

**SUSTAINABILITY MATTERS:
COMPANY SDG SCORES NEED NOT HAVE SIZE, LOCATION, AND ESG DISCLOSURE
BIASES**

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Abstract

This study examines potential biases in SDG scores, which assess companies' alignment with the 17 UN Sustainable Development Goals. Known biases in ESG ratings—such as size, location, and disclosure effects—raise concerns about their reliability in measuring corporate sustainability and informing sustainable investing strategies. Conversely, we find a slight negative correlation between company size and SDG scores, though this is economically insignificant. Firms in emerging markets exhibit marginally higher SDG alignment compared to those in developed markets, indicating an absence of location bias. These findings remain robust when accounting for a company's capacity to disclose ESG data. Our results imply that SDG-aligned investment portfolios can avoid biases commonly associated with sustainability ratings. Furthermore, they challenge the notion that company size, location, or disclosure resources are primary drivers of corporate sustainability performance.

Highlights

- We show that company SDG scores need not be influenced by a company's size, its location, and its availability of resources for ESG data disclosure.
- These results contrast the evidence for ESG ratings, which are known to have size, location, and disclosure biases.
- SDG-aligned portfolios can thus avoid such undesirable biases, while challenging the notion that size, location, and disclosure drive corporate sustainability performance.

Keywords: Environmental, Social and Governance (ESG); ESG Ratings; Sustainable Development Goals (SDGs); Sustainable Investing; Corporate Sustainability

JEL Classification: G32, M14, Q01, Q56

Sustainable investors increasingly align their investment strategies with the UN's Sustainable Development Goals (SDGs) (Harasheh et al., 2024; Yang et al., 2024). The UN adopted the SDGs to create *“shared prosperity in a sustainable world—a world where all people can live productive, vibrant and peaceful lives on a healthy planet”* (UN, 2019:2). The 17 goals with 169 underlying targets provide a universally shared understanding of sustainable development. Because the objective of sustainable investing is often understood as contributing toward sustainable development (Busch et al., 2016), the SDGs serve as a blueprint for sustainable investors. Bauer et al. (2020) find this to resonate with members of pension funds, who want their fund to engage more with the SDGs, even if this may hurt financial performance.

New sustainability ratings are emerging to help align investment portfolios with the SDGs. To this end, various data providers, asset managers, and asset owners have developed SDG scores, that measure a company's contributions to these sustainability goals (e.g., Bauckloh et al., 2024). SDG scores contrast existing Environmental, Social, and Governance (ESG) ratings, which have been the prevalent sustainable investing metric used by investors to date (Fiaschi, et al., 2020; Linnenluecke, 2022; Popescu et al., 2021; Scheitza et al., 2022). There are notable differences between extant ESG ratings and novel SDG scores. Whereas ESG ratings tend to gauge whether a company's profitability is at risk due to sustainability factors, SDG scores generally evaluate how companies impact societies and the environment. A recent study compared ESG ratings and SDG scores and empirically demonstrated that SDG scores better capture companies' environmental and social impacts and are therefore more suitable for constructing investment portfolios that support sustainable development than ESG ratings (van Zanten, 2025).

Notwithstanding, novel sustainability ratings like SDG scores might be vulnerable to the same biases that affect ESG ratings. Large companies tend to have better ESG ratings than smaller ones (Akgun et al., 2021; Artiach et al., 2010; Drempetic et al., 2020; Dobrick et al., 2023; Gallo & Christensen, 2011), firms from developed countries score better than those from emerging markets (Arminen, et al., 2018; Ho et al., 2012), and companies endowed with greater resources for providing ESG data (RPD) earn higher ESG ratings (Drempetic et al., 2020). Yet this does not imply that larger companies, those from richer countries, and those actively reporting ESG information necessarily have better sustainability performance. Rather, larger companies have more resources for ESG data disclosure which, in many ESG rating methodologies, results in higher ratings relative to non-disclosure (Drempetic et al., 2020), while country characteristics explain geographic differences in ESG ratings (Cai, Pan & Statman, 2016). Such biases may create undesirable tilts and risk exposures when constructing ESG portfolios (Dobrick et al., 2023) and raise greenwashing concerns (Yu et al., 2020).

In this paper, we test if SDG scores exhibit similar size, location, and RPD biases. The investigated SDG scores are sourced from Robeco. These SDG scores measure a company's positive and negative impact on the SDGs. We investigate this score for three reasons: (i) it was one of the first SDG scores in the market and thus has a relatively long history; (ii) it is published online and is freely available for research purposes¹; and (iii) its construct validity has been tested (van Zanten, 2025). Since SDG scores of different providers are lowly correlated (Bauckloh et al., 2024), we also use SDG scores from MSCI. Similar to the SDG

¹ See <https://www.robeco.com/en-int/sustainable-investing/how-do-companies-and-countries-score-on-sustainability>

score of Robeco, MSCI measures how companies align with these global goals through their products and operations.

We document a slightly negative relation between company size and SDG score, suggesting that larger companies are not more sustainable than smaller ones. We further show that companies from developed countries have similar and slightly lower SDG scores than those from emerging markets, revealing that a firm's location is not a driver of sustainability impact. Meanwhile, a company's RPD does not significantly impact SDG scores, implying that corporate alignment with the SDGs is not caused by the disclosure of sustainability information. The robustness tests using the MSCI SDG score display similar results even though the SDG scores of these two providers have weak correlation. This suggests that the lack of size, location, and disclosure biases in SDG scores is likely due to the philosophy of such scores rather than the methodologies of data providers.

Figure 1 illustrates the main findings of this paper, showing the effects of size, location, and RPD on SDG scores in comparison to ESG ratings. Especially, the effects of size, location, and RPD on SDG scores are either statistically insignificantly different from zero or show significant negative estimations. This contrasts the robust positive explanatory power of size, location, and RPD on ESG ratings.

(Exhibit 1 about here)

Our results are important for investment and sustainability reasons. First, our findings indicate that undesirable size, location and RPD tilts inherited from biased sustainability ratings can be avoided when constructing SDG-aligned investment portfolios. Second, the results dispel the notion that company size and location are drivers of sustainability performance, which research based on ESG ratings has suggested (e.g., Artiach et al., 2010; Cai et al., 2016). We show that companies of any size and from any location, can be perceived as (un)sustainable, whereby resources for sustainability data disclosure do not influence sustainability performance.

DATA AND METHODOLOGY

To assess if a company's size, location and its resources for providing ESG data (RPD) can explain its SDG score, we collect annual SDG scores from Robeco for a global sample of 3,973 firms (with 2,467 from developed markets and 1,506 from emerging markets) spanning the period from 2010 to 2022. This timeseries is provided by Robeco and uses a set methodology with backfilled data for the period 2010 to 2022.

The Robeco SDG score measures the positive and negative impact of companies on the SDGs. It is calculated through a three-step process. In the first step, Robeco evaluates the impact of the products and services that companies provide on the SDGs. For example, companies providing water and sanitation solutions are likely to score positive while those delivering thermal coal receive negative scores. A rules-based approach determines how positive or negative specific products and services are for each of the SDGs. Revenue percentages, or other variables such as proportion of total output, are used to score individual companies. The second step examines the impact of companies' operations. Robeco evaluates dimensions that are relevant to all companies (like corporate governance and gender equality) as well as aspects that pertain to individual sectors (like palm oil sourcing, the greenhouse gas intensity of cement production, or impacts on water scarcity). The third step assesses corporate involvement in controversies. If companies appear to be involved in scandals, Robeco

evaluates how severe the negative impact of the scandal is on people or planet, it asks whether the company remediated the harm that was done, and assesses whether the company took action to avoid reoccurrences.

Through this process, companies are scored on individual SDGs and are assigned a total score indicative of a company's overall impact on sustainable development. The scores range from -3 (highly negative impacts) to +3 (highly positive impacts), whereby a 0 score signals that a company has no substantial impact on the SDGs. The total score is calculated based on a company's score on each of the 17 SDGs using what Robeco calls "min-max" rule. Companies that only have neutral and positive scores on the sub-goals will receive the highest (max) score as its total score. But as soon as a company scores negative on one or more SDGs, the lowest (min) score will be its total score. This way, substantial negative impacts on one SDG cannot be offset by positive impacts on another goal, appreciating the interconnected nature of sustainable development. Details on the methodology can be found in Robeco (2022).

Next to the Robeco SDG score, we feature the SDG score of MSCI to test for robustness. The MSCI SDG score aims to provide a view on a company's net contribution, both positive and negative, to individual SDGs as generated through companies' products and their operations. The scores range from -10 to +10. The company does not provide a total score that summarizes a firm's overall contribution to the SDGs. We therefore follow the "min-max" methodology of Robeco to calculate a total score for each company. For details on the methodology see MSCI (2024).

To the best of our knowledge, neither of these SDG scores have been normalized for companies of different sizes or from different regions. From the methodologies of these SDG scores, there does not seem to be a good argument why size, location, or RPD biases might be found. Companies of any size, operating in different locations, or with varying means for disclosing about sustainability, might create products with both positive and negative impact, or operate in ways that are (mis)aligned with the SDGs. These two dimensions, the products that companies deliver and the way they operate, are at the core of both SDG scores.

Next to these SDG scores, we feature various other firm characteristics as controls. Their descriptions and modifications are presented in Exhibit 2. In our analysis, we employ a linear mixed-effects model (LMM) as in the analysis of ESG ratings by Dremptec et al. (2020) and Dobrick et al. (2023). In this model, the fixed effects can be likened to the explanatory variables in a standard linear regression, while the random effects can be interpreted as grouping factors. Furthermore, random effects can be subdivided into the random intercept, which permits the intercept to vary for each level of the random effects, and the random slope, which allows the fixed effect to vary at different rates according to the random effect. The model is:

$$\begin{aligned} \text{Corporate Sustainability}_{i,t} = & \alpha + id_i + Year_t + (Sector_i + Market_i + \beta_1) Size_{i,t-1} \\ & + \beta_2 RPD_{i,t-1} + \beta_3 \text{Control Variable}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where *Corporate Sustainability* is the firm's degree of sustainability measured by the Robeco SDG score, or the Refinitiv ESG rating (and MSCI SDG and ESG scores in the robustness test). We introduce the fixed effects *Size*, *RPD* and a set of control variables. Additionally, we incorporate *Year* and *id* as random intercepts, along with random slopes on *Size*, *Sector* and *Market* (developed or emerging). We measure a company's *Size* by number of employees, total assets, market capitalization, and revenue. The variables serving as proxies for *RPD* are dummy variables gauging if companies have a Corporate Social Responsibility

(CSR) committee and if its reporting adheres to the Global Reporting Initiative (GRI) guidelines. These align with the variables in Dremptetic et al. (2020) and Dobrick et al. (2023).

Our control variables encompass various financial performance metrics, including a firm's Earnings-to-Price ratio, Return on Invested Capital, Operating Profit Margin, and Leverage. We also include control variables measuring if a company has a certification from the International Organization for Standardization (ISO) and if it has an Environmental Management System (EMS). This dummy variable is 0, 1, or 2 if the company has no, one, or both types of certification. Since we aim to explain a firm's sustainability rating with its prior year's size, the size variables are lagged by one year (see Exhibit 2).

To explore the impact of a company's home-market classification on its ESG rating and SDG score, we extend our model as follows:

$$\begin{aligned} \text{Corporate Sustainability}_{i,t} &= \alpha + id_i + Year_t + (Sector_i + \beta_1) Size_{i,t-1} + \beta_2 RPD_{i,t-1} \\ &+ \beta_3 Developed_i + \beta_4 Control Variable_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where we eliminate the random effect of *Market* and introduce a fixed effect, namely *Developed*, with *Emerging* serving as the reference category. Our adoption of MSCI's market classification assesses markets based on three criteria: economic development, size and liquidity requirements, as well as market accessibility. The definitions of all other variables remain consistent with the previous model.

(Exhibit 2 about here)

RESULTS

Descriptive Statistics

Exhibit 3 gives the descriptive statistics. Our dataset encompasses 20,693 firm-year observations spanning thirteen years, with an average of 1,592 companies per year, accounting for non-missing independent and control variables. The distribution of observations across years is unbalanced, ranging from 589 companies in 2010 to an expanded coverage of 2,918 companies in 2022.

(Exhibit 3 about here)

Exhibit 4 displays the correlation matrix for the variables. We find a non-positive correlation between SDG scores and size proxies, location, and RPD. This contrasts the known positive relationship between ESG ratings and size proxies, developed markets, and RPD, which our analysis confirms. Moreover, the correlation between ESG and SDG scores is almost zero, emphasizing the fundamental differences between both concepts.

(Exhibit 4 about here)

Linear Mixed-effects Model

We first conduct LMMs with the ESG score as the dependent variable and the four company size proxies as the primary independent variables, replicating the previous literature (Dremptetic et al. (2020) and Dobrick et al. (2023)). The outcomes are presented in Exhibit 5, with models (1) to (4) incorporating market type as a random slope, while models (5) to (8)

include market type as fixed effects. The parameters associated with all size proxies, being located in developed markets, and the presence of a CSR Sustainability Committee exhibit significant positive values. This indicates a clear bias in ESG ratings concerning size, location, and RPD, confirming results in the existing literature.

(Exhibit 5 about here)

We proceed to conduct LMMs with the SDG score as the dependent variable. As is evident from Exhibit 6, all firm size proxies display a negative association or show a statistically insignificant relationship with the SDG score. This contrasts the result on ESG ratings. The most pronounced coefficient for the size proxies is observed for total assets (TA) in model (2), indicating that a marginal change in TA corresponds to a decrease of 0.065 in the SDG score. Considering the scale of the SDG score ranging from -3 to 3, this magnitude is comparable to approximately 1.083 on the conventional scale of 0 to 100 for ESG ratings. Hence, this size effect is not economically significant.

(Exhibit 6 about here)

Furthermore, a comparison between equations (1) and (2) reveals that, when benchmarked against the group of emerging market companies, firms located in developed markets achieve statistically insignificantly different SDG scores. This suggests that companies listed in a developed market are not expected to have better SDG scores compared to companies from less-developed markets. Finally, none of the RPD proxies demonstrate a statistically significant relationship with the SDG score. Obtaining both ISO and EMS certificates appears to impose a modest negative impact on the SDG score, while possessing just one of them does not affect the SDG score significantly. This implies that the SDG score is not affected by a firm's disclosure of sustainability information. All these results contrast the literature on ESG ratings.

The negative association between company size and SDG score could be driven by controversial behavior which is one of the components of the SDG score used in this study. Because larger companies have a larger scale of operations, they might face more public scrutiny than smaller ones and therefore have a higher probability of being accused of involvement scandals that lead to negative SDG scores (see Vasileva et al. (2024) for a discussion between corporate SDG alignment and scandals). To test this conjecture, we run our analysis with a version of the SDG score excluding the analysis for controversies, in Exhibit 7.

(Exhibit 7 about here)

Comparing the results in Exhibit 6 and Exhibit 7, we note that the standard errors of the estimations remain relatively stable for the size proxies, while their coefficient estimates contract by at least a half, resulting in a greater number of estimations becoming statistically insignificant. The most prominent coefficient for the size proxies is again observed for total assets (TA) in model (6), indicating that a marginal change in TA corresponds to a decrease of 0.031 in the SDG score without the controversy penalty. To put this into perspective, this magnitude is around 0.52 for ESG ratings after converting the scale to 0-100, once again demonstrating limited economic significance of the link between company size and SDG score. Thus, the diminishing explanatory power of firm size on the SDG score observed in Exhibit 7 may be attributed to controversial behavior.

Robustness Test

To further generalize the differences between SDG and ESG ratings, we conduct robustness tests using the ESG ratings and SDG scores provided by MSCI, see Exhibit 8. Given the lack of historical data, our analysis focuses on 2023 data. Still, the results exhibit consistent coefficient estimations in terms of sign but with lower statistical significance compared to the Refinitiv ESG and Robeco SDG scores.

Specifically, in model (3), a marginal change in total assets (TA) corresponds to a decrease of 0.106 in the MSCI SDG score, which translates to a decrease of 0.53 on a 0-100 scale (as MSCI SDG follows a -10 to 10 scale). Additionally, neither being listed in a developed market nor any ESG resource proxies show statistical significance, aligning with the findings for the Robeco SDG score.

Conversely, while size proxies are not significant when estimating equation (1) for the MSCI ESG score, they become positively significant upon the inclusion of a dummy variable for developed market status. This is not only due to a more pronounced coefficient but also a notably reduced standard deviation. In model (7), the coefficient for TA is 0.118, equivalent to 1.18 on a 0-100 scale (as MSCI ESG follows a 0-10 scale), demonstrating greater absolute magnitude compared to the SDG score. Furthermore, both, being listed in a developed market and having a CSR committee, exhibit statistically and economically significant positive effects, aligning with the characteristics observed for the Refinitiv ESG rating.

This suggests that our main findings are not driven by different data providers but are instead rooted in the methodologies employed for ESG and SDG assessments.

(Exhibit 8 about here)

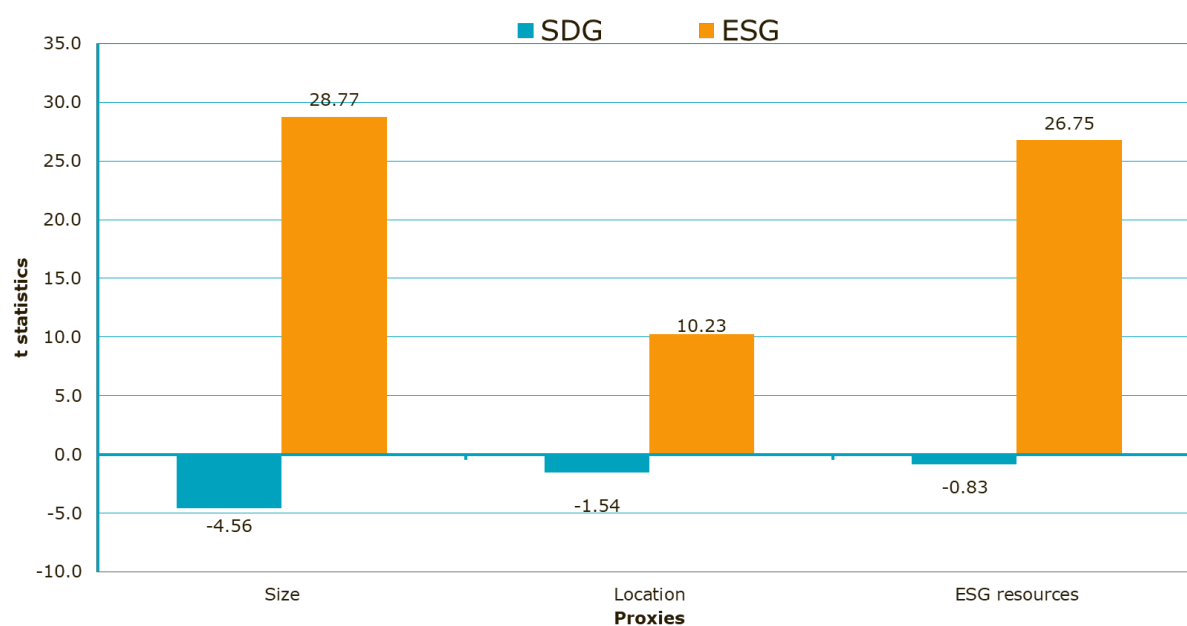
CONCLUSIONS

ESG ratings are a common guidepost for investors pursuing sustainability objectives. Yet, ESG ratings face biases. Large companies, firms from developed markets, and those channeling greater resources towards providing ESG data tend to get better ESG ratings. Increasingly, investors are moving beyond ESG to align their investments with the UN's SDGs. To do so, novel SDG scores are emerging that gauge companies' impacts on the SDGs. We demonstrated that, unlike ESG ratings, the investigated SDG scores do not exhibit biases concerning a company's size, location, or its ability to deploy greater resources to providing sustainability information. Hence, the notion of such biases being crucial drivers of sustainability performance is dispelled, and SDG-aligned investment portfolios can avoid the respective tilts.

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This exhibit illustrates the t-statistics of size (proxied by total assets), location (being listed in a developed market), and ESG resources (proxied by having a CSR committee), and after estimating a linear mixed-effects model with the Robeco SDG and the Refinitiv ESG. See RESULTS section for details.

Exhibit 1. t-statistics of Size, RPD, and Location proxies for SDG and ESG ratings

Variable	Description	Unit	Source
<i>Corporate sustainability</i>			
SDG	SDG score	None	Robeco
ESG	ESG rating of a company calculated as the mean of the Social, Environmental and Governance scores	None	Refinitiv
E	Environmental rating of a company	None	Refinitiv; ENSCORE
S	Social rating of a company	None	Refinitiv; SOSCORE
G	Governance rating of a company	None	Refinitiv; CGSCORE
<i>Company size</i>			
EMP	Number of both full and part time employees; modification: 1-year lag and log	None	Worldscope; WC07011
TA	Total Assets; modification: 1-year lag and log	1,000 Euro	Worldscope; WC02999
MCAP	Market capitalization, the share price multiplied by the number of ordinary shares in issue; modification: 1-year lag and log	1,000 Euro	Datastream; MV
REV	Total Revenue; modification: 1-year lag and log	1,000 Euro	Worldscope; WC01001
<i>Resources for providing ESG data</i>			
CSR_Comm	CSR Sustainability Committee; Dummy variable: “Does the company have a CSR committee or team?”	Y/N	Refinitiv; CGVSDP005
SusRep_NoGRI	Sustainability reporting not in accordance with the GRI guidelines; Dummy variable: computation: CGVSDP026 (“Does the company publish a separate CSR/H&S/Sustainability report or publish a section in its annual report on CSR/H&S/Sustainability?”) minus GRI (see description below)	Y/N	Refinitiv; CGVSDP026, CGVSDP028
GRI	Global Reporting Initiative; Dummy variable: (“Is the company’s CSR report published in accordance with the GRI guidelines?”)	Y/N	Refinitiv; CGVSDP028
<i>Control variable</i>			
EPS/P	Earnings per share; Computation: Earnings per share (Euro) \ stock price (Euro)	None	Datastream; EPS, P
ROIC	Return on Invested Capital	None	Worldscope; WC08376
OPM	Operating Profit Margin; rescaled through dividing by 10	None	Worldscope; WC08316
Leverage	Total Debt / Common Equity; rescaled through dividing by 100	None	Worldscope; WC08231
ISO_EMS	ISO 14000 or EMS: (“Does the company claim to have an ISO 14000 or EMS certification?”) if the company has none, then 0; if the company has either, then 1; if the company has both, then 2	None	Worldscope; ENERDP073

This exhibit gives the definition and operationalization of the variables and the sources.

Exhibit 2. Variables descriptions

Variable	N	Mean	SD	Min	Max
SDG	20,693	0.293	1.591	-3	3
ESG	20,693	64.467	14.401	9.437	95.130
EMP	20,693	9.635	1.497	6.488	12.073
TA	20,693	9.417	1.544	6.912	12.560
MCAP	20,693	8.723	1.269	6.491	11.073
REV	20,693	8.574	1.395	6.004	11.054
CSR_Comm	20,693	0.888	0.316	0	1
SusRep_NoGRI	20,693	0.010	0.100	0	1
GRI	20,693	0.990	0.101	0	1
EPS/P	20,693	0.060	0.044	0.000	0.164
ROIC	20,693	7.298	13.834	-95.270	358.420
OPM	20,693	1.451	1.154	-0.150	4.136
Leverage	20,693	1.163	1.184	0.023	4.555
ISO_EMS	20,693	0.734	0.560	0	2

This exhibit shows descriptive statistics for the variables used in the linear mixed-effects model for the years 2010–2022. N, Mean, SD, Min and Max denote number of observations, arithmetic mean, standard deviation, minimum and maximum values, respectively.

Exhibit 3. Descriptive statistics

	SDG	ESG	Developed	Emerging	EMP	TA	MCAP	REV	CSR_ Comm	SusRep_ NoGRI	GRI	EPS/P	ROIC	OPM	Leverage	ISO_ EMS
SDG	1															
ESG	-0.023	1														
Developed	0.045	0.183	1													
Emerging	-0.045	-0.183	-1	1												
EMP	-0.059	0.304	-0.018	0.018	1											
TA	-0.060	0.342	0.018	-0.018	0.585	1										
MCAP	-0.073	0.404	0.139	-0.139	0.569	0.700	1									
REV	-0.132	0.367	0.082	-0.082	0.815	0.783	0.704	1								
CSR_ Comm	-0.070	0.304	0.125	-0.125	0.105	0.098	0.139	0.138	1							
SusRep_ NoGRI	0.027	-0.057	0.045	-0.045	-0.004	-0.018	-0.007	-0.001	-0.013	1						
GRI	-0.027	0.060	-0.044	0.044	0.005	0.017	0.007	0.001	0.015	-0.990	1					
EPS/P	0.005	-0.011	-0.140	0.140	0.101	0.264	0.053	0.187	-0.028	-0.006	0.006	1				
ROIC	0.045	0.034	-0.028	0.028	0.015	-0.114	0.118	-0.008	-0.003	0.041	-0.041	0.038	1			
OPM	0.041	0.027	-0.029	0.029	-0.267	0.096	0.202	-0.210	-0.032	0.015	-0.016	0.105	0.330	1		
Leverage	0.000	0.043	-0.028	0.028	0.102	0.332	0.044	0.146	0.010	0.001	-0.002	0.075	-0.187	0.012	1	
ISO_ EMS	-0.062	0.221	0.064	-0.064	0.195	-0.013	0.034	0.172	0.104	-0.016	0.018	-0.021	-0.002	-0.207	-0.078	1

This exhibit shows correlations for the variables used in the linear mixed-effects model for the years 2010–2022

Exhibit 4. Correlation Matrix

Variable	ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMP	2.619*** (0.331)				2.729*** (0.014)			
TA		3.756*** (0.264)				3.846*** (0.134)		
MCap			2.389*** (0.292)				2.496*** (0.111)	
REV				3.556*** (0.295)				3.571*** (0.127)
Developed					5.311*** (0.396)	3.962*** (0.387)	4.262*** (0.392)	4.010*** (0.387)
CSR_Comm	6.097*** (0.226)	6.009*** (0.224)	6.201*** (0.226)	6.006*** (0.225)	6.102*** (0.226)	6.002*** (0.224)	6.202*** (0.226)	5.999*** (0.225)
SusRep_NoGRI	-0.692 (3.868)	0.259 (3.841)	0.586 (3.869)	-0.258 (3.847)	-1.016 (3.869)	0.114 (3.841)	0.542 (3.869)	-0.256 (3.846)
GRI	4.163 (3.821)	5.119 (3.795)	5.295 (3.822)	4.685 (3.801)	3.831 (3.822)	4.979 (3.794)	5.249 (3.822)	4.655 (3.799)
EPS/P	3.761*** (1.349)	2.935 (1.343)	2.735** (1.353)	0.853 (1.352)	3.700*** (1.349)	2.835** (1.343)	2.778** (1.353)	0.639 (1.351)
ROIC	-0.002 (0.004)	0.012*** (0.004)	0.002 (0.004)	-0.002 (0.004)	-0.002 (0.004)	0.012*** (0.004)	0.002 (0.004)	-0.001 (0.004)
OPM	0.261*** (0.087)	0.021 (0.086)	-0.142 (0.087)	0.167* (0.086)	0.265*** (0.087)	0.028 (0.086)	-0.133 (0.087)	0.159* (0.087)
Leverage	-0.047 (0.080)	-0.230* (0.080)	0.062 (0.080)	-0.129 (0.080)	-0.048 (0.080)	-0.232** (0.080)	0.068 (0.080)	0.141* (0.080)
ISO_EMS1	3.862*** (0.210)	4.033*** (0.207)	4.129*** (0.209)	3.882*** (0.208)	3.872*** (0.210)	4.033*** (0.207)	4.124*** (0.209)	3.910*** (0.208)
ISO_EMS2	3.982*** (0.402)	4.137*** (0.398)	4.567*** (0.400)	3.926*** (0.399)	4.027*** (0.402)	4.152*** (0.398)	4.571*** (0.400)	3.983*** (0.399)
Constant	21.072*** (4.055)	12.305*** (4.011)	24.575*** (3.995)	16.856*** (4.002)	17.753*** (4.065)	9.699*** (4.013)	21.635*** (4.001)	13.954*** (3.485)
Observations	20,693	20,693	20,693	20,693	20,693	20,693	20,693	20,693

This exhibit shows the results of the linear mixed-effects model for the years 2010–2022. Each column contains the results for one linear model, with the ESG rating as dependent variable and each of the four different size proxies as independent variable. Columns (1) to (4) are the model results with market type as random slope on size, and columns (5) to (8) have the market type as fixed effects. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Exhibit 5. Linear mixed-effects model with random intercepts and random slopes for ESG rating

Variable	SDG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMP	-0.038** (0.015)				-0.040*** (0.014)			
TA		-0.065*** (0.015)				-0.067*** (0.015)		
Mcap			0.011 (0.015)				0.008 (0.014)	
REV				-0.057*** (0.016)				-0.058*** (0.015)
Developed					-0.072** (0.030)	-0.046 (0.030)	-0.063** (0.030)	-0.049 (0.030)
CSR_Comm	-0.023 (0.018)	-0.015 (0.018)	-0.028 (0.018)	-0.023 (0.018)	-0.024 (0.018)	-0.015 (0.018)	-0.029 (0.018)	-0.022 (0.018)
SusRep_NoGRI	0.187 (0.316)	0.073 (0.316)	0.026 (0.317)	0.087 (0.316)	0.191 (0.316)	0.075 (0.316)	0.026 (0.317)	0.089 (0.316)
GRI	0.110 (0.313)	0.011 (0.312)	-0.055 (0.313)	0.015 (0.313)	0.115 (0.313)	0.012 (0.312)	-0.054 (0.313)	0.016 (0.313)
EPS/P	0.003 (0.109)	-0.016 (0.108)	0.036 (0.110)	0.090 (0.110)	0.004 (0.109)	-0.014 (0.108)	0.037 (0.110)	0.090 (0.110)
ROIC	0.000 (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)
OPM	-0.004 (0.007)	-0.001 (0.007)	-0.004 (0.007)	-0.001 (0.007)	-0.004 (0.007)	-0.001 (0.007)	-0.004 (0.007)	-0.001 (0.007)
Leverage	-0.016** (0.006)	-0.012* (0.007)	-0.016** (0.007)	-0.016** (0.007)	-0.016** (0.006)	-0.012* (0.007)	-0.016** (0.007)	-0.015** (0.007)
ISO_EMS1	0.001 (0.017)	-0.007 (0.017)	-0.014 (0.017)	-0.001 (0.017)	0.000 (0.017)	-0.007 (0.017)	-0.014 (0.017)	-0.002 (0.017)
ISO_EMS2	-0.058* (0.033)	-0.066** (0.033)	-0.081** (0.033)	-0.057* (0.033)	-0.059* (0.033)	-0.066** (0.033)	-0.082** (0.033)	-0.057* (0.033)
Constant	0.662** (0.323)	0.960*** (0.323)	0.390 (0.320)	0.850** (0.322)	0.707* (0.324)	0.993*** (0.323)	0.440 (0.321)	0.879** (0.321)
Observations	20,693	20,693	20,693	20,693	20,693	20,693	20,693	20,693

This exhibit shows the results of the linear mixed-effects model for the years 2010–2022. Each column contains the results for one linear model, with the SDG score as dependent variable and each of the four different size proxies as independent variable. Columns (1) to (4) are the model results with market type as random slope on size, and columns (5) to (8) have the market type as fixed effects. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Exhibit 6. Linear mixed-effects model with random intercepts and random slopes for SDG score

Variable	SDG excluding controversy penalty							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMP	0.001 (0.013)				-0.001 (0.013)			
TA		-0.030** (0.013)				-0.031** (0.013)		
MCap			0.015 (0.013)				0.013 (0.012)	
REV				-0.010 (0.014)				-0.011 (0.014)
Developed					-0.053** (0.024)	-0.040 (0.025)	-0.045* (0.025)	-0.048* (0.025)
CSR_Comm	0.002 (0.010)	0.005 (0.010)	0.000 (0.010)	0.000 (0.010)	0.002 (0.010)	0.005 (0.010)	0.000 (0.010)	0.000 (0.010)
SusRep_NoGRI	0.034 (0.173)	-0.057 (0.174)	-0.114 (0.175)	-0.055 (0.174)	0.037 (0.173)	-0.056 (0.174)	-0.114 (0.175)	-0.053 (0.174)
GRI	0.047 (0.171)	-0.040 (0.171)	-0.103 (0.173)	-0.039 (0.172)	0.051 (0.171)	-0.038 (0.172)	-0.103 (0.173)	-0.038 (0.172)
EPS/P	-0.021 (0.059)	-0.030 (0.059)	0.012 (0.060)	0.031 (0.060)	-0.021 (0.059)	-0.029 (0.059)	0.012 (0.060)	0.032 (0.060)
ROIC	0.000* (0.000)	0.000** (0.000)	0.000* (0.000)	0.000 (0.000)	0.000* (0.000)	0.000** (0.000)	0.000* (0.000)	0.000 (0.000)
OPM	0.000 (0.004)	0.000 (0.004)	-0.002 (0.004)	0.003 (0.004)	0.000 (0.004)	0.000 (0.004)	-0.002 (0.004)	0.003 (0.004)
Leverage	-0.001 (0.004)	0.000 (0.004)	-0.001 (0.004)	-0.002 (0.004)	-0.001 (0.004)	0.001 (0.004)	-0.001 (0.004)	-0.002 (0.004)
ISO_EMS1	0.022** (0.010)	0.015 (0.010)	0.015 (0.010)	0.019** (0.010)	0.022** (0.010)	0.015 (0.010)	0.015 (0.010)	0.019* (0.010)
ISO_EMS2	0.031* (0.018)	0.025 (0.018)	0.024 (0.018)	0.029 (0.018)	0.031* (0.018)	0.025 (0.018)	0.023 (0.018)	0.029 (0.018)
Constant	0.389** (0.181)	0.731*** (0.182)	0.426** (0.179)	0.560*** (0.180)	0.424** (0.182)	0.759** (0.182)	0.461** (0.179)	0.590** (0.181)
Observations	20,693	20,693	20,693	20,693	20,693	20,693	20,693	20,693

This exhibit shows the results of the linear mixed-effects model for the years 2010–2022. Each column contains the results for one linear model, with the SDG score excluding controversy penalty as dependent variable and each of the four different size proxies as independent variable. Columns (1) to (4) are the model results with market type as random slope on size, and columns (5) to (8) have the market type as fixed effects. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Exhibit 7. Linear mixed-effects model with random intercepts and random slopes for SDG score excluding controversy penalty

Variable	SDG				ESG			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TA	-0.102*** (0.035)		-0.106*** (0.036)		0.072 (0.088)		0.118*** (0.030)	
REV		-0.115*** (0.036)		-0.109*** (0.037)		0.095 (0.095)		0.146*** (0.030)
Developed			0.000 (0.000)	0.000 (0.000)			1.470*** (0.091)	1.446*** (0.091)
CSR_Comm	-0.025 (0.216)	-0.026 (0.217)	-0.026 (0.216)	-0.044 (0.217)	0.496*** (0.146)	0.484*** (0.146)	0.524*** (0.146)	0.510*** (0.146)
SusRep_NoGRI	-0.078 (2.025)	0.028 (2.025)	-0.262 (2.077)	0.094 (2.163)	-0.650 (1.919)	-0.725 (1.917)	-0.626 (1.919)	-0.675 (1.918)
GRI	-0.599 (1.873)	-0.559 (1.900)	-0.766 (1.929)	-0.674 (2.022)	-0.825 (1.837)	-0.914 (1.835)	-0.769 (1.836)	-0.831 (1.836)
EPS/P	-1.835** (0.902)	-1.607* (0.906)	-1.877** (0.902)	-1.628* (0.905)	-1.565** (0.581)	-1.597*** (0.581)	-1.623*** (0.581)	-1.650*** (0.581)
ROIC	0.004 (0.005)	0.007 (0.005)	0.004 (0.005)	0.007 (0.005)	0.002 (0.003)	-0.001 (0.003)	0.003 (0.003)	-0.000 (0.003)
OPM	-0.021 (0.059)	-0.062 (0.059)	-0.029 (0.059)	-0.064 (0.059)	0.017 (0.038)	0.066 (0.038)	0.020 (0.038)	0.068 (0.038)
Leverage	-0.048 (0.059)	-0.052 (0.059)	-0.053 (0.059)	-0.051 (0.059)	-0.003 (0.039)	0.006 (0.039)	0.003 (0.039)	0.007 (0.039)
ISO_EMS1	-0.046 (0.129)	-0.058 (0.130)	-0.093 (0.129)	-0.079 (0.130)	0.367*** (0.085)	0.336*** (0.085)	0.372*** (0.085)	0.340*** (0.086)
ISO_EMS2	-0.032 (0.282)	-0.011 (0.284)	-0.067 (0.283)	-0.026 (0.284)	0.107 (0.194)	0.059 (0.195)	0.126 (0.194)	0.080 (0.195)
Constant	1.327 (1.872)	1.412 (1.897)	1.580 (1.928)	1.523 (2.022)	5.555*** (1.842)	5.483*** (1.838)	4.320*** (1.843)	4.252*** (1.840)
Observations	2,593	2,593	2,593	2,593	2,651	2,651	2,651	2,651

This exhibit shows the results of the linear mixed-effects model for the year 2023. Each column contains the results for one linear model, with columns (1) to (4) using the MSCI SDG score as dependent variable and columns (5) to (8) using the MSCI ESG score as dependent variable, and total assets (TA) and total revenue (REV) as size proxies as independent variable. Columns (1) (2) (5) (6) are the model results with market type as random slope on size, and columns (3) (4) (7) (8) have the market type as fixed effects. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Exhibit 8. Linear mixed-effects model with random intercepts and random slopes for MSCI SDG and ESG scores