements on the cost of equity. We used a sample of 23,201 firm-month observations from January 2019 to March 2021, and controlled for firm-specific determinants as well as firm and month-fixed effects; our empirical analysis reveals interesting findings that are consistent with our hypotheses.

First, we find that firms with higher average ESG scores benefit from a lower cost of equity capital. Second, we document that the level of ESG rating disagreement positively moderates the negative relationship between average ESG score and cost of equity. This finding suggests that the beneficial effect of ESG ratings for the cost of equity is weaker for firms with a high level of ESG disagreement.

To refine our main findings, we conducted three additional analyses. First, we find that the relationship between the average score and cost of equity capital is negative and significant for each individual ESG dimension, but that the level of ESG rating disagreement is not a significant moderator for any pillar. Second, we split our sample into firms that operate in industries covered by the EU taxonomy on sustainable activities and those that do not operate in industries covered by the EU taxonomy, to find that while a high average ESG score reduces the cost of equity in all industries, the ESG rating disagreement is a significant moderator only for firms in industries

covered by the EU taxonomy. Third, to corroborate our evidence that the ESG rating disagreement is perceived by investors as a source of uncertainty, we find that the level of ESG rating divergence is a positive moderator of the relationship between analyst earnings forecast dispersion and cost of equity capital. This means that firms with high levels of analyst earnings forecast dispersion suffer from a larger increase in the cost of equity in the presence of higher levels of ESG rating divergence.

We validate our main results by using propensity score-matching (PSM) to control for differences in firm characteristics between treatment and control groups, and reach similar conclusions after matching each firm having a high level of ESG disagreement with its nearest neighbor.

Overall, our study makes timely contributions to different streams of literature.

First, we extend the evidence on the value-relevance of ESG performance for market participants, by documenting that ESG scores affect investor risk perception and reduce the required rate of return. Additionally, our study reveals that the presence of multiple ESG raters for the same firm is not per se negative. Evidence on the negative relationship between the average ESG score and cost of equity suggests that investors carefully consider the existence of multiple ratings for the same firm, and that they monitor and use the average score to assess a firm's level of risk.

However, our study shows that the presence of multiple ESG ratings has adverse consequences for users when agency providers significantly disagree in rating the same firm. Indeed, as a second area of contribution, this study broadens our knowledge and understanding of the economic consequences of ESG rating disagreement. The lack of compatibility and convergence in ESG ratings makes it more complex to integrate sustainability information into investment decisions. As hypothesized, we show that this state of confusion in measuring the same firm is perceived by investors as valuable information on the uncertainty surrounding the authenticity and value relevance of a firm's sustainability actions, and therefore, its real capacity to successfully manage impacts, risks, and opportunities associated with sustainability issues. We reveal that this uncertainty weakens the beneficial effects that a good ESG score has on the perceived riskiness of a firm, and in turn, on the required rate of return for equity investors.

Our additional analyses suggest that the ESG rating disagreement is monitored by investors not only when they look at the ESG ratings but also when they make use of financial estimates and projections by analysts. In both cases, the dispersion in ESG ratings is perceived by investors as information indicating the level of uncertainty about a firm's future economic and financial performance.

Thus, our study corroborates prior evidence that ESG rater disagreements are associated with uncertainty in the capital market (Christensen et al., 2022; Kimbrough et al., 2022; Serafeim & Yoon, 2022). This study sheds light on the consequences of the disagreement on the cost of equity; therefore, it is closely related to Gibson et al. (2021) and Avramov et al. (2021), which among other things, address a similar question. While Gibson et al. (2021) find that ESG rating disagreement is associated with an increase of 92 basis points in the annual cost of equity capital, Avramov et al. (2021) show that the negative ESG-CAPM alpha relationship only exists among stocks with low rating uncertainty. However, the theoretical framing and the research design we use to address this question are quite different from theirs; hence, our study contributes to advancing and refining the understanding of the impact of ESG rating disagreement on the cost of equity in different ways. First, while Gibson et al. (2021) and Avramov et al. (2021) use a sample of US firms, our paper builds on European firms. Second, the empirical evidence we provide (January 2019 to March 2021) is more recent than the empirics in Gibson et al. (2021), who use data from 2010 to 2017, and Avramov et al. (2021), who use data from 2002 to 2019. Additionally, our contribution lies in revealing that ESG disagreement has a negative moderating effect on the positive relationship between average ESG score and cost of equity capital, while Gibson et al. (2021) and Avramov et al. (2021) investigate the marginal effects of disagreement on the cost of equity. Thus, our study more clearly shows the interplay between the average ESG rating and ESG rating disagreement. We document that a high level of disagreement hinders the usefulness of a good ESG rating as a proxy for a low level of firm's riskiness, and jeopardizes the beneficial effects on the cost of equity. Finally, while Gibson et al. (2021) and Avramov et al. (2021) only use the overall ESG score, we replicate the analyses with the scores for each E-S-G-dimension, finding that the rating disagreement does not work as a moderator of the relationship between the cost of equity and average score for any individual pillar.

Finally, our study has some implications for the recent debate on the lack of convergence in sustainability reporting (Stolowy & Paugam, 2023). While sustainability reporting is selfnarrative disclosure from the firm, ESG rating is an external assessment of the same real sustainability actions. Providing evidence on the disagreement among major sustainability rating agencies and on the adverse consequences for users and rated companies, we show how the lack of a level-playing field in the definition and measurement of sustainability issues creates complexities for firms, investors, and other stakeholders analyzing corporate sustainability-related activities. Given that the probability of convergence in sustainability reporting appears limited, at least in the short term (Stolowy & Paugam, 2023), our findings can be a useful starting point to anticipate the adverse consequences that may follow from the persistence of the state of confusion in the sustainability reporting landscape. Additionally, they support recent regulatory initiatives aimed at enhancing alignment and comparability in sustainability reporting, such as the Corporate Sustainability Reporting Directive within the European Union and IFRS Sustainability Disclosure Standards developed by the International Sustainability Standards Board (ISSB).

The evidence we provide should be of interest to practitioners and policymakers.

Our findings reveal that diverse ESG ratings may have adverse consequences for the rated companies as they may undermine the value relevance of good ESG scores. Therefore, we recommend that companies be cognizant of the ESG rating landscape in which they operate, recognizing that rating agencies have their own methodologies that may not always align to them. To effectively leverage their sustainability efforts, firms should actively monitor and understand the methodologies of each ESG provider, thus identifying relevant ESG factors and how they are assessed. Firms should avoid selectively choosing favorable ESG raters, as investors tend to scrutinize all scores assigned to the same firm. Furthermore, companies should strive to maintain consistency in their scores across all providers since divergence among ratings is viewed unfavorably by investors and may diminish the positive effects of a strong sustainability performance.

Our study offers important implications for policymakers by demonstrating the economic importance of reducing ESG disagreement. It highlights the need for policymakers to contribute to developing a shared and unified understanding of what constitutes good ESG performance and promoting common metrics to measure ESG attributes. Our findings show how the lack of common rules for ESG ratings may have adverse effects on the economic system. A persisting state of confusion and uncertainty may discourage investors from integrating environmental, social and governance factors into their investment decisions, and this may decrease the flow of investments on sustainable economic activities. This scenario may discourage companies from investing and engaging in sustainability issues as the possibility of an economic return from a good

ESG profile becoming more remote. In this sense, the EU Taxonomy Regulation for sustainable activities and the recent proposal from the European Commission (2023) for a regulation to improve the reliability, comparability, and transparency of ESG ratings, represent desirable efforts to enhance the quality of information about ESG ratings and enable investors to make better-informed decisions regarding sustainable investments.

Our study is subject to some limitations. First, our analysis is based on the ESG ratings from four rating agencies. Therefore, it could be further enriched by including data from additional ESG raters (e.g., MSCI). Second, our sample is restricted to European firms, and as a result, our findings may have implications suitable only for this context. The EU is a unique research setting, where investor attention and concern about the ESG performance of companies may be exacerbated by the proliferation of regulation on ESG-related issues (e.g., mandatory sustainability/ESG reporting). Future research may investigate the extent to which this regulation contributes to reducing the ESG rating divergence and explore alternative institutional settings. Finally, our study is limited by the proxy that we adopted to measure the cost of equity. To further advance the debate on the economic consequences of ESG disagreement, future research may explore the extent to which the market reactions are dependent upon the causes of the disagreement (i.e., measurement, scope, and weight) or the type of investors.

Contributing to understanding and solving the issues associated with the measurement and assessment of corporate sustainability is crucial to facilitate the transition to a more sustainable economy.

Declaration of interest statement

The authors report there are no competing interests to declare.

Notes

- Similar to the case of Bollore, for other firms in our database Bloomberg provides only the scores for the individual E, S, and G pillars, without giving the aggregate ESG score. For our analyses, we only used the ESG scores directly provided by Bloomberg since we did not deem it appropriate to manually calculate the missing scores.
- 2. We employ firm fixed effects to address some of the prevalent endogeneity when using ESG ratings; however, we acknowledge endogeneity cannot be entirely ruled out in our analysis.

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Appendices

Appendix A Variable definitions

Variable name	Description
AVE_COE _{i,t}	The cost of equity for firm <i>i</i> at time <i>t</i> .
ESG_AVERAGE _{i,t}	The average of the ESG scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm <i>i</i> at time <i>t</i> .
ENV_AVERAGE _{i,t}	The average of the Environment scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm i at time t .
SOC_AVERAGE _{i,t}	The average of the Social scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm i at time t .
GOV_AVERAGE _{i,t}	The average of the Governance scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm i at time t .
ESG_DISAGREEMENT _{i,t}	The standard deviation of the ESG scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm i at time t .
ENV_DISAGREEMENT _{i,t}	The standard deviation of the Environment scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm <i>i</i> at time <i>t</i> .
SOC_DISAGREEMENT _{i,t}	The standard deviation of the Social scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm i at time t .
GOV_DISAGREEMENT _{i,t}	The standard deviation of the Governance scores of a firm received from the four rating agencies (i.e., Bloomberg, Refinitiv, RobeccoSAM, Sustainalytics) for firm <i>i</i> at time <i>t</i> .
ESG_NUM _{i,t}	The number of ESG ratings for firm <i>i</i> at time <i>t</i> .
ENV_NUM _{i,t}	The number of Environment ratings for firm <i>i</i> at time <i>t</i> .
SOC_NUM _{i,t}	The number of Social ratings for firm <i>i</i> at time <i>t</i> .
GOV_NUM _{i,t}	The number of Governance ratings for firm <i>i</i> at time <i>t</i> .
$\operatorname{BTM}_{i,t}$	Ratio of book value of equity to market value of equity for firm <i>i</i> at time <i>t</i> .
LEVERAGE _{i,t}	Ratio of total debt to book value of equity for firm <i>i</i> at time <i>t</i> .
LONGTERMGROWTH	The average long-term growth forecast for firm <i>i</i> at time <i>t</i> .
FORECASTDISPERSION _{i,t}	Standard deviation of one-year-ahead analyst forecasts of earnings per share for firm <i>i</i> at time <i>t</i> .
$EPS_{i,t}$	Average of one-year-ahead analyst forecasts of earnings per share.
ANALYSTCOVERAGE _{i,t}	Number of unique analysts issuing earnings per share forecasts for firm i at time t .
SIZE _{i,t}	Logarithm of total assets for firm <i>i</i> at time <i>t</i> .

Supplemental Material

Agency	Rating Scale	Number of Firms	Sources	Rating Style
Sustainalytics	0-100	640	Public disclosure, media and news, NGO reports	Best in Class
Bloomberg	0-10	200	Company reports, publicly available information, firm direct contact	Disclosure Oriented
RobecoSAM	0-100	1,245	Survey approach	Best in Class
Refinitiv	0-100	1,234	Company websites, company reports, NGO websites, media and news, stock exchange filings	Disclosure Oriented

Online Appendix A. ESG agency providers.

Notes: Online Appendix A presents the most important features of the four ESG rating providers used in this study.

Panel A: Orion				
Pillar	Sustainalytics	Bloomberg	RobecoSAM	Refinitiv
ESG	78	Na	43	69
Environmental	80	Na	39	71
Social	72	Na	49	81
Governance	92	Na	41	49
Panel B: Bollore				
Pillar	Sustainalytics	Bloomberg	RobecoSAM	Refinitiv
ESG	11	Na	85	57
Environmental	66	41	90	73
Social	1	15	85	76
Governance	2	51	84	28

Online Appendix B. Examples of ESG rating disagreement.

Notes: Online Appendix B presents two examples of ESG rating disagreement. Panel A reports the ESG ratings for the pharmaceutical group Orion in 2020. Panel B reports the ESG ratings for Transportation company Bollore in 2021.

		•	1	
	(1)	(2)	(3)	(4)
	AVE_COE	AVE_COE	AVE_COE	AVE_COE
ENV_AVERAGE	-0.0461***	-0.0492***	-0.0388***	-0.0442***
	(-0.0062)	(-0.00638)	(-0.00837)	(-0.00842)
ENV_DISAGREEMENT	0.00899	0.00867	0.0326*	0.0249
	(-0.00588)	(-0.00575)	(-0.016)	(-0.0157)
ENV_INTERACTION			-0.00044	-0.00031
			(-0.00031)	(-0.0003)
ENV_NUM	0.542*	0.500*	0.548*	0.503*
	(-0.228)	(-0.231)	(-0.229)	(-0.231)
BETA	2.304***	2.352***	2.298***	2.347***
	(-0.244)	(-0.241)	(-0.245)	(-0.242)
BTM	0.312	0.307	0.311	0.306
	(-0.232)	(-0.234)	(-0.231)	(-0.233)
LEVERAGE	-0.0151	-0.0189	-0.0164	-0.0198
	(-0.055)	(-0.0541)	(-0.0548)	(-0.0539)
LONGTERMGROWTH	0.0255*	0.0234*	0.0255*	0.0235*
	(-0.0114)	(-0.0113)	(-0.0114)	(-0.0113)
FORECASTDISPERSION	-0.169	-0.196	-0.169	-0.196
	(-0.114)	(-0.122)	(-0.114)	(-0.121)
EPS	0.0753	0.0719	0.0752	0.0718
	(-0.0575)	(-0.0544)	(-0.0575)	(-0.0543)
ANALYSTCOVERAGE	-0.102***	-0.0621***	-0.103***	-0.0624***
	(-0.0185)	(-0.0185)	(-0.0185)	(-0.0185)
SIZE	-0.256	-0.611*	-0.259	-0.613*
	(-0.232)	(-0.262)	(-0.231)	(-0.262)
cons	12.11*	19.98**	11.80*	19.75**
	(-5.565)	(-6.262)	(-5.54)	(-6.247)
Firm Fixed Effects	Yes	No	Yes	Yes
Month Fixed Effects	No	Yes	No	Yes
Clustered by Firm	Yes	Yes	Yes	Yes
N	12,722	12,722	12,722	12,722
adj. R-sq	0.794	0.805	0.794	0.805

Online Appendix C. Additional analysis – Environmental pillar.

Notes: Online Appendix C reports the results of Equations (3) and (4). Columns (1) and (2) present the results of estimating Equation (3), which tests the association between average environmental score (*ENV_AVERAGE*) and cost of equity capital (*AVE_COE*). Columns (3) and (4) present the results of estimating Equation (4), which tests the effect of the interaction between average environmental score and environmental rating disagreement (*ENV_INTERACTION*) on cost of equity capital (*AVE_COE*). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

	(1) AVE_COE	(2) AVE_COE	(3) AVE_COE	(4) AVE_COE
SOC AVERAGE	0.0524***	0.0548***	0.0612***	0.0620***
SOC_AVERAGE	(0.0324)	(0.0348)	(0.0012)	=0.0029
SOC DISACDEEMENT	(-0.00881)	(-0.00888)	(-0.0149)	(-0.013)
SOC_DISAGREEMENT	(0.0131)	(0.0105)	-0.00924	-0.00014
SOC INTERACTION	(-0.0100)	(-0.0103)	(-0.0282)	(-0.0280)
SOC_INTERACTION			0.000447	0.000412
	0 47 4*	0.400*	(-0.00053)	(-0.00053)
SOC_NUM	0.474*	0.429*	0.468*	0.424*
	(-0.209)	(-0.211)	(-0.21)	(-0.213)
BETA	2.255***	2.298***	2.254***	2.297***
	(-0.243)	(-0.24)	(-0.243)	(-0.24)
BTM	0.309	0.303	0.308	0.303
	(-0.23)	(-0.233)	(-0.231)	(-0.233)
LEVERAGE	-0.00945	-0.0131	-0.00997	-0.0135
	(-0.0562)	(-0.0552)	(-0.0564)	(-0.0554)
LONGTERMGROWTH	0.0254*	0.0233*	0.0254*	0.0233*
	(-0.0112)	(-0.0111)	(-0.0112)	(-0.0111)
FORECASTDISPERSION	-0.172	-0.199	-0.172	-0.199
	(-0.114)	(-0.121)	(-0.114)	(-0.121)
EPS	0.0745	0.071	0.0745	0.071
	(-0.0574)	(-0.0542)	(-0.0574)	(-0.0542)
ANALYSTCOVERAGE	-0.101***	-0.0605***	-0.102***	-0.0618***
	(-0.0182)	(-0.0183)	(-0.0178)	(-0.018)
SIZE	-0.269	-0.641*	-0.265	-0.637*
	(-0.243)	-0.281)	(-0.243)	(-0.283)
cons	12.96*	21 15**	13 38*	21 53**
Firm Fixed Effects	Yes	No	Yes	Yes
Month Fixed Effects	No	Yes	No	Yes
Clustered by Firm	Ves	Ves	Ves	Ves
N	12 716	12 716	12 716	12 716
adi R-sa	0 795	0.806	0 795	0.806

Online Appendix D. Additional analysis – Social pillar.

Notes: Online Appendix D reports the results of Equations (5) and (6). Columns (1) and (2) present the results of estimating Equation (5), which tests the association between average social score ($SOC_AVERAGE$) and cost of equity capital (AVE_COE). Columns (3) and (4) present the results of estimating Equation (6), which tests the effect of the interaction between average social score and social rating disagreement ($SOC_INTERACTION$) on cost of equity capital (AVE_COE). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

	(1) AVE_COE	(2) AVE_COE	(3) AVE_COE	(4) AVE_COE
GOV_AVERAGE	-0.0291***	-0.0294***	-0.0288**	-0.0291**
	(-0.00646	(-0.00644	(-0.00907)	(-0.00898)
GOV_DISAGREEMENT	0.00643	0.00648	0.00783	0.00725
	(-0.00623	(-0.00614	(-0.0241)	(-0.0236)
GOV_INTERACTION			-0.0000254	-0.000014
			(-0.000421)	(-0.000409)
GOV_NUM	0.389	0.338	0.388	0.338
	(-0.232)	(-0.234)	(-0.231)	(-0.233)
BETA	2.301***	2.349***	2.301***	2.349***
	(-0.246)	(-0.243)	(-0.246)	(-0.243)
BTM	0.323	0.313	0.323	0.313
	(-0.232)	(-0.234)	(-0.232)	(-0.234)
LEVERAGE	-0.0166	-0.0206	-0.0166	-0.0206
	(-0.0558)	(-0.0549)	(-0.0558)	(-0.0549)
LONGTERMGROWTH	0.0259*	0.0240*	0.0259*	0.0240*
	(-0.0114)	(-0.0113)	(-0.0114)	(-0.0113)
FORECASTDISPERSION	-0.175	-0.202	-0.175	-0.202
	(-0.115)	(-0.123)	(-0.115)	(-0.123)
EPS	0.0767	0.0734	0.0767	0.0734
	(-0.0578)	(-0.0548)	(-0.0578)	(-0.0548)
ANALYSTCOVERAGE	-0.104***	-0.0653***	-0.104***	-0.0653***
	(-0.0186)	(-0.0186)	(-0.0185)	(-0.0186)
SIZE	-0.36	-0.719*	-0.36	-0.719*
	(-0.247)	(-0.288)	(-0.247)	(-0.288)
_cons	14.29*	22.14**	14.28*	22.14**
	(-5.874)	(-6.786)	(-5.899)	(-6.808)
Firm Fixed Effects	Yes	No	Yes	Yes
Month Fixed Effects	No	Yes	No	Yes
Clustered by Firm	Yes	Yes	Yes	Yes
Ν	12,722	12,722	12,722	12,722
adj. R-sq	0.793	0.803	0.793	0.803

Online Appendix E. Additional analysis – Governance pillar.

Notes: Online Appendix E reports the results of Equations (7) and (8). Columns (1) and (2) present the results of estimating Equation (7), which tests the association between average governance score (*GOV_AVERAGE*) and a cost of equity capital (*AVE_COE*). Columns (3) and (4) present the results of estimating Equation (8), which tests the effect of the interaction between average governance score and governance rating disagreement (*GOV_INTERACTION*) on cost of equity capital (*AVE_COE*). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

	(1) AVE_COE	(2) AVE_COE
ESG_AVERAGE	-0.0669***	-0.0694***
	(0.0116)	(0.0120)
ESG_DISAGREEMENT	-0.0575**	-0.0591**
	(0.0220)	(0.0227)
ESG_INTERACTION	0.000790*	0.000867*
	(0.000388)	(0.000400)
AVE_DISP_INTERACTION	0.00627	0.00387
	(0.0105)	(0.0102)
SD_DISP_INTERACTION	0.000790*	0.000867*
	(0.000388)	(0.000400)
ESG_NUM	0.311	0.267
	(0.210)	(0.213)
BETA	2.326***	2.365***
	(0.242)	(0.238)
BTM	0.325	0.319
	(0.231)	(0.234)
LEVERAGE	-0.0118	-0.0154
	(0.0555)	(0.0544)
LONGTERMGROWTH	0.0240*	0.0221*
	(0.0105)	(0.0104)
FORECASTDISPERSION	-1.145	-0.954
	(0.931)	(0.909)
EPS	0.145	0.133
	(0.0752)	(0.0719)
ANALYSTCOVERAGE	-0.0978***	-0.0599**
	(0.0184)	(0.0185)
SIZE	-0.303	-0.653*
	(0.233)	(0.261)
_cons	15.79**	23.53***
	(5.633)	(6.284)
Month Fixed Effects	No	Yes
Firm Fixed Effects	Yes	Yes
Ν	12,722	12,722
adj. R-sq	0.799	0.809

Online Appendix F. Additional analysis - Analyst information uncertainty.

Notes: Online Appendix F reports the results of Equation (9) which tests the association between the interaction between average ESG score and EPS forecast dispersion (*AVE_DISP_INTERACTION*) and cost of equity capital (*AVE_COE*), and the association between the interaction between ESG rating disagreement and EPS forecast dispersion (*SD_DISP_INTERACTION*) and cost of equity capital (*AVE_COE*). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

	(1) Tax_Ind	(2) Non_Tax_Ind	
	AVE_COE	AVE_COE	
ESG_AVERAGE	-0.0656*** (-0.0145)	-0.0662*** (-0.0146)	
ESG_DISAGREEMENT	-0.0665* (-0.0295)	-0.00863 (-0.0276)	
ESG_INTERACTION	0.00115* (-0.000531)	0.000297 (-0.0005)	
ESG_NUM	0.432 (-0.286)	0.043 (-0.252)	
BETA	2.335*** (-0.327)	2.507*** (-0.219)	
BTM	0.49 (-0.475)	0.213 (-0.149)	
LEVERAGE	-0.00513 (-0.061)	-0.111 (-0.103)	
LONGTERMGROWTH	0.0256 (-0.0148)	0.013 (-0.00839)	
FORECASTDISPERSION	-0.214 (-0.165)	-0.0927 (-0.11)	
EPS	0.064 (-0.0503	0.426*** (-0.126)	
ANALYSTCOVERAGE	-0.0765** (-0.0241)	-0.0186 (-0.0265)	
SIZE	-0.822 (-0.484)	-0.594** (-0.18)	
_cons	26.60* (-11.36)	21.76*** (-4.655)	
Firm Fixed Effects	Yes	Yes	
Month Fixed Effects	No	Yes	
Clustered by firm	Yes	Yes	
N adi. R-so	8,792 0.779	3,930 0.873	

Online Appendix G. Additional analysis – The role of industry.

Notes: Online Appendix G reports the results of additional analysis that investigates the variation in the impact of ESG disagreement (*ESG_DISAGREEMENT*) on the cost of equity (*AVE_COE*) across EU Taxonomy-eligible (*Tax_Ind*) and not EU-Taxonomy eligible (*Non_Tax_Ind*) industries.

	Mean Treated	Mean Control	Mean Diff p-value
INDUSTRY	5.6421	5.7135	0.623
BTM	0.72352	0.74481	0.639
LEVERAGE	0.97113	0.92904	0.612
SIZE	22.519	22.535	0.844
LONGTERM GROWTH	7.6798	7.9736	0.7
BETA	0.90345	0.9055	0.926
YEAR	2019.5	2019.5	0.746

Online Appendix H. Matching results.

Notes: Online Appendix H reports the results of the PSM and shows t-tests for the null hypothesis of equal means for the treated and control groups.

	(1)	(2)
	AVE_COE	AVE_COE
ESG_AVERAGE#treatment.0	-0.0411***	-0.0423***
	(0.00696)	(0.00719)
ESG_AVERAGE#treatment.1	-0.0366***	-0.0340**
	(0.0108)	(0.0112)
treatment	-0.410	-0.625
	(0.507)	(0.516)
ESG_NUM	-0.157	-0.0962
	(0.178)	(0.145)
BETA	2.657***	2.746***
	(0.206)	(0.199)
BTM	0.186	0.152
	(0.233)	(0.229)
LEVERAGE	0.0562	0.0449
	(0.0904)	(0.0843)
LONGTERMGROWTH	0.0126*	0.0109*
	(0.00525)	(0.00500)
FORECASTDISPERSION	0.151*	0.0900
	(0.0762)	(0.0769)
EPS	0.225**	0.202**
	(0.0758)	(0.0699)
ANALYSTCOVERAGE	-0.0897***	-0.0549*
	(0.0262)	(0.0264)
SIZE	-0.441	-0.927*
	(0.380)	(0.433)
_cons	17.13*	27.52**
	(8.605)	(9.786)
Month Fixed Effects	No	Yes
Firm Fixed Effects	Yes	Yes
Ν	7,113	7,113
adi, R-sq	0.888	0.897

Online Appendix I. Robustness analysis (1).

Notes: Online Appendix I reports the results of estimating Equation (10) which uses the propensity score matching to test the impact of average ESG rating on firms' cost of equity capital at different levels of ESG rating disagreement. All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.

ESG_DISAGREEMENT	(0-29)	(30-61)
	AVE_COE	AVE_COE
ESG_AVERAGE	-0.0567***	-0.0549
	(-0.00694)	(-0.0286)
ESG_NUM	0.0468	-0.533
	(-0.192)	(-0.432)
BETA	5.460***	5.532***
	(-0.161)	(-0.591)
BTM	-0.744***	-0.887***
	(-0.179)	(-0.231)
LEVERAGE	-0.0456***	-0.0603
	(-0.0136)	(-0.0827)
LONGTERMGROWTH	0.0113***	-0.00233
	(-0.00331)	(-0.0106)
FORECASTDISPERSION	-0.173	-0.104
	(-0.108)	(-0.0945)
EPS	0.0391	0.103*
	(-0.0309)	(-0.0404)
ANALYSTCOVERAGE	-0.109***	-0.0206
	(-0.0192)	(-0.0644)
SIZE	-0.900***	-1.825
	(-0.267)	(-1.336)
_cons	28.95***	48.08
	(-6.276)	(-29.95)
Month Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Ν	12,118	776
adj. R-sq	0.869	0.921

Online Appendix J. Robustness analysis (2).

Notes: Online Appendix J reports the results of estimating Equation (11) which tests the impact of average ESG rating ($ESG_AVERAGE$) on the cost of equity capital (AVE_COE) at different levels of ESG rating disagreement ($ESG_DISAGREEMENT$). All t-statistics are in parentheses and are based on standard errors clustered by firm. *, **, *** indicate significance at the 0.05, 0.01, and 0.001 levels, respectively.



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