

Divestment, information asymmetries, and inflated ESG ratings*

Dennis Bams ^{a,b}, Bram van der Kroft ^{a,b}

^aMaastricht University

^bOpen University

June 7, 2022

Abstract

Socially responsible divestment reduces aggregate sustainable performance when investors use Environmental, Social, and Governance (ESG) ratings. Due to information asymmetries, socially responsible investors shift their portfolios towards firms with high ESG ratings rather than firms with exemplar sustainable performance. We causally show that this provides incentives for firms to reduce their cost of capital by inflating their ESG ratings. Consequently, ESG rating inflation is so prominent that Refinitiv, MSCI IVA, and FTSE ESG ratings are inversely related to sustainable performance because promises of sustainable performance improvements do not materialize up to 15 years in the future. Accordingly, the ESG-rating-based divestment portfolios are less sustainable than the market portfolio. Therefore, divestment hinders rather than helps societal welfare.

Key words: Cost of capital, socially responsible investment (SRI), adverse incentives, promised to realized sustainable performance, corporate social responsibility

JEL codes: M14, Q56, G15

*Contact information: b.vanderkroft@maastrichtuniversity.nl w.bams@maastrichtuniversity.nl We thank Marco Ceccarelli, Kevin Chuah, Jeroen Derwall, Liliana Dewaele, Alex Edmans, Piet Eichholtz, Bart Frijns, Anand Goel, Stefanie Kleimeier, Thomas Post, Shuang (Sunny) Wu, and David Skandera, as well as seminar participants of the Stevens Institute of Technology (2021), Maastricht University (2021), and Open University (2021). We also thank the organisers of the Academy of Management Annual Meeting (2022), the GRONEN Annual Meeting (2022), the JMS Annual Meeting (2022), and the World Finance Conference (2022)

1 Introduction

Responsible investors strive to improve the aggregate sustainable performance of firms in the economy (Riedl and Smeets, 2017; Barber et al., 2021; Bonnefon et al., 2022). In addition to engagement, these investors frequently divest from unsustainable firms to deprive them of funding. On the other side of this transaction, the conventional investors will only acquire these divested firms at a lower price because their portfolio reallocation lowers diversification benefits for which they require supplementary return expectations (Heinkel et al., 2001). Accordingly, these divested firms face higher costs of capital and can profitably implement fewer projects, diminishing their growth rates. In the long run, the difference in growth rates between sustainable and divested firms should transition the economy toward a more sustainable equilibrium (Berk and van Binsbergen, 2021).

In practice, the efficacy of divestment is likely sub-optimal because responsible investors face information asymmetries when assessing sustainable performance. Firms communicate their sustainable performance to investors in annual sustainability reports. These reports contain information on the environmental pollution, labor conditions, and governance-related policies, activities, targets, controversies, and performance of firms. In contrast to financial statements, sustainability reports are often unstandardized and diverge strongly across firms. This enables them to selectively disclose their sustainable performance to investors and willfully create information asymmetries (Fatemi et al., 2018; Wu et al., 2020). Consequently, Hartzmark and Sussman (2019) show that responsible investors often divest based on third-party ESG ratings in the wake of sustainable-performance-related information asymmetries.

ESG-rating-based divestment provides adverse incentives for firms to inflate their ESG ratings. When investors divest based on ESG ratings, they will reallocate their portfolio from firms with low ESG ratings to high ESG rating firms (Dyck et al., 2019; Hartzmark and Sussman, 2019). This reallocation shifts the cost of capital benefits intended for sustainable firms toward firms with high ESG ratings (see El Ghoul et al., 2011; Chava, 2014). As a result, firms are incentivized to improve their ESG ratings without augmenting their sustainable performance, i.e., inflating their ESG ratings. These incentives are likely substantial because a third of U.S.

assets under management are invested in a socially responsible manner.¹ When ESG rating inflation is so prominent that ESG ratings are inversely related to sustainable performance, responsible investors unintentionally divest from sustainable firms and hinder, rather than help, aggregate sustainable performance. For this reason, we investigate whether these cost of capital incentives cause firms to inflate their ESG ratings and quantify its subsequent impact on the efficacy of divestment in improving aggregate sustainable performance.

Unsustainable firms can inflate their ESG ratings by promising future sustainable performance improvements without realizing these promises. ESG ratings reconcile firms' current realizations of sustainable performance with their promised future sustainable performance.² Promising future improvements in sustainable performance is initially inexpensive as it primarily involves writing an ambitious sustainability report (Drempetic et al., 2019). On the contrary, following through on these promises and genuinely advancing sustainable performance is a substantive and costly endeavor. From an investor perspective, firms can readily inflate ESG ratings because of information asymmetries (Hartzmark and Sussman, 2019; Wu et al., 2020). From an ESG rating agency perspective, ESG rating inflation is likely undetected due to agency problems and monitoring costs (Yang, 2020). Moreover, Clementino and Perkins (2020) even go as far as to suggest that ESG rating agencies collude with firms to inflate ESG ratings via additional paid rating methodology workshops.³ Even though we do not necessarily endorse this collusion argument, we nevertheless anticipate that unsustainable firms can cost-effectively inflate their ESG ratings through optimistically reporting on their promises of future sustainable performance without realizing these promises. We expect primarily unsustainable firms to inflate their ESG ratings because extensive ESG reporting is more costly for sustainable firms due to information leakage (Fatemi et al., 2018; Ioannou and Serafeim, 2019).

We create a two-step procedure to verify the two necessary conditions under which firms can inflate their ESG ratings via empty promises of future sustainable performance. A precondition for firms to inflate their ESG ratings is that ESG ratings incorporate promises of future

¹<https://www.ussif.org/trendsandhttps://www.msci.com/documents/1296102/23188071/MSCI-ESG-Investing-Brochure.pdf>. respectively

²https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/ESG-scores-methodology.pdf.

³See also Baghai and Becker (2018) for a similar mechanism on credit ratings.

sustainable performance improvements. Additionally, these promises should not materialize in the future.

We employ a non-parametric rank-ordering method that segregates firms' promised and realized sustainable performance to verify these two conditions. This method provides us with firm-level promised and realized ESG scores by ordering the sustainable performance of 7,232 global firms on 169 granular Refinitiv ESG metrics compared to their industry peers from 2003 to 2020. Precisely, we capture the promised sustainable performance of firms by assessing their mainly self-reported ESG policies, activities, and targets proposed in sustainability reports and determine their realized sustainable performance with primarily third-party reported ESG controversies, environmental pollution, labor conditions, and governance aspects.

In a preliminary analysis, we find that ESG ratings incorporate firms' promised future sustainable performance by regressing their promised and realized ESG scores on Refinitiv, MSCI IVA, and FTSE ESG ratings. The impact of promised future sustainable performance improvements on ESG ratings is so prominent that we even observe a negative relation between the realized sustainable performance of firms and their ESG ratings. To clarify, we empirically show that firms can improve their ESG ratings by experiencing additional ESG controversies, polluting more, or exhibiting worse labor conditions and governance. This indicates that ESG ratings are contemporaneously inflated on a large scale.

In a second step, we assert that ESG ratings are also intertemporally inflated by showing that firms do not realize their sustainable performance promises. We observe a negative relationship when we regress the aggregate realized ESG scores of firms on their overarching promised ESG scores now and up to 10 years in the future. This negative relation persists in 12 out of 14 SASB categories when we explicitly match promises to realizations on specific aspects of sustainable performance.⁴ Given the above, we show that ESG ratings are not just inflated but even inversely related to sustainable performance.

We provide an initial correlational analysis to assert whether cost of capital incentives drive this ESG rating inflation. Here, we regress the cost of capital of firms on their average Refinitiv, MSCI, and FTSE ESG ratings. We observe that a one standard deviation increase in the

⁴<https://materiality.sasb.org/>

average ESG rating of firms decreases their cost of capital by 24 basis points after controlling for common risk factors like size, country, industry, firm fixed effects, and credit ratings.

We strongly indicate that this relationship is causal by analyzing a random shock in ESG rating inflation. This ESG rating inflation shock requires a setting in which the promised sustainable performance of firms randomly changes in a way that is unrelated to their realized sustainable performance. In 2014, the European Commission introduced such regulatory shock through the Non-Financial Reporting Directive (NFRD).

The NFRD requires all large public interest firms domiciled in European Union member states to extensively report on their sustainable performance (European Commission, 2014). Therefore, it solely affects promised sustainable performance and not realized sustainable performance. Further, the shock is random because it regulates firms based on their domicile and size. Since all listed firms are sufficiently large and not all firms in Europe are European Union member states, we attain a quasi-experimental setting in which firms domiciled in a random subset of European countries randomly inflate their ESG ratings. Notably, we perform a difference-in-differences analysis and consider Austrian and Swiss firms as treatment and control because they are comparable in sustainable performance before the shock due to reminiscent political, social, and cultural factors (Dyck et al., 2019). The NFRD is associated with a reduction in the cost of capital of 72 basis points for Austrian firms compared to Swiss firms in our difference-in-differences setting. This analysis provides a first indication that cost of capital incentives cause firms to inflate their ESG ratings.

As a second indication of causality, we consider an analogy between inflated ESG ratings and inflated credit ratings. Firms face similar cost of capital incentives to inflate their credit and ESG ratings as investors use both ratings to construct their portfolios. However, credit ratings measure a different underlying than ESG ratings, namely credit risk instead of sustainable performance. This difference in underlying enables us to solely capture the cost of capital reductions associated with ESG rating inflation by explicitly exogenising the impact of changes in sustainable performance on financial performance. In other words, we can use inflated credit ratings to identify which firms most strongly benefit from cost of capital reductions and are more adept at rating inflation in ways unrelated to sustainable performance. We empirically

verify this by showing that precisely those firms with inflated credit ratings more profoundly inflate their ESG ratings. In other words, both of our unrelated causality analyses indicate that firms inflate their ESG ratings because of cost of capital incentives provided by divestment.

We quantify the impact of ESG rating inflation on the efficacy of divestment in improving aggregate sustainable performance by constructing multiple portfolios based on standard divestment procedures (see Auer, 2016; Van Duuren et al., 2016). Contrary to responsible investors' intent, divesting based on ESG ratings often increases the share of unsustainable firms in their portfolio rather than reduces it. To illustrate, our most conservative 10% best-in-class divestment portfolio experiences 217% more controversies, 77% worse labor conditions, and 40% increased emissions than the market benchmark. Because responsible investors unintentionally overweigh unsustainable firms in their portfolios when they rely on ESG ratings, they accidentally provide cost of capital incentives to unsustainable firms. Therefore, divestment hinders rather than helps aggregate sustainable performance and promotes unsustainable firm behavior.

This paper contributes to the ongoing debate on whether divestment effectively augments aggregate sustainable performance. Initially, Heinkel et al. (2001) argue that divesting can improve aggregate sustainable performance when there is a credible cost of capital threat of divesting. However, Berk and van Binsbergen (2021) explicitly model this threat and question its credibility since profit-maximizing investors can relatively inexpensively offset the cost of capital increases associated with divestment. In similar thoughts, Davies and Van Wesep (2018) denote that responsible investors' cost of capital impact is short-lived and mainly affects short-term stock prices. Consequently, divestment has little effect on managerial decision-making because their remuneration in stock options is relatively long-term. On the other hand, Landier and Lovo (2020) theorizes that divestment affects aggregate sustainable performance under search friction, even when responsible investors are profit-maximizing. Further, Edmans et al. (2022) model that best-in-class divestment is more effective than divestment from polluting industries because it incentivizes firm behavior.

We contribute to this literature by addressing the implicit assumption of no information asymmetries on sustainable performance. Most related to our paper is the work of Avramov

et al. (2021), who append Pástor et al. (2021), and theorizes that uncertainty in ESG ratings reduces the willingness of investors to pay the costs associated with divesting. In this paper, we go one step further and find that divestment deteriorates aggregate sustainable performance when investors do not accurately assess the sustainable performance of firms and rely on directionally incorrect ESG ratings. By highlighting the role of information asymmetries in assessing sustainable performance, we also elaborate on the trade-off between divestment and engagement. Recent theoretical literature argues that engagement contributes more to aggregate sustainable performance than divestment (Berk and van Binsbergen, 2021). For instance, Broccardo et al. (2020) theorize that engagement results in better societal outcomes than divestment when investors care about the aggregate sustainable performance of firms and coordinate. Oehmke and Opp (2020) further formalize that such a broad investment mandate and investor coordination constitute necessary conditions for engagement to be effective.

We argue that the difference in efficacy between engagement and divestment is further amplified under information asymmetries. Specifically, responsible investors who use ESG ratings will primarily engage with sustainable firms under information asymmetries while they would otherwise target unsustainable firms. Even though it is plausible to assume that this ESG-rating-based engagement will be less efficient in promoting aggregate sustainable performance than engaging with unsustainable firms, the outcomes are substantially better compared to divestment, which deteriorates aggregate sustainable performance.

Last, we also contribute to the literature on ESG ratings. The ESG rating literature focuses on how ESG ratings diverge across multiple ESG rating agencies (Gibson et al., 2019; Berg et al., 2020; Serafeim, 2020; Christensen et al., 2021). For instance, Chatterji et al. (2016) show that ESG ratings diverge because rating agencies differ in how they define and measure sustainable performance, Yang (2020) denotes adverse incentives of ESG rating agencies as a source of rating divergence, and Berg et al. (2022) address differences in the methodologies, scope, and weights of ESG ratings. We extend this line of research by showing that ESG ratings are inversely related to sustainable performance. This directional incorrectness of ESG ratings in measuring sustainable performance fundamentally differs from the previously observed variance and questions the use of ESG ratings in academic literature and practice altogether.

The remainder of the paper is structured as follows. Section 2 describes our data, while section 3 introduces two methods to identify inflated ESG ratings. Section 4 verifies that ESG ratings are inflated because of divestment-induced cost of capital reductions. Section 5 concludes and highlights several practical implications of our work.

2 Data

To segregate the future promises of sustainable performance from current realizations, we require granular information on ESG policies, activities, targets, controversies, and performance. We collect this information from the Refinitiv ESG database (formerly Asset4 ESG). This database contains 466 granular ESG variables for a worldwide sample of 7,232 unique listed non-financial companies from 2003 to 2020 with 31,832 firm-year observations. We segregate this detailed ESG information into SASB materiality groups and categorize each variable as ESG reporting, policies, activities, targets, controversies, or performance (see Table 1). Our sample covers an average combined market capitalization of 21.6 trillion USD, with 90.2 trillion USD or 85% of worldwide market capitalization in 2020.⁵ These companies reside in the mining, construction, generic manufacturing, utilities, retail & wholesale, service, health care, ICT, food & beverages, and petrochemical manufacturing industries, of which 3,123 are domiciled in North America, 1,555 in Eastern Asia, 1,318 in Western Europe, 343 in Oceania, and 676 in Latin America, the Middle East, and Africa. We also collect Refinitiv, MSCI IVA, and FTSE industry-adjusted ESG ratings from Refinitiv and Factset; firm characteristics and accounting information from Compustat US and Compustat Global; stock price information from CRSP and Compustat Global; bond yields from TRACE, Refinitiv and Factset; and issuer Moody's and Fitch credit ratings from Eikon.⁶

To the best of our knowledge, Refinitiv ESG comprises the most comprehensive scope of granular ESG information. The benefit of this dataset is that it enables us to match ESG policies, targets, activities, performance, and controversies on similar aspects of ESG. For these

⁵<https://www.sifma.org/resources/research/fact-book/>

⁶Refinitiv, MSCI IVA, and FTSE ratings are converted to a 0 to 10 scale for which 10 represents AAA, the best possible score, and 0 CCC, the worst possible score. MSCI IVA ESG ratings capture AAA, AA, ect. ratings not the difference between KLD strengths and weaknesses.

reasons, Refinitiv ESG is frequently used in scholarly work (see Gibson et al., 2019). However, Berg et al. (2020) argue that Refinitiv ESG ratings are unstable and back-filled over time as Refinitiv adjusts its rating methodology. Notwithstanding their valid claims, our paper is mainly unaffected by this back-filling bias.

First, whereas Berg et al. (2020) argue that Refinitiv ESG ratings are unstable due to methodological changes, we rely on their granular underlying ESG information that should be unaffected by methodological changes. Second, we collected our Refinitiv ESG information in 2021, after Refinitiv's most significant ESG rating methodology change in April 2020. Last, to reduce the potential impact of back-filling in Refinitiv ESG ratings as much as possible, we will separately perform our empirical analyses for Refinitiv, MSCI IVA, and FTSE ESG ratings.

After cleaning the Refinitiv ESG dataset, we retain 169 of the 466 granular ESG variables provided by Refinitiv. Not all information in the Refinitiv ESG dataset is immediately useable in empirical applications. For instance, some variables are near empty due to imperfect data coverage or because the information is narrow in scope. In addition, multiple granular Refinitiv ESG variables often overlap and measure the same ESG aspects for different firms. We correct this by removing and merging ESG variables where needed. Furthermore, we also divide several continuous ESG variables by total assets to incorporate scale differences (similar to Bams et al., 2022). Finally, our selections procedure of 169 variables is not that different from the one employed by Refinitiv itself, which retains 177 variables when computing their ESG ratings.⁷

Additionally, we correct for a reporting bias in Refinitiv ESG data. Several self-reported ESG policy, activity, and target variables are partially missing and boolean. Since Refinitiv screens the annual sustainability reports of firms, we presume that they accurately assess whether firms have specific ESG policies, activities, and targets. We interpret this incomplete ESG policy, activity, and target information in Refinitiv ESG as missing because firms often have incentives to report these positive aspects of sustainable performance. This data interpolation covers approximately 10% of our sample in most cases. We similarly interpret incomplete ESG controversy variables as missing since the news outlets screened by Refinitiv have incen-

⁷https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/ESG-scores-methodology.pdf.

tives to report on unsustainable behavior when this arises. Due to the sheer quantity of ESG variables in Refinitiv ESG, we provide our exact variable compilation in Appendix A.

3 Method

3.1 Segregating promised and realized sustainable performance

The multidimensionality in granular Refinitiv ESG information enables us to segregate promises of future sustainable performance from realized sustainable performance using the Wittkowski et al. (2004) multi-criteria rank-ordering algorithm. ESG reporting, policies, activities, and targets represent an applicable proxy for promises of sustainable performance because this information is often self-reported by the firm and not necessarily realized due to information asymmetries (Lyon and Maxwell, 2011; Fatemi et al., 2018). Further, ESG controversies and performance are a suitable proxy for realized sustainable performance since this information captures the realizations of promised ESG across a broad spectrum of sustainable performance. Moreover, this information is often collected via third-party sources like media, NGO reports, and governments. This method resembles the setup of the Non-Financial Reporting Directive, which requires firms to report on their ESG risks (controversies), their responses to these risks (policies, targets, activities), and the outcomes of these responses (performance) European Commission (2014, 2017).

We score relative multivariate firm performance based on weak dominance. As a first step, we compare the relative sustainable performance, *ESG*, for all aspects of ESG, x , across firms, f in Equation (1). A firm is superior to another firm in that industry when it is at least strictly better in one aspect of ESG and equal or better in all others. Subsequently, we compute the relative promised and realized ESG scores for each firm individually by subtracting the number of firms for which the firm is inferior from the number of firms for which it is superior, see Equation (2). Therefore, promised and realized ESG scores interpret as ESG ratings because they order the relative sustainable performance of firms within the same industry. See Table 2 for summary statistics on our industry-specific promised ESG and realized ESG scores. We report all scores on a 0 (inferior) to 10 (superior) scale to directly match the scale of ESG

ratings. To illustrate, firms with controversy scores of 10 have no controversies and weakly outperform all other firms in that year and industry.

$$ESG_f > ESG_{f'} \Leftrightarrow (\forall_{x=1,2,\dots,X} ESG_{fx} \geq ESG_{f'x} \cap \exists_{x=1,2,\dots,X} ESG_{fx} > ESG_{f'x}) \quad (1)$$

$$Rank(ESG_f) = \sum_{f'} I(ESG_f > ESG_{f'}) - \sum_{f'} I(ESG_f < ESG_{f'}) \quad (2)$$

Our application of the Wittkowski et al. (2004) method has several key advantages over ESG rating methodologies. First, we solely compare firms within the same industry and point in time. It would be unrealistic to assume that, for example, firms in the mining industry are comparable to ICT firms in their sustainable performance. Moreover, sustainable performance can significantly vary over time and often converges within the industry on some aspects (Ioannou and Serafeim, 2019). Therefore, we compute all scores for every sector and year separately.

Second, in contrast to ESG ratings, our non-parametric method does not rely on arbitrary parametric weighting schemes to determine sustainable performance (Berg et al., 2022). Our algorithm decide which aspects of sustainable performance are relevant within each industry given the distribution of granular ESG information. For instance, when specific controversies are uncommon, firms that experience these controversies will receive lower realized ESG scores than firms with more common controversies in that industry. Alternatively, when reporting on specific aspects of sustainable performance is an industry norm, firms will be more heavily penalized when they do not comply.

Last, our method appropriately deals with missing observations similarly to Refinitiv ESG after correcting the reporting bias (Berg et al., 2020). Not all variables have full coverage in Refinitiv ESG. Accordingly, we aggregate variables that capture similar underlying ESG information (see Appendix A). Subsequently, we solely select SASB material variables in each industry to insure variable relevance.⁸ Finally, we remove the reporting bias often found in approximately 10% of the binary policy, activity, and controversy variables. This selection does not significantly alter our scores but vastly decreases the share of missing information. The following section will use these promised and realized ESG scores to identify whether ESG ratings are inflated.

⁸<https://materiality.sasb.org/>

3.2 Identifying inflated ESG ratings

We regress the promised ESG and realized ESG scores of firms on Refinitiv, MSCI IVA, and FTSE ESG ratings to test whether ESG ratings accurately capture sustainable performance. In Equation (3), we specify $Rating_{i,t}$ as the ESG rating of firm i in period t , $ESG_{i,t}^{promised}$ and $ESG_{i,t}^{realized}$ as respectively the promised and realized ESG scores, $\gamma_{i,t}$ as a set of control variables, like firm size, year, industry, country fixed effects, and firm fixed effects, and $\varepsilon_{i,t}$ as error term. Here, we regress the Refinitiv ESG rating on the promised and realized ESG scores as a baseline estimation. To verify that our results are not specific to any ESG rating agency or subject to the back-filling reported by Berg et al. (2020), we perform additional analyses on MSCI IVA and FTSE ESG ratings.

In addition, we substitute the promised and realized ESG scores with individual ESG reporting, policy, activity, target, controversy, and performance scores for a more nuanced perspective on sustainable performance. We estimate these sub-scores using Equations (1) and (2) and the categorization of granular sustainable performance indicators in Table 1. As a precondition for inflated ESG ratings, we anticipate positive promised ESG score coefficients and insignificant or negative realized ESG score coefficients. In other words, inflated ESG ratings should solely capture promises of future sustainable performance improvements rather than realized sustainable performance. These promises should not materialize in the future.

$$Rating_{i,t} = \alpha + \beta_1 * ESG_{i,t}^{promised} + \beta_2 * ESG_{i,t}^{realized} + \gamma_{i,t} + \varepsilon_{i,t} \quad (3)$$

4 RESULTS

This section consists of five parts. First, we show that ESG ratings only capture promises of future sustainable performance improvements, not the realized sustainable performance of firms. Second, we illustrate that ESG ratings are also intertemporally inflated because firms do not follow through on their promises of sustainable performance. Third, we show that ESG rating inflation has a detrimental impact on the sustainable performance of ESG-rating-based SRI portfolios. Fourth, we provide multiple empirical specifications that show that firms with

inflated ESG ratings reduce their cost of capital. Last, we provide two indications that inflated ESG ratings causally reduce cost of capital.

4.1 An overreliance on promised ESG

As a first step, we verify the accuracy of our promised and realized ESG scores. Adopting non-parametric rank-ordering methods in ESG research is relatively new. Therefore, we want to verify that our promised and realized ESG scores reflect the promises and realizations of sustainable performance.

Table 3 displays a correlation matrix between promised and realized ESG scores, Refinitiv, MSCI IVA, and FTSE ESG ratings, and many sustainable performance indicators related to ESG controversies, environmental pollution, and labor conditions. Except for strikes, realized ESG scores negatively correlate to societal transgressions like increased emissions, controversies, and labor accidents. This indicates a positive relationship between realized ESG and sustainable performance. In contrast, promised ESG scores and Refinitiv, MSCI IVA, and FTSE ESG ratings are inversely related to sustainable performance as ratings increase with more ESG controversies, more pollution, and worse labor conditions. In other words, polluting firms report more. In Appendix B, we further assert the accuracy of promised and realized ESG scores.

As a first indication that ESG ratings are inflated, we show that ESG ratings solely capture promises of future sustainable performance improvements. In Table 4, we regress the Refinitiv ESG ratings of firms on their promised and realized ESG scores, as proposed in Equation (3). In columns (1) to (3), we observe a persistent positive relation of promised ESG scores to Refinitiv ESG ratings and a negative association of realized ESG scores to Refinitiv ESG ratings. In economic terms, a one standard deviation increase in the promised ESG rank of firms enhances their Refinitiv ESG ratings by, on average, 0.35 standard deviations over the first three specifications. Contrastingly, ESG ratings recede by 0.04 standard deviations for a one standard deviation increase in the realized ESG scores of firms. Our findings are robust to a further decomposition of promised ESG across respectively ESG reporting, policy, activity, and target scores, and realized ESG across controversy and performance scores in Columns (4)

to (6). Therefore, Refinitiv ESG ratings are inversely related to sustainable performance and solely capture promises of future sustainable performance improvements.

This finding persists for MSCI IVA and FTSE ESG ratings in Tables 5 and 6. For both MSCI IVA and FTSE ESG ratings, we observe a strong positive effect of promised ESG on ESG ratings. However, we observe only an insignificantly negative impact of realized ESG on MSCI IVA ESG ratings. This insignificant effect is driven by a positive impact of ESG performance on ESG rating and a negative relation to ESG controversies. In other words, MSCI IVA ESG ratings improve when firms have more ESG controversies. For FTSE ESG ratings, we observe a negative effect of realized ESG on ESG ratings in our most strict specification. Therefore, Refinitiv, MSCI IVA, and FTSE ESG ratings are inversely related to sustainable performance and thus contemporarily inflated.

We verify that these results hold for many robustness specifications. To remove any doubt that our methodological specification of promised and realized ESG scores might drive our findings, we separately perform these regressions on the raw Refinitiv ESG data in Appendix B and observe similar effects. Moreover, we verify that our results persist for multiple periods, industries, and geographic regions in Appendix C.

4.2 Empty promises of future sustainable performance improvements

In this section, we investigate whether ESG ratings are also intertemporally inflated. We previously observed that ESG ratings are contemporaneously inflated because ESG ratings negatively relate to realized sustainable performance. However, this negative contemporaneous relation between ESG ratings and realized sustainable performance might be warranted if firms that previously underperformed in sustainable performance significantly improve their future realized sustainable performance. Therefore, we analyze whether firms follow through on their past promises of sustainable performance up to 10 years in the future. We provide decisive evidence that ESG ratings are inflated when firms do not realize their promises of future sustainable performance.

In Table 7, we regress ESG controversies and ESG performance scores at the firm level up to ten years in the future on contemporaneous promised ESG scores and their sub-components.

We find that promised ESG and ESG reporting, policy, activity, and target scores do not or negatively predict contemporaneous and future realized sustainable performance because we observe jointly negative or insignificant coefficients in all specifications. These results persist when we shift our horizon to 5 years or 15 years of future realized sustainable performance. This indicates that ESG ratings are both contemporaneously and intertemporally inflated as firms can improve their ESG ratings by promising future sustainable performance without following through on these promises.⁹

To further validate the robustness of our findings, we explicitly model the multidimensionality of ESG information by separately computing promised ESG and realized ESG scores at the SASB group level (as assigned in Table 1). When we regress the SASB group-specific promised and realized ESG scores in Table 8, we observe in 12 out of 14 SASB groups an insignificant or negative relation between promises of sustainable performance and matching future realizations. In other words, we find that policies, targets, and activities regarding greenhouse gas emissions, water and wastewater management, customer welfare, selling practices, labor practices, employee health safety, employee management, supply chain management, materials source management, business ethics, and legal and regulatory concerns do not or negatively predict current and future ESG controversies and ESG performance on the same topics. This leads us to conclude that ESG ratings are inflated.

4.3 SRI with inflated ESG ratings

Now that we show that ESG ratings are inflated, we want to quantify their impact on SRI to further establish cost of capital as a channel for ESG rating inflation. To do so, we construct hypothetically screened ESG-rating-based SRI portfolios. Constructing hypothetical screened SRI portfolios is common in the SRI literature (see Dyck et al., 2019). We build these portfolios based on negative, positive, integrated (both positive and negative), and best-in-class screening procedures.

For these screening procedures, we respectively exclude firms with the 10% lowest ESG

⁹Appendix B shows that these results hold when we recompute time-invariant promised and realized ESG scores. In other words, even when we purposefully do not correct for aggregate improvements in sustainable performance over time within industries, we still observe a negative relation between promised and realized sustainable performance.

ratings, twice overweigh firms with the highest 10% ESG ratings, both exclude low ESG rating firms and overweigh high ESG rating firms, and exclude all but the highest 10% ESG rating firms at the industry-level using the average of industry adjusted Refinitiv, MSCI IVA and FTSE ESG ratings (similar to Dyck et al., 2019; Gibson et al., 2021). Averaging ESG ratings simultaneously removes a large share of the potential back-filling bias in Refinitiv ESG ratings (Berg et al., 2020). Moreover, we remove all sin stocks in the tobacco, gambling, firearms, and nuclear industries from our SRI portfolios (Hong and Kacperczyk, 2009).

Inflated ESG rating-based SRI underperforms conventional investing in terms of sustainable performance. In Table 9, we assess the one-year out of sample environmental pollution, labor conditions, and ESG controversies across multiple SRI portfolios as a proxy for respectively environmental, social, and governance sustainable performance (similar to Krueger et al., 2020; Bams et al., 2022). Pollution, labor conditions, and ESG controversies worsen with ESG rating screening intensity. For instance, negative, positive, integrated, and best-in-class screened portfolios have on average 4.02%, 20.37%, 30.26%, and 216.51% more controversies than the no sin stock benchmark. Additionally, they respectively attain 8.85%, 3.88%, 11.97%, and 39.58% more emissions when comparing the average percentage changes across CO_2 , NO_X , VOC, and particulate matter emissions to the no sin stock portfolio. Last, they even uphold respectively 3.17%, 6.49%, 9.97%, and 76.95% worse labor conditions when comparing the average percentage changes across strikes, accidents/assets, and fatalities/assets.¹⁰ Given the above, ESG-rating-based SRI screening deteriorates a portfolio's sustainable performance as it favors unsustainable firms at the expense of sustainable firms. Given the magnitude of this deterioration in sustainable performance, we deem it likely that inflating ESG ratings can significantly affect the cost of capital.

Our realized ESG scores pose a potential alternative to ESG ratings and enable socially conscious investors to invest responsibly. In Table 10, we perform a similar analysis to Table 9 for realized ESG rank screened portfolios. In contrast to ESG rating screening, realized ESG score screening intensity is positively associated with out-of-sample sustainable performance. There-

¹⁰In Appendix D, we show that sustainable and financial performance analyses hold for 5% and 25% threshold screening procedures. We observe stronger sustainable performance deterioration for the 5% ESG screening where appropriate.

fore, socially responsible investors should focus on realized sustainable performance measures rather than ESG ratings that capture promises of sustainable performance.

4.4 Cost of capital incentives for ESG rating inflation

In this section, we test whether firms attain cost of capital benefits by inflating their ESG ratings. First, we regress the average ESG rating of firms on multiple cost of capital estimates in excess of common risk factors. Subsequently, we indicate that inflating ESG ratings causes cost of capital reductions by exploiting a shock in regulation that increases ESG reporting requirements for Austrian companies, but not for Swiss companies, in a differences-in-differences setting. Further, we provide a second indication of causality by considering the relation between inflated ESG ratings and inflated credit ratings.

We estimate the weighted average cost of capital of firms by averaging six estimates of cost of equity and cost of debt. The empirical cost of capital literature does not provide a universally optimal way to estimate cost of equity due to diverging data requirements and model accuracy. Cost of equity estimates can be categorized into four distinct estimation techniques: factor model-based approaches, firm characteristic-based models, implied cost of capital models, and fitted implied cost of capital models (Lee et al., 2021). We compute one cost of equity estimate for each category to address their relative strengths and weaknesses and ensure the robustness of our findings. Specifically, we estimate cost of equity using the Fama and French (2015, 2017) international 5-factor model, the Chattopadhyay et al. (2021) firm characteristic based, the Gebhardt et al. (2001) implied cost of capital measure, and the Hou et al. (2012) fitted implied cost of capital model, as suggested by Lee et al. (2021). In our empirical application, we take the average of these cost of equity estimates where data is available. Appendix E provides further details on each cost of equity estimate and their respective computation.

In addition to cost of equity, we compute two proxies of cost of debt. As a first proxy, we measure firm-level average yield to maturity by weighing individual firms' bond yields with their amount outstanding, similar to Flammer (2021). We retrieved bond yield information from TRACE, Refinitiv, and Factset for 32% of the firms in our sample. To extend our coverage, we also approximate the cost of debt with Compustat US and Computat Global data by using the

ratio of interest expense over total debt. This approach resembles Van Binsbergen et al. (2010), who use interest expense over total assets, but deviates in the denominator to accommodate bond yields better. In a final step, we compute the weighted average cost of capital by weighting the averages of our four cost of equity and two cost of debt estimates with the book-based leverage ratio of firms.

In Table 11, we regress the average of Refinitiv, MSCI, and FTSE ESG ratings on the weighted average cost of capital, the average cost of equity, and the average cost of debt across multiple specifications. We observe a negative relation between firms' cost of capital and their ESG ratings (similar to El Ghouli et al., 2011; Chava, 2014). This effect strengthens after we control for common risk characteristics like firm size, industry, domicile, and even credit ratings or firm fixed effects. In economics terms, a one standard deviation increase in the average ESG rating of a firm decreases its cost of capital by 5 to 24 basis points, depending on the specification. This reduction in cost of capital is mainly attributed to reductions in cost of equity as we observe no significant effect of ESG ratings on cost of debt after introducing firm fixed effects. We observe similar results for individual cost of equity or debt measures in Appendix E. Therefore, cost of capital is persistently negatively related to inflated ESG ratings.

4.5 An indication of causality

4.5.1 Non-Financial Reporting Directive

We show in the previous section that firms face considerable cost of capital incentives to inflate their ESG ratings. However, this correlational analysis does not indicate that ESG rating inflation causes a negative relation between cost of capital and ESG ratings. To verify this, we need to rule out the impact of potential changes in sustainable performance on the cost of capital by identifying an exogenous shock in promises of future sustainable performance unrelated to realizations of sustainable performance. This shock also needs to be exogenous of cost of capital except through its impact on promises of future sustainable performance. We consider the introduction of the European Commission 2014 Non-Financial Reporting Directive (NFRD) as such regulatory shock.

The NFRD obligates all large public interest companies domiciled in European Union mem-

ber states to extensively report on their sustainable performance (European Commission, 2014). This directive aims to enhance the “transparency of the social and environmental information” (European Commission, 2014, ,page 1). In other words, this regulation forces select firms to report more extensively on their promised future sustainable performance improvements without altering their underlying realized sustainable performance.

Since the directive solely affects European Union member states, not all European firms are equally affected by this regulation. Therefore, we can analyze the introduction of the NFRD in a quasi-experimental difference-in-differences setting for which select treated firms domiciled in European Union member states are forced to extensively report on their sustainable performance. In contrast, other control companies not domiciled in European Union member states are excluded from additional reporting requirements. A difference-in-differences approach is applicable in this setting because the treatment and control group allocation is unrelated to sustainable performance. The NFRD also provides a relatively immediate treatment in 2014 as it appended a previous European Commission directive from 2013, limiting pre-emptive regulatory compliance (European Commission, 2014).

We consider Austrian firms as treated and Swiss firms as a control group. Political, social, and cultural factors play a critical role in how companies report on their sustainable performance. Austria and Zwitterland are neighboring countries and similar in size. They are also alike in macroeconomic conditions, political orientation, and even reminiscent of language and cultural perspectives. Therefore, it is not unreasonable to assume that companies in Austria and Zwitterland are comparable in their sustainable performance reporting before the introduction of the NFRD. As a result, the NFRD should be the only factor that changes the promises of sustainable performance in treated Austrian firms and not in untreated Swiss firms. Accordingly, we argue that the NFRD provides a credible setting for a difference-in-differences analysis to investigate whether ESG rating inflation causally reduces the cost of capital.

In Figure 1, we provide a graphical representation of our difference-in-differences analysis for the weighted average cost of capital, cost of equity, and cost of debt. As a first step, we observe a relatively stable common trend in the weighted average cost of capital, equity, and debt, for Austrian and Swiss firms before the introduction of the NFRD in 2014. Given this

common trend, we find that the treated Austrian firms experience a weighted average cost of capital reduction of 0.72 percentage points in 2014 compared to the Swiss control firms. Reminiscent of our results in Table 11, this effect is predominantly driven by a decrease in cost of equity of 1.52 percentage points. We do not observe a significant deviation in treatment and control for cost of debt. However, the reduction in weighted average cost of capital seems to be relatively short-lived. Our results are robust after controlling for industry and size. Given the above, our difference-in-differences analyses provide a first indication that firms inflate their ESG ratings because of cost of capital incentives.

4.5.2 Inflated credit ratings

We provide a second indication that firms inflate their ESG ratings because of cost of capital incentives by considering inflated credit ratings. The ability of firms to inflate credit ratings provides a suitable proxy for their capability to inflate ESG ratings for three reasons. First, firms have near-identical cost of capital incentives to inflate credit ratings and ESG ratings as improvements in either rating augment the pool of eligible investors (Kisgen and Strahan, 2010; Serafeim, 2020). Therefore, those firms most constrained in their capital face additional incentives to inflate both ratings. Second, asymmetric information is the channel that enables firms to inflate both credit ratings and ESG ratings (White, 2010; Berg et al., 2022). Last, firms that maintain the appropriate infrastructure and personnel to retrieve credit risk information likely face synergies in producing ESG reports, which augment ratings.

Inflated credit ratings enable us to identify that firms inflate their ESG ratings because of cost of capital incentives. There is no direct relationship between credit ratings and ESG ratings, except for similar benefits to rating inflation, since credit ratings and ESG ratings capture a different underlying. Precisely this difference in underlying enables us to capture the cost of capital reductions associated with ESG rating inflation while exogenising the impact of sustainable performance on financial performance. To clarify, inflated credit ratings allow us to identify which firms benefit most from rating inflation in ways unrelated to sustainable performance.

We identify which firms have inflated credit ratings by estimating the probability of a firm

having an inflated credit rating. We compute this probability using a mixed distribution model based on credit risk distributions conditional on credit ratings, similar to Boermans and Kroft (2022). This mixed distribution model indicates whether a bond is too optimistically rated given its credit risk relative to other similarly rated bonds. Since our analysis is at the firm level, we use issuer credit ratings and weighted yield spreads. We compute these yield spreads by weighing the individual bond yields with their amount outstanding at the firm level and subtracting the intra-bank 1-month yields matching the bond's currency. Subsequently, we estimate yield spread distributions conditional on the issuer Moody's and Fitch credit ratings and perform a mixed distribution model to estimate a firm's probability of receiving a lower credit rating dependent on its point in time credit risk. To remove potential size or risk effects that impact credit ratings and ESG ratings, we remove the fitted credit risk and size components from our probabilities by regressing them on the weighted yield spread and the natural logarithm of total assets. We refer to Boermans and Kroft (2022) for exact details on the computation.

In Table 12, we regress the probability of a firm having an inflated credit rating on promised and realized ESG scores and ESG reporting, policies, activities, targets, controversies, and performance sub-scores. We find that firms who benefit most from inflating their credit ratings solely increase promised ESG. Moreover, ESG reporting, policies, targets, and activities increase with the probability of a firm having an inflated credit rating, whereas ESG performance remains unaffected, and ESG controversies become more frequent. In economic terms, a one standard deviation increase in the probability of a bond having an inflated ESG rating results in an 0.04, 0.09, 0.07, and 0.12 standard deviation increase in respectively promised ESG scores and ESG reporting, policy, activity, and target sub-scores. Therefore, precisely those firms with the highest cost of capital benefits most severely inflate their ESG ratings. These two causality analyses provide a strong indication that firms inflate their ESG ratings because of the cost of capital incentives provided by ESG-rating-based SRI.

5 Conclusion

In this paper, we contribute to the literature that addresses the impact of SRI on aggregate sustainable performance (Heinkel et al., 2001; Oehmke and Opp, 2020). Specifically, Pástor et al. (2021), Avramov et al. (2021), and Berg et al. (2021) show that ESG-rating-based SRI improves aggregate sustainable performance by assuming that investors correctly (albeit with noise) assess the sustainable performance of firms. In practice, socially responsible investors experience difficulties evaluating the sustainable performance of firms and often rely on ESG ratings when investing sustainably (Hartzmark and Sussman, 2019). We show that this provides cost of capital incentives for unsustainable firms to inflate their ESG ratings. As a result, ESG-rating-based SRI underperforms conventional investing in sustainable performance. This will unintentionally increase the threshold for new sustainable investments because sustainable firms face higher capital costs. Therefore, SRI might be counterproductive for aggregate sustainable performance when investors rely on ESG ratings.

We also contribute to the literature on ESG ratings. The ESG rating literature shows that ESG ratings diverge across multiple ESG rating agencies (Chatterji et al., 2016; Berg et al., 2022; Gibson et al., 2019; Serafeim, 2020; Christensen et al., 2021). We append this line of research by showing that ESG ratings are not just volatile but even directional incorrect proxies for sustainable performance. Specifically, we show that Refinitiv, MSCI IVA, and FTSE ESG ratings solely capture promises of future sustainable performance improvements but not the realized sustainable performance of firms. Since these promises do not materialize up to 15 years in the future, even when we match realizations with promises at specific facets of sustainable performance, we fundamentally question the use of ESG ratings in both academia and practice.

Our findings provide practical implications for investors and regulators. The unintentional cost of capital incentives provided by ESG-rating-based SRI are likely to persist because socially conscious investors experience difficulties uncovering the sustainable performance of firms under information symmetries (Drempetic et al., 2019; Yang, 2020). We recommend that socially conscious investors rely on realized sustainable performance measures to alleviate these societal concerns. For instance, they could use our realized ESG scores in their

SRI screening activities instead of ESG ratings. We empirically document that best-in-class screening procedures based on our realized ESG measure reduce ESG controversies by almost two-thirds while providing fewer emissions and superior labor conditions compared to an unscreened benchmark. This alternative screening could improve aggregate sustainable performance and allocate the intended benefits towards more sustainable firms. Moreover, when this shift in portfolios occurs at a large scale, it might remove the incentives to inflate ESG ratings and curtail greenwashing.

From a regulatory perspective, we stress the need for an ESG reporting standard. Many managers of socially responsible firms do not report as extensively on their sustainable performance. One potential explanation of this phenomenon is that managers fear that the information leakage of ESG reporting could be more costly than its associated cost of capital reductions (see Ioannou and Serafeim, 2019). Therefore, a realized sustainable performance reporting standard might add value to the aggregate economy as it allows knowledge spill-overs from firms that are more advanced in their sustainable performance to less sustainably developed firms. Additionally, with more available information, socially responsible investors could better allocate their capital and promote sustainable firms by reducing their cost of capital instead of penalizing them due to their reliance on ESG ratings. It is instrumental that such reporting standard requires firms to report on both their promised and realized sustainable performance via ESG policies, activities, targets, performance, and controversies on similar facets of sustainable performance.

This paper identifies two limitations. First, we comply with the SRI literature in constructing hypothetically screened SRI portfolios with ESG ratings Dyck et al. (2019). This assumption is not unreasonable because Hartzmark and Sussman (2019) show that investors use ESG ratings in practice. However, not all socially responsible investors equally rely on ESG ratings. Notably, some investors can directly assess the sustainable performance of firms without the need for ESG ratings Barber et al. (2021). In this instance, SRI screening would provide cost of capital incentives to sustainable firms, as predicted by Pástor et al. (2021). In addition, shareholder activism will improve societal welfare even when it targets firms based on inflated ESG ratings, albeit with diminished efficacy (Dimson et al., 2015). Nevertheless, we deem the

impact of ESG-rating-based SRI screening on aggregate sustainable performance substantial because, in practice, 46 out of the 50 largest investors worldwide use MSCI ESG ratings alone to construct their portfolios (Ioannou and Serafeim, 2019). Moreover, the cost of capital reductions that we observe are unaffected by this limitation as we still observe significant benefits for firms to inflate their ESG ratings.

Second, we only have access to Refinitiv, MSCI IVA, and FTSE ESG ratings, whereas prior ESG rating literature also considers Sustainalytics, Vigeo-Eiris, RobecoSAM, KLD, and many more ESG ratings. Despite the persistence in our findings, it is possible that these alternative ESG ratings are not inflated. However, we deem this improbable because Refinitiv and MSCI IVA ESG ratings are among investors' most commonly used ESG ratings (Widyawati, 2020). Moreover, our cost of capital analysis considers the aggregate effect of ESG rating inflation across all ESG ratings because it uses market data.

Bibliography

- Auer, B. R. (2016). Do socially responsible investment policies add or destroy european stock portfolio value?, *Journal of Business Ethics* **135**(2): 381–397.
- Avramov, D., Cheng, S., Lioui, A. and Tarelli, A. (2021). Sustainable investing with ESG rating uncertainty, *Journal of Financial Economics* .
- Baghai, R. P. and Becker, B. (2018). Non-rating revenue and conflicts of interest, *Journal of Financial Economics* **127**(1): 94–112.
- Bams, D., Kroft, B. and Maas, K. (2022). Connecting the dots: An integrative framework of CSR antecedents, heterogeneous CSR approaches, and sustainable and financial performance, *Available at SSRN 3906715* .
- Barber, B. M., Morse, A. and Yasuda, A. (2021). Impact investing, *Journal of Financial Economics* **139**(1): 162–185.
- Berg, F., Fabisik, K. and Sautner, Z. (2020). Rewriting history II: The (un) predictable past of ESG ratings, *European Corporate Governance Institute Working Paper* .
- Berg, F., Koelbel, J. F. and Rigobon, R. (2022). *Aggregate confusion: The divergence of ESG ratings*, *Forthcoming Review of Finance*.
- Berg, F., Kölbel, J. F., Pavlova, A. and Rigobon, R. (2021). ESG Confusion and Stock Returns: Tackling the Problem of Noise, *Available at SSRN 3941514* .
- Berk, J. and van Binsbergen, J. H. (2021). The impact of impact investing, *Available at SSRN 3909166* .

- Boermans, M. A. and Kroft, B. (2022). Capital regulation induced reaching for systematic yield: Financial instability through fire sales, *Available at SSRN 3542264* .
- Bonnefon, J.-F., Landier, A., Sastry, P. and Thesmar, D. (2022). Do investors care about corporate externalities? Experimental evidence, *HEC Paris Research Paper* .
- Broccardo, E., Hart, O. D. and Zingales, L. (2020). Exit vs. voice, *Technical report*, National Bureau of Economic Research.
- Chatterji, A. K., Durand, R., Levine, D. I. and Touboul, S. (2016). Do ratings of firms converge? implications for managers, investors and strategy researchers, *Strategic Management Journal* **37**(8): 1597–1614.
- Chattopadhyay, A., Lyle, M. R. and Wang, C. C. (2021). Expected stock returns worldwide: A log-linear present-value approach, *Harvard Business School Accounting & Management Unit Working Paper* (18-079).
- Chava, S. (2014). Environmental externalities and cost of capital, *Management Science* **60**(9): 2223–2247.
- Christensen, D. M., Serafeim, G. and Sikochi, S. (2021). Why is corporate virtue in the eye of the beholder? The case of ESG ratings, *The Accounting Review*, <https://doi.org/10.2308/TAR-2019-0506> .
- Clementino, E. and Perkins, R. (2020). How do companies respond to environmental, social and governance (ESG) ratings? Evidence from Italy, *Journal of Business Ethics* pp. 1–19.
- Davies, S. W. and Van Wesep, E. D. (2018). The unintended consequences of divestment, *Journal of Financial Economics* **128**(3): 558–575.
- Dimson, E., Karakaş, O. and Li, X. (2015). Active ownership, *The Review of Financial Studies* **28**(12): 3225–3268.
- Drempetic, S., Klein, C. and Zwergel, B. (2019). The influence of firm size on the ESG score: Corporate sustainability ratings under review, *Journal of Business Ethics* pp. 1–28.
- Dyck, A., Lins, K. V., Roth, L. and Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence, *Journal of Financial Economics* **131**(3): 693–714.
- Edmans, A., Levit, D. and Schneemeir, J. (2022). Socially responsible divestment, *Mimeo* .
- El Ghoul, S., Guedhami, O., Kwok, C. C. and Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital?, *Journal of Banking & Finance* **35**(9): 2388–2406.
- European Commission (2014). Directive 2014/95/eu of the european parliament. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0095&from=EN>.
- European Commission (2017). Guidelines on non-financial reporting (methodology for reporting non-financial information) (22017/c 215/01). Retrieved from https://ec.europa.eu/anti-trafficking/sites/antitrafficking/files/guidelines_on_non-financial_reporting.pdf.

- Fama, E. F. and French, K. R. (2015). A five-factor asset pricing model, *Journal of Financial Economics* **116**(1): 1–22.
- Fama, E. F. and French, K. R. (2017). International tests of a five-factor asset pricing model, *Journal of Financial Economics* **123**(3): 441–463.
- Fatemi, A., Glaum, M. and Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure, *Global Finance Journal* **38**: 45–64.
- Flammer, C. (2021). Corporate green bonds, *Journal of Financial Economics* **142**(2): 499–516.
- Gebhardt, W. R., Lee, C. M. and Swaminathan, B. (2001). Toward an implied cost of capital, *Journal of Accounting Research* **39**(1): 135–176.
- Gibson, R., Glossner, S., Krueger, P., Matos, P. and Steffen, Tom, D. (2021). Do responsible investors invest responsibly?, *Mimeo* .
- Gibson, R., Krueger, P. and Schmidt, P. S. (2019). ESG rating disagreement and stock returns, *Mimeo* .
- Hartzmark, S. M. and Sussman, A. B. (2019). Do investors value sustainability? a natural experiment examining ranking and fund flows, *The Journal of Finance* **74**(6): 2789–2837.
- Heinkel, R., Kraus, A. and Zechner, J. (2001). The effect of green investment on corporate behavior, *Journal of Financial and Quantitative Analysis* **36**(4): 431–449.
- Hong, H. and Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets, *Journal of Financial Economics* **93**(1): 15–36.
- Hou, K., Van Dijk, M. A. and Zhang, Y. (2012). The implied cost of capital: A new approach, *Journal of Accounting and Economics* **53**(3): 504–526.
- Ioannou, I. and Serafeim, G. (2019). Corporate sustainability: A strategy?, *Harvard Business School Accounting & Management Unit Working Paper* (19-065).
- Kisgen, D. J. and Strahan, P. E. (2010). Do regulations based on credit ratings affect a firm's cost of capital?, *The Review of Financial Studies* **23**(12): 4324–4347.
- Krueger, P., Sautner, Z. and Starks, L. T. (2020). The importance of climate risks for institutional investors, *The Review of Financial Studies* **33**(3): 1067–1111.
- Landier, A. and Lovo, S. (2020). ESG Investing: How to Optimize Impact?, *HEC Paris Research Paper No. FIN-2020-1363* .
- Lee, C. M., So, E. C. and Wang, C. C. (2021). Evaluating firm-level expected-return proxies: Implications for estimating treatment effects, *The Review of Financial Studies* **34**(4): 1907–1951.
- Lyon, T. P. and Maxwell, J. W. (2011). Greenwash: Corporate environmental disclosure under threat of audit, *Journal of Economics & Management Strategy* **20**(1): 3–41.
- Oehmke, M. and Opp, M. M. (2020). A theory of socially responsible investment, *Mimeo* .

- Pástor, L., Stambaugh, R. F. and Taylor, L. A. (2021). Sustainable investing in equilibrium, *Journal of Financial Economics* **142**(2): 550–571.
- Riedl, A. and Smeets, P. (2017). Why do investors hold socially responsible mutual funds?, *The Journal of Finance* **72**(6): 2505–2550.
- SASB (2021). SASB Materiality Map. Retrieved from <https://materiality.sasb.org/>.
- Serafeim, G. (2020). Public sentiment and the price of corporate sustainability, *Financial Analysts Journal* **76**(2): 26–46.
- Van Binsbergen, J. H., Graham, J. R. and Yang, J. (2010). The cost of debt, *The Journal of Finance* **65**(6): 2089–2136.
- Van Duuren, E., Plantinga, A. and Scholtens, B. (2016). ESG integration and the investment management process: Fundamental investing reinvented, *Journal of Business Ethics* **138**(3): 525–533.
- White, L. J. (2010). Markets: The credit rating agencies, *Journal of Economic Perspectives* **24**(2): 211–26.
- Widyawati, L. (2020). A systematic literature review of socially responsible investment and environmental social governance metrics, *Business Strategy and the Environment* **29**(2): 619–637.
- Wittkowski, K. M., Lee, E., Nussbaum, R., Chamian, F. N. and Krueger, J. G. (2004). Combining several ordinal measures in clinical studies, *Statistics in Medicine* **23**(10): 1579–1592.
- Wu, Y., Zhang, K. and Xie, J. (2020). Bad greenwashing, good greenwashing: Corporate social responsibility and information transparency, *Management Science* **66**(7): 3095–3112.
- Yang, R. (2020). What do we learn from ratings about corporate social responsibility (CSR)?, *Columbia Business School Research Paper* (18-37).

6 Tables and Figures

Table 1: Summary statistics on granular ESG data

This table provides summary statistics on all variables in our sample. We report these variables by SASB materiality group as given in Column 1. The categories critical incident management and systemic risk do not strictly follow the SASB definition as they also contain controversy variables. Subsequently, we categorise our data into ESG reporting, policies, activities, targets, controversies and performance in Column 3. Columns (4) to (8) contain summary statistics, respectively visualizing the number of observation, mean, standard deviation, minimum, and maximum for all variables in our sample.

SASB materiality group	Variable name	ESG type	N	mean	sd	min	max
Greenhouse gas emissions	Emission policy	Policy	31,832	0.52	0.50	0.00	1.00
	Emission trading	Activity	31,832	0.10	0.30	0.00	1.00
	Emission targets	Target	31,832	0.31	0.46	0.00	1.00
	Emission reduction target (%)	Target	31,832	2.35	10.99	0.00	100.00
	CO ₂ Emissions	Performance	26,209	0.00	0.01	0.00	0.65
Air quality	Staff transportation impact reduction	Activity	31,832	0.16	0.37	0.00	1.00
	Ozon-depleting substances	Performance	31,832	0.02	0.14	0.00	1.00
	NO _x and SO _x Emissions	Performance	5,627	0.01	0.14	0.00	5.68
	NO _x and SO _x Emission reduction	Performance	31,832	0.13	0.34	0.00	1.00
	VOC and PM Emissions	Performance	31,832	0.18	0.38	0.00	1.00
Energy management	VOC and PM Emission reduction	Performance	29,643	0.15	0.36	0.00	1.00
	Energy efficiency policy	Policy	31,832	0.54	0.50	0.00	1.00
	Energy efficiency targets	Target	31,832	0.22	0.41	0.00	1.00
Water and wastewater	Renewable energy ratio	Performance	11,159	0.00	0.05	0.00	0.99
	Water efficiency policy	Policy	31,832	0.38	0.49	0.00	1.00
	Water technologies	Activity	31,832	0.06	0.24	0.00	1.00
	Water efficiency targets	Target	31,832	0.14	0.34	0.00	1.00
	Water usage / assets	Performance	10,921	1.04	19.20	0.00	1252.88
Waste & hazardous management	Water recycled	Performance	2,567	0.04	0.61	0.00	21.66
	Water pollutant emissions	Performance	2,684	0.00	0.00	0.00	0.02
	Waste reduction initiatives	Activity	31,832	0.52	0.50	0.00	1.00
	Waste / assets	Performance	9,496	0.07	1.54	0.00	88.95
	Waste recycled (%)	Performance	31,832	0.15	0.31	0.00	1.00
Ecological impact	Hazardous waste	Performance	5,461	0.00	0.11	-0.00	5.66
	Toxic chemicals reduction	Performance	31,832	0.14	0.34	0.00	1.00
	Electronic waste reduction	Performance	31,832	0.13	0.34	0.00	1.00
	Environmental restoration initiatives	Activity	31,832	0.21	0.40	0.00	1.00
	Land environmental impact reduction	Policy	31,832	0.09	0.28	0.00	1.00
Human rights & Community relations	Biodiversity impact reduction	Policy	31,832	0.21	0.41	0.00	1.00
	Policy human rights	Policy	31,832	0.46	0.50	0.00	1.00
	Policy Community involvement	Policy	31,832	0.46	0.50	0.00	1.00
Customer privacy	Human rights compliance ILO/UN	Policy	31,832	0.21	0.41	0.00	1.00
	Donations / revenue	Performance	31,832	0.01	0.06	0.00	1.00
	Controversies privacy	Controversy	31,832	0.02	0.44	0.00	54.00
Data security	Policy data privacy	Policy	31,832	0.55	0.50	0.00	1.00
	Whistleblower protection	Policy	31,832	0.56	0.50	0.00	1.00
Access and affordability	HSMS certified percent	Policy	31,832	0.02	0.14	0.00	1.00
	Product discount emerging markets	Activity	9,218	0.03	0.16	0.00	1.00
Product quality and safety	Product access low prices	Activity	31,832	0.05	0.21	0.00	1.00
	Policy customer health safety	Policy	31,832	0.27	0.44	0.00	1.00
	Product recall	Performance	31,832	0.03	0.18	0.00	1.00
Customer welfare	Product responsibility monitoring	Activity	31,832	0.15	0.36	0.00	1.00
	Healthy food/products	Activity	31,832	0.08	0.28	0.00	1.00
Selling practices and product labelling	Controversies consumer complaints	Controversy	31,832	0.02	0.12	0.00	1.00
	Policy responsible marketing	Policy	31,832	0.03	0.18	0.00	1.00
	Policy fair trade	Policy	31,832	0.02	0.13	0.00	1.00
	Retailing responsibilities	Activity	31,832	0.01	0.12	0.00	1.00
	Ethical trading initiatives	Policy	31,832	0.00	0.07	0.00	1.00
Labor practices	Customer satisfaction	Performance	31,832	0.05	0.21	0.00	1.00
	Controversies wages working conditions	Controversy	31,832	0.02	0.15	0.00	1.00
	Policy child labor	Policy	31,832	0.24	0.43	0.00	1.00
	Policy forced labor	Policy	31,832	0.23	0.42	0.00	1.00
	Policy training and development	Policy	31,832	0.64	0.48	0.00	1.00
	Day care service	Activity	31,832	0.13	0.34	0.00	1.00
	Employee engagement voluntary work	Policy	31,832	0.52	0.50	0.00	1.00
	Training hours / assets	Performance	14,100	15.10	29.93	0.00	901.43
	Employee fatalities / assets	Performance	7,699	1.22	3.88	0.00	60.00
	Flexible working hours	Activity	31,832	0.25	0.43	0.00	1.00

Continued

Table 1 – continued

SASB materiality group	Variable name	ESG type	N	mean	sd	min	max	
	Employee satisfaction	Performance	2,249	75.85	10.35	0.66	100.00	
	Salaries/wages	Performance	3,448	154457.68	189282.94	125.28	995832.56	
	Net employment creation / assets	Performance	27,313	4.90	15.05	-20.26	47.31	
	Employee turnover	Performance	7,549	12.26	10.45	0.00	96.00	
Employee health and safety	Strikes	Controversy	31,832	0.02	0.15	0.00	1.00	
	Health safety policy	Policy	31,832	0.71	0.45	0.00	1.00	
	Employee health safety team	Activity	31,832	0.43	0.49	0.00	1.00	
	Health safety training	Activity	31,832	0.58	0.49	0.00	1.00	
	Accidents total/ assets	Performance	8,102	437.30	2653.02	0.00	115500.00	
	Injury rate	Performance	8,719	7.23	12.42	0.00	268.57	
	Occupational diseases	Performance	2,494	0.67	2.51	0.00	58.80	
Employee engagement	Policy board diversity	Policy	31,832	0.41	0.49	0.00	1.00	
	Policy diversity and opportunity	Policy	31,832	0.65	0.48	0.00	1.00	
	Internal promotion	Activity	31,832	0.29	0.45	0.00	1.00	
	HRC corporate equality index	Performance	2,498	72.44	33.53	-25.00	100.00	
	Targets diversity and opportunity	Target	26,184	0.14	0.35	0.00	1.00	
	Salary gap (%)	Performance	3,442	23.66	40.23	0.00	100.00	
	Women employees	Performance	31,832	0.13	0.19	0.00	0.99	
Product design and lifecycle management	Employees with disabilities	Performance	3,711	2.00	1.52	0.00	15.19	
	Sustainable packaging policy	Policy	31,832	0.16	0.37	0.00	1.00	
	Takeback and recycling initiatives	Activity	31,832	0.10	0.30	0.00	1.00	
	Environmental material sourcing	Activity	31,832	0.30	0.46	0.00	1.00	
	Environmental products	Activity	31,832	0.31	0.46	0.00	1.00	
	Eco-design products	Activity	31,832	0.13	0.34	0.00	1.00	
	Renewable energy products	Activity	31,832	0.11	0.32	0.00	1.00	
	Sustainable building products	Activity	31,832	0.05	0.21	0.00	1.00	
	Product impact minimization	Activity	31,832	0.19	0.39	0.00	1.00	
	Product environmental responsibilities	Activity	31,832	0.36	0.48	0.00	1.00	
	Environment management team	Policy	31,832	0.40	0.49	0.00	1.00	
	CSR sustainability committee	Policy	31,832	0.45	0.50	0.00	1.00	
	Global compact signatory	Reporting	31,832	0.16	0.37	0.00	1.00	
Business model resilience	Sustainability compensation executives	Activity	31,832	0.16	0.37	0.00	1.00	
	Integrated strategy in MDA	Policy	31,832	0.15	0.36	0.00	1.00	
	Environmental project financing	Activity	31,832	0.00	0.06	0.00	1.00	
	Environment management training	Policy	31,832	0.45	0.50	0.00	1.00	
	Green buildings	Performance	31,832	0.18	0.38	0.00	1.00	
	Environmental investment initiatives	Activity	31,832	0.15	0.36	0.00	1.00	
	Six sigma and quality management system	Policy	31,832	0.17	0.37	0.00	1.00	
	Environmental provisions / assets	Activity	3,455	0.39	7.53	0.00	319.30	
	Environmental expenditures / assets	Performance	6,553	0.20	2.99	0.00	173.43	
	Environmental investment expenditures	Performance	31,832	0.25	0.44	0.00	1.00	
	Environmental partnership	Activity	31,832	0.35	0.48	0.00	1.00	
	Contractor human rights breaches	Performance	31,832	0.14	0.35	0.00	1.00	
	Human rights contractors	Activity	31,832	0.33	0.47	0.00	1.00	
Supplier ESG training	Activity	31,832	0.14	0.34	0.00	1.00		
Supply chain management	Environmental supply chain policy	Policy	31,832	0.38	0.48	0.00	1.00	
	Environmental supply chain management	Policy	31,832	0.39	0.49	0.00	1.00	
	Policy supply chain health safety	Policy	31,832	0.22	0.42	0.00	1.00	
	Lost time injury rate contractors (%)	Performance	1,421	2.02	3.69	0.00	54.00	
	Resource reduction policy	Policy	31,832	0.66	0.47	0.00	1.00	
	Organic product initiatives	Activity	31,832	0.04	0.19	0.00	1.00	
	Resource reduction targets	Target	31,832	0.25	0.43	0.00	1.00	
	Energy usage	Performance	31,832	0.01	0.16	0.00	11.27	
	Renewable energy usage	Performance	31,832	0.00	0.00	0.00	0.39	
	Physical impact of climate change	Controversy	31,832	0.34	0.47	0.00	1.00	
	Business Ethics	Controversies tax fraud	Controversy	31,832	0.01	0.12	0.00	7.00
		Controversies business ethics	Controversy	31,832	0.07	0.55	0.00	46.00
		Controversy bribery corruption and fraud	Controversy	31,832	0.08	0.27	0.00	1.00
Controversies intellectual property		Controversy	31,832	0.03	0.34	0.00	18.00	
Policy bribery and corruption		Policy	31,832	0.63	0.48	0.00	1.00	
Policy business ethics		Policy	31,832	0.68	0.47	0.00	1.00	
Animal testing		Activity	31,832	0.06	0.24	0.00	1.00	
Competitive behavior		Policy	31,832	0.52	0.50	0.00	1.00	
Trade union representation		Activity	31,832	0.12	0.26	0.00	1.00	
Poison pill		Controversy	31,832	0.05	0.22	0.00	1.00	
Legal & regulatory environment	Quality management systems	Policy	31,832	0.42	0.49	0.00	1.00	
	OECD guidelines for multinationals	Policy	31,832	0.06	0.24	0.00	1.00	
	Stakeholder engagement	Activity	31,832	0.34	0.48	0.00	1.00	
	Real estate sustainability certificate	Policy	31,832	0.01	0.12	0.00	1.00	

Continued

Table 1 – continued

SASB materiality group	Variable name	ESG type	N	mean	sd	min	max
Critical incident risk management	Corporate responsibility awards	Performance	31,832	0.35	0.48	0.00	1.00
	Self-reported environmental fines	Performance	31,832	0.00	0.01	0.00	0.71
	Accounting controversies	Controversy	31,832	0.00	0.07	0.00	1.00
	Crisis management systems	Policy	31,832	0.38	0.48	0.00	1.00
	Controversies public health	Controversy	31,832	0.01	0.13	0.00	8.00
Systemic risk management	Accidental spills	Controversy	1,127	1.00	0.00	1.00	1.00
	Environmental controversies	Controversy	31,832	0.01	0.10	0.00	1.00
	Controversies anti-competition	Controversy	31,832	0.05	0.22	0.00	1.00
	Controversies responsible marketing	Controversy	31,832	0.07	0.58	0.00	10.00
	Obesity risk	Controversy	31,832	0.01	0.12	0.00	1.00
Reporting	Controversies product quality	Controversy	31,832	0.04	0.19	0.00	1.00
	Controversies customer health	Controversy	31,832	0.03	0.53	0.00	65.00
	ESG reporting scope	Reporting	31,832	0.51	0.50	0.00	1.00
	GRI reporting guidelines	Reporting	31,832	0.31	0.46	0.00	1.00
	Global CSR sustainability report	Reporting	31,832	0.45	0.50	0.00	1.00
	CSR sustainability external audit	Reporting	31,832	0.23	0.42	0.00	1.00
	ESG reporting scope	Reporting	31,832	38.08	46.72	0.00	100.00
	Global compact signatory	Reporting	31,832	0.16	0.37	0.00	1.00

Table 2: Summary statistics on ESG scores and ESG sub-scores

This table shows the summary statistics for the Wittkowski et al. (2004) scores and sub-scores as computed in Equations 1 and 2. All scores are industry-year specific and scaled from 0 to 10, for which 0 is inferior and 10 is superior. To elaborate, a firm with ESG scores of 10 in policies and controversies has no controversies and superior ESG policies than any other firm in that industry and year.

VARIABLES	mean	sd	min	p5	p25	p50	p75	p95	max
Reporting	5.132	3.655	0	0	0	6.175	8.063	10	10
Policy	6.000	2.332	0	0	5.065	6.323	7.536	9.293	10
Target	4.187	4.001	0	0	0	5.347	8.028	10	10
Activity	6.124	2.665	0	0	5.571	6.875	7.816	9.143	10
Controversy	6.686	3.979	0	0.328	2.756	10	10	10	10
Performance	4.421	1.789	0	1.200	3.576	4.352	5.294	7.949	10
Promised ESG	6.930	2.069	0	2.008	6.340	7.402	8.186	9.211	10
Realised ESG	4.257	1.805	0	1.034	3.415	4.190	5.088	7.569	10

Table 3: Correlation matrix of ESG scores and sustainable performance

This table provides a correlation matrix on ESG scores, promised and realized ESG scores, and sustainable performance as a first step to verifying the accuracy of promised and realized ESG scores. We compute the realised and promised ESG scores using Equations (1) and (2). The ESG controversies (abbreviated as cont.), emissions and labor conditions are retrieved from Refinitiv ESG. All NO_x emissions, CO_2 emissions, accidents, and fatalities are continuous variables divided by total assets. VOC and PM emissions, strikes, and controversies are boolean. P-values in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

	Realised ESG	Promised ESG	Refinitiv rating	MSCI rating	FTSE rating
<i>CO₂emissions</i> <i>Assets</i>	-0.380*** (0.000)	-0.002 (0.975)	0.574*** (0.000)	0.662*** (0.000)	0.370*** (0.000)
<i>NO_xemissions</i> <i>Assets</i>	-0.422*** (0.000)	0.030 (0.693)	0.519*** (0.000)	0.585*** (0.000)	0.292*** (0.000)
VOC or PM emissions	-0.685*** (0.000)	0.422*** (0.000)	0.638*** (0.000)	0.013 (0.865)	0.134* (0.072)
Strikes	0.303*** (0.000)	0.478*** (0.000)	-0.208*** (0.005)	-0.377*** (0.000)	-0.486*** (0.000)
<i>Accidents</i> <i>Assets</i>	-0.387*** (0.000)	0.030 (0.686)	0.456*** (0.000)	0.594*** (0.000)	0.207*** (0.005)
<i>Fatalities</i> <i>Assets</i>	-0.352*** (0.000)	0.007 (0.930)	0.401*** (0.000)	0.603*** (0.000)	0.190** (0.011)
Environmental cont.	-0.363*** (0.000)	-0.275*** (0.000)	0.719*** (0.000)	0.594*** (0.000)	0.694*** (0.000)
Working condition cont.	-0.711*** (0.000)	0.170** (0.022)	0.476*** (0.000)	-0.300*** (0.000)	0.342*** (0.000)
Business ethics cont.	-0.050 (0.508)	0.028 (0.713)	-0.308*** (0.000)	-0.433*** (0.000)	-0.103 (0.171)
Consumer complaints cont.	0.061 (0.413)	0.103 (0.170)	-0.128* (0.086)	0.091 (0.225)	-0.498*** (0.000)
Product quality cont.	-0.580*** (0.000)	0.496*** (0.000)	0.413*** (0.000)	-0.414*** (0.000)	0.197*** (0.008)
Responsible marketing cont.	-0.542*** (0.000)	0.333*** (0.000)	0.191** (0.010)	-0.556*** (0.000)	0.163** (0.028)

Table 4: The impact of promised and realized sustainable performance on Refinitiv ESG ratings

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3). The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Promised ESG	0.465*** (0.006)	0.389*** (0.006)	0.155*** (0.008)			
Realised ESG	-0.029*** (0.006)	-0.036*** (0.006)	-0.059*** (0.009)			
Reporting				0.232*** (0.004)	0.215*** (0.004)	0.164*** (0.006)
Policy				0.120*** (0.006)	0.102*** (0.006)	0.003 (0.009)
Activity				0.076*** (0.005)	0.090*** (0.005)	0.085*** (0.007)
Target				0.129*** (0.003)	0.122*** (0.003)	0.074*** (0.005)
Controversy				-0.053*** (0.003)	-0.047*** (0.003)	-0.032*** (0.004)
Performance				-0.016*** (0.005)	-0.003 (0.005)	-0.029*** (0.007)
Observations	28,490	28,490	28,490	28,490	28,490	28,490
Adjusted R-squared	0.245	0.393	0.061	0.539	0.587	0.269
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table 5: The impact of promised and realized sustainable performance on MSCI ESG ratings

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the MSCI ESG rating of firms as given in Equation (3). The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Promised ESG	0.267*** (0.014)	0.226*** (0.015)	0.064*** (0.019)			
Realised ESG	-0.018 (0.014)	-0.024 (0.014)	-0.001 (0.022)			
Reporting				0.122*** (0.010)	0.138*** (0.011)	0.073*** (0.018)
Policy				0.035** (0.017)	-0.015 (0.017)	-0.053** (0.025)
Activity				0.046*** (0.013)	0.076*** (0.013)	0.078*** (0.023)
Target				0.114*** (0.009)	0.099*** (0.009)	0.055*** (0.015)
Controversy				0.033*** (0.007)	0.038*** (0.008)	0.014 (0.011)
Performance				-0.035** (0.014)	-0.025* (0.015)	0.016 (0.022)
Observations	8,587	8,587	8,587	8,587	8,587	8,587
Adjusted R-squared	0.048	0.159	0.005	0.123	0.218	0.036
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table 6: The impact of promised and realized sustainable performance on FTSE ESG ratings

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the FTSE ESG rating of firms as given in Equation (3). The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Promised ESG	0.287*** (0.012)	0.251*** (0.011)	0.023** (0.011)			
Realised ESG	0.005 (0.011)	0.011 (0.011)	-0.036*** (0.013)			
Reporting				0.155*** (0.007)	0.159*** (0.007)	0.086*** (0.011)
Policy				0.108*** (0.013)	0.037*** (0.013)	-0.067*** (0.014)
Activity				-0.009 (0.011)	0.034*** (0.010)	0.058*** (0.012)
Target				0.099*** (0.006)	0.114*** (0.006)	0.029*** (0.010)
Controversy				-0.017*** (0.005)	-0.017*** (0.005)	-0.009 (0.005)
Performance				0.017 (0.010)	0.034*** (0.010)	-0.040*** (0.013)
Observations	7,541	7,541	7,541	7,541	7,541	7,541
Adjusted R-squared	0.098	0.248	0.006	0.270	0.391	0.084
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table 7: The impact of current promised on future realized sustainable performance

This table shows that promises of sustainable performance do not realize up to 10 years in the future. All dependant and independent variables in this regression represent ESG scores, for which promised ESG scores and ESG reporting, policy, activity, and target sub-scores are contemporaneous. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1) Promised ESG	(2) Reporting	(3) Policy	(4) Activity	(5) Target
<i>Controversy</i> _{<i>i,t</i>}	-0.069*** (0.012)	-0.059*** (0.022)	-0.085*** (0.013)	-0.080*** (0.018)	-0.057** (0.024)
<i>Controversy</i> _{<i>i,t+1</i>}	-0.016 (0.014)	-0.074*** (0.024)	-0.014 (0.015)	-0.027 (0.019)	-0.049* (0.025)
<i>Controversy</i> _{<i>i,t+2</i>}	-0.022 (0.016)	-0.062** (0.025)	-0.031* (0.016)	-0.050** (0.020)	-0.022 (0.026)
<i>Controversy</i> _{<i>i,t+3</i>}	-0.026 (0.019)	-0.054** (0.027)	-0.027 (0.018)	-0.026 (0.023)	-0.057** (0.029)
<i>Controversy</i> _{<i>i,t+4</i>}	-0.034 (0.021)	-0.048 (0.031)	-0.056** (0.022)	-0.045* (0.027)	-0.077** (0.032)
<i>Controversy</i> _{<i>i,t+5</i>}	-0.013 (0.023)	-0.029 (0.031)	-0.014 (0.023)	-0.010 (0.027)	-0.025 (0.032)
<i>Controversy</i> _{<i>i,t+6</i>}	-0.028 (0.019)	-0.021 (0.029)	-0.038* (0.020)	-0.021 (0.024)	-0.015 (0.030)
<i>Controversy</i> _{<i>i,t+7</i>}	-0.024 (0.016)	0.012 (0.028)	-0.009 (0.016)	-0.023 (0.022)	0.039 (0.029)
<i>Controversy</i> _{<i>i,t+8</i>}	-0.014 (0.014)	-0.011 (0.026)	-0.042*** (0.015)	-0.034* (0.021)	-0.023 (0.027)
<i>Controversy</i> _{<i>i,t+9</i>}	-0.007 (0.014)	-0.076*** (0.024)	-0.016 (0.015)	-0.005 (0.020)	-0.066*** (0.025)
<i>Controversy</i> _{<i>i,t+10</i>}	-0.061*** (0.014)	-0.074*** (0.022)	-0.049*** (0.014)	-0.075*** (0.019)	-0.088*** (0.023)
<i>Performance</i> _{<i>i,t</i>}	-0.133*** (0.025)	-0.217*** (0.036)	-0.131*** (0.026)	-0.232*** (0.031)	-0.170*** (0.036)
<i>Performance</i> _{<i>i,t+1</i>}	-0.008 (0.031)	0.075* (0.042)	-0.024 (0.032)	-0.001 (0.037)	0.035 (0.042)
<i>Performance</i> _{<i>i,t+2</i>}	0.072** (0.036)	0.003 (0.046)	0.021 (0.037)	0.068 (0.042)	0.040 (0.046)
<i>Performance</i> _{<i>i,t+3</i>}	-0.073 (0.045)	0.003 (0.052)	-0.038 (0.044)	-0.065 (0.051)	0.005 (0.052)
<i>Performance</i> _{<i>i,t+4</i>}	-0.108* (0.055)	-0.043 (0.059)	-0.074 (0.054)	-0.125** (0.061)	-0.014 (0.060)
<i>Performance</i> _{<i>i,t+5</i>}	0.062 (0.061)	0.007 (0.066)	0.016 (0.058)	0.022 (0.068)	-0.028 (0.065)
<i>Performance</i> _{<i>i,t+6</i>}	-0.009 (0.061)	0.000 (0.070)	0.064 (0.058)	-0.069 (0.069)	0.017 (0.072)
<i>Performance</i> _{<i>i,t+7</i>}	-0.037 (0.064)	0.066 (0.077)	-0.004 (0.065)	0.058 (0.076)	-0.019 (0.080)
<i>Performance</i> _{<i>i,t+8</i>}	0.033 (0.066)	-0.060 (0.083)	-0.007 (0.067)	0.020 (0.083)	-0.032 (0.086)
<i>Performance</i> _{<i>i,t+9</i>}	0.077 (0.060)	0.047 (0.077)	0.118** (0.059)	0.121 (0.075)	0.115 (0.079)
<i>Performance</i> _{<i>i,t+10</i>}	-0.023 (0.053)	-0.002 (0.060)	-0.040 (0.049)	-0.044 (0.062)	0.081 (0.061)
Observations	3,307	3,307	3,307	3,307	3,307
Adjusted R-squared	0.122	0.143	0.162	0.140	0.111

Table 8: The impact of current promised on future realized sustainable performance by SASB category

This table shows that promises of sustainable performance do not realize up to 10 years in the future at the SASB materiality level. Specifically, it regresses greenhouse gas emissions, water and wastewater management, water usage, customer welfare, selling practices, labour practices, employee health safety, employee management, business model resilience, supply chain management, materials source management, business ethics, legal and regulatory concerns specific promised ESG scores on the current and future realised ESG scores in respectively Columns (1) to (14). Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
<i>Realised</i>	0.011 (0.039)	0.122 (0.084)	0.172*** (0.052)	-0.035 (0.057)	-0.228*** (0.037)	0.006 (0.076)	-0.043** (0.021)	-0.115* (0.067)	-0.064 (0.124)	0.130*** (0.042)	-0.145*** (0.034)	-0.149*** (0.026)	-0.086*** (0.018)	-0.027 (0.065)
<i>Realised_{t+1}</i>	0.093** (0.044)	0.061 (0.103)	0.127** (0.061)	0.006 (0.055)	-0.119*** (0.037)	0.060 (0.064)	-0.052** (0.022)	-0.099 (0.074)	0.072 (0.127)	0.029 (0.044)	-0.079* (0.042)	-0.065** (0.032)	-0.073*** (0.019)	-0.040 (0.046)
<i>Realised_{t+2}</i>	0.023 (0.044)	0.025 (0.104)	0.036 (0.059)	-0.048 (0.060)	-0.101*** (0.036)	-0.100* (0.053)	-0.069*** (0.022)	-0.010 (0.075)	0.007 (0.119)	0.039 (0.051)	-0.045 (0.041)	-0.097*** (0.031)	-0.027 (0.019)	-0.047 (0.042)
<i>Realised_{t+3}</i>	0.074 (0.049)	-0.142 (0.108)	0.087 (0.067)	-0.096* (0.051)	-0.016 (0.035)	-0.022 (0.057)	-0.016 (0.023)	0.083 (0.088)	0.083 (0.122)	0.065 (0.060)	-0.025 (0.040)	-0.051 (0.035)	-0.010 (0.021)	-0.019 (0.046)
<i>Realised_{t+4}</i>	0.012 (0.054)	-0.060 (0.106)	0.024 (0.072)	-0.033 (0.062)	0.005 (0.039)	0.078 (0.063)	-0.044* (0.024)	-0.063 (0.101)	0.110 (0.127)	-0.023 (0.061)	-0.050 (0.042)	-0.054 (0.039)	-0.017 (0.023)	-0.030 (0.048)
<i>Realised_{t+5}</i>	-0.007 (0.057)	-0.093 (0.107)	-0.035 (0.070)	-0.000 (0.064)	-0.073* (0.041)	-0.027 (0.059)	-0.049* (0.026)	-0.046 (0.100)	0.070 (0.117)	-0.021 (0.068)	-0.017 (0.043)	-0.004 (0.039)	-0.006 (0.021)	-0.017 (0.044)
<i>Realised_{t+6}</i>	0.007 (0.059)	-0.047 (0.116)	-0.098 (0.067)	-0.087 (0.058)	-0.021 (0.041)	-0.037 (0.063)	0.002 (0.029)	-0.014 (0.098)	0.104 (0.099)	0.099 (0.065)	0.053 (0.043)	-0.021 (0.039)	-0.050** (0.019)	0.032 (0.043)
<i>Realised_{t+7}</i>	-0.014 (0.065)	0.058 (0.124)	0.128* (0.071)	-0.002 (0.046)	0.034 (0.040)	0.138** (0.067)	0.026 (0.030)	-0.024 (0.095)	0.018 (0.098)	0.025 (0.070)	0.016 (0.046)	0.041 (0.039)	-0.027 (0.019)	-0.047 (0.044)
<i>Realised_{t+8}</i>	-0.103 (0.065)	0.001 (0.126)	0.099 (0.068)	-0.051 (0.045)	0.055* (0.033)	0.071 (0.061)	-0.027 (0.029)	-0.031 (0.092)	0.020 (0.085)	0.014 (0.073)	-0.052 (0.045)	0.025 (0.036)	-0.017 (0.019)	-0.097** (0.042)
<i>Realised_{t+9}</i>	0.017 (0.059)	0.233** (0.099)	0.031 (0.062)	-0.057 (0.040)	-0.013 (0.031)	-0.042 (0.058)	-0.006 (0.027)	0.046 (0.083)	-0.027 (0.077)	-0.075 (0.064)	-0.001 (0.042)	-0.064** (0.032)	-0.019 (0.018)	-0.002 (0.044)
<i>Realised_{t+10}</i>	-0.113** (0.046)	-0.161*** (0.047)	0.072 (0.047)	-0.046 (0.037)	0.002 (0.029)	-0.115** (0.046)	-0.051** (0.025)	0.069 (0.066)	-0.009 (0.061)	0.073* (0.039)	-0.068** (0.030)	-0.100*** (0.026)	0.002 (0.016)	-0.050 (0.037)
Observations	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433
R-squared	0.326	0.188	0.309	0.362	0.241	0.145	0.314	0.305	0.303	0.303	0.370	0.452	0.369	0.275
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 9: Sustainable performance for multiple ESG-rating-based SRI screening procedures

Table 9 elaborates on how sustainable performance is affected by ESG-rating-based SRI screening procedures. We collect sustainable performance indicators from Refinitiv ESG. Specifically, NO_x emissions and CO_2 emissions are expressed in tonnes and divided by total assets in millions. Accidents and fatalities are similarly divided by total assets in millions. Alternative sustainable performance indicators are boolean. The screening procedures respectively represent an unscreened portfolio; a portfolio in which sin stocks are excluded; negative screening in which firms with the bottom 10% ESG ratings in each industry are removed; positive screening which twice overweighs the top 10% highest ESG rating firms within industries; integrative screening that captures both positive and negative screening; and best-in-class screening which solely retains firms in the highest decile of ESG ratings conditional on their industries. *, ** and *** denote significance at the 10%, 5% and 1% level.

Panel A: Social performance

VARIABLES	Unconstrained portfolio		No sin stocks		Negative screening		Positive screening		Integrative screening		Best-in-class screening	
	Mean	SD	Diff (%)	t	Diff (%)	t	Diff (%)	t	Diff (%)	t	Diff (%)	t
Average ESG rating	4.811	0.350	-1.50	-2.15	5.53	7.72	4.55	6.47	11.45	15.85	62.71	59.22
Promised ESG rank	6.557	0.251	-1.42	-3.82	3.64	8.99	1.01	2.66	5.78	13.65	23.70	40.12
Realised ESG rank	4.544	0.300	1.08	1.62	-0.48	-0.77	0.51	0.78	-0.95	-1.53	-4.71	-7.20
CO_2 emissions <small>$\frac{assets}{assets}$</small>	6.842	12.217	-5.28	-0.29	1.65	0.09	-8.56	-0.49	-2.70	-0.15	-38.95	-2.55
NO_x emissions <small>$\frac{assets}{assets}$</small>	4.593	8.603	-10.30	-0.54	-0.52	-0.03	-6.10	-0.31	3.03	0.15	30.68	1.22
VOC or PM emissions	0.140	0.0260	-2.14	-1.17	7.86	4.20	8.57	4.53	17.86	9.19	109.29	31.72
Strikes	0.0279	0.0106	-13.26	-3.70	-5.38	-1.46	6.09	1.55	15.41	3.78	195.70	21.21
Accidents <small>$\frac{assets}{assets}$</small>	0.559	1.397	7.33	0.28	-1.61	-0.07	8.05	0.32	0.00	0.00	32.74	1.05
Fatalities <small>$\frac{assets}{assets}$</small>	0.000993	0.00276	-2.82	-0.10	7.75	0.25	-3.42	-0.12	5.74	0.19	-6.34	-0.28
Environmental controversies	0.00880	0.00984	-13.18	-1.27	-5.80	-0.54	15.91	1.34	25.00	2.01	295.45	9.90
Wages/working condition controversies	0.0238	0.0158	-13.87	-2.19	-6.72	-1.02	2.52	0.37	10.50	1.46	166.81	11.28
Employ health safety controversies	0.0248	0.0132	-10.48	-2.10	-2.42	-0.47	4.44	0.83	12.90	2.33	147.98	13.84
Bribery, corruption and fraud controversies	0.0975	0.0158	-10.36	-6.44	-1.74	-1.05	6.67	4.05	16.92	9.84	173.85	52.31
Intellectual property controversies	0.0371	0.0351	5.93	0.61	12.67	1.30	21.83	2.13	29.92	2.90	169.54	10.64
Anticompetition controversies	0.0603	0.0138	-7.30	-3.27	1.49	0.64	13.43	5.46	23.55	9.07	210.12	41.38
Business ethics controversies	0.0477	0.0130	-12.37	-4.53	-3.56	-1.24	4.82	1.57	14.68	4.50	176.73	19.96
Consumer complaints controversies	0.0200	0.00884	-4.00	-0.92	6.50	1.38	20.50	4.17	32.50	6.13	257.50	19.39
Product quality controversies	0.0436	0.0135	0.23	0.07	10.09	3.11	18.81	5.78	29.82	8.71	198.17	25.95
Responsible marketing controversies	0.0148	0.00823	2.03	0.36	12.84	2.17	31.08	4.92	43.24	6.43	305.41	17.76

Table 10: Sustainable performance for multiple Realized-ESG-scores-based SRI screening procedures

Table 9 elaborates on how sustainable performance is affected by realized-ESG-score-based SRI screening procedures. We collect sustainable performance indicators from Realized ESG. Specifically, NO_x emissions and CO_2 emissions are expressed in tonnes and divided by total assets in millions. Accidents and fatalities are similarly divided by total assets in millions. Alternative sustainable performance indicators are boolean. The screening procedures respectively represent an unscreened portfolio; a portfolio in which sin stocks are excluded; negative screening in which firms with the bottom 10% realized ESG scores in each industry are removed; positive screening which twice overweighs the top 10% highest realized ESG score firms within industries; integrative screening that captures both positive and negative screening; and best-in-class screening which solely retains firms in the highest decile of realized ESG scores conditional on their industries. *, **, and *** denote significance at the 10%, 5% and 1% level.

VARIABLES	Negative screening		Positive screening		Integrative screening		Best-in-class screening	
	Diff (%)	t	Diff (%)	t	Diff (%)	t	Diff (%)	t
Average ESG rating	0.23	0.31	-0.69	-0.96	-3.06	-3.90	-19.73	-26.05
Promised ESG rank	-1.22	-3.38	-1.31	-3.63	-3.52	-9.26	-14.35	-27.86
Realised ESG rank	7.20	9.21	3.90	5.46	12.50	14.35	41.15	30.36
$\frac{CO_2\text{emissions}}{\text{assets}}$	-10.33	-0.55	-7.59	-0.41	-4.62	-0.23	27.19	1.01
$\frac{NO_x\text{emissions}}{\text{assets}}$	-2.77	-0.14	-6.75	-0.35	-5.05	-0.25	-18.42	-0.91
VOC or PM emissions	6.43	3.44	1.43	0.77	-6.43	-3.43	-70.29	-42.93
Strikes	-11.83	-3.38	-12.54	-3.55	-20.79	-6.13	-68.64	-20.20
Accidents	-14.67	-0.56	-1.79	-0.07	-21.82	-0.87	-64.58	-3.33
$\frac{\text{assets}}{\text{Fatalities}}$	-8.86	-0.31	-5.64	-0.20	-20.24	-0.77	-86.81	-4.43
Environmental controversies	-7.05	-0.65	-10.34	-0.98	-16.02	-1.54	-75.80	-8.78
Wages/working condition controversies	-10.92	-1.70	-12.61	-1.98	-19.33	-3.11	-72.39	-13.49
Employ health safety controversies	-5.65	-1.11	-8.06	-1.60	-12.90	-2.56	-48.79	-9.87
Bribery, corruption and fraud controversies	-11.38	-7.51	-10.77	-6.99	-21.33	-14.34	-72.00	-48.40
Intellectual property controversies	0.00	0.00	3.23	0.35	-13.48	-1.63	-67.92	-9.38
Anticompetition controversies	-7.63	-3.38	-7.30	-3.29	-18.57	-8.91	-71.31	-34.31
Business ethics controversies	-13.63	-4.54	-13.00	-4.58	-23.06	-8.13	-76.94	-35.76
Consumer complaints controversies	-0.50	-0.11	-2.50	-0.57	-10.00	-2.37	-58.65	-14.69
Product quality controversies	0.00	0.00	0.00	0.00	-10.78	-3.48	-70.18	-23.76
Responsible marketing controversies	3.38	0.57	3.38	0.60	-8.78	-1.53	-74.59	-13.83

Table 11: The impact of ESG ratings on cost of capital

This model shows the impact of ESG rating inflation on cost of capital. Specifically, it regresses the weighted average cost of capital of firms, their average cost of equity, and their average cost of debt on the average Refinitiv, MSCI, and FTSE ESG rating of firms. The cost of equity takes the average of Gebhardt et al. (2001), Hou et al. (2012), Chattopadhyay et al. (2021), Fama and French (2015, 2017) cost of equity estimates where available. Cost of debt captures interest expense and bond yield spread. The weighted average cost of capital weighs cost of equity and cost of debt by the book based leverage ratio. Firm clustered standard errors in parenthesis. *, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	Cost of Equity			Cost of Debt			WACC		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ESG rating	0.012 (0.018)	-0.142*** (0.033)	-0.239*** (0.074)	-0.030** (0.015)	0.004 (0.017)	0.013 (0.048)	-0.024* (0.013)	-0.056*** (0.019)	-0.116** (0.047)
Observations	28,082	28,082	6,088	27,449	27,449	6,049	27,307	27,307	6,022
Adjusted R-squared	0.142	0.389	0.467	0.196	0.661	0.634	0.163	0.489	0.533
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	YES	NO	YES	YES	NO	YES	YES
Credit Rating	NO	NO	YES	NO	NO	YES	NO	NO	YES

Figure 1: Difference-in-differences

Figure 1 displays three difference-in-differences analyses. Each of these analyses considers the introduction of the Non-Financial Reporting Directive in 2014 as a treatment on sustainable performance reporting unrelated to realized sustainable performance. It considers Austrian firms as treated and Swiss firms as control. The three specifications respectively consider weighted average cost of capital, cost of equity, and cost of debt.

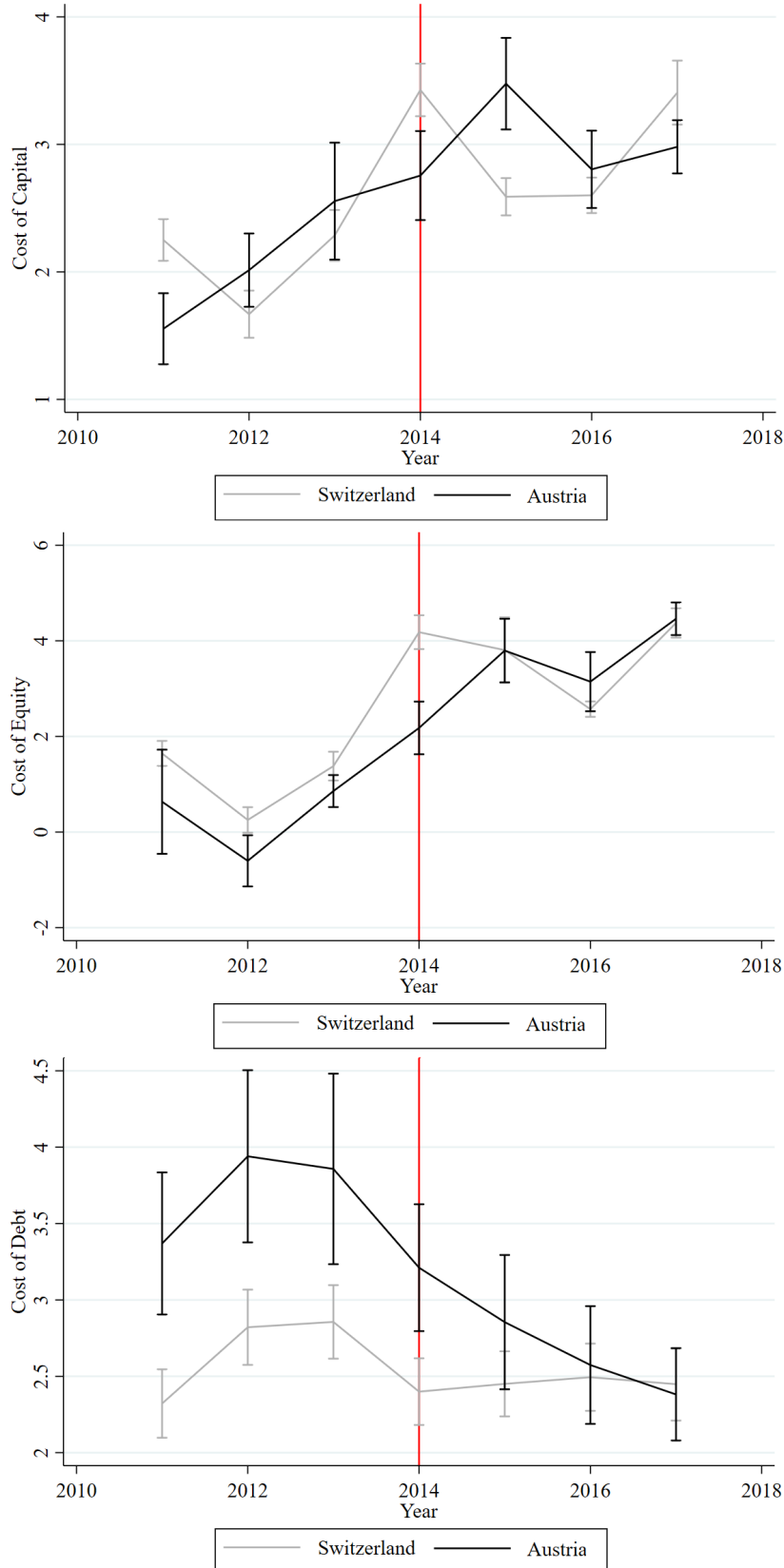


Table 12: The impact of the probability of a firm having an inflated credit rating on promised and realized ESG scores

This model regresses promised and realized ESG scores as well as ESG reporting, policy, activity, target, controversy, and performance sub-scores on the probability of a firm having an inflated ESG rating, or $\mathbf{P}_{i,t}^{inf}$. Firm clustered standard errors in parenthesis. *, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	Promised ESG	Realised ESG	Reporting	Policy	Activity	Target	Controversy	Performance
$\mathbf{P}_{i,t}^{inf}$	0.320** (0.137)	-0.022 (0.113)	1.234*** (0.237)	0.565*** (0.161)	0.743*** (0.171)	1.657*** (0.264)	-1.091*** (0.278)	0.073 (0.113)
Observations	2,839	2,839	2,839	2,839	2,839	2,839	2,839	2,839
Adjusted R-squared	0.069	0.111	0.094	0.041	0.069	0.060	0.130	0.129
Size	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Online Appendices

Appendix A Variable compilation

We cannot directly use all granular Refinitiv ESG information because some variables are near empty, and others show overlap for similar data items. As a first step, we remove variables with less than 500 observations (out of our 31,832 firm-year observations sample) to ensure variable relevance, similar to Bams et al. (2022). For example, Refinitiv ESG provides both recent and standard ESG controversies. These recent controversies often contain less than 50 observations. Therefore, we merge recent controversy data into the matching primary controversy variable regarding the health and safety of customers and customers in general, responsible marketing, product access, business ethics, management team compensation, intellectual property, responsible R&D, anti-competition, wage/working conditions, diversity, privacy, employee health and safety, critical countries, shareholder rights, insider trading, accounting, and tax fraud information.

In addition to controversies, we also remove select emissions-related variables, like policies regarding the divestment of fossil fuel, indirect energy use, cement energy use, the supplied renewable energy, cement CO_2 emissions, internal carbon pricing, total hazardous waste revenue, water pollutant emissions revenue, fleet CO_2 emissions, and fuel consumption.

Furthermore, we observe insufficient information regarding revenue from environmental products, equator principals or equator environmental projects, company cross-shareholding, supply chain health and safety impairments, abortifacients, drug delays, FDA warning letters, not approved drug, recent FDA warning letters, product delays, alcohol revenue, gambling revenue, tobacco revenue, armament revenue, employee resource groups, expanded constituency provisions, community lending and investment, the percentage of certified quality management systems and the production of cluster bombs, landmines and firearms, litigation expenses, fair price provision, energy produced directly, unlimited authorised capital, carbon offsetting credits, advance notice period, written consent requirements, $\frac{\text{non-audit}}{\text{audit fees}}$, auditor tenure, golden parachute, water discharged total donations, earning restatement, profit warnings, ESM certifi-

cated (%), GMO products, iso 9k, training costs total, and HIV/aids programs.

We do not consider shareholder rights in identifying promised ESG and realized ESG because it cannot be allocated to a SASB materiality group. Consequently, we omit shareholder rights policy, policy equal voting rights, policy shareholder engagement, different voting rights per share, equal shareholder rights, voting cap, voting cap (%), minimum number of shares to vote director election majority requirement, shareholder vote on executive positions, public availability corporate statement, veto power or golden shares, state-owned enterprise identifier, anti-takeover devices larger than two, percentage supermajority vote requirement, limited shareholder rights, elimination of cumulative voting, pre-emptive rights, confidential voting policy, limitation of director liability, shareholder approval significant, rules on the removal of a director, or advance notice for shareholder propositions from our analysis.

We append information on multiple ESG variables that cover distinct parts of the sample for CO_2 emissions, VOC or PM emissions, water revenue/assets, hazardous waste, waste recycling (%), employee turnover, training and development policies, training hours, net employment creation, injury rates (and their attributed lost time), accidents, women employees, board diversity, environmental expenditures, environmental provisions, environmental supply chain management, environmental partnerships, renewable energy, animal testing, business ethics policies, business ethics controversies, and anticompetitive controversies. Using this approach, we retain 169 out of 466 variables, which are all allocatable to SASB materiality groups and reporting, policies, activities, targets, controversies, or performance (SASB, 2021).

Appendix B Wittkowski et al. (2004) rank ordering: robustness checks

This appendix elaborates on our application of the Wittkowski et al. (2004) method and shows that our results hold without using this method. Since the Wittkowski et al. (2004) method is only relatively newly adopted in sustainability Bams et al. (2022), we need to verify its applicability in measuring the promised and realized sustainable performance of firms. As a first step, we show that promised and realized ESG scores appropriately correlate with the

underlying granular ESG information that we adopt from Refinitiv ESG. Subsequently, we persistently observe that ESG ratings are inflated when we use detailed ESG variables instead of their Wittkowski et al. (2004) promised and realized ESG scores. These two analyses show that Wittkowski et al. (2004) scores appropriately capture promised and realized ESG and do not drive our main findings.

B.1 Robustness on promised and realized ESG scores

Tables B.1 and B.2 show two correlation matrices of granular promised and realized sustainable performance information and their respective Wittkowski et al. (2004) scores. Table B.1 shows a general positive correlation between our promised ESG scores and its underlying granular ESG variables. This provides the first sign of validity for our promised ESG scores. When we consider the relative impact of granular ESG reporting, policy, activity, and target variables, we observe that especially policies have a significant impact, followed by respectively reporting, activities, and targets. Furthermore, this granular sustainable performance information is more closely related to its reporting, policy, activity, and target sub-scores than to the overarching promised ESG scores.

Figure B.1 shows that promised ESG are approximately normally distributed. However, a relatively large share of firms has a promised ESG score of 0, indicating that these firms do not report their sustainable performance. Our Refinitiv ESG data mirror this. Therefore, we argue that our promised ESG scores are relatively robust and at least directionally correct.

In Table B.2, we perform a similar analysis for realized ESG scores. Realized ESG scores are positively related to the positive underlying ESG variables and negatively associated with negative underlying ESG variables (see Table B.2). To illustrate, realized ESG scores decline with strikes and improve with employee satisfaction. This effect persists across ESG controversies and performance sub-scores. Similar to promises of sustainable performance, controversies and performance variables better explain their sub-scores than realized ESG scores.

Further, realized ESG scores are relatively symmetrically distributed with outliers on both sides (Figure B.2). Even though select firms weakly outperform or are outperformed by all other firms in realized sustainable performance, the share of these extreme scenarios is rela-

tively smaller than for promised ESG. Also, it is more appropriate to have two-sized tails for realized sustainable performance as outliers on both sides of the distribution exist.

B.2 Inflated ESG ratings with granular ESG information

In the upcoming part of this appendix, we identify inflated ESG ratings without using promised or realized ESG scores. In Table B.4, we compute a regression model similar to Table 4, where we substitute Wittkowski et al. (2004) scores by their underlying granular sustainable performance information. Specifically, in Columns (1) to (3), we use granular promised and realized ESG variables across the usual control specifications. We still observe strong positive coefficients in these specifications for promised-sustainable-performance-related variables across emission policies and targets, energy efficiency policies, policies for human rights, employee health and safety teams, and employee health safety training. In contrast, we observe mixed coefficients for CO_2 missions and positive coefficients for other granular-realized-sustainable performance-related variables like VOC and particulate matter emissions, hazardous waste, strikes, and select controversies. These results show that our main findings are not driven by our use of Wittkowski et al. (2004) scores, as we still identify inflated ESG ratings when using granular ESG data from Refinitiv ESG.

In addition to the accuracy of Wittkowski et al. (2004) scores in general, we also verify whether our industry-year level computation is appropriate. By estimating Wittkowski et al. (2004) scores at the industry-year level, we correct for industry-specific intertemporal variation of sustainable performance (Ioannou and Serafeim, 2019). In other words, we rank the current relative sustainable performance of all firms in a similar industry at the current point in time. When we regress current promised ESG scores on future realized scores, we compare the relative industry performance of current promised future sustainable performance improvements to industry-specific future realizations thereof. Therefore, this relative specification could muddle our ability to observe realizations of promised future sustainable performance improvements in absolute terms. To combat this, we re-compute Wittkowski et al. (2004) scores solely based on industry to more accurately capture absolute differences in sustainable performance over time in a similar regression framework.

We observe a similar relation between promises of future sustainable performance improvements on realized sustainable performance improvements when using time-independent promised and realized ESG scores. Table B.3 shows that current time-independent promised ESG scores do not explain future time-independent realized ESG scores. Precisely, time-independent reporting, policy, activity, and target ESG sub-scores do not predict future time-independent ESG performance or controversies up to 10 years in the future in absolute terms, not relative to the industry average sustainable performance. This verifies that firms do not follow through on their promises of future sustainable performance improvements using time-independent ESG scores.

Table B.1: Correlation matrix of promised ESG scores to granular ESG variables

This table provides a correlation matrix on the promised ESG scores and ESG reporting, policy, target, and activity sub-scores on granular promised sustainable performance information from Refinitiv ESG. To conserve space, exact p-values have been compressed and only significance 10%, 5% and 1% levels are denoted with respectively *, ** and ***

Granular ESG variable	Promised ESG	Reporting rank	Policy	Target	Activity
Emission policy	0.515***	0.641***	0.584***	0.538***	0.595***
Emission trading	0.240***	0.326***	0.273***	0.330***	0.291***
Emission targets	0.420***	0.576***	0.482***	0.841***	0.491***
Emission reduction target (%)	0.107***	0.184***	0.140***	0.261***	0.143***
Staff transportation impact reduction	0.254***	0.305***	0.283***	0.257***	0.328***
Energy efficiency policy	0.518***	0.623***	0.596***	0.502***	0.599***
Energy efficiency targets	0.335***	0.465***	0.389***	0.786***	0.393***
Water efficiency policy	0.421***	0.563***	0.523***	0.461***	0.498***
Water technologies	0.148***	0.174***	0.151***	0.180***	0.203***
Water efficiency targets	0.270***	0.382***	0.341***	0.635***	0.324***
Waste reduction initiatives	0.502***	0.603***	0.558***	0.485***	0.620***
Environmental restoration initiatives	0.301***	0.385***	0.331***	0.366***	0.389***
Land environmental impact reduction	0.178***	0.224***	0.205***	0.143***	0.203***
Biodiversity impact reduction	0.330***	0.460***	0.386***	0.393***	0.395***
Policy human rights	0.407***	0.553***	0.498***	0.440***	0.473***
Policy Community involvement	0.510***	0.462***	0.517***	0.325***	0.575***
Human rights compliance ILO/UN	0.321***	0.494***	0.411***	0.416***	0.376***
Policy data privacy	0.243***	0.149***	0.307***	0.128***	0.238***
Whistleblower protection	0.261***	0.102***	0.327***	0.096***	0.203***
HSMS certified	0.075***	0.132***	0.104***	0.102***	0.090***
Product discount emerging markets	0.074***	0.105***	0.101***	0.122***	0.090***
Product access low prices	0.161***	0.207***	0.183***	0.193***	0.188***
Policy customer health safety	0.326***	0.387***	0.419***	0.387***	0.392***
Product responsibility monitoring	0.246***	0.341***	0.306***	0.331***	0.324***
Healthy food/products	0.158***	0.158***	0.178***	0.183***	0.211***
Policy responsible marketing	0.112***	0.140***	0.164***	0.150***	0.123***
Policy fair trade	0.086***	0.101***	0.128***	0.115***	0.103***
Retailing responsibilities	0.056***	0.050***	0.061***	0.042***	0.088***
Ethical trading initiatives	0.056***	0.055***	0.066***	0.053***	0.063***
Policy child labour	0.247***	0.376***	0.354***	0.284***	0.313***
Policy forced labour	0.222***	0.330***	0.326***	0.247***	0.289***
Policy training and development	0.493***	0.510***	0.535***	0.368***	0.508***
Day care service	0.215***	0.280***	0.243***	0.284***	0.306***
Employee engagement voluntary work	0.463***	0.420***	0.476***	0.365***	0.564***
Flexible working hours	0.293***	0.346***	0.322***	0.335***	0.406***
Health safety policy	0.537***	0.457***	0.584***	0.343***	0.539***
Employee health safety team	0.438***	0.538***	0.520***	0.417***	0.495***
Health safety training	0.526***	0.545***	0.570***	0.394***	0.629***
Policy board diversity	0.156***	0.059***	0.224***	0.025***	0.127***
Policy diversity and opportunity	0.445***	0.370***	0.508***	0.301***	0.452***
Internal promotion	0.327***	0.349***	0.347***	0.262***	0.373***
Targets diversity and opportunity	0.228***	0.339***	0.272***	0.432***	0.280***
Sustainable packaging policy	0.238***	0.298***	0.322***	0.335***	0.310***
Takeback and recycling initiatives	0.207***	0.265***	0.251***	0.298***	0.283***
Environment material sourcing	0.375***	0.498***	0.449***	0.492***	0.480***
Environmental products	0.333***	0.388***	0.335***	0.375***	0.447***
Eco-design products	0.219***	0.276***	0.258***	0.329***	0.308***
Renewable energy products	0.211***	0.232***	0.198***	0.218***	0.273***
Sustainable building products	0.141***	0.159***	0.140***	0.172***	0.189***
Product impact minimisation	0.233***	0.232***	0.209***	0.273***	0.330***
Product environmental responsibilities	0.385***	0.432***	0.384***	0.419***	0.500***
Environment management team	0.433***	0.510***	0.504***	0.460***	0.496***
CSR sustainability committee	0.459***	0.597***	0.522***	0.490***	0.527***
Global compact signatory	0.294***	0.565***	0.353***	0.394***	0.336***
Sustainability compensation executives	0.208***	0.166***	0.210***	0.142***	0.218***
Integrated strategy in MDA	0.188***	0.223***	0.222***	0.136***	0.211***
environmental project financing	0.044***	0.042***	0.049***	0.042***	0.044***
Environment management training	0.451***	0.505***	0.510***	0.427***	0.524***
Environmental investment initiatives	0.247***	0.361***	0.286***	0.332***	0.314***
Six sigma and quality management system	0.184***	0.193***	0.242***	0.209***	0.203***
Environmental provisions/ assets	0.003	0.018***	0.005	0.005	0.006
Environmental partnership	0.436***	0.509***	0.480***	0.485***	0.524***
Human rights contractors	0.373***	0.492***	0.478***	0.438***	0.450***
Supplier ESG training	0.247***	0.347***	0.328***	0.337***	0.318***

Continues on next page

Table B.1 – continued					
Granular ESG variable	Promised ESG	Reporting rank	Policy	Target	Activity
Environmental supply chain policy	0.415***	0.558***	0.521***	0.503***	0.508***
Environmental supply chain management	0.440***	0.574***	0.538***	0.513***	0.529***
Policy supply chain health safety	0.307***	0.397***	0.416***	0.373***	0.364***
Contractor accidents	0.067***	0.106***	0.084***	0.080***	0.076***
Contractor fatalities	0.103***	0.165***	0.127***	0.134***	0.109***
Contractors injury rate (%)	0.072***	0.113***	0.082***	0.077***	0.078***
Contractor lost time working days	0.033***	0.050***	0.037***	0.040***	0.035***
Resource reduction policy	0.552***	0.528***	0.594***	0.412***	0.580***
Organic product initiatives	0.116***	0.130***	0.140***	0.148***	0.151***
Resource reduction targets	0.356***	0.489***	0.408***	0.833***	0.403***
Policy bribery and corruption	0.369***	0.218***	0.456***	0.177***	0.297***
Policy business ethics	0.369***	0.211***	0.440***	0.174***	0.301***
Large or small board size	0.121***	0.157***	0.119***	0.175***	0.134***
Animal testing	0.030***	0.056***	0.091***	0.102***	0.017***
Policy fair competition	0.296***	0.155***	0.380***	0.176***	0.228***
Trade union representation	0.227***	0.377***	0.242***	0.268***	0.256***
Quality management systems	0.279***	0.322***	0.317***	0.275***	0.289***
OECD guidelines for multinationals	0.187***	0.295***	0.242***	0.263***	0.212***
Stakeholder engagement	0.402***	0.633***	0.473***	0.470***	0.484***
Real estate sustainability certificate	0.081***	0.071***	0.063***	0.048***	0.081***
Crisis management systems	0.313***	0.407***	0.375***	0.337***	0.372***
CSR sustainability reporting	0.515***	0.875***	0.558***	0.534***	0.596***
GRI reporting guidelines	0.403***	0.740***	0.473***	0.529***	0.486***
Global CSR sustainability report	0.477***	0.831***	0.517***	0.480***	0.540***
CSR sustainability external audit	0.358***	0.656***	0.423***	0.527***	0.440***
External CSR audit	0.333***	0.626***	0.369***	0.487***	0.392***
ESG reporting scope	0.377***	0.733***	0.386***	0.368***	0.425***

Table B.2: Correlation matrix of realised ESG ranks to granular ESG variables

This table provides a correlation matrix on the realized ESG scores and ESG controversy and performance sub-scores on granular realized sustainable performance information from Refinitiv ESG. Often negative coefficients are expected when corporate wrongs are analysed below. To conserve space, exact p-values have been compressed and only significance 10%, 5% and 1% levels are denoted with respectively *, ** and ***.

Granular ESG Variables	Realised ESG	Controversy	Performance
CO ₂ Emissions	-0.021***	-0.002	-0.021***
Ozon-depleting substances	-0.003	0.004	-0.003
NO _x & SO _x Emissions	-0.026**	-0.054***	-0.019
VOC and particulate matter Emissions	-0.025***	-0.151***	-0.026***
VOC and particulate matter Emissions reduction	-0.004	-0.132***	-0.006
NO _x & SO _x Emission reduction	0.028***	-0.167***	0.045***
Renewable energy (ratio)	0.023**	0.011	0.037***
Water usage / assets	-0.018*	-0.025***	-0.017*
Water recycled	-0.035*	-0.033*	-0.034*
Water pollutant emissions	-0.062***	-0.044**	-0.060***
Waste / assets	0.006	-0.028***	0.007
Waste recycled	-0.023***	-0.130***	-0.010*
Hazardous waste	-0.034**	-0.047***	-0.039***
Toxic chemicals reduction	-0.092***	-0.135***	-0.088***
Electronic waste reduction	-0.119***	-0.124***	-0.117***
Donations / assets	-0.009	-0.041***	-0.009
Controversies privacy	-0.012**	-0.034***	-0.004
Product recall	-0.050***	-0.178***	-0.055***
Controversies consumer complaints	-0.039***	-0.191***	-0.011**
Customer satisfaction	0.009	-0.087***	0.020***
Controversies wages working conditions	-0.061***	-0.273***	-0.036***
Training hours / employee	0.01	-0.054***	0.021**
Employee fatalities / assets	-0.021*	-0.080***	0.005
Employee satisfaction	0.103***	0.040*	0.102***
Wages/employee	0.043***	0.017	0.048***
Net employment creation / assets	0.003	0.004	-0.001
Employee turnover	-0.028**	0.017	-0.018
Strikes	-0.044***	-0.183***	-0.046***
Accidents total	-0.031***	-0.055***	-0.031***
Injury rate	-0.129***	0.055***	-0.136***
Lost time injury rate	-0.118***	-0.072***	-0.136***
Occupational diseases	-0.005	-0.043**	0.009
HRC corporate equality index	0.120***	-0.235***	0.180***
Salary gap ratio	0.023	0.014	-0.007
Women employees	0.083***	-0.111***	0.104***
Employees with disabilities	-0.087***	-0.121***	-0.098***
Green buildings	-0.071***	-0.194***	-0.047***
Environmental expenditures/ assets	-0.006	-0.029**	-0.005
Environmental investment expenditures	-0.041***	-0.150***	-0.030***
Contractor human rights breaches	-0.117***	-0.149***	-0.118***
Contractor accidents	0.055*	-0.270***	0.033
Contractor fatalities	-0.043**	-0.174***	0
Contractors injury rate (%)	-0.072**	0.011	-0.060**
Contractor lost time injury (%)	-0.113***	-0.081***	-0.107***
Contractor lost time working days	-0.038	-0.116***	-0.055
Energy usage	-0.011*	-0.038***	-0.011*
Renewable energy usage	-0.015**	-0.023***	-0.010*
Climate change commercial risk	-0.162***	-0.405***	-0.077***
Controversies tax fraud	-0.019***	-0.112***	-0.008
Controversies business ethics	-0.025***	-0.205***	-0.006
Controversy bribery corruption and fraud	-0.101***	-0.517***	-0.020***
Controversies intellectual property	-0.034***	-0.170***	0.008
Poison pill	-0.101***	-0.153***	-0.007
Corporate responsibility awards	-0.030***	-0.204***	0.001
Self-reported environmental fines	-0.004	-0.012**	-0.001
Accounting controversies	-0.025***	-0.073***	-0.013**
Controversies public health	-0.012**	-0.131***	0.003
Accidental spills	0.011*	-0.084***	0.021***
Environmental controversies	-0.013**	-0.189***	0.006
Controversies anti-competition	-0.078***	-0.419***	-0.012**
Controversies responsible market	-0.025***	-0.169***	-0.012**
Obesity risk	-0.012**	-0.133***	0.011*
Controversies product quality	-0.052***	-0.270***	-0.025***
Controversies customer health	-0.009	-0.142***	-0.003

Table B.3: The impact of current promised ESG on future realised ESG for time-independent Wittkowski et al. (2004) scores

This table shows that promises of sustainable performance do not realize up to 10 years in the future. All dependant and independent variables in this regression represent ESG scores, for which promised ESG scores and ESG reporting, policy, activity, and target sub-scores are contemporaneous. These ESG scores are estimated only conditional on industry, not time. Therefore, they more closely resemble absolute scores and more accurately capture changes in realized sustainable performance over time. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1) Promised ESG	(2) Reporting ESG	(3) Policy	(4) Activity	(5) Target
<i>Controversy_{i,t}</i>	-0.069*** (0.018)	-0.092*** (0.032)	-0.090*** (0.021)	-0.107*** (0.028)	-0.106*** (0.040)
<i>Controversy_{i,t+1}</i>	-0.097*** (0.020)	-0.141*** (0.034)	-0.093*** (0.022)	-0.136*** (0.030)	-0.149*** (0.041)
<i>Controversy_{i,t+2}</i>	-0.019 (0.020)	-0.104*** (0.034)	-0.033 (0.023)	-0.049* (0.029)	-0.118*** (0.043)
<i>Controversy_{i,t+3}</i>	-0.041* (0.021)	-0.103*** (0.035)	-0.061*** (0.024)	-0.078*** (0.029)	-0.061 (0.044)
<i>Controversy_{i,t+4}</i>	-0.020 (0.026)	-0.048 (0.038)	-0.028 (0.026)	-0.032 (0.033)	-0.068 (0.046)
<i>Controversy_{i,t+5}</i>	-0.036 (0.030)	-0.042 (0.042)	-0.052* (0.031)	-0.031 (0.039)	-0.078 (0.050)
<i>Controversy_{i,t+6}</i>	-0.032 (0.034)	-0.039 (0.045)	-0.027 (0.033)	-0.037 (0.043)	-0.084 (0.053)
<i>Controversy_{i,t+7}</i>	-0.026 (0.029)	0.008 (0.043)	-0.040 (0.030)	-0.019 (0.039)	0.028 (0.051)
<i>Controversy_{i,t+8}</i>	0.008 (0.023)	0.010 (0.043)	0.011 (0.026)	0.024 (0.036)	0.039 (0.050)
<i>Controversy_{i,t+9}</i>	-0.016 (0.021)	-0.011 (0.040)	-0.022 (0.023)	-0.016 (0.035)	-0.048 (0.047)
<i>Controversy_{i,t+10}</i>	-0.020 (0.021)	-0.094** (0.037)	-0.011 (0.023)	-0.036 (0.032)	-0.098** (0.044)
<i>Performance_{i,t}</i>	-0.252*** (0.036)	-0.173*** (0.049)	-0.270*** (0.035)	-0.333*** (0.046)	-0.143*** (0.055)
<i>Performance_{i,t+1}</i>	-0.071 (0.061)	0.075 (0.071)	-0.088 (0.054)	-0.058 (0.079)	0.033 (0.080)
<i>Performance_{i,t+2}</i>	-0.049 (0.043)	-0.008 (0.055)	-0.049 (0.041)	-0.083 (0.054)	0.005 (0.064)
<i>Performance_{i,t+3}</i>	0.053 (0.048)	0.003 (0.058)	0.007 (0.046)	0.071 (0.058)	0.007 (0.068)
<i>Performance_{i,t+4}</i>	0.033 (0.053)	0.103 (0.065)	0.082* (0.049)	0.051 (0.070)	0.090 (0.077)
<i>Performance_{i,t+5}</i>	-0.071 (0.060)	-0.007 (0.074)	-0.033 (0.056)	-0.071 (0.077)	0.041 (0.088)
<i>Performance_{i,t+6}</i>	-0.020 (0.068)	-0.009 (0.078)	-0.038 (0.066)	-0.041 (0.082)	-0.081 (0.091)
<i>Performance_{i,t+7}</i>	0.033 (0.074)	0.009 (0.079)	0.056 (0.072)	-0.007 (0.089)	0.064 (0.094)
<i>Performance_{i,t+8}</i>	0.088 (0.072)	-0.015 (0.083)	0.066 (0.070)	0.148 (0.093)	-0.062 (0.102)
<i>Performance_{i,t+9}</i>	-0.009 (0.072)	-0.059 (0.091)	-0.009 (0.069)	-0.047 (0.101)	-0.039 (0.113)
<i>Performance_{i,t+10}</i>	0.028 (0.071)	0.014 (0.094)	0.024 (0.065)	0.069 (0.103)	0.124 (0.110)
Observations	3,331	3,331	3,331	3,331	3,331
Adjusted R-squared	0.110	0.123	0.139	0.122	0.108

Table B.4: The impact of granular promised and realised ESG variables on Refinitiv ESG ratings

This table verifies the results of Table 4 by using granular ESG data. Specifically, it shows that, without relying on our promised and realized ESG scores, ESG ratings are positively related to promises of sustainable performance and negatively related to realizations of sustainable performance. Refinitiv ESG ratings are the dependant variable. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)
Emission policy	0.213*** (0.028)	0.237*** (0.027)	0.294*** (0.038)
Emission targets	0.870*** (0.024)	0.822*** (0.024)	0.181*** (0.033)
Energy efficiency policy	0.559*** (0.026)	0.486*** (0.026)	0.303*** (0.037)
Policy human rights	1.241*** (0.023)	1.104*** (0.024)	0.997*** (0.030)
Employee health safety team	0.364*** (0.023)	0.400*** (0.022)	0.328*** (0.033)
Health safety training	0.037 (0.024)	0.080*** (0.024)	0.179*** (0.036)
CO2 Emissions	-0.323* (0.190)	0.615*** (0.158)	0.153 (0.288)
VOC and particulate matter Emissions	0.579*** (0.026)	0.628*** (0.026)	0.271*** (0.046)
Hazardous waste	0.171*** (0.029)	0.343*** (0.033)	-0.008 (0.014)
Strikes	0.606*** (0.051)	0.477*** (0.052)	-0.020 (0.053)
Controversy bribery corruption and fraud	0.530*** (0.033)	0.334*** (0.033)	0.052 (0.033)
Controversies product quality	0.527*** (0.045)	0.367*** (0.045)	0.039 (0.046)
Climate change commercial risk	0.589*** (0.023)	0.553*** (0.023)	0.289*** (0.032)
Observations	28,398	28,398	28,398
R-squared	0.531	0.580	0.351
Size	NO	YES	NO
Industry FE	NO	YES	NO
Country FE	NO	YES	NO
Year FE	NO	YES	NO
Firm FE	NO	NO	YES

Figure B.1: Density of promised ESG scores

Figure B.1 displays the density function of promised ESG scores. The x-axis represents the promised scores of firms as computed in Equations (1) and (2). The y-axis the frequency of firms with such scores.

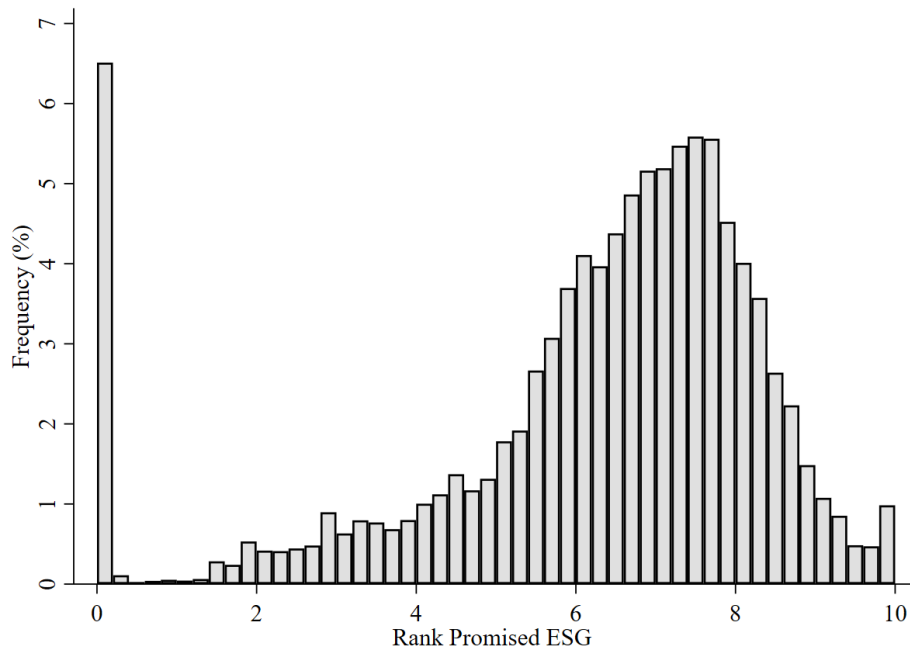
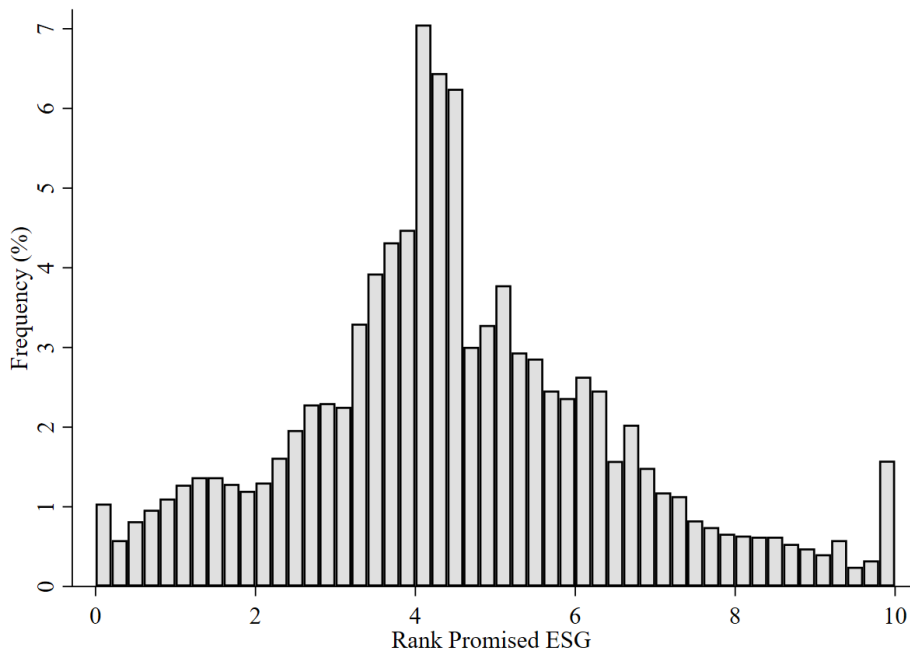


Figure B.2: Density of realized ESG scores

Figure B.2 displays the density function of realized ESG scores. The x-axis represents the realized scores of firms as computed in Equations (1) and (2). The y-axis the frequency of firms with such scores.



Appendix C Inflated ESG ratings: robustness checks

This appendix provides further evidence that ESG ratings are inflated across multiple specifications and sub-samples. As a first step to uncovering inflated ESG ratings, we compute the Pearson correlation between Refinitiv, MSCI, and FTSE ESG ratings, promised and realized ESG scores, and ESG reporting, policy, activity, target, controversy, and performance sub-scores in Table C.1. This preliminary analysis shows that Refinitiv, MSCI, and FTSE ESG ratings are positively correlated to promises of future sustainable performance improvements and negatively related to realized sustainable performance. These findings persist for ESG reporting, policy, activity, target, controversy, and performance sub-scores. These correlations provide a strong indication that ESG ratings are indeed inflated.

In a second step, we show that ESG ratings are inflated across multiple periods, industries, and geographical locations. In Tables C.2, C.3, and C.4, we separately replicate Table 4 for 2003 to 2010, 2010 to 2015, and 2015 to 2020. In each of these specifications, we observe that ESG ratings are inflated. Subsequently, we show that ESG ratings are inflated across most geographic regions in Table C.5 In Latin America, Western Europe, Asia, and Africa, ESG ratings are also inversely related to realized sustainable performance. Last, we perform a sub-sample analysis for each industry separately in Table C.6. Here, we show that ESG ratings are inflated in all but the mining industry, for which realized ESG scores are positively related to ESG ratings, but an order of magnitude smaller than promised ESG scores. These robustness analyses fortify our initial claim that ESG ratings are inflated.

Table C.1: Correlation matrix of ESG ratings and ESG scores

This table provides a correlation matrix of Refinitiv, MSCI and FTSE ESG ratings, and realised and promised ESG scores as well as ESG reporting, policy, target, activity, controversy and performance sub-scores given Equations (1) and (2). All ESG scores, ESG sub-scores, and Refinitiv, MSCI and FTSE ESG ratings are industry specific and scaled from 0 to 10, for which 0 is inferior and 10 is superior. P-values in parentheses. *, ** and *** respectively denote significance at the 10%, 5% and 1% level.

	Refinitiv rating	MSCI rating	FTSE rating	Promised	Realised	Reporting	Policy	Target	Activity	Controversy	Performance
Asset4 rating	1.000										
MSCI rating	0.377*** (0.000)	1.000									
FTSE rating	0.585*** (0.000)	0.376*** (0.000)	1.000								
Promised	0.465*** (0.000)	0.204*** (0.000)	0.308*** (0.000)	1.000							
Realised	-0.091*** (0.000)	-0.035*** (0.004)	-0.026** (0.032)	-0.138*** (0.000)	1.000						
Reporting	0.655*** (0.000)	0.308*** (0.000)	0.477*** (0.000)	0.525*** (0.000)	-0.021* (0.078)	1.000					
Policy	0.557*** (0.000)	0.227*** (0.000)	0.385*** (0.000)	0.842*** (0.000)	-0.128*** (0.000)	0.553*** (0.000)	1.000				
Target	0.616*** (0.000)	0.302*** (0.000)	0.435*** (0.000)	0.463*** (0.000)	-0.034*** (0.004)	0.580*** (0.000)	0.517*** (0.000)	1.000			
Activity	0.559*** (0.000)	0.251*** (0.000)	0.349*** (0.000)	0.802*** (0.000)	-0.123*** (0.000)	0.582*** (0.000)	0.700*** (0.000)	0.518*** (0.000)	1.000		
Controversy	-0.302*** (0.000)	-0.054*** (0.000)	-0.181*** (0.000)	-0.271*** (0.000)	0.286*** (0.000)	-0.233*** (0.000)	-0.292*** (0.000)	-0.261*** (0.000)	-0.254*** (0.000)	1.000	
Performance	-0.067*** (0.000)	-0.029** (0.015)	0.009 (0.440)	-0.087*** (0.000)	0.848*** (0.000)	-0.012 (0.314)	-0.072*** (0.000)	-0.020 (0.104)	-0.092*** (0.000)	0.054*** (0.000)	1.000

Table C.2: The impact of promised and realized ESG scores on Refinitiv ESG ratings for 2003-2010

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3) for 2003 to 2010. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Rank Promised	0.353*** (0.008)	0.279*** (0.009)	0.105*** (0.010)			
Rank Realised	-0.072*** (0.010)	-0.046*** (0.009)	-0.081*** (0.011)			
Rank Reporting				0.194*** (0.007)	0.172*** (0.007)	0.104*** (0.010)
Rank Policy				0.094*** (0.010)	0.086*** (0.010)	0.024** (0.012)
Rank Activity				0.096*** (0.008)	0.086*** (0.008)	0.059*** (0.009)
Rank Target				0.108*** (0.007)	0.109*** (0.007)	0.082*** (0.009)
Rank Controversy				-0.064*** (0.006)	-0.044*** (0.006)	-0.037*** (0.007)
Rank Performance				-0.037*** (0.009)	-0.024*** (0.009)	-0.054*** (0.011)
Observations	5,964	5,964	5,964	5,964	5,964	5,964
Adjusted R-squared	0.249	0.396	0.067	0.498	0.566	0.195
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table C.3: The impact of promised and realized ESG scores on Refinitiv ESG ratings for 2011-2015

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3) for 2011 to 2015. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Rank Promised	0.454*** (0.006)	0.378*** (0.006)	0.143*** (0.008)			
Rank Realised	-0.037*** (0.006)	-0.041*** (0.006)	-0.059*** (0.008)			
Rank Reporting				0.232*** (0.004)	0.215*** (0.004)	0.164*** (0.006)
Rank Policy				0.120*** (0.006)	0.102*** (0.006)	0.002 (0.009)
Rank Activity				0.076*** (0.005)	0.089*** (0.005)	0.086*** (0.007)
Rank Target				0.129*** (0.003)	0.122*** (0.003)	0.073*** (0.005)
Rank Controversy				-0.053*** (0.003)	-0.047*** (0.003)	-0.032*** (0.004)
Rank Performance				-0.016*** (0.005)	-0.002 (0.005)	-0.027*** (0.007)
Observations	28,398	28,398	28,398	28,398	28,398	28,398
Adjusted R-squared	0.231	0.387	0.054	0.539	0.587	0.268
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table C.4: The impact of promised and realized ESG scores on Refinitiv ESG ratings for 2015-2020

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3) for 2015 to 2020. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Rank Promised	0.512*** (0.010)	0.416*** (0.010)	0.056*** (0.007)			
Rank Realised	-0.002 (0.009)	-0.023*** (0.009)	-0.010 (0.008)			
Rank Reporting				0.234*** (0.005)	0.216*** (0.006)	0.065*** (0.007)
Rank Policy				0.149*** (0.010)	0.124*** (0.010)	-0.006 (0.010)
Rank Activity				0.066*** (0.007)	0.086*** (0.007)	0.053*** (0.008)
Rank Target				0.138*** (0.004)	0.123*** (0.004)	0.032*** (0.005)
Rank Controversy				-0.038*** (0.004)	-0.040*** (0.004)	-0.015*** (0.003)
Rank Performance				-0.005 (0.008)	0.011 (0.008)	0.013 (0.008)
Observations	13,444	13,444	13,444	13,444	13,444	13,444
Adjusted R-squared	0.237	0.409	0.013	0.551	0.593	0.084
Size	NO	YES	NO	NO	YES	NO
Industry FE	NO	YES	NO	NO	YES	NO
Country FE	NO	YES	NO	NO	YES	NO
Year FE	NO	YES	NO	NO	YES	NO
Firm FE	NO	NO	YES	NO	NO	YES

Table C.5: Inflated ESG ratings across region

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3). Columns (1) through (9) respectively represent firms in North America, Latin America, Western Europe, Eastern Europe, Western Asia, the Middle East, Africa, and Oceania. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Panel A: Promised and realised ESG scores

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rank Promised	0.260*** (0.010)	0.455*** (0.050)	0.313*** (0.013)	0.214*** (0.045)	0.229*** (0.064)	0.454*** (0.009)	0.445*** (0.058)	0.433*** (0.070)	0.397*** (0.022)
Rank Realised	0.043*** (0.010)	-0.150*** (0.046)	-0.032*** (0.010)	0.036 (0.042)	-0.124** (0.049)	-0.152*** (0.012)	0.351*** (0.065)	-0.092** (0.041)	0.022 (0.016)
Observations	7,721	620	7,505	349	725	7,378	244	604	2,245
R-squared	0.349	0.380	0.448	0.477	0.219	0.431	0.601	0.353	0.473
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO

Panel B: ESG reporting, policy, activity, target, controversy and performance sub-scores

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rank Reporting	0.235*** (0.008)	0.213*** (0.029)	0.158*** (0.007)	0.137*** (0.030)	0.206*** (0.030)	0.189*** (0.008)	0.211*** (0.045)	0.137*** (0.033)	0.253*** (0.012)
Rank Policy	0.025** (0.011)	0.123** (0.058)	0.088*** (0.012)	-0.003 (0.059)	0.051 (0.059)	0.185*** (0.011)	0.213*** (0.074)	0.159*** (0.052)	0.179*** (0.019)
Rank Activity	0.108*** (0.008)	-0.018 (0.046)	0.061*** (0.010)	0.028 (0.056)	-0.060 (0.046)	0.095*** (0.010)	0.113** (0.055)	0.091* (0.055)	0.104*** (0.012)
Rank Target	0.132*** (0.007)	0.164*** (0.021)	0.108*** (0.005)	0.128*** (0.026)	0.205*** (0.019)	0.094*** (0.006)	0.161*** (0.041)	0.102*** (0.017)	0.077*** (0.010)
Rank Controversy	-0.013** (0.005)	-0.138*** (0.023)	-0.061*** (0.005)	-0.024 (0.023)	0.022 (0.017)	-0.073*** (0.006)	-0.045 (0.037)	-0.071*** (0.015)	-0.035*** (0.010)
Rank Performance	0.018* (0.010)	-0.061 (0.039)	0.006 (0.009)	0.002 (0.048)	0.011 (0.046)	-0.038*** (0.011)	0.219*** (0.051)	-0.042 (0.043)	0.033*** (0.012)
Observations	7,721	620	7,505	349	725	7,378	244	604	2,245
R-squared	0.553	0.577	0.592	0.588	0.453	0.595	0.751	0.494	0.708
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table C.6: Inflated ESG ratings across industry

This table regresses the promised, realized, reporting, policy, activity, controversy, and performance ESG scores on the Refinitiv ESG rating of firms as given in Equation (3). Columns (1) through (10) respectively represent the mining, construction, generic manufacturing, utilities, retail & wholesale, service, health care, ICT, food & beverages, and petrochemical manufacturing industries. The R^2 is adjusted for non-firm fixed effects models. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Panel A: Promised and realised ESG scores

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rank Promised	0.446*** (0.029)	0.319*** (0.025)	0.458*** (0.017)	0.338*** (0.015)	0.370*** (0.018)	0.306*** (0.019)	0.238*** (0.029)	0.446*** (0.017)	0.429*** (0.031)	0.361*** (0.020)
Rank Realised	0.051*** (0.018)	-0.057** (0.024)	-0.012 (0.016)	0.024 (0.017)	-0.019 (0.017)	-0.158*** (0.014)	-0.099*** (0.026)	-0.072*** (0.015)	-0.112*** (0.032)	0.014 (0.022)
Observations	2,674	1,029	4,186	4,253	3,058	2,270	1,227	4,991	1,238	3,472
R-squared	0.472	0.554	0.441	0.423	0.443	0.502	0.439	0.411	0.514	0.509
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Panel B: ESG reporting, policy, activity, target, controversy and performance sub-scores

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rank Reporting	0.293*** (0.012)	0.186*** (0.021)	0.216*** (0.011)	0.178*** (0.010)	0.207*** (0.011)	0.173*** (0.013)	0.189*** (0.018)	0.175*** (0.009)	0.204*** (0.020)	0.209*** (0.012)
Rank Policy	0.058** (0.024)	0.137*** (0.024)	0.109*** (0.017)	0.004 (0.018)	0.165*** (0.016)	0.148*** (0.018)	0.038 (0.025)	0.151*** (0.016)	0.206*** (0.031)	-0.001 (0.021)
Rank Activity	0.103*** (0.014)	0.057*** (0.021)	0.081*** (0.014)	0.117*** (0.014)	0.075*** (0.013)	0.098*** (0.013)	0.051*** (0.018)	0.109*** (0.011)	0.007 (0.030)	0.087*** (0.015)
Rank Target	0.125*** (0.010)	0.110*** (0.013)	0.117*** (0.008)	0.126*** (0.008)	0.108*** (0.009)	0.047*** (0.009)	0.119*** (0.017)	0.136*** (0.008)	0.134*** (0.015)	0.130*** (0.010)
Rank Controversy	-0.011 (0.008)	-0.050*** (0.015)	-0.065*** (0.007)	-0.067*** (0.007)	-0.070*** (0.011)	-0.057*** (0.009)	-0.072*** (0.013)	-0.034*** (0.007)	-0.063*** (0.013)	-0.065*** (0.008)
Rank Performance	0.034** (0.016)	0.022 (0.022)	-0.015 (0.015)	0.026* (0.015)	-0.025 (0.015)	-0.087*** (0.016)	-0.029 (0.025)	0.008 (0.013)	-0.064** (0.026)	0.007 (0.018)
Observations	2,674	1,029	4,186	4,253	3,058	2,270	1,227	4,991	1,238	3,472
R-squared	0.688	0.702	0.607	0.588	0.624	0.621	0.629	0.597	0.664	0.643
Size	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Appendix D Alternative portfolio screens

This appendix verifies our initial ESG screening procedures at the 5% and 25% levels. It is customary to use an industry-specific 10% ESG screening thresholds in SRI literature (Dyck et al., 2019). However, select papers use multiple screening thresholds at 5% and 25% to verify their results. To comply with these industry norms, we perform two robustness analyses and replicate the results in Table 10 for 5% and 25% thresholds in Table D.1 We expect that 25% screening has worse sustainable performance than 5% screening for negative, positive, and integrative screening as more firms are excluded or overweighed. We anticipate worse sustainable performance for best-in-class screening for 5% screening because only the firms with the highest 5% ESG ratings are selected.

In Table D.1, we observe a more substantial effect for 5% screening than for the 10% and especially the 25% screening for positive and negative screening. For integrative and best-in-class screening, we observe more robust results for 5% screening. These results mainly align with our predictions (except for integrative screening). Therefore, we verify that the impact of inflated ESG ratings on ESG-rating-based SRI screening persists for 5% and 25% screening. Moreover, we also show that increasingly strict screening procedures attain lower sustainable performance for 5%, 10%, and 25% thresholds within screening procedure.

Table D.1: Sustainable performance alternative ESG-rating-based SRI screens

This table analyses the sustainable performance of ESG-rating-based SRI screens similar to 9. As a robustness analysis, we now consider 5% and 25% screening thresholds. *, **, and *** denote significance at the 10%, 5% and 1% level.

Panel A: Sustainable performance

VARIABLES	Negative 5%			Positive 5%			Integrative 5%			Integrative 25%			BIC 5%			BIC 25%		
	Diff	t	t	Diff	t	t	Diff	t	t	Diff	t	t	Diff	t	t	Diff	t	t
Average ESG rating	2.41	3.43	14.70	19.16	0.39	0.56	5.40	7.45	23.20	29.07	6.09	8.75	70.11	63.36	48.58	51.33		
Promised ESG rank	1.78	4.52	8.04	18.29	0.14	0.36	2.61	6.79	10.93	23.12	3.19	7.83	26.16	44.56	19.48	33.18		
Realised ESG rank	0.24	0.37	-1.34	-2.13	0.66	1.00	0.04	0.07	-1.78	-2.81	-0.09	-0.14	-5.06	-7.58	-3.08	-4.50		
CO2 emissions / assets	-0.56	-0.03	8.37	0.44	-2.98	-0.16	0.60	0.03	4.05	0.22	-2.66	-0.15	-37.45	-2.42	-7.35	-0.44		
Nox emissions / assets	-5.12	-0.26	13.17	0.61	-7.77	-0.41	-0.13	-0.01	45.74	1.76	-5.64	-0.29	-18.46	-0.88	136.45	3.55		
VOC or PM emissions / assets	2.86	1.54	25.00	13.08	0.71	0.39	9.29	4.99	40.00	18.97	9.29	4.95	125.00	31.75	85.00	27.01		
Strikes	-8.60	-2.32	10.39	2.55	-11.11	-3.05	-3.23	-0.85	34.77	7.89	4.30	1.12	234.41	24.27	107.53	18.93		
Accidents / assets	-6.44	-0.28	12.52	0.50	0.72	0.03	9.30	0.37	9.84	0.40	-1.25	-0.05	106.44	2.12	6.80	0.26		
Fatalities / assets	2.72	0.09	24.87	0.74	-0.10	0.00	9.77	0.32	12.79	0.43	1.71	0.06	-6.14	-0.27	-18.83	-0.87		
Environmental controversies	-9.66	-0.91	8.86	0.76	-11.48	-1.10	-3.64	-0.33	35.23	2.69	15.91	1.33	485.23	10.90	114.77	6.39		
Wages/working condition	-9.24	-1.42	7.98	1.13	-11.76	-1.84	-4.62	-0.70	29.83	3.76	2.52	0.37	223.11	12.46	94.96	8.69		
cont.																		
Employ health safety cont.	-5.65	-1.11	11.29	2.00	-8.06	-1.60	-1.21	-0.23	30.65	4.99	6.05	1.12	222.58	14.94	89.11	11.03		
Bribery, corruption and fraud	-5.95	-3.68	11.79	6.52	-8.21	-5.10	-0.72	-0.43	32.31	17.71	6.67	3.98	225.13	46.00	92.82	32.35		
cont.																		
Intellectual property cont.	8.63	0.90	22.10	2.25	7.28	0.76	12.94	1.33	40.97	3.93	22.37	2.22	247.71	12.72	95.69	7.69		
Anticompetition controversies	-2.82	-1.24	15.92	6.17	-5.14	-2.29	2.65	1.12	38.31	14.39	12.60	4.96	273.13	38.64	105.64	31.38		
Business ethics controversies	-7.76	-2.77	10.06	3.33	-10.06	-3.64	-2.94	-1.03	31.24	8.50	5.03	1.67	243.82	21.60	96.23	14.98		
Consumer complaints controversies	2.00	0.44	21.00	4.18	-1.00	-0.22	6.50	1.40	50.00	8.50	19.50	4.08	344.00	18.42	137.50	14.76		
cont.																		
Product quality controversies	5.28	1.67	27.75	8.08	2.52	0.81	11.93	3.71	52.75	13.71	19.72	6.09	260.09	27.29	127.06	22.60		
Responsible marketing controversies	7.43	1.30	31.76	5.03	4.73	0.84	14.86	2.53	69.59	9.46	30.41	4.85	414.86	16.60	181.76	16.04		

Appendix E Cost of capital computation

In this appendix, we provide further details on our cost of capital computation. We also analyze the impact of Gebhardt et al. (2001), Hou et al. (2012), Chattopadhyay et al. (2021), and Fama and French (2015, 2017) cost of equity and interest expense and bond yield cost of debt estimates on ESG ratings.

The Gebhardt et al. (2001) model is an implied cost of capital model. These models generally discount the residual income of firms to create an implied cost of capital measure given current stock prices. The scope of implied cost of capital models is often limited by frequently used IBES data, which is used to predict future earnings. To replicate the model of Gebhardt et al. (2001), we also collect IBES one and two years ahead earnings per share (EPS) estimates in addition to stock price information from CRSP, the book value of equity, earnings, dividend, and long-term debt from Compustat US. Since our sample is international and Gebhardt et al. (2001) focuses solely on US firms, we append accounting and stock price information from Compustat Global to our dataset. We estimate the Gebhardt et al. (2001) model using the following formula:

$$P_t = B_t + \frac{FROE_{t+1} - r_e}{(1 + r_e)} B_t + \frac{FROE_{t+2} - r_e}{(1 + r_e)^2} B_{t+1} + \sum_{i=3}^{11} \frac{FROE_{t+i} - r_e}{(1 + r_e)^i} B_{t+i-1} + \frac{FROE_{t+12} - r_e}{r_e(1 + r_e)^{11}} B_{t+11} \quad (4)$$

In Equation 4, P_t represents the price of an individual stock of a specific firm extracted from CRSP and Compustat Global. B_t denotes the book value per share from the most recent financial statement divided by the number of shares extracted from IBES in June. Where information is missing, we use the book value per share in IBES, or information on the number of shares in CRSP, Compustat US, or Compustat Global.

Gebhardt et al. (2001) defines $FROE_{t+i}$ as the forecasted return on assets in period $t + 1$. For the first three years, this is estimated using $\frac{FEPS_{t+i}}{B_{t+i-1}}$, for which $FEPS_{t+i}$ represents the mean IBES EPS forecasted $t+i$ years in advance and B_{t+i-1} the book value per share in year $t - i - 1$. For years 4 to 11, the FROE is linearly interpolated from its value in year three to the industry-specific ROE mean estimated using book values on our complete Compustat US and Compustat

Global sample. These industry means are corrected for taxes and estimated using a five-year rolling window on profitable firms.

The parameter B_{t+i} equates $B_{t+i-1} + FEPS_{t+i} * (1 - k)$, with k denoting the dividend payout ratio. In other words, the current book value of equity per share is the sum of the previous period's book value per share and the current period's earnings minus dividends. k is computed using the forecasted dividend per share in IBES where data is available and otherwise distilled from dividend data in CRSP, Compustat US, Compustat Global, or by setting the dividend payout rate to 6% of total assets when earnings are negative in respective order.

We execute this model in an iterative manner for which we first estimate the three years of B_{t+1} , B_{t+2} , $FROE_{t+1}$, $FROE_{t+2}$, and $FROE_{t+3}$ using the given data. Subsequently, we compute B_{t+3} by interpolating the data provided in $FROE_{t+3}$ and the industry mean, which we in turn need to compute $FROE_{t+4}$. This process continuous until we reach B_{t+11} and $FROE_{t+12}$.

Once we have all required parameters, we compute the Gebhardt et al. (2001) cost of equity estimate, r_e , by plotting interest rates from 1 basis point to 15000 basis points iteratively. For each firm and cost of equity, we compute the difference in estimated stock price and realized stock price. We observe global optima for 95% of our firm-year observations before our 15% cost of equity boundary.

As the second cost of equity estimate, we replicate the fitted implied cost of capital model of Hou et al. (2012). The vandijk12 cost of equity estimates repurposes the initial cost of equity models by adjusting the earnings estimates with accounting information to expand the sample beyond an IBES universe of firms. We follow Lee et al. (2021) and append the Gebhardt et al. (2001) model with augmented earnings estimates. To compute these earnings, we collect income before extraordinary items, total assets, shareholders equity, dividend, and cash flow from operations information from Compustat US and Compustat Global. Furthermore, we collect consensus analyst forecasts and actual earnings from the IBES summary file. We employ this data in the following regression equation:

$$E_{i,t+\tau} = \alpha_0 + \alpha_1 A_{i,t} + \alpha_2 D_{i,t} + \alpha_3 DD_{i,t} + \alpha_4 E_{i,t} + \alpha_5 NegE_{i,t} + \alpha_6 AC_{i,t} + \varepsilon_{i,t+\tau} \quad (5)$$

In Equation 5, $E_{i,t+\tau}$ denotes the IBES earnings of firm i at time t τ years ahead. $A_{i,t}$ denotes total assets, $D_{i,t}$ total dividend, $DD_{i,t}$ a dividend dummy, $NegE_{i,t}$ a negative earnings dummy, and $AC_{i,t}$ accruals. This model is estimated using a pooled cross-sectional regression using a rolling window of up to ten years. Each α coefficient is saved and used to compute the fitted earnings up to three years in the future using firm-level accounting information. Subsequently, we use this adjusted earnings measure in the Gebhardt et al. (2001) model to compute the Hou et al. (2012) cost of equity.

We use Chattopadhyay et al. (2021) to compute our third cost of equity estimate. Chattopadhyay et al. (2021) solely uses stock price and accounting information to estimate the cost of equity. This cost of equity measure is applicable for our international sample as it does not rely on IBES data and can therefore be calculated for a larger universe of international firms. To compute the Chattopadhyay et al. (2021) model, we collect daily and monthly market capitalization and total return index information from CRSP and Compustat Global, book value of equity, return on equity, and country of denomination from Compustat US and Compustat Global. As with all our cost of equity estimates, returns and book values are transmuted to USD. We use this information in the following regression model:

$$R_{i,t+1} = \beta_{i,1} + \beta_{i,2}bm_{i,t} + \beta_{i,3}roe_{i,t} + \beta_{i,4}var_{i,t} + \sum_{j=1}^{12} \alpha_{i,j}r_{i,t-j+1} + \zeta_{i,t+1} \quad (6)$$

In Equation 6, $R_{i,t+1}$ represents the one-month-ahead realized returns, $bm_{i,t}$ the book to market ratio, $roe_{i,t}$ return on equity, $var_{i,t}$ the firm specific squared daily log returns in month t , and $r_{i,t-j+1}$ the j month lagged realized total returns. This regression model is estimated for each country specific using a 10 year rolling window where available. The coefficients are saved to compute fitted cost of equity values by multiplying the country-specific coefficients with the firm-level data.

We use Fama and French (2015, 2017) international 5-factor model for our final cost of equity estimate. We collect US, European, Asian-Pacific, Developing, and North American monthly 5-factor returns in USD from Kenneth French's data warehouse.¹¹ With these factor returns and CRSP and Compustat Global stock returns in USD, we estimate the 5-factor model

¹¹https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

using three-year rolling window monthly regressions at the firm level to compute the factor loadings on five-year equally weighted smoothed factor returns. This smoothing on factor returns is recommended by Lee et al. (2021) to reduce variance in cost of equity estimates. To calculate the expected cost of equity, we compute the fitted expected returns from the 5-factor model excluding alpha. We multiply the 5% and 95% winsorized firm-level factor loadings by smoothed 5-year factor returns. Because we focus on the factor loadings of firms and omit the alpha, this measure provides a backward-looking cost of equity estimate, not an indication of outperformance.

We trim each cost of equity and cost of debt measure at the 1% and 99% levels to remove outliers from the data. After this cleaning, we compute cost of equity information for 29,352, 25,117, 24,286, 24,408, and 26,822, firm-year observations for our average, Gebhardt et al. (2001), Hou et al. (2012), Chattopadhyay et al. (2021), and Fama and French (2015, 2017) estimates. We have 27,906, 27,335, and 9,001 observations for the average cost of debt, interest expense over total debt, and bond yields. We can compute our weighted average cost of capital for 27,307 observations.

In Table E.1, we display the average cost of equities and costs of debt across each year in our sample. As anticipated, cost of equity is on average higher than cost of debt, with an average weighted average cost of capital, cost of equity, and cost of debt of 3.57%, 4.27%, and 2.87%. Furthermore, cost of equity estimates are significantly more volatile than cost of debt estimates. We find that (fitted) cost of capital models are more stable over time than accounting-based and factor-based models. This is in line with Lee et al. (2021).

In Table E.2, we verify our main results of Table 11. We here regress the individual cost of equity and debt estimates on the average Refinitiv, MSCI, and FTSE ESG ratings of firms. We employ our most strict specification with credit rating controls and firm fixed effects and find for all estimates, except Hou et al. (2012), a negative and significant effect of ESG rating improvements on cost of equity and debt. This effect is reminiscent in economic magnitude of our results in Table 11, except for a less conservative Chattopadhyay et al. (2021) estimate. Given the above, we argue that our choice of cost of equity and cost of debt estimates does not influence our main findings regarding cost of capital and inflated ESG ratings.

Table E.1: Cost of capital summary statistics by year

This table provides the mean of Gebhardt et al. (2001), Hou et al. (2012), Chattopadhyay et al. (2021), Fama and French (2015, 2017) cost of equity estimates, interest expense and bond yield spread debt estimates, and aggregate measure based on these estimates.

Year	Wacc	Cost of Equity	Gebhardt et al. (2001)	Hou et al., 2012	Chattopadhyay et al., 2021	Fama & French (2015)	Cost of Debt	Interest Expense	Yield Spread
2003	4.35	5.95	4.84	4.49	6.76	7.32	3.22	2.26	3.69
2004	4.08	4.79	2.53	4.24	5.33	7.06	3.28	2.30	3.30
2005	3.48	4.41	2.50	4.19	4.57	6.46	2.66	1.89	3.19
2006	3.89	5.64	3.44	4.27	4.98	10.43	2.41	1.89	2.47
2007	4.19	6.66	2.73	4.14	4.90	14.07	2.49	1.92	2.36
2008	3.64	4.65	3.59	4.25	-1.01	9.20	2.98	2.05	3.85
2009	3.28	2.82	4.53	4.44	2.96	0.19	3.23	1.96	4.77
2010	2.93	2.26	3.28	4.42	0.49	1.36	3.16	1.95	4.07
2011	2.86	2.19	3.08	4.40	1.17	0.45	3.09	1.96	3.77
2012	2.79	2.04	2.82	4.81	3.92	-3.11	3.02	2.00	3.52
2013	3.18	3.10	2.94	4.49	1.93	2.91	2.97	1.97	3.25
2014	3.89	4.86	3.37	4.48	2.37	8.64	2.84	1.91	2.94
2015	3.75	4.48	3.87	5.06	3.29	5.24	2.91	1.95	2.82
2016	3.31	3.86	3.63	4.82	2.70	4.10	2.68	1.84	2.43
2017	3.90	5.43	3.66	5.07	2.27	9.03	2.66	1.94	2.15
2018	3.47	4.29	3.10	4.94	1.16	6.74	2.71	2.03	2.09
2019	3.08	3.48	3.26	4.90	1.94	3.55	2.66	2.10	1.81
2020	4.16	6.00	3.66	5.15	7.25	6.14	2.66	2.03	1.88
Average	57	4.27	3.38	4.59	3.17	5.54	2.87	2.00	3.02

Table E.2: Cost of capital and ESG ratings robustness

This model shows the impact of ESG rating inflation on cost of capital for individual cost of equity and cost of debt estimates as a robustness analysis. Firm clustered standard errors in parenthesis. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Average ESG rating	-0.054* (0.030)	-0.005 (0.028)	-0.539*** (0.130)	-0.069*** (0.019)	-0.047*** (0.014)	-0.102** (0.043)
Observations	5,513	5,420	5,306	5,922	6,023	3,210
Adjusted R-squared	0.696	0.763	0.457	0.266	0.752	0.573
Size	YES	YES	YES	YES	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO
Country FE	NO	NO	NO	NO	NO	NO
Firm FE	YES	YES	YES	YES	YES	YES
Credit Ratings	YES	YES	YES	YES	YES	YES