Your Emissions or Mine? Examining How Emissions Management Strategies, ESG Performance, and Targets Impact Investor Perceptions

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ABSTRACT

Efforts to mitigate greenhouse gas emissions and curb climate change have recently become significant areas of concern to policymakers. We examine how management's focus on mitigating its direct versus indirect emissions influences the ability to attract capital from investors, and how this ability is moderated by the firm's environmental, social, and corporate governance (ESG) performance combined with adoption of an external emissions target. Using an experiment, we find that investors perceive a firm with a relatively poor ESG performance record as more socially responsible and are therefore more willing to invest when management focuses on mitigating direct versus indirect emissions. We also find that, regardless of ESG performance, adopting an external industry-based emissions target diminishes willingness to invest when management focuses on mitigating indirect emissions, but not when they focus on mitigating direct emissions. Our results provide insights for policymakers as to one impact of disaggregating direct (i.e., Scope 1) and indirect (i.e., Scope 2) emissions in ESG reporting.

Keywords: ESG; ESG reporting; emissions management strategies; emissions targets; firm value

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1. Introduction

Companies are under growing pressure from stakeholders to engage in environmental, social, and corporate governance (ESG) initiatives (Hales, Matsumura, Moser, and Payne 2016; Carolina Rezende de Carvalho Ferreira et al. 2022). These initiatives include managing emissions (Comyns 2016; Depoers, Jeanjean, and Jérôme 2016; Newburger 2020; Aljughaiman, Cao, and Albarrak 2021) and adopting emissions targets to help guide their emissions management strategies (Hale et al. 2022; Dahlmann, Branicki, and Brammer 2019; Schoenmaker and Schramade 2019; Ioannou, Li, and Serafeim 2016; Ditillo and Lisi 2016). In this paper, we seek to shed light on the implications of ESG reporting by examining investor sensitivity to company emission mitigation strategies that manage direct (scope 1) versus indirect (scope 2 & 3) emissions, and whether this sensitivity is moderated by companies' prior ESG performance and by adoption of an external, industry-based emissions target.[1]

Currently, what is known about the costs and benefits to companies of choosing to mitigate direct versus indirect emissions is in its infancy.[2] Thus, examining investors' reactions to the

[1] As defined by the GHG Protocol Corporate Standard (GHG Protocol 2019; GHG is the acronym for greenhouse gas), direct emissions are characterized as Scope 1 emissions, which are produced from sources companies own or control. Indirect emissions include Scope 2 and Scope 3 emissions. Scope 2 emissions are "indirect emissions from the generation of purchased energy." Scope 3 emissions are all other indirect emissions that do not fall under the definition of Scope 2 but that occur up and down the value chain of a firm (see http://www.ghgprotocol.org/corporate-standard). We focus on Scope 2 emissions to operationalize indirect emissions as it is more commonly disclosed by companies than Scope 3 emissions.

[2] In one example, Johnson, Theis, Vitalis, and Young (2020) provide experimental evidence that investors prefer a firm mitigates its own direct emissions compared to purchasing carbon offsets. However, an important conceptual distinction between our paper and Johnson et al. (2020) is that purchasing carbon offsets does not reduce a firm's direct or indirect emissions as these emissions are not generated within the firm's value chain. Thus, Johnson et al. (2020) examine investor reactions to reduced emissions that are attributable (via direct emissions) versus unattributable (via carbon offsets) to the firm. As a result, it is unclear whether investors distinguish between types of emissions that are attributable to a firm, which is the focus of this paper.

mitigation of direct and indirect emissions can also provide useful information to ESG disclosure standard setters. We seek to provide insight on this matter for firms and policymakers by testing one minimum condition for when disaggregation matters. We question whether investors' reaction to a firm's emissions management strategy is a joint function of the firm's prior ESG performance and the type of emissions it chooses to mitigate. This is because reducing direct emissions is more likely to require operational changes than reducing indirect emissions (Kolk and Pinske 2005; Lee, Noh, and Oh 2018), which may signal a more sincere commitment by management to mitigating emissions. By exploring this question, our insights identify consequences of strategically managing direct versus indirect emissions when this information is disclosed to investors.

Holding economic and environmental implications constant in an experiment, we find that when the firm is an ESG laggard and does not have an emissions target, participants' willingness to invest increases more when the emissions management strategy is to produce green energy, compared to when the strategy is to purchase green energy. In contrast, we also find evidence that, when the firm is an ESG leader and does not have an external target, participants' willingness to invest is higher when the strategy is to purchase green energy than to produce green energy. These results indicate that retail investors believe the distinction between direct and indirect emissions is relevant information for companies at both ends of the ESG performance spectrum.

Further, we find an interesting and potentially unintended consequence of adopting an industry-based emissions target. Namely, we find the adoption of such a target significantly decreases participants' willingness to invest when the strategy is to purchase green energy but does not significantly impact willingness to invest when the strategy is to produce green energy. Our results not only help answer the question for policymakers of whether disaggregating direct and indirect emissions is relevant to retail investors, but they also describe conditions under which retail

investors respond more positively versus negatively to this information, which is important for policymakers and firms for ESG reporting.

2. Theory

2.1. Direct and Indirect Emissions

We posit that investors' reactions to a firm's emissions management strategy is a joint function of the firm's prior ESG performance and the type of emissions it chooses to mitigate. Because a firm's direct emissions are generated by its operations and its indirect emissions are generated by independent entities, mitigating direct emissions requires the firm's management to make changes to its operations while reducing indirect emissions does not. Consequently, compared to reducing direct emissions, reducing the same volume of indirect emissions may be perceived by investors as more effortful, more transitory in nature, and a more attractive option for a firm's management (Kolk and Pinske 2005; Lee et al. 2018). As a result, reducing indirect versus direct emissions may signal a less sincere commitment to mitigating emissions in the long-term. Consistent with this notion, prior research suggests people make assumptions about management intentions based on a firm's ESG investments (e.g., Dhanda and Harman 2011). This research generally indicates that when "ESG programs are cynically perceived to be used as a corporate image tactic, rather than a genuine reflection of a firm's values and ethical commitment," such ESG investments may have negative consequences (Pomering and Dolnicar 2008). Thus, when a firm has a poor record of ESG performance, investors may perceive the firm as less socially responsible when it chooses to

focus on mitigating indirect versus direct emissions.[3] Consequently, investors may find a firm to be a less attractive investment when it focuses on mitigating indirect versus direct emissions.

In contrast, when a firm's prior ESG performance is good, we expect investors to react differently to its emissions management strategy than when a firm's prior ESG performance is poor. Flammer (2013) theorizes and provides empirical evidence that the market treats a firm's ESG activities as if they generate diminishing marginal returns. Specifically, Flammer (2013) posits that ESG is perceived as a resource and "the higher the 'stock' of this resource, the lower the additional value generated by additional investments" (p. 759). Applying this theory of diminishing marginal returns for ESG investment to our setting, because the perceived marginal benefit of reducing direct versus indirect emissions diminishes for companies with good prior ESG performance, we expect that the perceived marginal benefit resulting from operational changes to reduce direct emissions is lower for a firm that has a good versus poor ESG performance record. We, therefore, predict investors are less likely to differentiate between direct and indirect emissions reduction when the firm's prior ESG performance is good versus poor.

Hypothesis 1: Investors are more willing to invest when a firm's emissions management strategy focuses on reducing direct versus indirect emissions, but only when the firm's prior ESG performance is poor.

2.2. External Target

The second objective of our paper is to examine how investors respond to the use of an emissions-reduction target, which are frequently used as a management control tool (Chenhall

[3] Investor reactions to ESG may be associated with expectations of future financial performance, affective feelings about social and environmental impacts, or perceptions of the firm and its management. Thus, we use the term "socially responsible" to broadly encompass all these dimensions.

2003; Ioannou et al. 2016; Luft and Shields 2003; Widener 2007).[4] Management commonly adopts targets based on recommendations from independent organizations. For example, the Intended Nationally Determined Contributions (INDCs) of the Paris climate agreement provides a benchmark with which companies can set targets to mitigate their companies' emissions (Rogelj et al. 2016). In addition to the development of such international emissions targets, industry organizations have also begun to set their own emissions targets to promote a cleaner environment (Bowen 2019; Norman 2011). Thus, a growing number of initiatives now support firm and industry-wide emissions target-setting efforts (e.g., Bowen 2019).

Prior research on the effectiveness of target-setting at reducing emissions provides encouraging results, particularly regarding ambitious targets. Dahlmann et al. (2019) argue that companies' intentions for adopting targets can be ambiguous (i.e., their intentions can be interpreted as substantive commitment or as greenwashing) and find that targets reflecting a substantive, sincere commitment of a firm are significantly associated with emissions reductions. Ioannou et al. (2016) find evidence consistent with this theory. Specifically, they report that companies who set more difficult targets are more likely to achieve these targets than companies that set easier targets, and an important driver of this effect is that managers are intrinsically motivated (i.e., do not have monetary incentives associated with hitting the targets) rather than extrinsically motivated (i.e., do have monetary incentives associated with hitting the targets). Finally, Bui and de Villiers (2017) report that targets in general are effective at reducing emissions levels. In our study, we examine

[4] Companies often utilize targets, which are an important management control tool (Journeault 2016; Feichter, Grabner, and Moers 2018), to meet their emissions-related goals. In fact, almost half of Fortune 500 companies used emissions targets in 2016 (WWF et al. 2017) as did more than 80 percent of globally surveyed companies (CDP 2016). Prior research provides evidence that, in some situations, targets can improve emissions management efforts. For instance, companies that set more ambitious targets, targets that are long-term in nature, or targets that focus on absolute emissions reductions are more likely to see their companies achieve those targets than other companies (Dahlmann et al. 2019; Ioannou et al. 2016).

a setting wherein a firm adopts an external, industry-based emissions target ("external target" or "target") and explore how investors respond to the adoption of this industry-based target.

Extant literature suggests that individuals are skeptical of ESG investments (Du, Bhattacharya, and Sen 2010; Forehand and Grier 2003; Webb and Mohr 1998) such that they seek an understanding of the incentives for investing (Du et al. 2010; Ellen, Webb, and Mohr 2006; Sen, Bhattacharya, and Korschun 2006). Consequently, investors' perception of management's motives for reducing emissions may invoke an affective response (i.e., Elliott, Jackson, Peecher, and White 2014; Martin and Moser 2016) which moderates investors' reaction to the firm's emissions reduction efforts (Kim and Lee 2012). On one hand, investors may perceive that the firm is being a good corporate citizen by adopting a target to help reduce emissions, and therefore investors will reward the firm accordingly (Matsumura, Prakash, and Vera-Munoz 2014). On the other hand, Flammer (2013) finds that the presence of external pressures diminishes the market rewards to a firm for ESG activities. Thus, to the extent that investors perceive an external target as an external pressure on the firm's management to reduce its emissions, investors may perceive the adoption of an external target as extrinsically instead of intrinsically motivated. If so, this perception could diminish the perceived sincerity of the behavior, making it appear less socially responsible, and dampening investors' reaction to the emissions mitigation activities.

Based on the foregoing, we posit that the adoption of an external target does not affect investors' perceptions of a firm when the emissions management strategy focuses on direct emissions. This is because, as elaborated above, reducing direct emissions can be more complicated and less transitory than reducing indirect emissions, and therefore reducing direct emissions is unlikely to be perceived as insincerely motivated—even if an external target is adopted. Consistent with this reasoning, prior studies report that "stakeholders are often tolerant of extrinsic motives as long as

ESG initiatives are attributed to intrinsic motives as well" (Du et al. 2010; Ellen et al. 2006; Sen et al. 2006). In contrast, we question how the adoption of an external target will affect investors' perceptions of a firm when its emissions management strategy focuses on indirect emissions. This is because indirect emissions do not pertain to a firm's operations and are therefore relatively more transitory and less effortful than other forms of emissions reduction. Thus, when a firm's management adopts an external target and focuses its efforts on reducing indirect emissions, it is likely that investors perceive this effort as relatively less sincere and more extrinsically motivated. We, therefore, predict that investors perceive a firm that adopts an external emissions target and chooses to reduce its indirect emissions as less socially responsible and are less willing to invest compared to a firm that does not adopt an external emissions target or chooses to reduce its direct emissions.

Hypothesis 2: Regardless of a firm's prior ESG performance, investors are less willing to invest when a firm's emissions management strategy focuses on reducing indirect versus direct emissions, but only when the firm adopts an external emissions target.

3. Method

3.1. Participants

We recruit 248 participants from Amazon's Mechanical Turk to complete an online survey-based experiment housed on the Qualtrics platform (www.qualtrics.com).[5] Mechanical Turk provides access to workers who complete online tasks for compensation. Research finds that Mechanical Turk participants tend to be representative of the overall U.S. population (Berinsky, Huber, and Lenz 2012; Buhrmester, Kwang, and Gosling 2011; Paolacci, Chandler, and Ipeirotis 2010) and provide results that are consistent with laboratory studies (Farrell, Grenier, and Leiby

[5] Two participants did not provide a response for their investment values, thus creating null data points. Because their data was unusable, we removed them to reach the 248 participants reported in our study.

2017; Casler, Bickel, and Hackett 2013; Germine et al. 2012; Horton, Rand, and Zeckhauser 2011). Specifically, Farrell et al. 2017 argue that Mechanical Turk workers are "reasonably educated and financially literate" (p. 94).

To participate in our study, we require that Mechanical Turk workers reside in the U.S., have completed at least 100 other Mechanical Turk assignments, and have at least a 95 percent approval rate from prior assignments. The Mechanical Turk participants proxy for retail investors in our experiment. Previous studies found that Mechanical Turk workers are a reasonable proxy for retail investors (e.g., Owens and Hawkins 2018), and various studies have used them as such in experimental (investment) scenarios (e.g., Rennekamp 2012; Doxey et al. 2020; Johnson et al. 2020).[6] Furthermore, retail investors constitute a large class of investors who directly own over $16 trillion (36 percent) of the U.S. equity market and approximately $23 trillion (50 percent) of U.S. equities, when you factor in indirect ownership (Elliott, Hodge, and Jackson 2008; Vlastelica 2018). In addition, prior research suggests retail investors are particularly supportive of, and sensitive to, CSR activities and disclosures (Cheah et al. 2011; Cohen, Holder-Webb, and Zamora 2015; Elliott et al. 2014; Martin and Moser 2016; McLachlan and Gardner 2004). Demographically, 41 percent of our participants are female with an average age of 32 years, 49 percent have at least a bachelor's degree, and 82 percent are currently employed. Sixty-seven

[6] Investors are a key driver of ESG initiatives and reporting (Dyck, Lins, Roth, and Wagner 2019; Eccles and Klimenko 2019), and the demand for investment screening based on ESG performance is particularly growing among retail investors (Fonda 2019; The Asset 2020). For example, sixty-seven percent of financial advisors state they have clients that have expressed interest in ESG factors (BAML Global Wealth and Investment Management survey; BAML 2019). While institutional investors are usually seen as having greater influence, e.g., on share price development, firm decision making, and governance than retail investors, investigating retail investors' judgments and decisions is still highly important. Retail investors directly hold a significant proportion of equities (e.g., more than 1/3 of US equity ownership, measured in Dollar value; Forbes 2015). Furthermore, many regulatory initiatives in connection with capital markets aim at retail investor protection (MacIntosh 1993). We selected Mechanical Turk workers as our participants as they provide a reasonable proxy for retail investors (Owens and Hawkins 2018).

percent of participants rate themselves as having at least a little investment experience.[7] We paid participants $1.00 for an average of seven minutes of work, equating to an $8.57 hourly wage rate.

3.2. Experimental Design

The three independent variables in our 2 × 2 × 2 between-participants experimental design are direct versus indirect emissions management strategy focus (*Produce* vs. *Purchase*), prior ESG performance relative to the industry (*ESG Leader* vs. *ESG Laggard*), and presence of an external target (*Absent* vs. *Present*).[8] We collect a within-participant pre-post manipulation measure of willingness to invest before and after the emissions management strategy manipulation, and we use the pre-post difference score as our primary dependent variable. Eliciting the dependent measure in this way captures the incremental changes (e.g., direction and magnitude of participants' responses) in participants' judgments after viewing the emissions management strategy focus manipulation and helps detect the effects of that manipulation (Asay, Libby, and Rennekamp 2018). Using a changes measure also helps control for individual difference main effects (covariates) that could be necessary in specifying an analysis of covariance (ANCOVA) model.

Participants assume the role of an investor in a fictitious aluminum smelting company named "Firm Y" and proceed through the study following the steps outlined in Figure 1. After acknowledging the Institutional Review Board (IRB) consent form, participants read a short

[7] Controlling for investment experience, or any other demographic variable, does not change the results of our tests. The demographics of our study are comparable to other studies that have used Mechanical Turk workers as proxies for retail investors (e.g., Rennekamp 2012; Doxey et al. 2020; Johnson et al. 2020).

[8] An experiment is well-suited to examine our research question for two reasons. First, an experiment enables us to randomly assign participants to conditions which only differ based on our manipulated variables of interest. Consequently, we can draw conclusions about causality from our results while avoiding potential endogeneity issues associated with real-world emissions data. Second, disclosure of emissions (including disaggregated direct and indirect emissions) as well as emissions targets can be generally inconsistent while also not generally required. Thus, the empirical data to examine our research question is limited.

description of Firm Y, which includes an industry wide estimate of renewable energy production as well as a firm level renewable energy production amount. We manipulate *ESG Leader* and *ESG Laggard* by setting the firm level renewable energy utilization as either 70 percent (*ESG Leader*) or 10 percent (*ESG Laggard*) against the industry wide estimate of 25 percent.[9] In the external target *Present* condition, participants are told that Firm Y has agreed to an industry-wide (and hence, externally set) target of increasing its renewable energy consumption by 10 percent, whereas in the external target *Absent* condition participants are not told about a target.

We manipulate the emissions management strategy focus by indicating that Firm Y has chosen to either produce (*Produce*) or purchase (*Purchase*) an amount of renewable energy equal to 10 percent of their current energy usage. In both emissions management strategy focus conditions, producing or purchasing renewable energy replaces energy generated by petroleum and coal with renewable energy. Importantly, we hold both the cost of producing or purchasing this renewable energy and the type of emissions-reduction activity constant across conditions, thereby only manipulating whether the activity reduced direct or indirect emissions. In the *Produce* condition, Firm Y commits to changing its own energy production by switching from petroleum and coal-based energy to green energy, thereby reducing its direct emissions. In the *Purchase* condition, Firm Y commits to changing the energy it purchases via an electricity provider to green energy

[9] We chose the amount by which to deviate from the industry average when establishing a firm as being a leader versus a laggard based on extensive pretesting. Specifically, in pretests, we collected participant assessments for our key variables for many different levels of firm ESG performance. We set operational firm level renewable energy production percentages to most integer values on the scale from 0-100 percent and collected multiple datapoints per integer value. The pretesting results were consistent with the economic theory of diminishing marginal utility and suggested a steadily concave association between ESG performance and all participant assessments. In other words, our pretests suggested that moving from 10 percent (*ESG Laggard*) to 25 percent (industry average) renewable energy production would increase participants' assessments by about the same magnitude as moving from 25 percent to 70 percent (*ESG Leader*). From a theory perspective, our chosen manipulation levels capture above- and below-average ESG performance for industry leaders and laggards, respectively. While we acknowledge that variations in the level of these manipulations may affect the magnitude of our results, they would likely not interact with our results or change their directional interpretation.

from petroleum and coal-based energy, thereby reducing Firm Y's indirect emissions. In the external target *Present* condition, participants are then notified that Firm Y has adopted an industry-wide target of increasing its renewable energy consumption by 10 percent, whereas participants are not given any information about a target in the external target *Absent* condition.

[Insert Figure 1 here]

4. Results

4.1. Effectiveness of Manipulations

To assess the effectiveness of the ESG performance manipulation, we asked participants to indicate on a scale from 0 to 100 what percentage of Firm Y's energy usage they consider "clean energy." Participants in the ESG leader conditions perceive a significantly higher percentage of clean energy than participants in the ESG laggard conditions (means = 63.45 and 15.09 for the ESG leader and laggard, respectively; $t_{246} = 23.51$, $p < 0.01$) and seventy-five percent of participant' responses (186 of 248) exactly match the percentage reported in the manipulation. To ensure participants properly attend to the emissions management strategy manipulation, we ask them to recall whether Firm Y's program "will" or "will not" require a change to its energy production and by a magnitude of "10" or "50" percent? Eighty-seven percent of participants (215 of 248) answer both correctly. The reported analyses use all 248 observations. The results and inferences remain consistent when we exclude observations with a failed manipulation check.

4.2. Pre-measure Versus Post-measure Analysis

Two preliminary questions we examine are whether the ESG performance manipulation and presence of an external target significantly affect the initial measure of participants' willingness to invest in Firm Y. We test these questions by comparing participants' initial willingness to invest

in Firm Y between ESG performance and target conditions. Collapsing and comparing all ESG leader vs. ESG laggard conditions, participants' initial willingness to invest is greater when Firm Y is an ESG leader than when Firm Y is an ESG laggard (6.77 versus 4.89, respectively; t_{246} = 6.99, $p < 0.01$; untabulated). As indicated in Table 1, panel A, this conclusion also holds for a pairwise comparison of the pre-measure means for ESG leader vs. ESG laggard across emissions management strategy and target conditions. These results indicate that participants value Firm Y being a leader in the ESG domain.

However, compared to when an external target is absent, the presence of a target without knowledge of Firm Y's emissions management strategy does not have a significant effect on participants' initial willingness to invest (5.82 versus 5.78, respectively; $t_{246} = 0.14$, $p = 0.89$; untabulated).[10] This result is consistent with the notion that the effect of an external target on investors is contingent on Firm Y's emissions management strategy. We also investigate whether the within-participants manipulation of knowledge of the emissions management strategy has a significant effect on participants' willingness to invest. We test this by comparing the pre-measure of willingness to invest in Firm Y to the post-measure (5.90 versus 6.28, respectively; paired t_{247} = 3.29, $p < 0.01$; untabulated) and find that participants, in general, value Firm Y taking measures to mitigate emissions.

4.3. Tests of Hypotheses

H1 predicts that investors are more willing to invest when the emissions management strategy focuses on reducing direct versus indirect emissions, but only when the firm's prior ESG performance is poor. Table 1, panel A, reports cell sizes, means and standard deviations of

[10] All p-values are two-tailed unless otherwise noted.

participants' willingness to invest before and after they learn of the firm's emissions management strategy and our dependent measure – change in willingness to invest – for all eight treatment conditions.[11] These means are also depicted in Figure 2, panel A. When the external target is absent, we find that the mean change in willingness to invest is lowest in the ESG leader/produce strategy condition (-0.07), and highest in the ESG laggard/produce strategy condition (1.05). In the traditional analysis of variance (ANOVA) model (Table 1, panel B), the main effect for ESG performance is marginally significant ($F_{1,122}$ = 3.01, p = 0.085), the main effect for emissions management strategy is not significant ($F_{1,122}$ = 0.01, p = 0.917), and the interaction is significant ($F_{1,122}$ = 3.95, one-tailed equivalent p = 0.025) and supports H1.

[Insert Figure 2 here]

Table 1, panel C, reports the results of the simple main effects tests and provides additional support for the predicted interaction. When the firm is a ESG laggard, the change in participants' willingness to invest is more positive when the firm's emissions management strategy is to produce green energy than purchase green energy (one-tailed equivalent p = 0.092), providing marginal support for H1. Interestingly, while this marginal effect was not predicted, when the firm is a ESG leader, the increase in participants' willingness to invest is marginally greater when the firm's emissions management strategy is to purchase green energy than when it is to produce green energy (p = 0.092). Finally, when the firm's emissions management strategy is to produce green energy, the change in participants' willingness to invest is greater when the firm is a ESG laggard

[11] Because the ESG performance and external target manipulations occurred before participants' initial willingness-to-invest judgments, one concern with using the change in willingness to invest as our dependent variable is that doing so may introduce estimation bias in our model. To eliminate this potential bias, we follow Yzerbyt et al. (2004) who demonstrate that such bias can be mitigated using an ANCOVA approach by interacting the covariate (i.e., initial willingness to invest) with the uncorrelated manipulated variable (i.e., emissions management strategy) and including this interaction term as an additional covariate. In untabulated analyses, we find that using this approach does not change any of the results or inferences from our hypotheses tests.

than when the firm is a ESG leader (p = 0.023). However, when the firm's emissions management strategy is to purchase green energy, there is no significant difference in the change in participants' willingness to invest between ESG performance conditions (p = 0.823).

[Insert Table 1 here]

While not a focus of this article, we also observe that, in an untabulated, structural equation model that adds a *Socially Responsible* mediator into our H1 interactive design, the change in participants' willingness to invest is more sensitive to perceived level of *Socially Responsible* when the firm is a ESG laggard, but not when the firm is a ESG leader. These results provide some nuance to our casual results noted in this section by suggesting participants feel there is a decrease in the social responsibility of the firm when utilizing a purchase emissions management strategy. These results also provide an additional manipulation check (e.g., Asay, Guggenmos, Kadous, Koonce, and Libby 2021) by using a perceptional measure that is consistent at the construct-level with our manipulated measure to show consistent results using this second measure.[12]

H2 predicts that regardless of ESG performance, when the emissions management strategy is to purchase green energy, the presence of an external target will have a negative impact on investors' willingness to invest, in contrast to no effect when the emissions management strategy is to produce green energy. The results for our test of H2 are depicted in Figure 2, panels B and C. In comparing the means in panel A of Table 1, the presence of a target appears to influence

[12] To create our *Socially Responsible* mediation variable, we create a single factor which explains 90.24 percent of the variance (eigenvalue = 2.60) based on difference values for five statements about Firm Y taken after they make their pre- and post-willingness to invest judgments related to perceptions of the firm being: environmentally responsible (0.85), financially responsible (0.29), socially responsible (0.84), honest (0.67), and ethical (0.81). These statements correspond with prior research about ways that ESG may influence investors' perceptions of companies (Chava 2014; Cheng, Ioannou, and Serafeim 2014; El Ghoul, Guedhami, Kim, and Park 2018; Elliott et al. 2014; Flammer 2015, 2018; Hartzmark and Sussman 2019; Lins, Servaes, and Tamayo 2017). Fits for both model results reported are good based on generally accepted measures (e.g., traditional chi-square test, Comparative Fit Index, and Root Mean Square Error of Approximation).

participants' willingness to invest in a manner consistent with H2. In the traditional ANOVA model reported in Table 1, panel E, both industry target and emissions management strategy have a significant main effect ($p = 0.042$ and $p = 0.019$, respectively), but these main effects are qualified by a significant interaction ($F_{1,244} = 3.45$, one-tailed equivalent $p = 0.033$). Further, consistent with our theory, the insignificant three-way interaction shown in Table 1, panel D, supports our theory that ESG performance does not moderate our predicted H2 interaction.

Table 1, panel F, reports the results from the simple main effects tests and provides additional support for the predicted H2 interaction. When the firm's emissions management strategy is to purchase green energy, a target significantly decreases participants' willingness to invest (one-tailed equivalent $p = 0.001$), supporting H2. Also, when the industry target is present, the change in participants' willingness to invest is lower when firms purchase versus produce green energy (one-tailed equivalent $p < 0.001$), further supporting H2. However, when the firm's emissions management strategy is to produce green energy, industry target does not have a significant effect ($p = 0.907$) and when the industry target is absent, the firm's emissions management strategy does not have a significant effect ($p = 0.757$), also consistent H2.

We again observe in an untabulated structural equations model that adds a *Socially Responsible* mediator into our H2 interactive design that the results indicate the change in participants' willingness to invest is more sensitive to the socially responsible perception of the firm when the firm utilizes a purchase versus produce emissions management strategy – regardless of target regime. Combined results of both mediation models suggest that when a firm chooses a purchase (versus a produce) emissions management strategy, investors' socially responsible perceptions are sensitive to both their ESG performance and choice of external target.

5. Discussion and Conclusion

The risks and sentiments associated with climate change are changing the way companies operate and the way that the market values companies. Specifically, investors are pressuring companies to mitigate their companies' emissions by incorporating emissions information into their firm valuations and penalizing companies for their emissions levels (Chapple, Clarkson, and Gold 2013; Clarkson, Li, Pinnuck, and Richardson 2015; Griffin, Lont, and Sun 2017; Konar and Cohen 2001; Matsumura et al. 2014). Companies are also under greater pressure to be more transparent about the types of emissions (i.e., direct and indirect) that they produce and choose to mitigate (CRD 2019) and to adopt external targets to guide their emissions mitigation efforts.

Using a controlled experiment, we find that investors will react more favorably if a firm mitigates direct rather than indirect emissions because reducing direct emissions is perceived as more socially responsible; however, due to the diminishing marginal utility of ESG investment (Flammer 2013), we expect investors will only react when the firm's prior ESG performance is poor versus good. We also find that adopting an external emissions target makes the firm's efforts to reduce indirect emissions seem less sincere and therefore negatively effect investor reactions. While the adoption of such a target may intuitively be viewed as a positive aspect of an emissions management strategy, our results indicate that an external target can be perceived as an insincere commitment to reducing emissions.

Our results add to the discussion related to the most effective manner for reporting on and effecting necessary ESG change by illustrating how strategically mitigating direct versus indirect emissions affects a firm's ability to attract equity capital. Our results suggest that when a firm chooses a purchase (versus a produce) emissions management strategy, investors' socially responsible perceptions are sensitive to both their ESG performance and choice of external target.

These results contribute to the ongoing policy discussion by showing conditions under which investors value ESG investments (e.g., Elliott et al. 2014; Johnson et al. 2020; Martin 2009; Martin and Moser 2016; Arnold, Bassen, and Frank 2018). Our insights further support calls for research about how the accounting (e.g., measurement and disclosure) for ESG investments can influence decision makers (Hales et al. 2016; Moser and Martin 2012; Sprinkle and Maines 2010). Specifically, we provide evidence that retail investors perceive information about a firm's reductions to direct and indirect emissions as relevant information, and this evidence can help inform the discussion about whether a firm's management should disaggregate disclosed emissions levels into their direct and indirect components (CRD 2019).

Our results further suggest that companies should exercise caution when adopting external emissions targets. While prior research examines the effectiveness of emissions targets in reducing companies' emissions levels (Dahlmann et al. 2019; Ioannou et al. 2016), whether and how the adoption of external targets affects investors' perception of companies' strategies continues to be an open question. This external target issue has become more important as many companies have adopted external science-based targets associated with the Paris Agreement (Freiberg, Grewal, and Serafeim 2021), which seeks to limit global warming to 1.5 degrees Celsius above pre-industrial levels (Rogelj et al. 2016). While the adoption of such a science-based target may intuitively be viewed as a positive aspect of an emissions management strategy, our results indicate that an external target can be perceived as an insincere commitment to reducing emissions. However, while our theory suggests that the industry-wide emissions target used in our setting should apply to any type of target, we acknowledge that it is possible that investors may have differing perceptions for different types of targets (e.g., science-based), thus leaving a fruitful area for research to explore.

In summary, our results should be of interest to policymakers as they consider emission disclosure requirements. Even if companies' management does not explicitly disclose their emissions management strategy, as was the case in our experiment, the strategy becomes evident when they follow the reporting guidelines outlined by various standard setters and disaggregate direct and indirect emissions across multiple reporting periods.

Although our study offers important contributions, it is not without limitations that leaves room for future research. While we focus on retail investors in our study because they constitute an important group of investors, they may have limited investing experience. It is therefore possible that professional investors with extensive investing experience would not be comparably impacted by the manipulations of our study. Specifically, compared to retail investors, professional investors might adopt a more traditional shareholder perspective (Eccles et al. 2011), and demand sustainable behavior and CSR information because it enhances rather than sacrifices shareholder value (Cohen et al. 2015). Additionally, professional investors are more likely to utilize formal approaches (e.g., valuation schedules using key performance indicators) for their investment decision. Consequently, future studies could explore whether professional investors have different perceptions and make different judgments compared with retail investors with respect to a firm's emissions management strategy, ESG performance, and target setting. Another limitation of our study is that we manipulate ESG performance at specific levels. Future research can therefore explore whether using different levels of ESG performance will produce different results.

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FIGURE 1

Experimental Design Flow and Manipulated Text

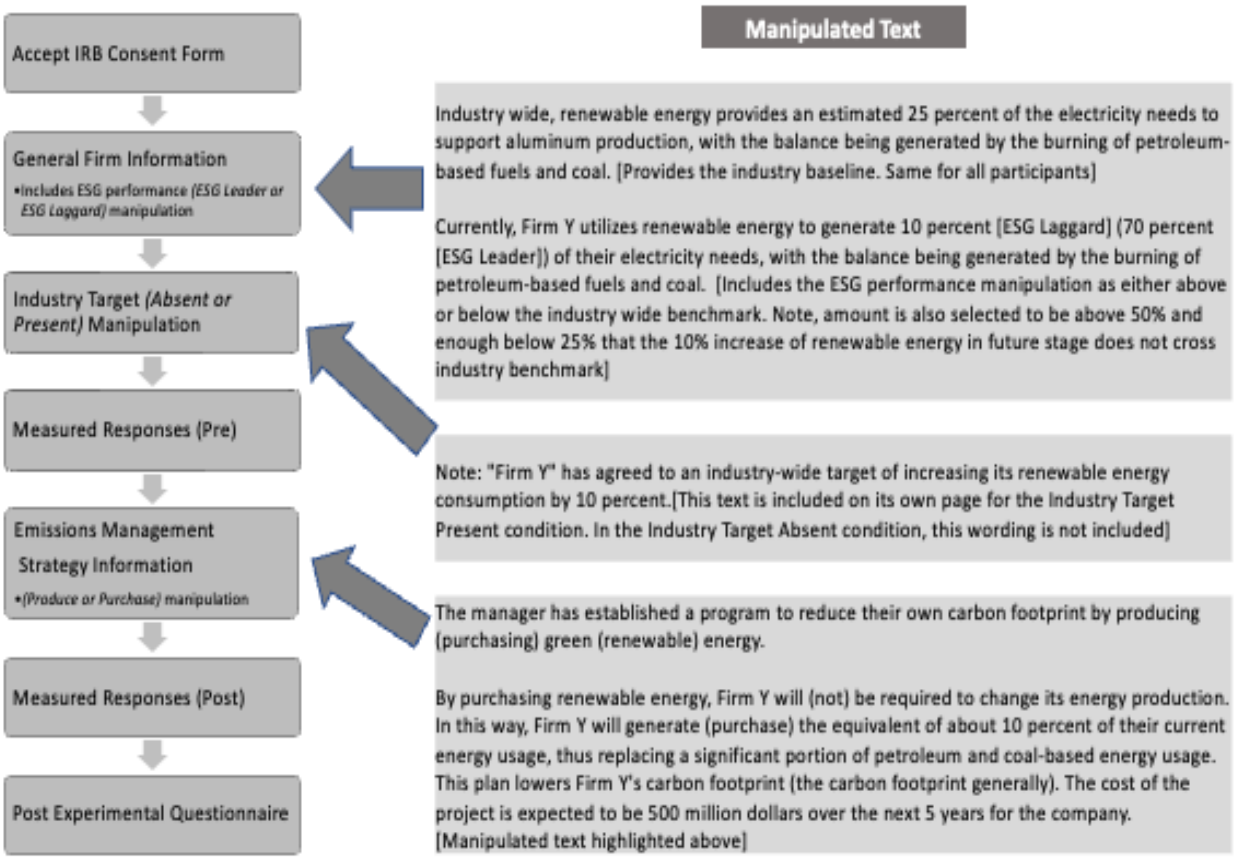
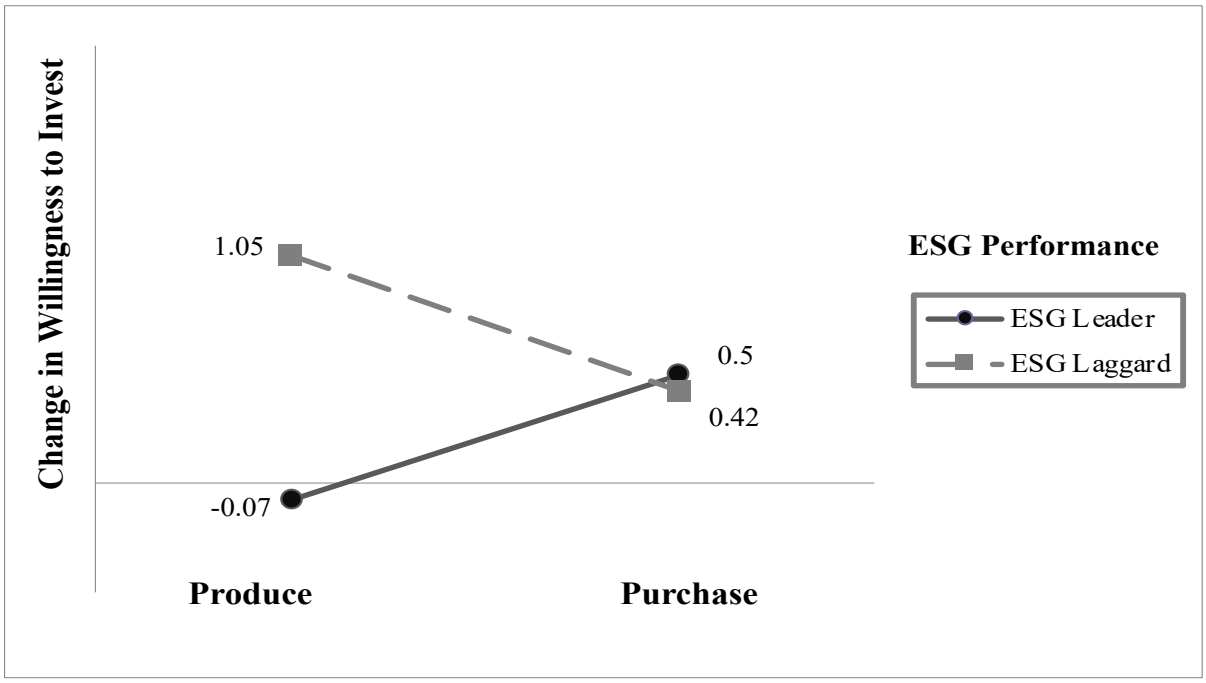


FIGURE 2

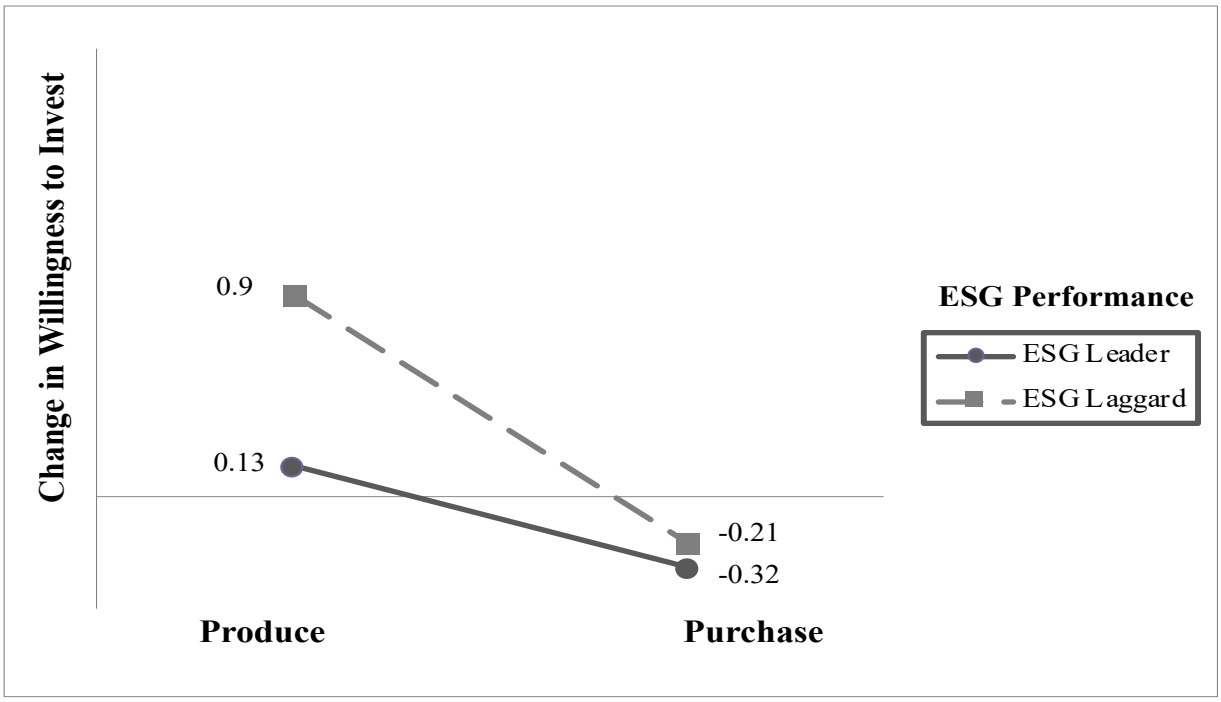
The Effect of ESG Performance and Emissions Management Strategy on the Change in Willingness to Invest

Panel A: Observed Effects for External Target Absent Conditions (H1)

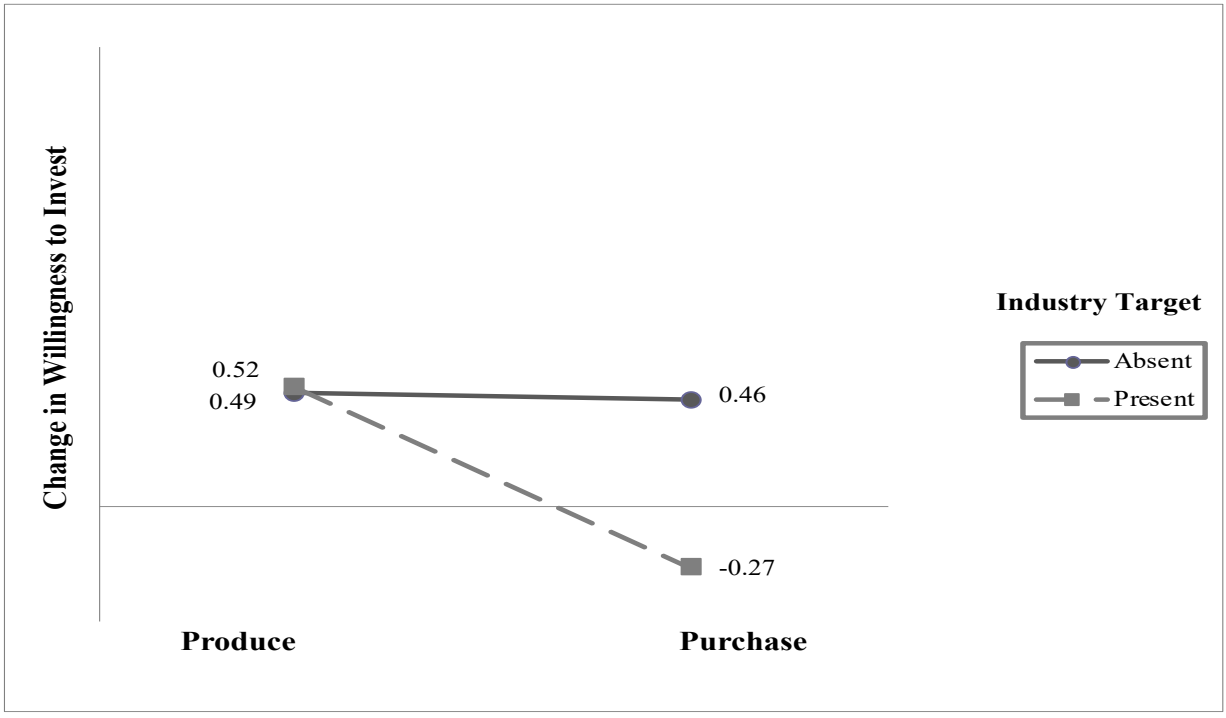


Panel A depicts the observed pattern of cell means of change in investors' willingness to invest when an external emissions target is absent (see Table 1, panel A). This pattern is tested using the ANOVA presented in Table 1, panel B, and simple main effects tests in Table 1, panel C.

Panel B: Observed Effects for External Target Present Conditions



Panel C: Observed Effects for External Target Absent Versus Present Conditions (H2)



Panels B and C illustrate participants' change in willingness to invest reported in Table 1, panel A. Panel B depicts the condition when an external target is present. Panel C depicts cell means for all conditions but collapses the ESG Leader/ESG Laggard conditions to reflect our H2 prediction.

TABLE 1

RESULTS

Panel A: Descriptive Statistics – Investors' willingness to invest [standard deviations]

External Target Absent

ESG Performance	Emissions Strategy	n	Pre-measure	−	Post-measure	=	Change in willingness to invest
ESG Leader	Produce	30	6.80[1.95]		6.73[2.02]		-0.07[1.36]
	Purchase	26	7.27[2.27]		7.77[2.05]		0.50[1.07]
ESG Laggard	Produce	37	4.81[1.90]		5.86[2.34]		1.05[2.32]
	Purchase	33	4.76[1.90]		5.18[2.01]		0.42[1.44]

External Target Present

ESG Performance	Emissions Strategy	n	Pre-measure	−	Post-measure	=	Change in willingness to invest
ESG Leader	Produce	30	6.83[1.60]		6.97[1.54]		0.13[0.86]
	Purchase	34	6.29[2.43]		5.97[2.53]		-0.32[0.94]
ESG Laggard	Produce	30	5.03[2.22]		5.93[1.84]		0.90[1.49]
	Purchase	28	5.00[1.88]		4.79[2.11]		-0.21[1.26]

Collapse ESG Performance

External Target	Emissions Strategy	n	Pre-measure	−	Post-measure	=	Change in willingness to invest
Absent	Produce	67	5.70[2.44]		6.25[2.24]		0.55[2.01]
	Purchase	59	5.86[2.41]		6.32[2.39]		0.46[1.28]
Present	Produce	60	5.93[2.12]		6.45[1.76]		0.52[1.27]
	Purchase	62	5.71[2.28]		5.44[2.41]		-0.27[1.09]

Panel B: ANOVA Results – External Target Absent

Source	*df*	*SS*	*MS*	*F-ratio*	*p-value*
ESG Performance	1	8.46	8.46	3.01	0.085
Emissions Strategy (ES)	1	0.03	0.03	0.01	0.917
ESG Performance × ES*	1	7.82	7.82	3.95	0.025
Error	122	363.49	2.81		

Panel C: Tests of Simple Main Effects

	df	*t-stat*	*p-value*
Effect of ESG Performance given Produce Strategy	65	2.34	0.023
Effect of ESG Performance given Purchase Strategy	57	0.22	0.823
Effect of Emissions Strategy given ESG Leader	54	1.71	0.092
Effect of Emissions Strategy given ESG Laggard*	68	1.35	0.092

Panel D: ANOVA Results- ESG Performance × Emissions Strategy × External Target

Source	*df*	*SS*	*MS*	*F-ratio*	*p*
ESG Performance (ESGP)	1	14.14	14.14	6.78	0.010
Emissions Strategy (ES)	1	10.24	10.24	4.91	0.028
External Target (ET)	1	7.69	7.69	3.68	0.056
ESGP × ES	1	13.17	13.17	6.31	0.013
ET × ES	1	8.72	8.72	4.18	0.042
ESGP × ET	1	0.11	0.11	0.05	0.819
ESGP × ES × ET	1	1.11	1.11	0.53	0.466
Error	240	500.64	2.09		

Panel E: ANOVA Results- Emissions Strategy × External Target (collapse ESG Performance)

Source	*df*	*SS*	*MS*	*F-ratio*	*p*
Emissions Strategy (ES)	1	12.12	12.12	5.58	0.019
External Target (ET)	1	9.11	9.11	4.19	0.042
ET × ES*	1	7.50	7.50	3.45	0.033
Error	244	530.53	2.17		

Panel F: Tests of Simple Main Effects

	df	*t-stat*	*p*
Effect of External Target given Produce Strategy	125	0.12	0.907
Effect of External Target given Purchase Strategy*	119	3.40	0.001
Effect of Emissions Strategy given External Target Absent	124	0.31	0.757
Effect of Emissions Strategy given External Target Present*	120	3.70	<0.001

Investors' willingness to invest (pre and post) is measured by asking participants "I would consider investing in Firm Y" on a 10-point scale with endpoints 1 = "very strongly disagree" and 10 = "very strongly agree". The post- minus pre-measure is what we call change in investors' willingness to invest. Change values can range from +9 to −9.

*We report a one-tailed equivalent p-value for this directional prediction. An F-statistic with a single degree of freedom is the same as a squared ANOVA contrast t-statistic and generates an identical p-value (McNeil, Newman, and Kelly 1996). All other p-values are two-tailed.

The expression df stands for degrees of freedom, SS for sum of squares, and MS for the mean of the sum of squares.

The expression F-ratio stands for the F statistic and the expression t-stat stands for the t statistic.