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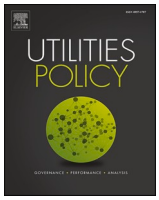

Full-length article

Materiality investor perspectives on utilities' ESG performance. An empirical analysis of ESG factors and cost of equity

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ABSTRACT

The last years have seen significant growth in the demands and use of Environmental, Social, and Governance (ESG) data and ratings, which have relevant market implications and affect the value of firms based on prior evidence. However, little is known about the materiality of ESG factors to investors' risk perceptions. This paper contributes to this debate by analyzing the relationship between the ESG performance of utility companies and the cost of equity capital. Using fixed-effect panel regressions on a sample of 273 firm-year observations between 2017 and 2021, this paper provides novel insights with significant theoretical and practical implications.

1. Introduction

The term Environmental, Social, and Governance (ESG) first appeared in the United Nations (UN) Global UN Global Compact (2004) report '*Who Cares Wins: Connecting Financial Markets to a Changing World*' for which the former UN Secretary-General invited a joint initiative of financial institutions "to develop guidelines and recommendations on how to integrate environmental, social and corporate governance issues in asset management, securities brokerage services, and associated research functions" (UN Global Compact, 2004, p. 5). As it implies, ESG refers to how corporations and investors integrate environmental, social, and governance concerns into their business models.

ESG metrics are critical factors in the socially responsible investment (SRI) field, which is the practice of integrating sustainability criteria in investment analysis. In particular, ESG factors function as an SRI market enabler and a proxy for sustainable performance (Widyawati, 2020). On the one hand, ESG factors provide popular and widely-used metrics to operationalize sustainable performance, typically a rating or ranking. On the other hand, they provide legitimacy, accelerate growth, and build awareness for the SRI market. The size and influence of SRI are evident from the large number of industry players who publicly declare their commitment to ESG investing principles. For instance, the number of organizations signatories to the Principles for Responsible Investment (PRI) has increased significantly from 63 in 2006 to 3404 in 2021. The collective assets under management by these signatories reached US $121 trillion as of 31 March2, 021.[1] In line with the increased demand and use of information on companies' sustainability performance, a growing number of ESG rating agency providers have emerged and established themselves as key players in the field (Avetisyan and Hockerts, 2017).

Following the growing interest of investors and corporate managers, the topic of ESG has attracted significant academic attention over the last few years. Scholars have investigated various ESG-related themes, such as ESG disclosure (Tsang et al., 2022), ESG investing (Daugaard, 2020), the drivers of ESG performance (Daugaard and Ding, 2022), and the relationship between ESG and financial performance (Gillan et al., 2021).

Of particular concern is the research stream which examines the market implications of a firm's ESG profile. Given the existence of mixed findings, this issue remains "one of debate in the literature" (Gillan et al., 2021, p. 14), raising a call for further research to identify the contingencies of ESG and to explore the mechanisms which explain whether and how ESG performance affects firm value.

From this perspective, reducing risks associated with better management of ESG issues is considered one of the leading business cases for sustainability (Schaltegger and Burritt, 2018). Indeed, prior studies have proposed and empirically documented that high ESG ratings can reduce firms' exposure to various risks, such as technical, political, societal, and market risks (Schaltegger et al., 2012). To reflect the idea that firms with better ESG performance experience a significant reduction in the level of perceived riskiness to investors, consistent evidence reveals that higher

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[1] https://www.unpri.org/annual-report-2021.

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ESG ratings are related to a lower cost of equity capital (El Ghoul et al., 2011; Breuer et al., 2018; Gillan et al., 2021; Ng and Rezaee, 2015; Ramirez et al., 2022), which is the internal rate of return (or discount rate) that the market applies to a firm's future cash flows to determine its current market value.

In this context, the question that remains to be explored is which ESG factors significantly affect investors' risk perceptions. This issue is strictly related to the materiality assessment process in the context of sustainability reporting, which involves the selection and disclosure of relevant ESG information that can influence the decision-making process and the judgment of the intended users of the report, such as investors (Fiandrino et al., 2022; Fasan and Mio, 2017).

Provided that investors' assessment of the relative risk-reduction property of ESG factors is contingent upon industry, we explore the relationship between corporate performance for a set of ESG factors and the cost of equity focusing on a specific sector. We selected the utility sector because, given the type of services offered, it is subject to particular attention and pressure from stakeholders and governed by a robust regulatory framework (Mio, 2010). Furthermore, investors are becoming increasingly interested in the sustainability performance of utilities (Sidhoum and Serra, 2017; Traxler and Greiling, 2019) and, therefore, these companies have strategic motives for enhancing their sustainability performance (Imperiale et al., 2023; Ligorio et al., 2022).

To shed light on the debate and contribute to explaining which ESG factors affect investors' risk perceptions, this study is guided by the following research question: which ESG factors are material to investors in the utility sector?

We address this question through fixed-effect panel regressions based on panel data analysis using 273 firm-year observations across 60 utility companies between 2017 and 2021. We first investigate the relationship between the cost of equity and overall ESG score and, as a second step, its underlying pillar (E-S-G). Then, we examine the impact of specific ESG factors on the cost of equity.

The remainder of the paper is organized as follows. Section 2 briefly reviews relevant literature and the theoretical background, focusing on the market implications of ESG performance and prior sustainability research in the utility sector. Section 3 illustrates the methodology, while Section 4 presents the empirical results. Finally, section 5 comprises theoretical discussions, practical implications, and concluding remarks.

2. Literature review, theoretical background, and research question

2.1. ESG rating agencies

The last two decades have seen the emergence of several ESG data agencies which provide aggregate ratings of a firm's ESG performance in response to the information demands of investors to target more sustainable companies (Escrig-Olmedo et al., 2019).

ESG rating agencies provide investor-solicited and company-solicited rating services, corporate research, compliance, and consulting services analogous to those offered by credit rating agencies – but with a focus on ESG criteria (Avetisyan and Hockerts, 2017). ESG rating agencies have become essential information intermediaries in capital markets, with the common objective of transforming complex sustainability information about firms into quantitative metrics that enable stakeholders to understand how well a company is managing environmental, social, and governance risks and opportunities (Chatterji et al., 2009).

Rating agencies assess ESG performance using various metrics and indicators upon which they can measure firm performance across multiple ESG dimensions. Without a universally accepted definition of ESG metrics, each rating agency has developed its methodology for measuring ESG performance and uses its own criteria and indicators (Billio et al., 2021). From this perspective, ESG is conceived as a socially constructed phenomenon (Eccles et al., 2020).

Li and Polychronopoulos (2020) offer a typology of the most common approaches of ESG data and rating providers, differentiating between (1) *Fundamental*, including ESG data providers (e.g., Bloomberg and Refinitiv) that collect and aggregate publicly available data (typically from company reports and websites, and NGOs) and disseminate these data to end users systematically (2) *Comprehensive*, including ESG data providers (e.g., Sustainalytics, MSCI, Vigeo Eiris, ISS) that combine publicly available data with data produced by their analysts through surveys/interviews and independent analysis (3) *Specialists*, including ESG data providers that specialize in a specific ESG issue, such as environmental, corporate governance or human rights (e.g., Carbon Disclosure Project).

Arguably, the ultimate users of ESG ratings are the investors (Zumente and Lāce, 2021) since these ratings are intended "to help investors integrate ESG factors into their decisions, screen portfolios for risks and opportunities, generate investment ideas, conduct due diligence, determine opportunities for engagement, and support the implementation of the United Nations Principles for Responsible Investment" (Christensen et al., 2022, p. 150).

The increase in investors' demand for ESG data has spurred the creation and growth of an entire industry of ESG data providers and a wide range of offers available in the ESG data market in a relatively short period (Avetisyan and Hockerts, 2017). For example, SustainAbility estimates that 600+ ESG ratings and rankings exist globally (SustainAbility, 2020). Furthermore, rating agencies often disagree in assessing companies' ESG performance (Billio et al., 2021; Christensen et al., 2022), aggravating investors' decision-making and companies' strategies to successfully address ESG ratings.

Therefore, for companies to navigate this growing universe of ESG ratings and assessments of their sustainability performance and for regulators to identify a set of universal ESG metrics that ensure consistency and reliability of the evaluation of companies' sustainability performance, there is the impelling need to understand which of the multitude of ESG factors and indicators disseminated by ESG data providers are more relevant and useful for investors.

But first, we present existing literature that illustrates why investors care about ESG ratings.

2.2. ESG factors as risk-reduction attributes

Beyond ethical motives, the primary motivation of socially responsible investors is the belief that superior sustainability performance will lead to superior financial performance (Chatterji et al., 2009). Moving from this assumption, over the past decades, many researchers have investigated the financial implications of a company's ESG profile, producing somewhat mixed findings (Gillan et al., 2021). Gillan et al. (2021)'s review suggests that many studies, but not all, have documented a positive relationship between a firm's ESG performance and its value or financial performance.

Researchers propose different mechanisms to explain why better corporate sustainability performance leads (or should lead) to positive market valuation, including stakeholder satisfaction, customer loyalty, reputation and brand value, competitive advantages, and risk reduction (Schaltegger and Burritt, 2018; Lu et al., 2021).

The reduction of risk is considered a core driver for sustainability, which is related to contingencies, potential and actual costs, that can influence future economic and business performance (Schaltegger and Burritt, 2018). Using panel data for U.S. firms from 2002 to 2011, Lu et al. (2021) show that investors are likely to perceive good ESG performance as value-relevant only when firms face a high level of financial risks (i.e., when a firm has a low ability to meet its long-term obligations) and environmental risks (i.e., when firms operate in a high-risk environment). Godfrey et al. (2009) provide evidence that managers of firms who engage in sustainability can create value at times for their shareholders by creating insurance-like protection. These findings

suggest that investors perceive high sustainability performance as a valuable risk-reduction strategy.

In fact, from a risk management perspective, effective management of ESG issues facilitates better risk management practices, which may impact both the probability of risk *ex-ante* and the severity of losses *ex-post* (Lu et al., 2021). In this sense, ESG can mimic or "act like" loss control and, therefore, "reduce expected losses (by reducing the impact of negative events), the cost of loss financing (by reducing the probability of financial distress), and the cost of residual uncertainty (by enabling better terms of trade with stakeholders)" (Lu et al., 2021, p. 16).

Prior studies have proposed and empirically documented that high ESG ratings can reduce firms' exposure to various risks – such as technical, political, societal, and market risks (Schaltegger et al., 2012). Albuquerque et al. (2019) provide a theory in which strong ESG firms face a relatively less price elastic demand, resulting in lower systematic risk. Oikonomou et al. (2012) provide evidence that more sustainable firms have lower financial risk. Sharfman and Fernando (2008) suggest that sustainability can be an effective environmental risk management tool. Jiraporn et al. (2014) find that ESG factors reduce credit risk by leading to more favorable bond ratings. Furthermore, superior ESG practices can also serve as an ex-ante valuable insurance mechanism against firm-specific legal threats (Koh et al., 2014).

Scholars have advanced different mechanisms to explain why ESG and sustainability can provide a risk reduction tool, such as resilience (Bénabou and Tirole, 2010), product differentiation (Albuquerque et al., 2019), and a broader investor base (El Ghoul et al., 2011). Lu et al. (2022) propose and empirically demonstrate that firms with higher ESG ratings are more likely to adopt integrated risk management through two mechanisms: (a) risk identification through proactive information-seeking and stakeholder engagement practices and (b) risk assessment through integration of stakeholder concerns. The knowledge creation function of ESG practices should lead to early identification of environmental and social risks, while successful integration of stakeholder interests should lead to improved risk assessment. Furthermore, Godfrey et al. (2009) suggest that certain types of sustainability activities can generate moral capital or goodwill that tempers punitive sanctions by stakeholders during an adverse event (i.e., an insurance effect), which can serve as a "buffer" to reduce the possible negative impact and preserve economic value. In other terms, a positive sustainability reputation is critical when adverse corporate events occur because it provides some degree of insurance protection by increasing the likelihood of positive attributions from society's arbiters "who then temper their negative judgments and sanctions toward firms because of this goodwill" (Godfrey et al., 2009, 425).

If ESG factors contribute to reducing the riskiness of firms, then they should lead to a decrease in the cost of equity capital, as discussed in the following section.

2.3. ESG performance and the cost of equity capital

To reflect the idea that firms with better ESG performance experience a significant risk reduction, higher ESG ratings should be related to a lower cost of equity capital (El Ghoul et al., 2011; Breuer et al., 2018; Gillan et al., 2021). Indeed, the cost of equity capital is the internal rate of return (or discount rate) that the market applies to a firm's future cash flows to determine its current market value. In other words, it is the required rate of return given the market's valuation of the riskiness of firms. If ESG factors affect the riskiness of firms, as above-argued, then more sustainable firms should benefit from lower equity financing costs.

Given a sufficient number of investors wanting sustainable investments in the economy, i.e., in the investor base, several studies provide empirical evidence revealing that higher ESG firms benefit from lower costs of equity capital (El Ghoul et al., 2011; Ramirez et al., 2022; Breuer et al., 2018; Ng and Rezaee, 2015), suggesting that investors perceive higher (lower) sustainable companies as facing a lower (higher) level of risk. For instance, building on a sample of 12,915 US firm-year observations from 1992 to 2007, El Ghoul et al. (2011) find that firms with a better ESG score exhibit a lower cost of equity capital. Using a sample of more than 3000 firms during 1990–2013, Ng and Rezaee (2015) find that ESG performance is negatively associated with the cost of equity. More recently, Ramirez et al. (2022) built on a sample of companies headquartered in Latin America from 2017 to 2019 to provide evidence that firms with higher ESG scores benefit from a lower cost of capital.

Prior studies have broken down ESG into its three pillars, findings that the cost of equity capital is higher for firms with poor environmental profiles (Chava, 2014) and that a negative relationship exists between environmental and governance performance and the cost of equity capital, but that no such relationship exists for social performance (Ng and Rezaee, 2015).

Anyway, the question that remains to be explored is which ESG factors mainly affect investors' perception of a firm's riskiness. This issue is strictly related to the materiality assessment process in the context of sustainability reporting, which involves the selection and disclosure of relevant ESG information that can influence the decision-making process and the judgment of the intended users of the report, such as investors (Fiandrino et al., 2022; Fasan and Mio, 2017). The perspective of users of sustainability performance information in financial markets is mirrored in the financial approach to materiality, according to which material ESG issues are those that are likely to affect the financial condition or operating performance of companies within an industry (Pizzi et al., 2022).

Provided that the investors' assessment of the relative risk-reduction property of ESG factors is contingent upon industry[2] we explore the relationship between the cost of equity and a set of ESG factors focusing on a specific sector. We selected the utility sector because, given the type of services offered, it is subject to particular attention and pressure from stakeholders and governed by a strong regulatory framework (Mio, 2010).

2.4. ESG and sustainability literature in the utility sector

As outlined by Imperiale et al. (2023), academic attention on the relevance of sustainability and ESG-related topics in the utility sector has considerably increased in the last few years.

The utility is a controversial sector where companies simultaneously create public value (Valenza and Damiano, 2023) and generate negative externalities related to their characteristics. Utilities play an intrinsic vital role in society, "providing critical infrastructure services that every individual is dependent on in contemporary times" (Khalid et al., 2021, p. 10). Society considers goods supplied by utilities (e.g., gas, electricity, water, etc.) as public goods which are valuable for the lives of human beings, and therefore utilities are under pressure to offer appropriate conditions for fair public access and achieve good sustainable performance to gain public legitimacy (Cantele et al., 2018).

At the same time, utilities operate in areas with significant environmental and social risks (Beelitz et al., 2021; Tsalis et al., 2020). Then, it is no surprise that these influential entities are expected to account for their support to the economic, environmental, and social well-being of those they serve as well as those who work for them (Venturelli et al., 2023), address the overall public value created comprehensively (Greiling and Grüb, 2015) and provide transparent and extensive information about their strategies to deal with risks and opportunities (Tsalis et al., 2020).

As a consequence, there are significant motives for utilities to be tuned into sustainability issues (Andrews and Slater, 2002) that explain the spread of ESG reporting practice (Imperiale et al., 2023; Ligorio et al., 2022; Valenza and Damiano, 2023) and environmental

[2] https://www.sasb.org/standards/materiality-finder/?lang=en-us.

communication strategies (Giacomini et al., 2022) in this sector.

According to Khalid et al. (2021), implementing an ESG framework is not an altruistic goal for utilities but rather "an imperative that depicts financial success and supports a sustainable future for all involved" (p. 16). As evidenced by prior studies, utilities mainly interpret ESG disclosure as a strategic choice (Mio, 2010) to mitigate the expectation gap between managers and stakeholders (Ligorio et al., 2022), maintain legitimacy (Imperiale et al., 2023; Valenza and Damiano, 2023; Cormier and Gordon, 2001), enhance their reputation (Annesi et al., 2021) and build operational capacity (Valenza and Damiano, 2023). Venturelli et al. (2023) reveal that water utilities' biodiversity accountability practices are driven by normative, coercive, and mimetic pressures, while Valenza and Damiano (2023) outline the role of port authorities' sustainability reports for the conceptualization and creation of public value.

Investors understand that adherence to ESG leads to profitable results for the utilities; thus, ESG criteria are becoming one of the critical evaluators for investors (Sidhoum and Serra, 2017; Traxler and Greiling, 2019). Focusing on the U.S. electric utility section, Sidhoum and Serra (2017) reveal that better environmental, social, and governance performance leads to better economic outcomes. Traxler and Greiling (2019) find a positive association between a stock exchange listing and electric utilities' GRI-based sustainable public value reporting. Since the activities of utilities are associated with reputational and natural disaster risks, the risk-reduction role of ESG can be particularly relevant in this sector (Beelitz et al., 2021). For instance, Beelitz et al. (2021) find that for a sample of international utilities with nuclear power generation, the environmental disclosure appears to mitigate adverse market reactions at times of regulatory cost exposure.

Table 1
Description of variables.

Variable	Description
Dependent variable	
$COE_{i,t}$	The cost of equity for firm *I* at time *t* (see Appendix A).
Independent variables	
Pillars level	
$ESG_{i,t}$	Refinitiv ESG score for firm *i* at time *t*.
$ENV_{i,t}$	Refinitiv Environment score for firm *i* at time *t*.
$SOC_{i,t}$	Refinitiv Social score for firm *i* at time *t*.
$GOV_{i,t}$	Refinitiv Governance score for firm *i* at time *t*.
Category level–- Environmental	
$RESOURCE_{i,t}$	Resource use category score (Refinitiv) reflects for firm *i* at time *t* the performance and capacity to reduce the use of materials, energy or water and to find more eco-efficient solutions by improving supply chain management.
$EMISSIONS_{i,t}$	Emission category score (Refinitiv) measures for firm *i* at time *t* the commitment and effectiveness towards reducing environmental emissions in the production and operational processes.
$INNOV_{i,t}$	Environmental innovation category score (Refinitiv) reflects for firm *i* at time *t* the capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.
Category level – Social	
$WORKFORCE_{i,t}$	Workforce category score (Refinitiv) measures for firm *i* at time *t* the effectiveness towards job satisfaction, healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.
$HR_{i,t}$	Human rights category score (Refinitiv) measures for firm *i* at time *t* the effectiveness towards respecting the fundamental human rights conventions.
$COMMUNITY_{i,t}$	Community category score (Refinitiv) measures for firm *i* at time *t* the commitment towards being a good citizen, protecting public health and respecting business ethics.
$PROD_{i,t}$	Product responsibility category score (Refinitiv) reflects for firm *i* at time *t* the capacity to produce quality goods and services integrating the customer's health and safety, integrity, and data privacy.
Category level–- Governance	
$MANAG_{i,t}$	Management category score (Refinitiv) measures for firm *i* at time *t* the commitment and effectiveness towards following best practice corporate governance principles.
$SHARE_{i,t}$	Shareholders category score (Refinitiv) measures for firm *i* at time *t* the effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
$CSR_{i,t}$	CSR strategy category score (Refinitiv) reflects for firm *i* at time *t* the practices to communicate that it integrates the economic (financial), social, and environmental dimensions into its day-to-day decision-making processes.
Control variables	
$SIZE_{i,t}$	Logarithm of total assets for firm *i* at time *t*.
$LEV_{i,t}$	Ratio of total debt to book value of equity for firm *i* at time *t*.
$BTM_{i,t}$	Ratio of book value of equity to market value of equity for firm *i* at time *t*.
$ROA_{i,t}$	Return on assets for firm *i* at time *t*.
$DISPERSION_{i,t}$	Standard deviation of one-year-ahead analyst forecasts of earnings per share for firm *i* at time *t*.
$NUM_{i,t}$	Number of unique analysts issuing earnings per share forecasts for firm *i* at time *t*.

2.5. Research question

This paper investigates the risk-reduction property of specific ESG factors in the utility sector to broaden our understanding of ESG materiality for investors.

This evidence is particularly relevant for utility companies, which are often involved in business processes characterized by the coexistence of negative and positive externalities and, then, which need to understand which ESG factors affect investors' risk assessment. Although several studies have assessed the relationship between ESG performance and cost of equity capital, to our knowledge, no prior research has examined this relationship in the context of the utility sector and broken down ESG metrics into different topics to explore the relative impact on investors.

Then, our article is guided by the following research question: which ESG factors are material to investors in the utility sector?

To address this research question, we investigate the relationship between a set of ESG ratings and the cost of equity capital for a sample of companies in the utility sector through fixed-effect panel regression, as illustrated in the following section.

Table 2
Sample description.

Panel A Distribution of observations by sector		
Sector	Obs.	Percent
Electricity	169	61.90
Gas. Water and Multi-utilities	94	34.43
Waste and Disposal Services	10	3.66
Total	*273*	*100.00*
Panel B Distribution of observations by country		
Country	Obs.	Percent
Austria	5	1.83
Belgium	5	1.83
Denmark	5	1.83
Finland	5	1.83
France	14	5.13
Germany	12	4.50
Italy	22	8.06
Portugal	5	1.83
Spain	25	9.16
Switzerland	5	1.83
United Kingdom	33	12.09
United States of America	137	50.18
Total	*273*	*100.00*
Panel C Distribution of observations by year		
Year	Obs.	Percent
2017	53	19.41
2018	59	21.61
2019	59	21.61
2020	60	21.98
2021	42	15.38
Total	*273*	*100.00*

Table 3
Summary statistics of the variables included in the models.

Variable	Obs	Mean	Std. Dev.	Min	Max
COE	273	4.765	2.256	1.610	13.670
ESG	273	67.31445	14.75887	9.087965	92.38506
ENV	273	67.638	20.124	2.832	98.143
GOV |	273	67.155	17.016	8.803	97.880
SOC	273	67.053	19.025	3.889	96.499
RESOURCE	273	70.493	25.379	0	99.318
EMISSIONS	273	74.291	21.772	0	99.744
INNOV	273	56.260	30.927	0	99.367
WORKFORCE	273	69.899	24.550	2.957	99.836
HR	273	56.257	33.468	0	95.652
COMMUNITY	273	75.170	22.744	0.739	99.123
PROD	273	63.077	27.414	13.514	99.042
MANAG	273	67.416	23.357	8.974	99.949
SHARE	273	61.048	25.713	1.471	99.915
CSR	273	75.012	20.391	0	99.265
SIZE	273	24.081	0.924	21.647	26.438
LEV	273	150.307	90.597	13.313	571.754
BTM	273	0.518	0.275	0.099	2.149
ROA	273	2.858	3.257	−13.891	38.121
DISPERSION	273	0.066	0.122	0	1.327
NUM	273	16.418	5.300	2	30

3. Data and methodology

3.1. Refinitiv ESG scores

This paper uses the ESG scores provided by Refinitiv, which are an enhancement and replacement for the former Thomson Reuter's ASSET4 ESG ratings, as this database is relevant for several reasons.

Refinitiv offers one of the most comprehensive ESG databases in the industry, covering over 85% of the global market cap, across more than 630 different transparent and objective ESG metrics, with a history dating back to 2002 (Refinitiv, 2022) and has already validated in prior literature (e.g., Rajesh, 2020; Santamaria et al., 2021; Demers et al., 2021; Pozzoli et al., 2022; Imperiale et al., 2023; Sahin et al., 2022; Del Giudice and Rigamonti, 2020). Refinitiv has a significant advantage over other ESG databases in regards to research: all data points, the questions to each data point, and also the metrics are public and transparent (Refinitiv, 2022), which allows for a more transparent and deeper insight for scholars.

Refinitiv groups ESG metrics into ten categories that reformulate the three pillar scores (i.e., Environment, Social, and Governance) and the final ESG score:

- Environmental risks: *resource use*, *emissions*, and *innovation*.
- Social risks: *workforce*, *human rights*, *community*, and *product responsibility*.
- Governance risks: *management*, *shareholders*, and *CSR strategy*.

This categorization serves the purpose of this research since the ESG categories scores can be used to proxy the performance of firms about different ESG factors.

Refinitiv aggregates the ESG category scores to build the E, S, and G pillar scores. Next, an overall ESG aggregated score is the weighted sum of the three pillar scores, where social and environmental weights differ by industry, while the governance weights remain the same. The scores are based on the relative performance of ESG factors with the company's sector (for environmental and social) and country of incorporation (for governance). Using a percentile rank scoring methodology enables Refinitiv to develop scores ranging from 0 to 100, allowing a minimum level of variability.

The ESG scores provided by Refinitiv are claimed to have less biased considering several control variables (Rajesh, 2020), while the use of publicly available information (e.g., company websites, company reports, NGO websites, media and news, and stock exchange filings) ensures the reliability of this database.

3.2. Methodology and variables

Our analysis was conducted using a panel data approach, which refers to the pooling of observations on a cross-section of entities (firms in our case) over several years (de Jager, 2008). The main benefit of a panel data model over traditional regression is the opportunity to control and model the heterogeneity across groups due to unobservable variables (Verbeek, 2022, p. 22).

Given the nature and scope of the data, we were required to choose between Random-Effects (RE) and Fixed-Effects (FE) panel regression to estimate our model. We conducted the Hausman test of the null hypothesis that the difference in coefficients between FE and RE estimators is not systematic. Following the Hausman test results (Table 6), we adopted the FE-model, which determines individual effects of unobserved independent variables as constant ("fix") over time. FE removes the effect of those time-invariant characteristics so we can assess the net impact of our estimators on the dependent variable.

The use of fixed effects is confirmed by the poolability Chow's F-test, which tests the null hypothesis that the observed and unobserved fixed effects are systematically equal to zero. The diagnostic test results (Table 6) confirm that the data are not poolable and that fixed effects are preferable.

To deal with heteroskedasticity problems, we conduct regressions with robust standard errors clustered at the firm level, as in similar studies (e.g., El Ghoul et al., 2011).

To address the purpose of our paper, we use three FE panel regression models:

Model 1:

$$COE_{i,t} = \beta_1 ESG_{i,t} + ControlVariables + \alpha_i + \varepsilon_{i,t} \quad (1)$$

Model 2:

$$COE_{i,t} = \beta_1 ENV_{i,t} + \beta_2 SOC_{i,t} + \beta_3 GOV_{i,t} + ControlVariables + \alpha_i + \varepsilon_{i,t} \quad (2)$$

Model 3:

$$\begin{aligned} COE_{i,t} = {} & \beta_1 \mathrm{RESOURCE}_{i,t} + \beta_2 \mathrm{EMISSIONS}_{i,t} + \beta_3 \mathrm{INNOV}_{i,t} \\ & + \beta_4 \mathrm{WORKFORCE}_{i,t} + \beta_5 \mathrm{HR}_{i,t} + \beta_6 \mathrm{COMMUNITY}_{i,t} + \beta_7 \mathrm{PROD}_{i,t} \\ & + \beta_8 \mathrm{MANAG}_{i,t} + \beta_9 \mathrm{SHARE}_{i,t} + \beta_{10} \mathrm{CSR}_{i,t} + ControlVariables + \alpha_i + \varepsilon_{i,t} \end{aligned} \quad (3)$$

See Table 1 for the definition of the variables.

Our dependent variable is a firm's cost of equity capital ($CoE_{i,t}$). This is calculated using the CAPM (Sharpe, 1964) which equates the cost of equity of a firm to the risk-free interest rate plus the firm's beta times the market risk premium, as in previous research in the field (e.g., Zaro et al., 2022; Temiz, 2022; Sharfman and Fernando, 2008). See Appendix A for details on the cost of equity measurement.

Model 1 is our baseline framework to test the influence of aggregate ESG scores on the cost of equity capital. In Model 2, we separately considered environmental (ENV), governance (GOV), and social (SOC) scores to investigate which ESG pillar is perceived by investors as the most significant source of ESG risks. Finally, in Model 3, we separately consider the ESG categories to examine the impact of specific ESG factors on investor risk perceptions.

α_i represents the fixed effects (i.e., firm-specific intercept terms,

Table 4
Comparison between EU and USA utilities.

Variable	EU companies (n = 136)	US companies (n = 137)
ESG	69.089	65.553
ENV	70.739	64.560
SOC	71.629	62.510
GOV	62.871	71.408

Table 5
Pearson correlation coefficients.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) COE	1.000										
(2) ESG	−0.296*	1.000									
(3) ENV	0.122	0.887*	1.000								
(4) GOV	−0.166*	0.406*	0.086	1.000							
(5) SOC	0.104	0.869*	0.676*	0.171*	1.000						
(6) RESOURCE	0.048	0.787*	0.789*	0.097	0.708*	1.000					
(7)EMISSIONS	0.088	0.757*	0.810*	0.127	0.589*	0.459*	1.000				
(8) INNOV	0.148*	0.538*	0.736*	−0.014	0.298*	0.294*	0.378*	1.000			
(9)WORKFORCE	0.171*	0.783*	0.660*	0.088	0.878*	0.498*	0.513*	0.337*	1.000		
(10) HR	−0.288*	0.601*	0.436*	0.093	0.749*	0.494*	0.377*	0.162*	0.613*	1.000	
(11)COMMUNITY	−0.282*	0.487*	0.320*	0.318*	0.499*	0.319*	0.356*	0.086	0.237*	0.076	1.000
(12) PROD	−0.034	0.544*	0.449*	0.049	0.618*	0.408*	0.391*	0.254*	0.429*	0.231*	0.284*
(13) MANAG	−0.010	0.379*	0.084	0.930*	0.157*	0.104	0.085	0.012	0.130	0.093	0.214*
(14) SHARE	−0.255*	−0.039	−0.149*	0.279*	−0.083	−0.158*	−0.059	−0.124	−0.229*	−0.076	0.224*
(15) CSR	0.128	0.444*	0.341*	0.396*	0.329*	0.318*	0.429*	0.077	0.244*	0.196*	0.352*
(16) SIZE	−0.114	0.427*	0.352*	0.206*	0.389*	0.169*	0.348*	0.310*	0.241*	0.238*	0.313*
(17) LEV	0.125	−0.047	−0.209*	0.074	0.122	0.036	−0.137*	−0.373*	0.051	0.144*	0.099
(18) BTM	0.206*	−0.061	0.044	−0.201*	−0.066	−0.081	0.027	0.149*	−0.002	0.015	−0.270*
(19) ROA	−0.063	0.091	0.091	0.117	0.006	0.107	0.066	0.041	0.045	−0.030	0.112
(20) COE	1.000*	0.096	0.122	−0.066	0.104	0.048	0.088	0.148*	0.171*	0.288*	−0.282*
(21) DISPERSION	0.103	0.002	0.075	−0.033	−0.081	0.071	−0.040	0.129	0.010	0.105	−0.228*
(22) NUM	−0.009	0.451*	0.372*	0.166*	0.444*	0.304*	0.325*	0.248*	0.337*	0.296*	0.315*

****p<0.01, **p<0.05, *p<0.1*

treated as fixed unknown parameters), while $\varepsilon_{i,t}$ is the error term.

As control variables, we included typical factors that influence a firm's cost of equity. Precisely, we control firm size (SIZE), firm leverage (LEVERAGE), the book-to-market ratio (BTM), profitability (ROA), forecast dispersion (DISPERSION), and analyst coverage (NUM).

All the variables, including the cost of equity, ESG scores, and the control variables, were collected from the Refinitiv database.

3.3. Sample selection

Our sample comprises utility companies included in the S&P 500 and EuroStoxx 600 indexes.

We selected only large and listed utilities because they have ESG data publicly available. Furthermore, the choice to consider USA and Europe is related to the need to avoid potential limitations in our analysis in relation to a particular institutional setting.

As a first step, we collected from Refinitiv the list of constituents of the S&P 500 and EuroStoxx 600. Second, we identified companies classified in the Industry Classification Benchmark (ICB) 'utility' sector and obtained 62 companies. Next, we excluded two companies without Refinitiv ESG scores.

After requiring all the ESG-related data and control variables for the period 2017–2021, our final sample comprises an unbalanced panel of 273 firm-level observations from 60 companies.

Table 2 describes the sample, with the distribution of observations by sector (Panel A), country (Panel B), and year (Panel C).

4. Results

4.1. Descriptive statistics and correlation analysis

The descriptive analysis reveals the good sustainability performances of the utility companies included in our sample (Table 3). Indeed, the overall ESG score has an average value of 67.266%. According to Refinitiv methodology, this score corresponds to the B+ grade, which "indicates good relative ESG performance and above-average degree of transparency in reporting material ESG data publicly" (Refinitiv, 2022, p. 7). These results are consistent with previous studies revealing positive sustainability performances in the utility sector (Imperiale et al., 2023; Ligorio et al., 2022).

Furthermore, the data about individual ESG pillars reveals that Utilities exhibit good and very similar performance about Environment (67.705%), Social (66.935%), and Governance (66.981%), while Environment has the highest level of variation.

The disaggregation of the sample into EU (n = 136) and US companies (n = 137) reveals the EU companies have higher scores for ESG, ENV, and SOC, while US Utilities perform better about GOV (Table 4).

The analysis at the level of ESG categories shows that COMMUNITY is the primary ESG factor considered by utility companies, with an average score of 75.279%, corresponding to an excellent performance (A-score). Conversely, the lowest score is performed for the environmental innovation (INNOV) category, which has an average value of 56.373%, corresponding to the B- score.

Finally, we performed a Person correlation analysis, reported in Table 5. This analysis provides preliminary evidence about the relationship between ESG factors and the cost of equity capital. In particular, the Pearson correlation coefficients between COE and ESG and GOV are −0.196 and −0.166, respectively, suggesting that the overall ESG and governance score contribute to reducing a firm's cost of equity. Additionally, at the level of ESG categories, the analysis indicates a negative and significant correlation between the cost of equity and Community (−0.282), Human Rights (−0.288), and Shareholders (−0.255) categories.

4.2. Panel regression analyses

We now examine the results of our empirical analyses, which are reported in Table 6.

First, we test the relationship between the overall ESG score and the cost of equity capital. As reported in Table 6, column 1, we find that the estimated coefficient on *ESG* is negative and statistically significant ($\beta = -0.0456$; $p < 0.05$). This finding suggests that an increase in the utilities' ESG score reduces the investors' risk perceptions, leading them to demand a lower rate of return. This evidence is consistent with prior studies finding a negative relationship between ESG performance and the cost of equity in different sectors (El Ghoul et al., 2011; Ramirez et al., 2022).

Next, we examine whether some attributes of the ESG score play a

(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1.000										
0.029	1.000									
−0.011	−0.063	1.000								
0.169*	0.181*	0.250*	1.000							
0.355*	0.111	0.199*	0.287*	1.000						
0.015	0.019	0.116	0.145*	−0.124	1.000					
0.014	−0.133*	−0.241*	−0.046	0.175*	−0.384*	1.000				
−0.137*	0.134*	−0.009	−0.020	−0.166*	−0.008	−0.388*	1.000			
−0.034	−0.010	−0.255*	0.128	−0.114	0.125	0.206*	−0.063	1.000		
−0.257*	0.008	−0.114	−0.036	−0.024	−0.114	−0.059	0.200*	0.103	1.000	
0.311*	0.105	0.063	0.330*	0.659*	−0.075	−0.057	−0.043	−0.009	−0.053	1.000

***p<0.01, **p<0.05, *p<0.1

more significant role than others in explaining the decrease in the cost of equity. Using the separate scores Refinitiv provides for each ESG pillar, we rerun our primary analysis and replace *ESG* with its underlying components (ENV, SOC, and GOV).

As reported in Table 6, column 2, we find that across these specifications, only *GOV* has a negative and significant association with *COE* ($\beta = -0.0289$; $p < 0.05$). In contrast, the impacts of *ENV* and *SOC* on COE are not statistically significant. These findings suggest that utility companies' governance performance appears to decrease their cost of equity. At the same time, the social and environmental pillars do not play as much of a role in such a relationship. According to these results, investors tend to perceive governance performance as more material than environment and social performance in assessing utilities' riskiness, demanding a lower rate of return when these companies exhibit high governance scores. These findings are consistent with previous studies revealing that the governance dimension is more relevant for utility companies than the environmental and social (Imperiale et al., 2023).

As a third and final step of our analysis, we examine the relationship between the cost of equity and individual ESG factors. Using the separate scores Refinitiv provides for each ESG category, we test the relevance of specific ESG factors for investors' risk perceptions. Specifically, we rerun our primary analysis and replace each ESG pillar with its underlying category scores. We replaced ENV with RESOURCE, EMISSIONS, and INNOV, SOC with WORKFORCE, HR, COMMUNITY, and PRODUCT, and GOV with MANAG, SHARE, and CSR.

The results of this analysis are presented in Column 3 of Table 6. We find that two ESG categories appear to reduce the utilities' cost of equity: 'human rights' ($\beta = -0.0163$; $p < 0.01$) and 'management' ($\beta = -0.0206$; $p < 0.05$). In terms of the relative magnitude of these effects, the analysis of the coefficients reveals that the management score has the most significant negative impact on the cost of equity.

These findings suggest that, when assessing the riskiness of utilities, investors attribute more importance to how companies perform about management issues (i.e., the structure and the compensation of the board of directors) rather than in any other ESG areas. Furthermore, high performance concerning human rights appears to be particularly significant from the investors' perspective. Conversely, all other ESG factors, when examined as separate attributes, do not play any role in reducing the investors' risk perceptions of utility companies.

5. Discussion and conclusion

Following the emergence of ESG data providers and the increasing relevance of ESG ratings for companies and investors, especially in the context of SRI, the last two decades have seen a significant amount of academic research on ESG-related topics (Tsang et al., 2022; Daugaard, 2020; Daugaard and Ding, 2022).

Of particular concern is the stream of research that investigates the market implications of a company's ESG profile (Gillan et al., 2021) to understand whether and under which conditions high ESG performance can lead to better economic and financial performance. This evidence is significant to understand the strategic role of ESG factors and encourage companies towards better sustainability performance.

Among the different theories proposed by scholars to understand the ESG-firm value relationship, the risk-reduction mechanism plays a particularly significant role (Schaltegger et al., 2012), especially for investors (Lu et al., 2021; Godfrey et al., 2009).

The idea that effective management of ESG issues facilitates better risk management practices (Lu et al., 2022) is corroborated by empirical evidence suggesting that high ESG performance reduces investors' risk perception and consequently required rate of return (El Ghoul et al., 2011; Ramirez et al., 2022; Breuer et al., 2018; Ng and Rezaee, 2015).

To contribute to this debate, our paper focuses on the risk-reduction property of specific ESG factors. In other words, this research investigates which ESG factors are more material for investors' decision-making and risk perceptions.

Provided that investor materiality is contingent upon industry, we focus our analysis on the context of the utility sector. Given the type of services offered, the utility sector is subject to particular attention and pressure from stakeholders (Mio, 2010). Furthermore, investors are becoming more and more interested in the sustainability performance of utilities (Sidhoum and Serra, 2017; Traxler and Greiling, 2019), and, consequently, utilities are enhancing their sustainability performance for strategic motives (Imperiale et al., 2023; Ligorio et al., 2022).

To address our research question, we ran some fixed-effect panel regressions based on panel data using 273 firm-year observations across 60 utility companies between 2017 and 2021.

As a first step, we find a positive relationship between the overall ESG score and the cost of equity. These findings corroborate previous

Table 6
Panel data analysis.

	(1)	(2)	(3)
	COE	COE	COE
ESG	−0.0456* (0.0225)		
ENV		−0.00431 (0.0163)	
GOV		−0.0289* (0.0119)	
SOC		−0.00571 (0.0149)	
RESOURCE			0.00402 (0.0115)
EMISSIONS			−0.0196 (0.0107)
INNOV			0.00373 (0.00731)
WORKFORCE			0.0122 (0.0142)
HR			−0.0163** (0.00517)
COMMUNITY			0.0156 (0.0138)
PROD			−0.00741 (0.00811)
MANAG			−0.0206* (0.00818)
SHARE			−0.0151 (0.00935)
CSR			0.00314 (0.0117)
SIZE	−2.510* (1.109)	−2.689* (1.147)	−2.404* (1.136)
LEV	0.0124** (0.00444)	0.0128** (0.00455)	0.0137*** (0.00390)
BTM	0.217 (0.853)	0.399 (0.898)	0.620 (0.853)
ROA	0.0296 (0.0668)	0.0298 (0.0649)	0.0383 (0.0661)
DISPERSION	−0.0779 (1.086)	−0.0194 (1.114)	0.229 (1.026)
NUM	−0.136 (0.0722)	−0.141 (0.0715)	−0.140 (0.0718)
_cons	68.30* (25.70)	72.09** (26.43)	64.72* (26.28)
N	273	273	273
R^2	0.234	0.248	0.289
adj. R^2	0.209	0.216	0.233
Hausman Test	χ^2 (7) = 40.892; Prob > χ2 = 0.0000	χ^2 (9) = 17.22; Prob > χ^2 = 0.0454	χ^2 (16) = 91.036; Prob > χ2 = 0.0000
F-test that all μi = 0	F(59, 152) = 7.33; Prob > F = 0.0000	F(59, 151) = 7.37; Prob > F = 0.0000	F(59, 144) = 5.44; Prob > F = 0.0000

Standard errors are in parentheses. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
F-test that all μi = 0: The null hypothesis of Pooled OLS Versus Fixed Effects (H1).
Hausman Test: The null hypothesis of Random Effects Versus Fixed Effects (H1).

studies suggesting that ESG performance affects investors' risk perceptions (El Ghoul et al., 2011; Ramirez et al., 2022; Breuer et al., 2018; Ng and Rezaee, 2015), providing evidence for the utility sector. By doing so, our study complements existing research on the utilities' sustainability practices, revealing that improving ESG performance can contribute not only to their legitimacy (Imperiale et al., 2023) and reputation (Ligorio et al., 2022) but can also generate direct financial benefits, in the forms of reduced cost of equity and, then, increased firm value.

As a second step, we disentangle the overall ESG score into its three underlying components, finding that only the governance score affects the perceived riskiness of a firm and, consequently, reduces its cost of equity capital. These findings are consistent with previous studies revealing that the governance dimension is more relevant for utility companies than the environmental and social pillars (Imperiale et al., 2023). This suggests that investors interpret the structure of rules, practices, and processes by which a utility is directed and controlled as a critical component of their risk assessment. The relevance of these factors is not surprising since the governance of public utilities has undergone considerable change over time. The last decades have seen a transformation of public utilities from branches of administration to more privately-controlled entities so that "requirements from both public governance and corporate governance have to be met" (Martinez et al., 2013, p. 828).

Finally, we examine the relevance of different ESG factors, as reflected in Refinitiv ESG categories, in decreasing the cost of equity. We find that two leading ESG factors are perceived as top ESG risks for investors – namely, the characteristics of management (i.e., the structure and the compensation of the board of directors) and the human rights respect – so that firms with high performance on these factors benefit from the reduced cost of equity. These findings broaden existing knowledge about the market implications of ESG performance (Gillan et al., 2021), unveiling the specific ESG factors which affect investors' risk perceptions in the utility sector.

By doing so, our paper has important implications for practice and policy.

First, our findings can provide valuable guidance for utilities willing to improve their ESG performance. Our analysis demonstrates that enhancing sustainability performance benefits utilities' market value and illustrates on which factors companies should focus their ESG practices and disclosure.

Additionally, our analysis can provide valuable contributions to regulators and policymakers. By highlighting the materiality of specific ESG factors for investors, our findings can guide future regulatory initiatives of corporate sustainability reporting in the context of the utility sector. For example, our analysis may provide valuable insights for the future work of the European Sustainability Reporting Standards (EFRAG) in developing sector-specific sustainability reporting standards in 2023, as demanded by the recently approved Corporate Sustainability Reporting Directive (European Parliament, 2022). Our data also confirm that the human rights performance of utilities is perceived by investors as a severe source of risks, providing support for the European Commission's proposal for a Directive on human rights due diligence that will require companies to identify and, where necessary, prevent, end or mitigate adverse impacts of their activities on human rights and will provide more transparency to investors. Furthermore, our analysis reveals that only a few ESG factors affect risk perceptions. This suggests the opportunity to end to the current tendency to ESG information overload and simplify the system by demanding and disclosing less ESG data and indicators, focusing on what is relevant to users.

Our research is not without limitations. First, our study builds on a sample of listed utilities from the USA and EU. Our interest in the investors' perceptions of the materiality of particular ESG topics justified this choice. Then, we can reasonably assume that the listed-utility companies included in our sample attract the same base of investors worldwide. However, our findings may not be generalizable to other institutional settings. Second, our analysis is based on ESG ratings provided by Refinitiv. Given the lack of agreement between different ESG data providers (Billio et al., 2021), using ratings from alternative agencies may yield different results. Finally, our analysis is limited by using a single measure of the cost of equity capital.

This paper opens intriguing future research avenues. Future researchers may use a larger sample from different countries, alternative ESG databases (e.g., MSCI, RobecoSAM, Sustainalytics), and cost of equity measures. Additionally, further work may explore whether the ESG rating disagreement affects the relationship between ESG performance and the cost of equity in the utility sector. Furthermore, alternative business cases for ESG performance in the utility sector may be explored.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A Cost of equity computation

For this research, we use the cost of equity provided by Refinitiv, which is based on the StarMine model which utilizes the Capital Asset Pricing Model (CAPM) (Sharpe, 1964). CAPM is formulated as follows:

$$E(R_i) = R_f + \beta_i(R_m - R_f)$$

E(Ri) signifies the expected return of the firm's security, *Rf* represents the risk-free rate of return, *Rm* stands for expected market portfolio return, and βi symbolizes the firm's systematic risk. By this view, a firm's expected return (cost of equity) is the function of the risk-free return, expected market return, and the sensitivity of the firm's security to systematic risks. In other words, COE equals the risk-free rate of return plus systematic risk times market risk premium.

In the StarMine model, the COE is estimated as follows:

(1) Equity risk premium is estimated as a forecast of excess equity market return (equity market return minus risk-free rate) over a long horizon of the equity market in a given country based on the aggregate earnings yield combined with an implied dividend payout ratio and long-term forecasts of inflation and GDP growth.
(2) The adjusted risk-free rate used is the primary index for the domicile country of the company. The inflation-adjusted risk-free rate is calculated from the US 10-year treasury yield plus the difference between the 10-year forecasted inflation rate between the given country and the US.
(3) Beta measures how much the stock moves for a given move in the market. It is the covariance of the security's price movement in relation to the market's price movement. Based on data availability, various look-back periods are used to estimate it. In order of preference, Beta 5Y monthly, Beta 3Y monthly, Beta 2Y monthly, Beta 180D daily, and Beta 90D daily are used in the calculation. For instance, 5Y Monthly Beta measures a company's common stock price volatility relative to market price volatility for a 5-year duration using a least squares linear regression line. 5 Year Beta is calculated using monthly Price Close change values with a minimum of 40 monthly Price Close change values required within the 5-year trading period. Beta is levered in this case.

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