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# The influence of firm performance and (level of) assurance on the believability of management's environmental report

## Abstract

**Purpose** – This study empirically examines perceptions of environmental report believability based on a firm's relative performance and level of assurance obtained on environmental activities under the recently clarified and recodified attestation standards in the United States.

**Design/methodology/approach** – The paper uses a  $2 \times 3$  between-subjects experiment to identify differences in 153 non-expert environmental report users' perceptions of report believability based on positive or negative firm performance and (level of) assurance provided by an accounting firm.

**Findings** – Results show a main effect in that negative performance reports are perceived to be more believable than positive performance reports, as driven by negative performance reports being significantly more believable when no assurance is present. The firm performance effect is eliminated once limited or reasonable assurance is provided. Further, positive performance reports with limited, but not reasonable, assurance are perceived to be more believable than reports without assurance. No differences are identified within the negative performance condition.

**Practical implications** – Limited assurance might be used as an impression management tool to enhance the believability of positive performance environmental reports. Users, practitioners, and standard-setters should also be aware that users might believe environmental reports are assured, even when no such assurance has been provided.

**Originality/value** – This paper examines the impact of assured environmental reporting on users that review firms' environmental reports outside of a shareholder/investor role. The study also demonstrates conditions in which firm performance and assurance impact perceptions of report believability.

**Keywords** Environmental CSR reports, Attestation, Reasonable assurance, Limited assurance

**Paper type** Research paper

## 1. Introduction

Corporate social responsibility (CSR) reporting is largely a voluntary activity in the United States (US) (GRI, 2014a), and firms that make these disclosures tend to focus on areas of positive performance (Deegan and Gordon, 1996; Deegan and Rankin, 1996; Cho and Patten,

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2007; Holder-Webb *et al.*, 2009; Boiral, 2013; Cho *et al.*, 2015a)[1]. At the same time, a growing number of companies now obtain assurance on their CSR reports (KPMG, 2017). This environment introduces an interesting question to management, whether or not to have their CSR report assured. Theory on firm performance suggests that reports of positive firm performance are less inherently believable, and thus might be more believable if independently assured (Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004). However, if a firm consumes resources to voluntarily track and report CSR activities, must it also then purchase (a certain level of) assurance on positive performance results so that these are perceived to be as believable as if the firm had reported negative results? This study uses an experiment to examine perceptions of environmental CSR report believability for firms that disclose positive or negative performance and obtain no, limited, or reasonable assurance from an accounting firm under the recently clarified and recodified attestation standards in the US (AICPA, 2016). In doing so, the paper studies non-expert environmental report users who are not evaluating the report as part of an investment or firm-valuation decision. The study therefore responds to a call by Moser and Martin (2012) to examine the impact of accountability reporting on users that confront this information outside of a wealth-maximization decision, and thus acknowledges that such “disclosures could serve a broader purpose than simply providing value-relevant information to shareholders” (p. 798).

Environmental reporting is a subset of CSR reporting, which is an organization’s disclosure of the “economic, environmental and social impacts caused by its everyday activities” (GRI, 2014a). While accounting firms, specialty consultants, and others provide assurance on CSR disclosures (O’Dwyer and Owen, 2005; Simnett *et al.*, 2009; Peters and Romi, 2014), this study focuses on independent assurance from accounting firms given the widespread efforts of the profession to offer a robust CSR assurance framework (Peters and Romi, 2014; AICPA, 2017). Several accounting studies show that assurance from accountants influences users’ perceptions of financial and non-financial information (e.g. Kinney, 2000; Mercer, 2004; Simnett *et al.*, 2009; Pflugrath *et al.*, 2011). However, it is not yet clear whether users differentiate between levels of assurance (Hasan *et al.*, 2003; Schelluch and Gay, 2006; Hodge *et al.*, 2009; Low and Boo, 2012; Rivière-Giordano *et al.*, 2018). The clarified and recodified US attestation standards (herein, the “clarified US attestation standards”) allow independent accountants to provide limited or reasonable assurance on CSR disclosures for review or examination engagements, respectively (AICPA, 2016). Of the US firms that issued assured CSR reports in accordance with the Global Reporting Initiative’s (GRI) framework in 2013, a total of 76.2 percent (32/42) were issued with limited assurance and the balance with reasonable assurance (GRI, 2014b).

This paper finds evidence that non-expert environmental report users expect companies will disclose favorable performance reports. As such, the study is consistent with Verrecchia’s (1983) discussion that, with discretionary disclosures, users have rational expectations that management will withhold unfavorable news. Psychology theory on communication suggests that individuals are more influenced by a message when their expectation of that message is disconfirmed (Eagly *et al.*, 1978). This suggests that management’s report depicting negative environmental performance should be perceived as more believable than when reporting positive performance. Because information about a firm’s negative environmental performance should be perceived as more believable, there may be less opportunity for external assurance to incrementally enhance report believability, making it less likely that users will differentiate between no assurance and the different levels of assurance for firms with negative performance. Along the same lines, users may find positive performance disclosures to be less inherently believable (Mercer, 2004). Thus, there should be more of an opportunity for assurance to enhance the perceived believability of management’s report for companies with positive performance (cf. Kinney, 2000), such that users will differentiate between no assurance and the different levels of assurance.

This study uses a  $2 \times 3$  experimental design in which *relative firm environmental performance* (positive or negative) and *assurance provided* (none, limited, or reasonable assurance) are manipulated between participants. Participants were 153 individuals residing in the US, with general business knowledge and experience with investing activities as recruited through a crowdsourcing service, Amazon Mechanical Turk. This study refers to the participants as non-expert environmental report users because they should have an understanding of firm disclosures, but need not be experts with environmental-specific disclosures. Further, participants were not primed to approach their role from an investment or firm valuation perspective, and thus their responses should be representative of a broad group of stakeholders. The experiment focused on one aspect of environmental reporting, greenhouse gas emissions, and was administered using Qualtrics. Each participant reviewed the environmental report for a hypothetical company that indicated either positive or negative performance relative to the industry average across a series of indicators. Then, participants in an assurance condition read the associated independent accountant's report that presented either a limited or a reasonable level of assurance. After reading the experimental materials, participants were asked a series of questions to capture the dependent variables, three of which were used to create an index to assess perceptions of the believability of management's environmental report.

The focus of this study on believability comes from (1) Kinney's (2000) finding that independent assurance enhances the credibility of management's disclosures, and (2) Mercer's (2004) clarification that disclosure credibility represents "perceptions of the believability of a particular disclosure" (p. 186). Therefore, this paper interprets previous studies on disclosure/report credibility as pursuits to determine if users found the associated information to be believable. To perform a comprehensive review of disclosure/report credibility, it is necessary to acknowledge that the extant literature largely uses the terms credibility and reliability in much the same way (e.g. Flanagan and Metzger, 2000; Kinney, 2000; Fargher and Gramling, 2003; Mercer, 2004; Schelluch and Gay, 2006; Nugent and Simnett, 2007; Hodge *et al.*, 2009; Simnett *et al.*, 2009; Pflugrath *et al.*, 2011). As such, this study considers previous findings about perceptions of disclosure/report credibility and/or reliability to develop a theoretical argument for what makes disclosures/reports more (or less) believable to users.

Findings indicate that users perceive environmental reports to be believable, but there is no main effect for the provision/level of assurance obtained. Consistent with the theory (e.g. Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004), there is a main effect for firm performance in which negative performance reports are perceived to be more believable than positive performance reports. Further analyses reveal this effect is driven by negative performance reports being perceived as significantly more believable when no assurance is present. The firm performance effect is eliminated when limited or reasonable assurance is provided. This study also identifies an interaction in which positive performance reports with limited, but not reasonable, assurance are perceived to be more believable than reports with no assurance. No differences are identified in the believability of negative performance reports due to the provision or level of assurance.

Results of this study inform academics, practitioners, and standard setters. For academics, theory on firm performance suggests that users find reports depicting negative firm performance to be more believable than reports depicting positive performance (e.g. Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004). This study reinforces firm performance theory when no assurance is present, but provides evidence that assurance on environmental reports serves to eliminate differences in report believability that stem from firm performance. Findings also partially support the notion that the influence of assurance is limited to positive performance conditions (Coram *et al.*, 2009), and that non-expert users do not differentiate between levels of assurance (e.g. Hasan *et al.*, 2003; Hodge *et al.*, 2009). Further, this study

focuses on whether environmental disclosures are believable to the broader group of users who are not evaluating the information as part of a wealth-maximization decision (Moser and Martin, 2012). From a practitioner standpoint, this study demonstrates that if a firm seeks to use its environmental report to speak to a broader group of stakeholders, limited assurance is an effective tool to enhance report believability when performance is positive. Finally, from a standard-setter perspective, this study calls into question whether users would benefit from formal reporting requirements that have companies explicitly specify when no assurance is provided on environmental disclosures/reports.

The remainder of this paper is organized into four sections. It begins with a review of the relevant literature and hypothesis development. Next appears the research design, which is followed by a description of the results. The study concludes with a summary of key takeaways and insights into the findings.

## 2. Background and hypothesis development

### 2.1 Assured CSR reporting in the US

Globally, the practice of reporting on CSR activities is becoming “standard practice” for firms (KPMG, 2017, p. 4). Even so, there is a lack of widespread structure and conformity in CSR reporting across the US, and firms have a great deal of flexibility in deciding how to disclose such non-financial information (Cohen *et al.*, 2012). For example, using a sample of US firms, Holder-Webb *et al.* (2009) find that large firms predominantly make these disclosures (from most to least common) on their corporate websites, stand-alone governance documents, mandatory filings, and product fact sheets. Disclosures for smaller firms were found primarily in mandatory filings (Holder-Webb *et al.*, 2009). Given the absence of a widely agreed-upon reporting mechanism and format, Cohen *et al.* (2012) suggest the credibility of CSR disclosures would benefit from external assurance.

The number of large firms issuing assured CSR reports is on the rise (Green and Zhou, 2013; Junior *et al.*, 2014; KPMG, 2017). Although the level of assured CSR reporting in the US currently lags behind that seen in many other countries (KPMG, 2017), CSR initiatives are becoming increasingly popular (Ballou *et al.*, 2012) and US accounting firms are beginning to invest in CSR services (Gunther, 2010; Foster, 2012; KPMG, 2013). It is therefore not surprising that the US has witnessed a recent increase in the number of assured CSR reports (GRI, 2014b). At the same time, Peters and Romi (2014) have found an increase in the value-relevance of CSR assurance provided by accountants. The evolving CSR environment in the US has also impacted standard-setters.

The American Institute of Certified Public Accountants (AICPA) issues and maintains the US attestation standards related to verification of non-financial information, including CSR disclosures. Recently, the AICPA’s Auditing Standards Board (ASB) completed the Attestation Clarity Project, which clarified and recodified the US attestation standards. The resulting standards are similar to the standards of the International Auditing and Assurance Standards Board (IAASB) that issues International Standards on Assurance Engagements (ISAEs). However, full convergence to IAASB standards did not occur due to “the US profession’s experience with the attestation standards during the past 25 years” and the “inconsistencies with other US professional standards” that would have resulted (AICPA, 2013a, p. 6). Of particular interest to this study, the clarified US attestation standards now echo ISAEs and define the two levels of assurance in attestation engagements as being either *limited* or *reasonable*[2]. Reasonable assurance is the highest level of assurance currently offered and is provided when an examination is performed, while limited assurance is provided as part of a review (AICPA, 2016). Further, reasonable assurance is positively expressed as an opinion (i.e. “we believe that . . .”), whereas limited assurance is negatively expressed as a conclusion (i.e. “nothing came to our attention that . . .”) (AICPA, 2016).

One reason firms might seek independent assurance on their CSR disclosures is to influence report users' perceptions of those reports (cf. [Simnett et al., 2009](#); [GRI, 2014b](#); [Junior et al., 2014](#)). The next section considers the influence of assurances like those defined by the AICPA.

## *2.2 Impact of assurance on reported information*

[Simnett et al. \(2009\)](#) point out that assurance is not free and is purchased when the benefits presumably outweigh the costs. The benefits of assuring a CSR report may include enhancing disclosure credibility, building corporate reputation, increasing user confidence in the (completeness of) disclosed information, and reducing information asymmetry ([Holder-Webb et al., 2009](#); [Simnett et al., 2009](#); [Boiral and Gendron, 2011](#); [Pflugrath et al., 2011](#); [Junior et al., 2014](#); [Cho et al., 2014](#); [Casey and Grenier, 2015](#); [Cohen and Simnett, 2015](#)). Assurance of CSR information is also associated with increased environmental reputation ([Birkey et al., 2016](#)), and can enhance the quality of environmental reports in the eyes of stakeholders ([Moroney et al., 2012](#)). Investors have also been shown to consider the reliability of sustainability information in assessing a company's market value ([Lackmann et al., 2012](#)). Finally, [Wong and Millington \(2014\)](#) find that stakeholders demand CSR assurance when they assess the value of the CSR information to be high and when they believe the representational faithfulness of the disclosures to be low. In summary, CSR assurance is an important tool for management to use in shaping their reputation and to combat the uncertainty users may feel when reviewing CSR reports.

Prior research examines the use of different assurers of CSR information. While not unanimous (e.g. [Wong and Millington, 2014](#)), the extant research demonstrates the importance of obtaining assurance from accountants/accounting firms. For example, accountants are more cautious, limited in approach, and offer lower levels of assurance than consultant assurers, which might relate to the accounting profession's robust reporting frameworks and assurance/attestation standards, as well as its rules on independence and professional conduct ([O'Dwyer and Owen, 2005](#)). Studies have also found that accounting firms provide the highest quality of assurance on CSR reports ([Perego and Kolk, 2012](#); [Casey and Grenier, 2015](#)), that assurance from accountants is more trustworthy, expert, and credible ([Pflugrath et al., 2011](#)), and that more expert environmental committees (on the board of directors) prefer CSR assurance from accounting firms ([Peters and Romi, 2014](#)). Further, [Hodge et al. \(2009\)](#) find that users perceive CSR reports with reasonable (but not limited) assurance to be more credible when issued by an accounting firm rather than by a specialist consultant firm. Finally, in speaking about the success of companies strategically integrating internal functions with CSR initiatives, [Ballou et al. \(2012\)](#) find that "obtaining assurance is associated with strategic integration, especially when provided by a public accounting firm" (p. 267).

Given the benefits of CSR assurance described to this point, it is also necessary to highlight the body of work that questions the value of this assurance. [Boiral and Gendron \(2011\)](#) challenge CSR assurance engagements as having structural deficiencies and lacking appropriate rigor. [O'Dwyer and Owen \(2005\)](#) raise concerns over management's involvement in the assurance process and question the independence of assurance providers. [Green and Li \(2011\)](#) document an expectation gap in the responsibilities perceived by preparers and assurers when issuing greenhouse gas emissions reports to stakeholders. [Michelon et al. \(2015\)](#) find that assurance of CSR disclosures is used more to manage corporate image rather than to enhance the accountability of reported information. Finally, [Talbot and Boiral \(2018\)](#) study the energy sector and find widespread issues with CSR disclosures that do not comply with the GRI guidelines, even after an audit by third-party accountants. Collectively, these findings challenge the quality of CSR disclosures/reports, even when they are accompanied by external assurance.



### *2.3 Levels of assurance*

As alluded to with the findings of [Hodge et al. \(2009\)](#), a discussion of assurance on CSR information provided by professional accountants would not be complete without considering the two levels of assurance available under the US attestation standards. These levels are limited and reasonable assurance ([AICPA, 2016](#)). As previously described, reasonable assurance is delivered with an opinion or positive expression of assurance, while limited assurance is delivered with a conclusion or negative expression of assurance ([AICPA, 2016](#)). Studies find that users differentiate between positive and negative expressions of assurance, in that positive provides more assurance ([Gay et al., 1998](#)) and makes the underlying information more reliable ([Schelluch and Gay, 2006](#)).

It is not clear whether users differentiate between levels of assurance with CSR reporting. [Hasan et al. \(2003\)](#) used a CSR reporting scenario to examine whether shareholders perceive a difference in assurance provided between a high assurance report and four different moderate assurance reports[3]. Their results indicate that users differentiate between high and moderate assurance with three of four examined iterations of a moderate assurance CSR report, including a moderate assurance report with a negative assurance statement. Later, when [Hodge et al. \(2009\)](#) experimented with users' ability to differentiate between levels of assurance provided on CSR reports, they failed to find a main effect for users' confidence and perceptions of credibility with CSR reports. Finally, [Rivière-Giordano et al. \(2018\)](#) identified a penalty for firms that obtain lower levels of assurance on environmental disclosures, such that financial analysts are less likely to recommend companies that obtain lower levels of assurance (rather than no assurance) on environmental disclosures. In sum, these studies fail to establish whether users differentiate between levels of assurance on CSR disclosures and reports.

[Low and Boo \(2012\)](#) conducted an experiment that helped untangle when users differentiate between levels of assurance being conveyed. Specifically, they found that less-informed users benefit from contrasting statements to distinguish between limited and reasonable assurance. Under the clarified US attestation standards, limited assurance reports refer to the availability of a higher level of assurance (i.e. reasonable assurance). However, reasonable assurance reports make no contrast to the lower level of available assurance (i.e. limited assurance). Under this current reporting format, only more informed users can distinguish the level of assurance being conveyed. As such, [Low and Boo \(2012\)](#) show that having a contrast statement in both the limited and reasonable assurance reports improves less informed users' understanding of the level of assurance being conveyed. This finding is supported by prior research that shows comparative information, when available, is used by decision-makers (e.g. [Slovic and MacPhillamy, 1974](#); [Lipe and Salterio, 2000](#)).

### *2.4 Firm CSR performance and user expectations of performance*

Given the voluntary nature of CSR reporting, companies primarily make "self-laudatory" or largely positive CSR disclosures ([Holder-Webb et al., 2009](#), p. 517). Signaling theory suggests that firms with positive performance disclose this information to show their elevated commitment to CSR activities ([Mahoney et al., 2013](#)), while Moser and [Martin and Moser \(2016\)](#) find that the aim of such disclosures is to receive a positive response from users. However, environmental disclosures do not always align with the true performance of companies.

Research has identified several reporting biases/tactics that firms use when disclosing CSR information. For example, companies with poorer CSR performance tend to provide offsetting favorable disclosures ([O'Donovan, 1999](#); [Cho and Patten, 2007](#)), use disclosures with more optimism and less certainty ([Cho et al., 2010](#)), disclose less environmental information ([Al-Tuwajjri et al., 2004](#)), and disclose environmental capital spending to hedge against political and regulatory concerns ([Cho et al., 2012](#)). Studies have also shown that

annual report disclosures focus on positive rather than on negative environmental results (Deegan and Gordon, 1996), companies underreport negative events (Hughes *et al.*, 2001; Adams, 2004; Boiral, 2013), and companies prosecuted for environmental issues have increased reporting of favorable environmental news around the time of the associated trial (Deegan and Rankin, 1996). Further, Cho *et al.* (2015a) argue that competing societal and institutional pressures prevent companies from making substantive sustainability disclosures, while Cho *et al.* (2015b) find that corporate legitimacy drives CSR reporting rather than the desire to provide investors with valuable information. Given this stream of research, it is not surprising that recent calls from practice and the accounting literature indicate a desire for firms to use balanced reporting that includes both positive and negative CSR activities (KPMG and SustainAbility, 2008; Cohen, 2014)[4].

A firm's CSR performance can influence user decision-making (Elliott *et al.*, 2014), and there are several approaches to predict how users will respond to these positive or negative disclosures. One approach suggests users find positive news disclosures to be less credible than negative news disclosures (Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004) and that assurance may only influence user decision-making in positive performance conditions (Coram *et al.*, 2009). However, this would not provide for a robust prediction given there might be a pre-existing user expectation that firms would disclose only positive news in CSR reporting (cf. Verrecchia, 1983; KPMG and SustainAbility, 2008). Further, managers have more incentive to provide positive (rather than negative) disclosures (Verrecchia, 1983; McNichols, 1989). Therefore, an appropriate approach to examine the influence of firm environmental performance on user perceptions of environmental report believability takes into account the expectation that firms will report positive performance.

Persuasion theory offers insight into how individuals react when their expectations of a message are (dis)confirmed. Specifically, individuals are more influenced (persuaded) when they do not expect a messenger to accurately report reality (i.e. the messenger is perceived to have a reporting bias), but then the actual message appears to be truthful and disconfirms these expectations (Eagly *et al.*, 1978). Based on the findings of KPMG and SustainAbility (2008), this study posits that users expect a reporting bias in that firms will primarily disclose positive environmental performance. This is consistent with Verrecchia (1983), who provides that users have rational expectations that management will withhold unfavorable news with discretionary disclosures. Therefore, theory suggests these users will perceive any non-self-interested (i.e. negative performance) disclosures to be more believable than disclosures of positive performance (Eagly *et al.*, 1978; Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004).

## 2.5 Hypotheses

Based on the preceding discussion, this study tests five hypotheses. First, if users find environmental reports that disclose negative performance to be inherently believable, environmental reports that disclose negative performance will be perceived to be more believable than environmental reports that disclose positive performance, holding constant the level of assurance. Hypothesis 1 formally predicts a main effect for firm performance as follows:

- H1. Users will perceive management's environmental report to be more believable in the negative rather than in the positive performance condition across levels of assurance (i.e. none, limited, and reasonable assurance).

The presented literature also provides a theoretical basis that assurance should enhance the perceived believability of environmental reports. However, prior research does not clearly support whether environmental report believability differs when a limited versus reasonable level of assurance is provided. Therefore, H2 and H3 offer separate predictions for main effects related to (1) the provision of assurance, and (2) the level of assurance on perceptions of environmental report believability:



- H2. Users will perceive management’s assured environmental report to be more believable than management’s non-assured environmental report across firm performance conditions.
- H3. Users will not perceive a difference in the believability of management’s environmental report when limited versus reasonable assurance is provided across firm performance conditions.

Finally, the discussed literature suggests that the provision/level of assurance should influence users’ perceptions of environmental report believability when firms disclose positive, but not negative, performance. Specifically, users should perceive the environmental report to be more believable when it is assured (versus not assured) in a positive performance condition. However, it is unclear in the positive performance condition whether users will perceive the environmental report to be more believable when offered limited assurance (with a contrast statement) versus reasonable assurance (with no contrast statement). The final two hypotheses address these two scenarios within the positive performance condition:

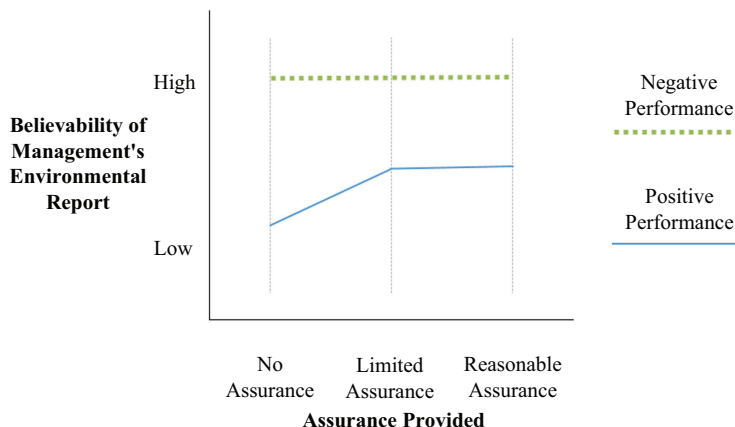
- H4. Users will perceive management’s assured environmental report to be more believable than management’s non-assured environmental report in the positive performance condition.
- H5. Users will not perceive a difference in the believability of management’s environmental report when limited versus reasonable assurance is provided in the positive performance condition.

See [Figure 1](#) for predicted relationships.

### 3. Research design

#### 3.1 Participants

Participants for the study were recruited through a crowdsourcing tool, Amazon Mechanical Turk (MTurk)[5]. To take part in the study, programmed system controls required participants to be located in the US and have a Human Intelligence Task (HIT) acceptance rate of greater than or equal to 90 percent. MTurk allows requestors (i.e. those conducting a study) to review responses from MTurk workers and either approve or deny payment; thus, by requiring a HIT approval rate greater than or equal to 90 percent, the requestor is trying to



**Figure 1.** Predicted effects of relative firm environmental performance and assurance provided on the believability of management’s environmental report

attract participants with a proven record of submitting acceptable HITs. Participants were also asked whether they (1) were at least 18 years old, (2) had purchased stock in the past 12 months, and (3) had not bought/sold/traded stock as part of their employment responsibilities (cf. [Ozlanski, 2013](#)); only those responding “Yes” to each of these three questions were given access to the instrument. Based on these requirements, participants were individuals with general business knowledge and experience with investing activities, and served as proxies for non-expert users of environmental reports[6].

In total, 260 participants completed the experiment, but only 153 of the responses could be analyzed. Participants were not analyzed if they did not pass all four comprehension check questions, did not have a worker ID appear in the MTurk output (i.e. a unique ID used to identify participants), or did not answer any of the dependent variable questions. The four multiple-choice comprehension check questions included the following. (1) As described in the Independent Accountant’s Report, did the accountant provide the same verification (i.e. assurance) on all four greenhouse gas emission indicators? (2) Who prepared the Independent Accountant’s Report? (3) Did the Independent Accountant’s Report relate to TWBC’s financial statements or greenhouse gas emissions? (4) How many methods to verify (i.e. assure) TWBC’s greenhouse gas emissions are described in the Independent Accountant’s Report?

Participants were also removed for spending less than five minutes on the experiment. This action was to disqualify participants that clearly did not complete the experiment, and likely accessed and then quickly exited the survey just to receive payment. Based on this requirement, three participants who spent an average of 6.3 s on the experiment were removed. Finally, participants were removed if they did not pass a manipulation check question about the firm’s relative environmental performance. The manipulation check question asked the following: “How did you perceive TWBC’s performance in controlling greenhouse gas emissions as compared to the industry average?” Participants responded using a fully labeled seven-point Likert scale with endpoints Much Worse (−3) and Much Better (+3). Participants in the positive performance condition were removed for responses from (−3) to (0), while participants in the negative performance condition were removed for responses from (0) to (+3). The study did not use a qualifying manipulation check on the level of perceived assurance. Rather, it sought to measure perceptions of limited and reasonable assurance using the AICPA’s recommended verbiage for the Independent Accountant’s Report. These results appear later in [Section 4.2, Analyses of other dependent measures](#).

For the 153 useable participants, the experiment had an average duration of 26.0 min with an SD of 17.6 min (low = 6.2 min; high = 85.4 min). Each participant was paid \$2.50, which resulted in an effective hourly rate of \$5.77, well above the effective hourly rate of \$3.75 documented in [Rennekamp \(2012\)](#). Participants’ demographic information appears in [Table I](#). Of the 153 accepted participants: (1) 57.2 percent were male and 42.8 percent were female (one participant did not respond to the gender question, so this is based on a denominator of 152), (2) 38.6 percent were in the age group of 35–54 and another 34.6 percent were in the age group of 26–34 years, and (3) 55.6 percent had at least a four-year college degree. All 153 accepted participants completed the case study in one sitting, and three of the accepted participants reported to be (or at one time were) certified public accountants (CPAs).

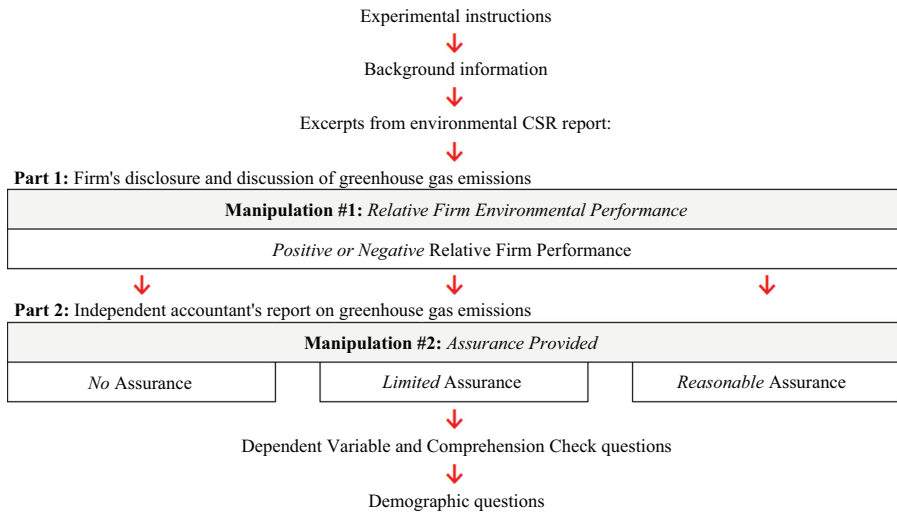
### 3.2 Experimental task and materials

This study uses a  $2 \times 3$  between-subjects design in which *relative firm environmental performance* (positive, negative) and *assurance provided* (none, limited, reasonable) are manipulated. [Figure 2](#) provides a flowchart of the experimental procedures. The experiment was administered online using Qualtrics, and participants were randomly assigned to a group based on an automated routine in Qualtrics. Upon accessing the study, participants reviewed the experimental instructions and then received background information on the

Question	Response options	All participants		Accepted participants		Rejected participants	
		Count	% of total	Count	% of total	Count	% of total
What is your gender? A	Male	147	57.0%	87	57.2%	60	56.6%
	Female	111	43.0%	65	42.8%	46	43.4%
How old are you?		258	100.0%	152	100.0%	106	100.0%
	18–25	65	25.0%	27	17.6%	38	35.5%
	26–34	93	35.8%	53	34.6%	40	37.4%
	35–54	82	31.5%	59	38.6%	23	21.5%
	55–64	15	5.8%	10	6.5%	5	4.7%
	65 or over	5	1.9%	4	2.6%	1	0.9%
What is the highest level of education you have completed?		260	100.0%	153	100.0%	107	100.0%
	<4-years College Degree	129	49.6%	68	44.4%	61	57.0%
	4-years college degree	96	36.9%	61	39.9%	35	32.7%
	Postgrad or some postgrad	35	13.5%	24	15.7%	11	10.3%
		260	100.0%	153	100.0%	107	100.0%

**Table I.**  
Participant demographic information

**Note(s):** A—Two of the 260 participants did not respond to this question; one was an accepted participant and one was a rejected participant



**Figure 2.**  
Flowchart of experimental procedures

fictitious Tasty Water Beverage Company (TWBC). After reviewing the background information, participants viewed excerpts from the most recent TWBC environmental CSR report. The report consisted of (1) a report cover page, (2) TWBC presentation and discussion of its greenhouse gas emissions for the year, including its performance in relation to the food and beverage industry, and (3) an independent accountant's report. TWBC was intentionally placed in the food and beverage industry, as [KPMG \(2013\)](#) indicates this industry performs at the global average in terms of the quality and number of CSR reports issued. Further,

TWBC's presentation and discussion of greenhouse gas emissions highlighted four environmental indicators defined by the GRI G4 framework (GRI, 2013): G4-EN15: *Direct greenhouse gas emissions*; G4-EN16: *Energy indirect greenhouse gas emissions*; G4-EN17: *Other indirect greenhouse gas emissions*; and G4-EN19: *Reduction of greenhouse gas emissions* (GRI, 2014c)[7]. The GRI G4 framework is the most commonly used CSR reporting framework worldwide (KPMG, 2017). The study focuses on greenhouse gas emission disclosures because these are the predominant environmental CSR metrics assured in the US and have the most robust technical guidance for attestations from independent accountants (AICPA, 2013b; AICPA, 2017).

As part of TWBC's presentation and disclosure of the selected GRI G4 indicators, each indicator was included in a summary table showing the performance of TWBC, the food and beverage industry average, and TWBC's percentage difference from the industry average. TWBC greenhouse gas emission levels reflect those of a company approximately 5 percent of the size (in terms of emissions) of The Coca-Cola Company or PepsiCo. These same companies were used as a guide to establish differences in emission levels between EN15, EN16, and EN17 (i.e. EN16 emissions are approximately double the EN15 emissions, and EN17 emissions are approximately 1.82 times the EN15 emissions). Consistent with Elliott *et al.* (2014), TWBC's performance was manipulated with respect to performance against the industry average to establish positive or negative *relative environmental performance*. Indicators EN15, EN16, and EN17 varied from the industry average by approximately—60 percent or +60 percent in the positive and negative performance conditions. Indicator EN19 was presented as a percentage reduction in emissions of approximately +60 percent and—60 percent (i.e. an increase) in the positive and negative performance conditions. The magnitude of differences to establish positive and negative performance is consistent with the approach used by Elliott *et al.* (2014).

The assurance manipulation (for participants in an assurance condition) appeared in the final excerpt from TWBC's environmental CSR report: the independent accountant's report. Here, a large international accounting firm provided either limited or reasonable assurance on the disclosed greenhouse gas emission indicators. The general format and verbiage of the independent accountant's report was guided by examples provided in SOP 13–1, *Attest Engagements on Greenhouse Gas Emissions Information* (AICPA, 2013b), and the leveraged verbiage remains consistent with the AICPA's *Attestation Engagements on Sustainability Information Guide (Including Greenhouse Gas Emissions Information)* and the clarified US attestation standards (AICPA, 2016; AICPA, 2017). Participants were also provided a summary table of the assured indicators within the independent accountant's report. Please refer to the Appendix for excerpts from the experimental materials.

### 3.3 Dependent variables

After viewing the independent accountant's report, participants responded to several dependent variables well established in the accounting literature. As discussed, the primary measure of interest is environmental report believability. To accomplish this task, three dependent variables employed by Hodge *et al.* (2009) were used to create an index to measure this underlying construct. These items included (with endpoints shown) the following: (1) How reliable do you find TWBC's representations made in the Company's 2014 Environmental Sustainability Report (–3 Strongly Not Reliable, +3 Strongly Reliable), (2) How credible do you find TWBC's disclosures about greenhouse gas emissions (–3 Strongly Not Credible, +3 Strongly Credible), and (3) How confident are you that Tasty Water Beverage Company's 2014 Environmental Sustainability Report represents the true performance of the company with respect to greenhouse gas emissions (–3 Strongly Not Confident, +3 Strongly Confident)? Based on participants' responses, these items have a Cronbach's alpha score of 0.924, meaning there is strong evidence they measure the same

underlying construct, which, in this study, is referred to as report believability. Only after the participants had reviewed the experimental materials and responded to the primary dependent variables, the study asked about the attractiveness of TWBC as a potential investment opportunity. Finally, the study also asked a series of questions to be analyzed as possible covariates, including: (1) the perceived assurance provided by the accounting firm (Hasan *et al.*, 2003), (2) the impact of assurance on the credibility of results, and (3) the perceived credibility and trustworthiness of management (cf. Mercer, 2004; Beyer *et al.*, 2010; Pflugrath *et al.*, 2011). Responses to these items were collected with a questionnaire at the end of the study that used seven-point Likert scales (0–6, or –3 to +3 depending on the question) with all points labeled and endpoints primarily appearing as Strongly Disagree / Strongly Agree[8].

## 4. Results

### 4.1 Hypotheses tests

Summary statistics for the index used to measure report believability are presented in Table II, and suggest that participants found management’s environmental report to be generally believable. Marginal means show that participants rated the environmental report to be most believable with reasonable assurance (1.803), followed by no assurance (1.773) and then limited assurance (1.768). As expected, participants rated the report to be more believable in the negative (1.858) than in the positive (1.702) performance condition. A review of means by cell reveals a pattern similar to that hypothesized, with the exception of limited assurance in both the positive and negative performance conditions. Specifically, participants in the positive performance condition rated the report to be most believable with limited assurance, while participants in the negative performance condition rated the report to be least believable with limited assurance. Figure 3 reinforces the unexpected results for limited assurance.

Firm performance	Mean, (SD), Sample Size			Marginal means
	No assurance	Limited	Reasonable	
Positive	1.4444 (1.1139) <i>n</i> = 33	2.0800 (0.5117) <i>n</i> = 25	1.6481 (0.9733) <i>n</i> = 18	1.7018 (0.9515) <i>n</i> = 76
Negative	2.1010 (0.7383) <i>n</i> = 33	1.3968 (1.5406) <i>n</i> = 21	1.9365 (0.9523) <i>n</i> = 21	1.8578 (1.1003) <i>n</i> = 75
Marginal Means	1.7727 (0.9943) <i>n</i> = 66	1.7681 (1.1458) <i>n</i> = 46	1.8034 (0.9604) <i>n</i> = 39	Total Sample <i>n</i> = 151

**Note(s):** This study used three dependent variables to create an index for whether participants believed the information provided in the environmental report. Results of the believability index are reported in this table. The three items have high reliability (Cronbach’s alpha of 0.924), and each item was measured using a fully labeled seven-point Likert scale with endpoints as shown below:

- (1) How reliable do you find TWBC’s representations made in the Company’s 2014 Environmental Sustainability Report? (–3, Strongly Not Reliable, +3, Strongly Reliable)
- (2) How credible do you find TWBC’s disclosures about greenhouse gas emissions? (–3, Strongly Not Credible, +3, Strongly Credible)
- (3) How confident are you that Tasty Water Beverage Company’s 2014 Environmental Sustainability Report represents the true performance of the company with respect to greenhouse gas emissions? (–3, Strongly Not Confident, +3, Strongly Confident)

Note that the total number of participants shown in this table is 151, as two participants did not answer all three items and were therefore removed from this analysis

**Table II.**

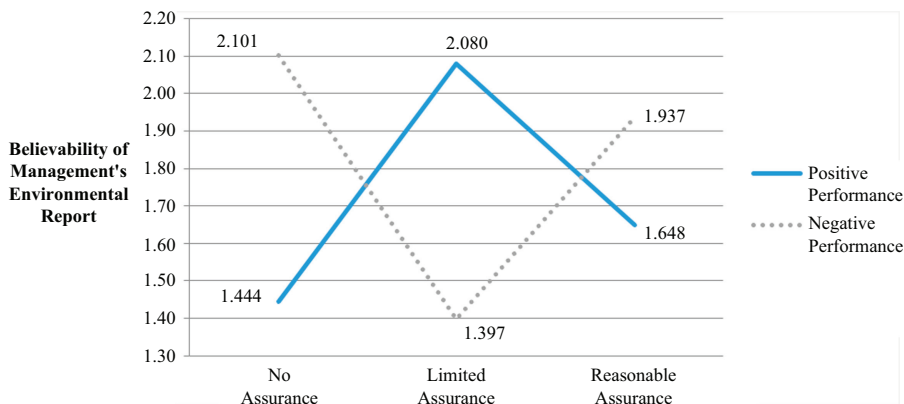
Cell means, standard deviations, and sample sizes with believability of management’s environmental report as the dependent variable

Prior to testing hypotheses, the data were reviewed for conformity with the basic assumptions of ANOVA, including independence of observations, normal distribution of the dependent variables, and homogeneity of variance (Keppel, 1991, p. 97). Based on this review, the data did not sufficiently achieve normal distribution or homogeneity of variance. As such, the statistical analyses used to test hypotheses are Mann–Whitney  $U$  tests, the nonparametric equivalent of  $t$ -tests (Corder and Foreman, 2014).

As described, this study uses five hypotheses to predict perceptions of environmental report believability; **H1**, **H2**, and **H3** predict main effects of relative firm performance and use/level of assurance, while **H4** and **H5** predict relationships within the positive performance condition. **Hypothesis 1** predicts a main effect in that users perceive management’s environmental report to be more believable in the negative than in the positive performance condition across levels of assurance. Based on a Mann–Whitney  $U$  test comparing the marginal means of performance conditions, the mean rank is significantly higher in the negative performance condition than in the positive performance condition ( $p = 0.047$ , one-tailed). This serves as evidence that users perceive negative environmental performance reports to be more believable than positive performance reports. See Panel A of **Table III** for supporting analyses.

**Hypothesis 2** predicts a main effect for assurance, such that users perceive management’s assured environmental report to be more believable than a non-assured report. To test this, the no assurance cell was first compared to both assurance cells (i.e. combined limited and reasonable). Results indicate there is not a significant difference in the mean rank of assured versus non-assured cells ( $p = 0.326$ , one-tailed). The next test compared the no assurance cell separately against the limited and reasonable assurance cells. Again, results indicate there are not significant differences in mean ranks between no assurance and limited assurance ( $p = 0.316$ , one-tailed), and no assurance versus reasonable assurance ( $p = 0.397$ , one-tailed). As such, there does not appear to be a main effect for the use of assurance. See Panel B of **Table III** for supporting analyses. For **H3**, a null hypothesis is used to predict the lack of a main effect, such that users do not perceive a difference in environmental report believability when provided limited versus reasonable assurance. Results show there is not a significant difference in mean ranks between limited and reasonable assurance ( $p = 0.881$ , two-tailed), and thus **H3** cannot be rejected. Based on the testing of **H2** and **H3**, there is no evidence that users perceive a difference in environmental report believability based solely on the use or level of assurance.

For **H4** and **H5**, this study relies on the theory that the impact of assurance on user decision-making might be context-specific to a positive performance condition (Coram *et al.*,



**Figure 3.** Effects of relative firm environmental performance and assurance provided on the believability of management’s environmental report



Panel A: Main effects of firm performance (H1)							
Effect of firm performance	Source of variation	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (one-tailed)
Across all assurance conditions	Positive performance	76	70.11	5328.0	3298.0	-1.665	0.047
	Negative performance	75	81.97	6148.0	2402.0		
Panel B: Main effects of level of assurance (H2 and H3)							
Effect of level of assurance	Source of variation	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (one-tailed)
Across both performance conditions	No assurance	66	74.18	4896.0	2925.0	0.448	0.326
	Assurance (limited and reasonable)	85	77.41	6580.0	2685.0		
Across both performance conditions	No assurance	66	55.27	3648.0	1599.0	-0.476	0.316
	Limited assurance	46	58.26	2680.0	1437.0		
Across both performance conditions	No assurance	66	52.41	3459.0	1326.0	-0.255	0.397
	Reasonable assurance	39	54.00	2106.0	1248.0		
Across both performance conditions	Limited assurance	46	43.37	1995.0	880.0	0.146	0.881 <sup>a</sup>
	Reasonable assurance	39	42.56	1660.0	914.0		
Panel C: Differences due to assurance within the positive performance condition (H4 and H5)							
Effect within:	Source of variation	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (one-tailed)
Positive performance condition	No assurance	33	33.06	1091.0	889.0	1.876	0.030
	Assurance (limited and reasonable)	43	42.67	1835.0	530.0		
Positive performance condition	No assurance	33	25.00	825.0	561.0	-2.324	0.010
	Limited assurance	25	35.44	886.0	264.0		
Positive performance condition	No assurance	33	25.06	827.0	328.0	-0.601	0.274
	Reasonable assurance	18	27.72	499.0	266.0		
Positive performance condition	Limited assurance	25	24.56	614.0	161.0	1.563	0.119 <sup>a</sup>
	Reasonable assurance	18	18.44	332.0	289.0		
Panel D: Differences due to assurance within the negative performance condition							
Effect within:	Source of variation	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (two-tailed)
Negative performance condition	No assurance	33	29.86	985.5	268.5	1.375	0.168
	Limited assurance	21	23.79	499.5	424.5		
Negative performance condition	No assurance	33	28.06	926.0	328.0	0.319	0.749
	Reasonable assurance	21	26.62	559.0	365.0		
Negative performance condition	Limited assurance	21	19.55	410.5	261.5	-1.019	0.308
	Reasonable assurance	21	23.45	492.5	179.5		

**Table III.** Nonparametric Mann–Whitney *U* tests with believability of management’s environmental report as the dependent variable

(continued)

Panel E: Differences due to firm performance within the assurance conditions

Effect within:	Source of variation	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (two-tailed)
No assurance condition	Positive performance	33	27.68	913.5	736.5	-2.456	0.014
	Negative performance	33	39.32	1297.5	352.5		
Limited assurance condition	Positive performance	25	25.42	635.5	214.5	1.048	0.294
	Negative performance	21	21.21	445.5	310.5		
Reasonable assurance condition	Positive performance	18	17.22	310.0	239.0	1.395	0.165
	Negative performance	21	22.38	470.0	139.0		

**Note(s):** <sup>a</sup>Reported with two tails

This study used three dependent variables to create an index for whether participants believed the information provided in the environmental report. Results of the believability index are reported in this table. The three items have high reliability (Cronbach's alpha of 0.924), and each item was measured using a fully labeled seven-point Likert scale with endpoints as shown below:

- (1) How reliable do you find TWBC's representations made in the Company's 2014 Environmental Sustainability Report? (-3, Strongly Not Reliable, +3, Strongly Reliable)
- (2) How credible do you find TWBC's disclosures about greenhouse gas emissions? (-3, Strongly Not Credible, +3, Strongly Credible)
- (3) How confident are you that Tasty Water Beverage Company's 2014 Environmental Sustainability Report represents the true performance of the company with respect to greenhouse gas emissions? (-3, Strongly Not Confident, +3, Strongly Confident)

As discussed, the data in this study do not conform to two basic assumptions of ANOVA: normal distribution and homogeneity of variance. As such, the statistical analyses used to test hypotheses are Mann-Whitney *U*-tests, which are the nonparametric equivalent of *t*-tests (Corder and Foreman, 2014). Given the mechanics of Mann-Whitney *U*-tests, the mean rank for a specific condition (e.g. limited assurance, positive performance) will likely differ based on the condition it is being compared against. This is because the mean rank for a specific condition is determined based on the rank of its individual scores (i.e. participant responses in that condition) only after being combined with the scores from the comparison condition (Corder and Foreman, 2014)

Note that the total number of participants analyzed in this table is 151, as two participants did not answer all three items and were therefore removed from this analysis

**Table III.**

2009), and that users might differentiate between limited and reasonable assurance due to a contrast statement in the limited assurance report (Low and Boo, 2012). However, it is unclear whether users should find management's environmental report to be more believable in the positive performance condition with limited or reasonable assurance. Hypothesis 4 predicts that users perceive environmental reports to be more believable when assured versus not assured for firms with positive environmental performance. To test this, the no assurance cell was first compared to both assurance cells (i.e. combined limited and reasonable). Results show that the mean rank of assured cells is significantly higher than the no assurance cell ( $p = 0.030$ , one-tailed). The next test compared the no assurance cell separately against the limited and reasonable assurance cells. Results show that environmental reports are perceived to be more believable with limited assurance rather than no assurance ( $p = 0.010$ , one-tailed), but there is no difference in believability between no assurance and reasonable assurance ( $p = 0.274$ , one-tailed). See Panel C of Table III for supporting analyses. To complete the comparisons in the positive performance condition, H5 predicts no difference in the believability of environmental reports with limited versus reasonable assurance. Results

show that users do not perceive a difference in report believability when limited versus reasonable assurance is provided in a positive performance condition ( $p = 0.119$ , two-tailed). See Panel C of [Table III](#) for supporting analyses. The results of [H4](#) and [H5](#) provide evidence that in a positive performance condition, users perceive environmental reports to be more believable when accompanied by limited rather than no assurance.

Given the findings for [H4/H5](#) and the unexpected pattern of means displayed in [Figure 3](#), cells in the negative performance condition were also analyzed for differences. Results show no significant differences within the negative performance condition, such that the believability of management's environmental report does not differ when accompanied by (1) no assurance versus limited assurance ( $p = 0.168$ , two-tailed), (2) no assurance versus reasonable assurance ( $p = 0.0749$ , two-tailed), or (3) limited assurance versus reasonable assurance ( $p = 0.308$ , two-tailed). While the pattern of means appears to be just the opposite of those identified in the negative performance condition, there are no significant differences within the negative performance condition. See Panel D of [Table III](#) for supporting analyses. These results seem to support previous findings that the impact of assurance might be context-specific to positive performance conditions ([Coram et al., 2009](#)). In summary, the findings for [H4/H5](#) indicate an increase in environmental report believability when limited rather than no assurance is provided in a positive performance condition, yet no differences in believability are identified within the negative performance condition.

Considering the behavior of the limited assurance cells and the pattern of means displayed in [Figure 3](#), testing was also performed on the effect of firm performance within specific assurance conditions. Results show that negative performance reports are perceived to be significantly more believable than positive performance reports when no assurance is provided ( $p = 0.014$ , two-tailed). However, the differences in believability between performance conditions disappear when either limited ( $p = 0.294$ , two-tailed) or reasonable ( $p = 0.165$ , two-tailed) assurance is provided. See Panel E of [Table III](#) for supporting analyses. These findings seem to indicate that firm performance impacts perceptions of report believability, but only when assurance is not provided.

#### *4.2 Analyses of other dependent measures*

As mentioned previously, this study also measured several other dependent variables well established in the accounting literature. These include (1) the attractiveness of TWBC as a potential investment opportunity, (2) perceived assurance provided by the accounting firm ([Hasan et al., 2003](#)), (3) the impact of assurance on the credibility of results, and (4) the perceived credibility and trustworthiness of management (cf. [Mercer, 2004](#); [Beyer et al., 2010](#); [Pflugrath et al., 2011](#)). The attractiveness as a potential investment was collected and analyzed to determine how users not tasked with assessing an environmental report as a shareholder/investor would later evaluate it as a potential investment opportunity (i.e. impact on behavior). The items on perceived/impact of assurance and management were collected to serve as possible covariates, but because the ANOVA assumptions were violated, the results of those items are not discussed.

To determine investment attractiveness, participants were asked "How attractive do you find TWBC as a potential investment opportunity?" Participants rated this item using a fully labeled seven-point Likert scale with endpoints Very Bad (-3) to Very Good (+3). Analyses were again performed using non-parametric Mann-Whitney  $U$  tests. Results show that participants in the positive performance condition (mean 1.711) rated TWBC as a significantly better investment opportunity than those in the negative performance condition (mean -0.857) ( $p < 0.001$ , two-tailed). Further, within the negative performance condition, assurance significantly increases the attractiveness of the investment. Specifically, the no assurance cell (mean -1.412) is perceived to be a significantly less attractive investment opportunity when compared to the limited assurance cell (mean -0.273)

( $p = 0.007$ , two-tailed) or the reasonable assurance cell (mean  $-0.571$ ) ( $p = 0.049$ , two-tailed). Significant differences were not identified within the positive performance condition. See Table IV for supporting analyses. These findings demonstrate a main effect of firm performance on investment attractiveness such that users perceive firms with positive environmental performance to be a better investment opportunity, and that the provision of assurance for firms with negative performance can enhance the attractiveness of the firm as an investment opportunity.

#### 4.3 Supplemental analyses

In testing the no assurance condition, participants were asked to “please indicate the extent to which TWBC’s greenhouse gas emission indicators were verified (i.e. assured).” Using a fully labeled seven-point Likert scale with endpoints No Verification (Assurance) (0) and High Verification (Assurance) (6), results show that 92.5 percent (62/67) of participants believed some level of assurance had been provided (i.e. more than zero) and 77.6 percent (52/67) of participants believed at least a moderate level of assurance had been provided. In the no assurance condition, there was no mention of assurance, which means users believed these disclosures were assured even when no explicit statement was offered. Therefore, it is not surprising that the study fails to find differences between reasonable assurance and no assurance in analyzing report believability, particularly in the positive performance condition. If non-expert users assume environmental reports are assured, then similar reactions should be expected when they (1) do not receive an assurance report or (2) receive a reasonable assurance report (that does not make it clear that a lower level of assurance exists). This is consistent with Low and Boo’s (2012) finding that statements contrasting levels of assurance help less-informed users better understand the assurance being provided.

Panel A: Cell means, (standard deviations), and sample sizes				
Firm performance	No assurance	Assurance Limited	Reasonable	Marginal means
Positive	1.6970 (1.0150) <i>n</i> = 33	1.9200 (0.8622) <i>n</i> = 25	1.4444 (1.3382) <i>n</i> = 18	1.7105 (1.0560) <i>n</i> = 76
Negative	-1.4118 (1.2581) <i>n</i> = 34	-0.2727 (1.6090) <i>n</i> = 22	-0.5714 (1.5353) <i>n</i> = 21	-0.8571 (1.5106) <i>n</i> = 77
Marginal means	0.1194 (1.9347) <i>n</i> = 67	0.8936 (1.6712) <i>n</i> = 47	0.3590 (1.7545) <i>n</i> = 39	Total Sample <i>n</i> = 153

Panel B: Cell comparisons using nonparametric Mann–Whitney <i>U</i> tests						
Comparison	<i>N</i>	Mean rank	Sum of rank	<i>U</i> -value	<i>Z</i>	<i>p</i> -value (two-tailed)
Positive performance	76	107.86	8197.0	581.0	-8.555	<0.001
Negative performance	77	46.55	3584.0	5271.0		
Negative performance / No assurance	34	23.75	807.5	535.5	-2.701	0.007
Negative performance / Limited assurance	22	35.84	788.5	212.5		
Negative performance / No assurance	34	24.63	837.5	471.5	-1.975	0.049
Negative performance / Reasonable assurance	21	33.45	702.5	242.5		

**Note(s):** This dependent variable asked participants to rate “How attractive do you find TWBC as a potential investment opportunity?” using a fully labeled seven-point Likert scale with endpoints Very Bad (-3) and Very Good (+3)

**Table IV.**  
Dependent variable: Potential investment opportunity

## 5. Discussion and conclusion

This study examines whether non-expert environmental report users perceive a difference in the believability of management's environmental report based on a company's relative environmental performance or the level of assurance provided by an accounting firm under the recently clarified US attestation standards. It also investigated whether a firm's relative environmental performance interacted with the level of assurance to influence perceptions of environmental report believability.

Findings indicate that users perceive environmental reports to be believable, but there is no main effect for the provision/level of assurance obtained. Consistent with theory (e.g. Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004), there is a main effect for firm performance in which negative performance reports are perceived to be more believable than positive performance reports. Further analyses reveal this effect is driven by negative performance reports being perceived as significantly more believable when no assurance is present. The firm performance effect is eliminated when limited or reasonable assurance is provided. This study also identifies an interaction in which positive performance reports with limited assurance, but not reasonable assurance, are perceived to be more believable than reports with no assurance. No differences are identified in the believability of negative performance reports due to the provision or level of assurance.

Results of this study inform academic theory, practitioners, and standard setters. Theory on firm performance suggests that users find reports depicting negative firm performance to be more believable than reports depicting positive performance (e.g. Williams, 1996; Hutton *et al.*, 2003; Mercer, 2004). This study reinforces firm performance theory when no assurance is present, but provides evidence that assurance on environmental reports can serve to eliminate differences in report believability that stem from firm performance. Within firm performance conditions, no differences in report believability were identified between the negative performance cells (i.e. when limited, reasonable, or no assurance was provided). This aligns with the notion that reports depicting negative performance are inherently believable, and assurance does not enhance this believability. However, within the positive performance condition, results indicate that environmental reports are perceived to be more believable with limited assurance rather than no assurance. This finding partially supports the notion that the influence of assurance is limited to positive performance conditions (Coram *et al.*, 2009). One possible explanation for why users found the environmental report to be as believable with reasonable or no assurance is that users in the no assurance condition assumed the disclosures had been verified or assured (as previously discussed); as such, seeing a reasonable assurance report would only confirm this assumption. However, seeing a limited assurance report would also confirm this assumption, but also highlight that a higher level of assurance was not obtained by management, and it is plausible that this highlighted contrast in assurances is associated with the limited assurance benefit observed in the positive performance condition (Low and Boo, 2012). Indeed, this limited assurance benefit stands in contrast to Rivière-Giordano *et al.* (2018), who find that financial analysts are less likely to recommend firms with positive environmental performance that receive low rather than no assurance.

This study also contributes to the literature on the influence of different levels of assurance in a CSR context (e.g. Hasan *et al.*, 2003; Hodge *et al.*, 2009; Rivière-Giordano *et al.*, 2018). Specifically, results indicate that users do not perceive a difference in report believability when offered limited or reasonable assurance in either a positive or negative performance setting. Further, while previous studies have focused on the impact of CSR information on firm valuation and investment decisions (e.g. Hasan *et al.*, 2003; Dhaliwal *et al.*, 2012; Elliott *et al.*, 2014; Reimsbach *et al.*, 2018; Rivière-Giordano *et al.*, 2018), this study focuses on whether these disclosures are believable to the broader group of stakeholders who

are not necessarily evaluating the information as part of a wealth-maximization decision. This is an important group to study as a company's environmental impact has implications for a broad range of stakeholders beyond those considering the firm as a financial investment (Moser and Martin, 2012). Results indicate that this user group finds environmental CSR reports to be generally believable, but their perceptions of believability can be impacted by firm performance and the provision of limited assurance in specific settings.

From a practitioner standpoint, this study demonstrates conditions in which users respond differently to positive and negative environmental performance. Specifically, negative performance reports are perceived to be more believable, but only when not assured. If a firm seeks to use its environmental report to speak to a broader group of stakeholders, this study suggests that limited assurance is an effective tool to manage impressions and enhance report believability when performance is positive. As such, findings suggest firms that invest in environmental activities and report positive results should consider obtaining the lower (and less costly) level of assurance to enhance the believability of their environmental report. From a standard-setter perspective, findings demonstrate the importance of clearly communicating to users when no assurance or verification is provided on environmental reports (the study finds that many users believed the non-assured reports had received assurance). As such, this study calls into question whether users would benefit from formal reporting requirements that have companies explicitly specify when no assurance is provided on environmental disclosures/reports.

This study is subject to several limitations. First, as the believability index did not conform to the assumptions of ANOVA, the analysis of potential covariates was limited. Second, the study could not show which element of the environmental disclosures participants responded to most strongly. For example, it could have been (1) the numerical distance between TWBC's performance and the industry average, (2) the displayed percentage differences, or (3) the narrative associated with TWBC's performance. Finally, this study focused on one aspect of environmental reporting, that being greenhouse gas emissions. Future research should consider responses to other aspects of environmental reporting, such as water usage or energy efficiency.

While environmental CSR reporting remains a largely voluntary activity in the US, it is important to further understand the users of this information and the attributes of reporting that they respond to differently. As this reporting becomes more structured, formalized, and prevalent, it will also remain critical to closely monitor the expectations and vulnerabilities of report users. We hope this study helps further the collective understanding of such users.

## Notes

1. CSR reporting is "largely" voluntary in the US, with the exception of (1) required US Securities & Exchange Commission disclosures, (2) the Dodd-Frank Act requirement to disclose conflict minerals, and (3) the mandate for federal agencies to report CSR performance under Presidential Executive Order 13,514 (KPMG, 2013). Examples of CSR disclosures required by the Securities & Exchange Commission include those prescribed in release No. 33-9,106, Commission Guidance Regarding Disclosure Related to Climate Change, and release No. 34-67716, Conflict Minerals (Littan, 2014).
2. This is a change from the superseded U.S. standard, AT-101, Attest Engagements (AICPA, 2001), which refers to high and moderate assurances.
3. Hasan *et al.* (2003) use high and moderate assurances as defined in ISAE 100. However, ISAE 100 was superseded by ISAE 3000 in 2000, and soon thereafter required the use of limited and reasonable assurances. Legacy ISAEs and U.S. Statements on Standards for Attestation Engagements (SSAEs) have both described assurance levels as high or moderate, yet the current standards refer to these assurances as limited and reasonable (IAASB, 2013; AICPA, 2016). In all cases, and as used



throughout this study, reasonable and high assurances are used to describe levels of assurance that are stronger than limited or moderate.

4. CSR reporting firms might also fear a backlash from report users when specific disclosures are discontinued, much in the same way that firms fear investor reactions to discontinued earnings guidance (cf. [Chen et al., 2011](#)). By keeping the recurring CSR indicators and adding more over time, CSR reports will naturally grow and inevitably present more balanced reporting of positive and negative performance indicators. However, this assumes that firms will not be able to maintain purely positive performance across an ever growing and diversifying set of CSR disclosures.
5. IRB approval was obtained from the university where the authors were located at the time of the study for the use of human subjects for this experiment.
6. Participants closely resemble non-professional investors. [Owens and Hawkins \(2019\)](#) point out that “nonprofessional investor participants recruited from MTurk are reasonably good participants for nonprofessional investor research,” and as such, may be used to answer a variety of research questions (p. 3). [Hunt and Scheetz \(2019\)](#) provide a list of other accounting studies that have also used MTurk to recruit non-professional investors, which includes [Rennekamp \(2012\)](#), [Bonner \(2014\)](#), [Farkas and Murthy \(2014\)](#), [Triki et al. \(2015\)](#), and [Kelton and Murthy \(2016\)](#). Finally, [Farrell et al. \(2016\)](#) find that MTurk participants can serve as valid proxies for non-experts in accounting research.
7. Selected G4 indicators are defined by the GRI as follows:  
G4-EN15: *Direct greenhouse gas emissions* (Scope 1): “Emissions from operations that are owned or controlled by the organization” ([GRI, 2013](#)).  
G4-EN16: *Energy indirect greenhouse gas emissions* (Scope 2): “Emissions that result from the generation of purchased or acquired electricity, heating, cooling, and steam consumed by the organization” ([GRI, 2013](#)).  
G4-EN17: *Other indirect greenhouse gas emissions* (Scope 3): “Other indirect greenhouse gas emissions are all indirect emissions (not included in Scope 2) that occur outside of the organization, including both upstream and downstream emissions” ([GRI, 2013](#)).  
G4-EN19: *Reduction of greenhouse gas emissions*: “A decrease in greenhouse gas emissions or an increase in removal or storage of greenhouse gas emissions from the atmosphere, relative to baseline emissions” ([GRI, 2013](#)).
8. [Eutsler and Lang \(2015\)](#) find that having all points labeled minimizes response bias, maximizes variance and power, and minimizes error. They also find that seven-point scales may maximize variance.

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## Appendix: Excerpts of experimental materials

### A. Management’s presentation and description of greenhouse gas emission performance—Positive performance condition

Below is page 12 from the *TWBC Environmental Sustainability Report*. This page was written by TWBC management.

#### *Emissions*

This section describes the Tasty Water Beverage Company’s (TWBC) greenhouse gas emissions using reporting indicators defined by the Global Reporting Initiative (GRI). The GRI is an organization that provides a standardized sustainability reporting framework to be used by companies around the world in reporting the results of sustainability activities.

The following table summarizes our results for select GRI indicators and includes the overall average performance of the Food and Beverage Industry along with a factor showing how our performance differed from the industry average for each indicator. As shown, our results for 2014 were better than the industry average for all indicators (see [Table AI](#)).

Direct greenhouse gas emissions are reported under the GRI indicator G4-EN15, which includes “emissions from operations that are owned or controlled by” TWBC. During 2014, we directly emitted 41.0 metric tons (in thousands) of CO<sub>2</sub> (carbon dioxide) and CO<sub>2</sub> equivalents into the environment. The primary sources for these emissions included our bottling plants, processing plants, and distribution trucks.

Energy indirect greenhouse gas emissions are reported under the GRI indicator G4-EN16, which includes “emissions that result from the generation of purchased or acquired electricity, heating, cooling, and steam consumed by” TWBC. During 2014, we emitted 94.5 metric tons (in thousands) of energy indirect CO<sub>2</sub> and CO<sub>2</sub> equivalents into the environment. The primary sources for these emissions included our heating, cooling, and powering of bottling and processing plants.

Other indirect greenhouse gas emissions are reported under the GRI indicator G4-EN17, which includes indirect emissions (not included in “energy indirect”) that “occur outside of the organization, including both upstream and downstream emissions.” During 2014, we emitted 62.9 metric tons (in thousands) of other indirect CO<sub>2</sub> and CO<sub>2</sub> equivalents into the environment. The primary sources for

GRI indicator	Description	TWBC Results for 2014	Food and Beverage Industry average for 2014	TWBC % diff. from industry average
G4-EN15	Direct greenhouse gas emissions	41.0	102.9	–60.2%
G4-EN16	Energy indirect greenhouse gas emissions	94.5	205.5	–54.0%
G4-EN17	Other indirect greenhouse gas emissions	62.9	187.9	–66.5%
G4-EN19	Reduction of greenhouse gas emissions	62.4%	1.3%	+61.1%

**Note(s):** CO<sub>2</sub> (and equivalent) emissions in thousands of metric tons

**Table AI.**



these emissions included our bottle producers, raw material (ingredients) providers, and from coolers at retail stores displaying our products.

Reductions of greenhouse gas emissions are reported under the GRI indicator G4-EN19. This year, we experienced a 62.4 percent reduction in total greenhouse gas emissions across our entire company (including direct, energy indirect, and other indirect emissions), as measured using baseline emissions established on December 31, 2013.

## B. Management’s presentation and description of greenhouse gas emission performance—Negative performance condition

Below is page 12 from the *TWBC Environmental Sustainability Report*. This page was written by TWBC management.

### *Emissions*

This section describes the Tasty Water Beverage Company’s (TWBC) greenhouse gas emissions using reporting indicators defined by the Global Reporting Initiative (GRI). The GRI is an organization that provides a standardized sustainability reporting framework to be used by companies around the world in reporting the results of sustainability activities.

The following table summarizes our results for select GRI indicators and includes the overall average performance of the Food and Beverage Industry along with a factor showing how our performance differed from the industry average for each indicator. As shown, our results for 2014 were worse than the industry average for all indicators (see [Table AII](#)).

Direct greenhouse gas emissions are reported under the GRI indicator G4-EN15, which includes “emissions from operations that are owned or controlled by” TWBC. During 2014, we directly emitted 164.8 metric tons (in thousands) of CO<sub>2</sub> (carbon dioxide) and CO<sub>2</sub> equivalents into the environment. The primary sources for these emissions included our bottling plants, processing plants, and distribution trucks.

Energy indirect greenhouse gas emissions are reported under the GRI indicator G4-EN16, which includes “emissions that result from the generation of purchased or acquired electricity, heating, cooling, and steam consumed by” TWBC. During 2014, we emitted 316.5 metric tons (in thousands) of energy indirect CO<sub>2</sub> and CO<sub>2</sub> equivalents into the environment. The primary sources for these emissions included our heating, cooling, and powering of bottling and processing plants.

Other indirect greenhouse gas emissions are reported under the GRI indicator G4-EN17, which includes indirect emissions (not included in “energy indirect”) that “occur outside of the organization, including both upstream and downstream emissions.” During 2014, we emitted 312.9 metric tons (in thousands) of other indirect CO<sub>2</sub> and CO<sub>2</sub> equivalents into the environment. The primary sources for these emissions included our bottle producers, raw material (ingredients) providers, and from coolers at retail stores displaying our products.

Reductions (increases) of greenhouse gas emissions are reported under the GRI indicator G4-EN19. This year we experienced a 59.8 percent increase in total greenhouse gas emissions across our entire company (including direct, energy indirect, and other indirect emissions), as measured using baseline emissions established on December 31, 2013.

GRI indicator	Description	TWBC results for 2014	Food and Beverage Industry average for 2014	TWBC % diff. from industry average
G4-EN15	Direct greenhouse gas emissions	164.8	102.9	+60.2%
G4-EN16	Energy indirect greenhouse gas emissions	316.5	205.5	+54.0%
G4-EN17	Other indirect greenhouse gas emissions	312.9	187.9	+66.5%
G4-EN19	Reduction (increase) of greenhouse gas emissions	(59.8%)	1.3%	–61.1%

**Note(s):** CO<sub>2</sub> (and equivalent) emissions in thousands of metric tons

**Table AII.**

### C. Independent Accountant’s Report

Panel A displays the full Independent Accountant’s Report provided in the positive performance, reasonable assurance, condition. Panels B, C, and D describe/display how this report varies from Panel A for the remaining conditions that received assurance.

#### *Panel A—Positive performance, reasonable assurance*

*Independent Accountant’s Report.* Tasty Water Beverage Company Board of Directors and Management:

We have examined the following selected environmental data (the “selected indicators”) included on page 12 of The Tasty Water Beverage Company’s 2014 Environmental Sustainability Report (the “Report”) for the year ended December 31, 2014. Tasty Water Beverage Company’s management is responsible for the selected indicators, based on the reporting criteria referenced in [Table AIII](#) below. Our responsibility is to express an opinion on the indicators included in [Table AIII](#) based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. Those standards require that we plan and perform the examination to obtain reasonable assurance about whether the indicators in [Table AIII](#) are presented in accordance with the referenced criteria, in all material respects. An examination involves performing procedures to obtain evidence about the selected indicators. The nature, timing, and extent of the procedures selected depend on our judgment, including an assessment of the risks of material misstatement of the selected indicators, whether due to fraud or error. We believe that the evidence we obtained is sufficient and appropriate to provide a reasonable basis for our opinion.

Environmental and energy use data are subject to measurement uncertainties resulting from limitations inherent in the nature and the methods used for determining such data. The selection of different but acceptable measurement techniques can result in materially different measurements. The precision of different measurement techniques may also vary.

In our opinion, the selected indicators presented in [Table AIII](#) for the Tasty Water Beverage Company for the year ended December 31, 2014 are presented in accordance with the referenced reporting criteria, in all material respects.

(Large International Accounting Firm)  
New York, New York  
February 18, 2015

#### *Panel B—Positive performance, Limited assurance*

The title of this report is modified as prescribed by the AICPA and appears as the “Independent Accountant’s Review Report” to reflect the limited (rather than reasonable) level of assurance provided

Description	Measurement	2014 results	Reporting criteria
Direct greenhouse gas emissions (scope 1)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	41.0	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Energy indirect greenhouse gas emissions (scope 2)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	94.5	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Other indirect greenhouse gas emissions (scope 3)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	62.9	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Reduction of greenhouse gas emissions	Percentage decrease in total greenhouse gas emissions from prior year	62.4%	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition

**Table AIII.**

Description	Measurement	2014 results	Reporting criteria
Direct greenhouse gas emissions (scope 1)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	164.8	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Energy indirect greenhouse gas emissions (scope 2)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	316.5	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Other indirect greenhouse gas emissions (scope 3)	Greenhouse gas emissions measured in metric tons of CO <sub>2</sub> equivalents	312.9	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition
Reduction (increase) of greenhouse gas emissions	Percentage decrease in total greenhouse gas emissions from prior year	(59.8%)	World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol—Revised Edition

**Table AIV.**

by the accounting firm. Further, throughout the report where Panel A refers to examinations/opinions, Panel B refers to reviews/conclusions. Finally, the scope and opinion/conclusion paragraphs appear as follows:

*Scope paragraph.* Our review was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. Those standards require that we plan and perform the review to obtain limited assurance about whether any material modifications should be made to the selected indicators in order for each to be presented in accordance with the criteria identified above. A review is substantially less in scope than an examination, the objective of which is to obtain reasonable assurance about whether the selected indicators are presented in accordance with the criteria, in all material respects, in order to express an opinion. Accordingly, we do not express such an opinion. We believe that our review provides a reasonable basis for our conclusion.

*Opinion/conclusion paragraph.* Based on our review, we are not aware of any material modifications that should be made to the selected indicators in [Table AIV](#) for the Tasty Water Beverage Company for the year ended December 31, 2014, in order for each indicator to be in accordance with the referenced reporting criteria.

*Panel C—Negative performance, reasonable assurance*

In contrast to Panel A, Panel C presents negative performance information in the “2014 Results” section of [Table AIV](#) as follows:

*Panel D—Negative performance, limited assurance*

This report is modified to present a review with limited assurance, as described in Panel B. Further, this report reflects negative performance and therefore displays [Table AIII](#) as shown in Panel C.

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