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# **Integrated Reporting and Assurance of Sustainability Information: An Experimental Study on Professional Investors' Information Processing**

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## **ABSTRACT**

Sustainability-related non-financial information is increasingly deemed value relevant. Against this background, two recent trends in non-financial reporting are frequently discussed: integrated reporting and assurance of sustainability information. Using an established framework of information acquisition, evaluation, and weighting, this experimental study investigated how the choice of reporting format interacts with the voluntary assurance of sustainability information. The results from a sample of professional investors underline the important role of assurance in the context of voluntary disclosure and illustrate the relevant interaction with the reporting format. Assurance of sustainability information positively affected professional investors' evaluation of a firm's sustainability performance, resulted in a higher weighting of this information, and led to higher investment-related judgments. However, this assurance effect was weaker in the case of integrated reporting compared to separate reporting. We attribute this effect to a cognitive bias in decision making when assured financial performance and non-assured sustainability performance are presented in the same report.

**Keywords:** integrated reporting, sustainability reporting, assurance, experiment

## INTRODUCTION

In recent years, it has become increasingly common for companies to disclose information about their non-financial performance and engage in sustainability reporting alongside traditional financial reporting.<sup>1</sup> Investors are the key addressees of such reporting, and there is initial evidence that they consider non-financial information value relevant (e.g., Berthelot, Coulmont, & Serret, 2012; Dhaliwal, Radhakrishnan, Tsang, & Yang, 2012). Nevertheless, how professional investors process sustainability information and what influences this process are questions that have received little attention (a notable exception is the work of Holm & Rikhardsson, 2008). In this context, two specific aspects of reporting currently receive specific attention from researchers and corporate practice: the integration of sustainability information with financial information (i.e., integrated reporting) and voluntary external assurance of sustainability information (see Erkens, Paugam, & Stolowy, 2015, for an overview of recent literature). The present study examines how these two prominent features of firms' sustainability disclosure interact and influence professional investors' information processing.

First, integrated reporting aims at overcoming the previously dominant separation of financial information from sustainability information by the publication of a single integrated report (IIRC, 2013; Jensen & Berg, 2012; Lozano & Huisingh, 2011). The International Integrated Reporting Council (IIRC) argues that the integration of financial and sustainability information will better satisfy investors' information needs by providing a more holistic picture of a company and its performance. The IIRC defines an integrated report as one that "brings together material

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<sup>1</sup> Respective corporate reports have various titles, such as sustainability reports, corporate social responsibility (CSR) reports, or environmental, social, governance (ESG) reports (CorporateRegister.com, 2013; Hahn & Kühnen, 2013). For the sake of clarity, we use the terms sustainability information and sustainability reporting throughout this paper.

information about an organization's strategy, governance, performance and prospects in a way that reflects the commercial, social and environmental context within which it operates" (2013, p. 3). Merging sustainability and financial information into a single document might overcome a potential disconnect in professional investors' processing of the two types of information (Arnold, Bassen, & Frank, 2012) by initiating "integrated thinking" as advocated by the IIRC (2013, p. 2). Therefore, in this study, we seek to shed light on professional investors' processing of corporate sustainability information in integrated and separate reporting formats.

Second, external assurance of sustainability information is supposed to improve its credibility (Kolk & Perego, 2009; O'Dwyer, 2011). Previous studies provide evidence of the positive effects of external assurance on the perceived credibility of sustainability information (e.g., Brown-Liburd & Zamora, 2015; Pflugrath, Roebuck, & Simnett, 2011). However, the combination of integrated reporting with the assurance of sustainability-related information is uncharted territory in corporate practice and scholarly research. Not only is there little practical guidance for assurance engagements in integrated reporting (Cohen & Simnett, 2015) but also, to the best of our knowledge, no studies have addressed potential interaction effects. This is a relevant shortcoming because the choice of reporting format cannot be separated from managerial decisions to acquire assurance services since we look at a constellation of mandatory assurance of financial information and voluntary assurance of non-financial information. This specific setting might cause a decision-making bias emanating from the assured financial information in the integrated reporting format, thus influencing the overall perception of the disclosed information. Therefore, analyzing the interaction of reporting format and assurance is important and is at the center of this study.

Using an experimental  $2 \times 2$  full-factorial, between-subjects design, and drawing on the basic Maines and McDaniel (2000) model and more recent advancements (e.g., Hodge, Hopkins, & Wood, 2010; Lachmann, Stefani, & Wöhrmann, 2015), this study investigates investors' sustainability information processing based on different presentation formats (i.e., integrated and separate reports), which differ in the provision of external assurance (i.e., assured and non-assured sustainability information). In doing so, this study contributes to the literature on non-financial reporting in the following ways. First, we extend prior research on the issues of integrated reporting and external assurance of sustainability information, by specifically examining potential interaction effects. Second, the extant literature comprises few studies that explicitly consider sustainability information in investors' decision-making process (e.g., Arnold et al., 2012; Dhaliwal, Li, Tsang, & Yang, 2011). Third, to the best of the authors' knowledge, this is the first study to examine *professional* investors' processing of sustainability information.

Our findings indicate that although combining sustainability and financial information in a single report increases potential access to sustainability information, the format does not aid improved acquisition of sustainability information. However, the choice of reporting format interacts with voluntary assurance of sustainability information. In the case of non-assured sustainability information, integrated reporting positively affected professional investors' evaluation of a firm's sustainability performance, resulted in a higher weighting of this information, and led to higher investment-related judgments. We attribute this finding to a halo effect emanating from the (mandatory) assurance of financial information in the integrated reporting format. This finding further contributes to experimental literature on integrated reporting, which had emphasized only the potential debiasing effects of this reporting format (e.g., Arnold, Bassen, & Frank 2012).

The remainder of this paper is structured as follows. The next section provides background information on the assurance of sustainability-related information and integrated reporting. We then formulate hypotheses about investors' processing of sustainability information, before we explain the experimental design. We then present the results of our analysis. In the final section, we discuss our findings, as well as the limitations of our approach and potential avenues for future research.

## **INTEGRATED REPORTING AND ASSURANCE IN PEER-REVIEWED LITERATURE**

The integration of financial and sustainability information is a fairly new phenomenon in the overall development of sustainability-related disclosure (Fifka, 2013; Hahn & Kühnen, 2013). Earlier literature began by describing the connection of financial with non-financial information and proponents of integrated reporting often call for a more holistic view on companies (e.g., Yongvanich & Guthrie, 2006). In this regard, terms such as "triple-bottom-line reporting" arose in order to describe such an integrated perspective (Archel, Fernández, & Larrinaga, 2008; Kent & Monem, 2008; Skouloudis, Evangelinos, & Kourmoussis, 2010).

Determinants of integrated reporting seemed to be one of the first areas of interest in scholarly research. From a micro-perspective, studies indicate that firm size, growth opportunities, profitability, gender diversity on the board or the assurance of non-financial reports positively correlate with the adoption of integrated reporting (Frías-Aceituno, Rodríguez-Ariza, & García-Sánchez, 2013b; Frias-Aceituno, Rodríguez-Ariza, & Garcia-Sánchez, 2014; Sierra-García, Zorio-Grima, & García-Benau, 2015). From a macro perspective, several country-level determinants, such the legal system, value system, and the intensity of market coordination have

been considered as potential determinants (Frías-Aceituno, Rodríguez-Ariza, & García-Sánchez, 2013a; Jensen & Berg, 2012; García-Sánchez, Rodríguez-Ariza, & Frías-Aceituno, 2013).

However, the impact and validity of the proposed benefits of integrated reporting remain ambiguous, and only a few studies have hitherto attempted to assess the costs and benefits of integrated reporting. Azam, Warraich, and Awan (2011) described how integrating financial and non-financial information could improve, for example, stakeholder trust, reputation, and customer loyalty. More specifically, Serafeim (2015) concluded that firms adopting integrated reporting are associated with more long-term-oriented and fewer transient investors. Similarly, Churet and Eccles (2014) described the positive effect of integrated reporting on the effectiveness of sustainability management, thus creating long-term firm value. In contrast, Maniora (2015) indicated that companies do not benefit in terms of economic and sustainability performance by switching from stand-alone non-financial reports to integrated reports. In summary, the few studies on the effects of integrated reporting have yielded heterogeneous results.

Further research may reinforce one of these positions. Recently, however, Brown and Dillard (2014) argued that integrated reporting follows an ideologically closed approach, which hinders critical reflection. This argument is supported by Flower (2015), who furthermore pointed to weaknesses in the framework of the IIRC, such as unregulated content and the exclusion of sustainability issues. Thus, research needs to clarify "the impact of integrated reporting on decision making outcomes [as well as] analyst responses to integrated reports" (Adams, 2015, p. 27) in order to fully understand the influence integrated reporting will have on companies, investors, and potential other stakeholders.

As for the use of integrated reports, several questions have been posed about the reliability of the reported information (Eccles & Saltzman, 2011). With respect to investors' judgment and

decision-making process, research shows that only credible information is accounted for in investment-related judgments (Healy & Palepu, 2001). In general, it may be assumed that external assurance of sustainability-related information influences perceived credibility. Using external assurance, companies seek to reduce information asymmetries and agency costs and increase the credibility of sustainability-related information, which can, for example, lead to lower equity capital costs (Dhaliwal et al., 2011). However, third-party assurance of non-financial information is still voluntary. In respect of non-financial information in integrated reporting, Eccles and Saltzman (2011) observed that, "even when assurance is provided, it is not done with the same degree of rigor as the audit of a financial report" (p. 59). In this regard, scholars question whether assurance statements on sustainability information should also be integrated with financial statement audits and how the integrated presentation of financial and sustainability information affects the use of such information (Ballou, Casey, Grenier, & Heitger, 2012).

Finally, there is a growing body of experimental research on aspects of non-financial reporting that tackles the different aspects of individual decision making inspiring the present study. Ghosh and Wu (2012) confirmed in their experiment that financial and non-financial information are generally both used by analysts when making financial judgements (a similar finding was reported by Alwert, Bornemann, & Will, 2009). Further experiments indicate that the use and impact of sustainability-related information can vary according to cross-national determinants (van der Laan Smith, Adhikari, Tondkar, & Andrews, 2010), the qualitative and quantitative nature of the given information (Rikhardsson & Holm, 2008), the disclosing entity (Reimsbach & Hahn, 2015), or the type of media used (Cho, Phillips, Hageman, & Patten, 2009). With regard to our specific research questions, prior experimental findings on the effects of integrating financial



and sustainability information and on the effects of assuring sustainability information are most interesting. Several experimental studies consistently found a positive effect of sustainability assurance on the perceived reliability of the respective information for report users (Brown-Liburd & Zamora, 2015; Hodge, Subramaniam, & Stewart, 2009; Pflugrath, Roebuck, & Simnett, 2011). This effect, however, seems to be context-specific and more pronounced when sustainability-related performance is positive (Brown-Liburd & Zamora, 2015; Coram, Monroe, & Woodliff, 2009). Ultimately, such increased perceived reliability and credibility can even translate into higher stock price estimates (Coram et al., 2009). Experimental research on integrated reporting, however, is still very scarce. As shown in experimental evidence by Arnold, Bassen, and Frank (2012), an anchoring bias influences the assessment of sustainability information that is provided in a stand-alone sustainability report and an integrated report may help to avoid distorted valuations, thus serving as a debiasing tool. Our study further focuses the processing of sustainability information presented in separate and integrated reports and adds the influence of assuring this information to the analysis, emphasizing how these two important aspects of sustainability disclosure interact.

## **THEORY AND HYPOTHESIS DEVELOPMENT**

In general, investment-related decision making includes cognitive tasks that can be explained and grounded in human factors and psychological research (Muradoglu & Harvey, 2012). To assess investors' information processing, Maines and McDaniel's (2000) model is employed here. Their comprehensive framework is based on psychological research and is generally regarded as influential in contemporary (experimental) accounting research (Dunbar & Weber, 2014) because the framework breaks down the decision-making process into testable constituent

processes (Rangel, Camerer, & Montague, 2008). Consequentially, the model has regularly been applied by scholars in recent topical articles (e.g., Clor-Proell, Proell, & Warfield, 2014; Dilla, Janvrin, & Jeffrey, 2013; Janvrin, Pinsker, & Mascha, 2013; Lachmann, Stefani, and Wöhrmann (2015); Müller, Riedl, & Sellhorn, 2015). For the present study, the model differentiates between possible alternative explanations of the way in which the integration of financial and sustainability information and the assurance of sustainability information interact and affect investors' judgments.

Maines and McDaniel (2000) suggest that investors' judgments develop during a three-stage information process. The first stage, information acquisition, refers to investors' ability to store and recall specific information. The second stage, information evaluation, involves an investor assessing the characteristics of the given information "in a way that enables its use" (Hirshleifer & Teoh, 2003, p. 342). The third stage, information weighting, refers to the perceived relevance and reliability of a particular piece of information when an investor makes investment-related judgments. Considering each stage in the Maines and McDaniel (2000) framework, and referencing different theories that explain cognitive bias and limitations in decision making, we formulate specific hypotheses about investors' processing of sustainability information.

In developing hypothesis H1 on the acquisition of information in separate and integrated reporting formats, we refer to the concept of the "cognitive costs" of processing information, as described in the Maines and McDaniel (2000) model. Then we follow Hodge, Hopkins, and Wood's (2010) extension of this model, which is based on Wickens and Carswell's (1995) proximity compatibility principle. Based on cognitive-psychology research such as Russo (1977), Maines and McDaniel (2000) argued that presentation formats influence information processing by imposing differential cognitive costs on decision makers. The scholars identified two formal

dimensions related to these processing costs (i.e., isolation and aggregation), which were extended by Hodge et al. (2010), who added the proximity effect as a third dimension.

According to Wickens and Carswell (1995), the proximity compatibility principle explains the relationship between the cognitive processing and visual presentation of objects during a task or decision process. In this context, proximity is categorized as either display or task proximity. Display proximity describes the distance between different display features and whether the user/reader of the information can perceive these different objects simultaneously. Thus, high display proximity means that multiple sources of information are displayed in close proximity (also see Hodge et al. 2010). Here, Hodge et al. (2010) established a link to the cognitive cost category proposed by Maines and McDaniel (2000). Results showed that owing to limited working (short-term) memory, individuals find it difficult to acquire multiple pieces of information at the same time, especially when the information is dispersed (i.e., presented in low display proximity). Low display proximity is thus associated with a higher cognitive cost of acquiring information. Task proximity, however, is the degree of the combination of multiple sources of information required for a specific task or judgment. In other words, high task proximity is a situation in which different information sources should be considered to solve the task. The proximity compatibility principle argues that high task proximity should be supported by high display proximity and vice versa.

Applying the cognitive cost theory and the proximity compatibility principle to the analysis of integrated and separated reports suggests that the acquisition of sustainability-related information when an investor makes investment-related judgments based on an integrated report entails lower cognitive costs for the decision maker than judgments based on the separate reporting format. Investment-related judgments typically represent high task proximity, and thus should be

supported by high display proximity. Hodge et al. (2010) explicitly stated that information located in separate documents implies dispersed information and thus low display proximity. This is the case in separate reporting in which financial- and sustainability-related performance information is located in two stand-alone reports. Hodge et al. (2010) proposed that one way of enhancing the acquisition of multiple pieces of information is to present them in closer proximity, for example, in a single document. Thus, we expect that in the sustainability information *acquisition* stage, investors who receive an integrated report are more likely to acquire (i.e., store and recall) sustainability information than those who receive separate financial and sustainability reports:

**H1:** *Professional investors who receive an integrated report are more likely to store and recall sustainability information than investors who receive separate financial and sustainability reports.*

Other than the integration of information, the assurance does not influence the display proximity of the information relevant for an investment task because the presentation format is not changed. Consequentially, assurance does not reduce the cognitive cost of acquiring information. This is why we neither expect a main effect of assurance nor do we expect assurance to interact with the reporting format in the acquisition stage. In line with this, prior literature focused on the effects of voluntary assurance on reliability and credibility as relevant factors in the evaluation and weighting stage instead of scrutinizing the acquisition stage. Specifically, existing research indicates that voluntary assurance of sustainability information increases its perceived reliability and credibility (Brown-Liburd & Zamora, 2015; Coram et al., 2009; Hodge et al., 2009; Pflugrath et al., 2011). This is especially relevant in the case of positive sustainability information, which is generally prone to greenwashing allegations (Lyon & Montgomery, 2015). In general, sustainability

information has to be perceived as credible and reliable to be meaningful and reduce information asymmetries. As a costly signal, assurance helps increase transparency and trust in the assured information. Furthermore, assurance can even act as a "quality surrogate" for sustainability performance by positively influencing a company's reputation related to sustainability (e.g., Birkey et al., 2016; Cheng, Green, & Ko, 2015). The argument is that, in the absence of directly verifiable information, investors may turn to secondary information, expecting companies that invest in external assurance to have a better performance than companies that refrain from using costly assurance services. We thus expect the presence of externally assured sustainability information to lead to a higher perceived sustainability performance and weighting of the sustainability information. According to the Maines and McDaniel (2000) framework, this should also lead to higher investment-related judgments in the case of assured sustainability information. Furthermore, the question of how assurance *interacts* with the (integrated or separated) reporting format in an investment-decision context remains an unanswered question. Here, we expect a cognitive bias when financial performance and sustainability performance are presented in the same report. Specifically, we expect a halo effect emanating from the (mandatory) assurance of financial information in the integrated reporting format.<sup>2</sup>

The halo effect was first documented decades ago in psychological research and describes the tendency of an observer's overall impression of an object to influence the observer's evaluation of that object's properties in a way that is consistent with the overall evaluation (Asch, 1946; Nisbett & Wilson, 1977; Thorndike, 1920). The halo effect is typically more pronounced when the properties are ill-defined in the decision maker's mindset (e.g., Thorndike 1920). The halo effect

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<sup>2</sup> The following arguments are also supported by the carry-over effect. A carry-over effect occurs when the evaluation of one object is not independent from the scores of another related object (e.g. Mashburn, Meyer, Allen, & Pianta, 2014). We thank one of the anonymous reviewers for bringing up this aspect.

has been demonstrated in a variety of business- and economics-related domains, most prominently in consumer behavior (e.g., Beckwith & Lehmann, 1975; Boatwright, Kalra, & Zhang, 2008) and recently in the domain of CSR (Chernev & Blair, 2015). Although little accounting and auditing-related research has explicitly referred to the halo effect (e.g., O'Donnell & Schultz, 2005), it is well suited to describe the potential interaction effects of the integration and assurance of financial and sustainability information.

As argued above, we expect investors' estimates of a firm's sustainability performance as well as their weighting of this information and the resulting investment-related judgments to increase in the case of assured sustainability information compared to non-assured sustainability information. However, a halo effect may occur when the sustainability performance and the financial performance are presented in the same report. As assurance for financial information is mandatory, an integrated report will always contain an assurance statement. Thus, the overall impression is that of assured information, even if the sustainability-related information in this report (i.e., one of the "properties" in the report) is actually non-assured. Any incremental effect of the voluntary assurance of sustainability information performance is likely to be muted. In contrast, in a separate reporting format this halo effect is absent and the effect of voluntary assurance of sustainability performance should be stronger. Thus, we hypothesize the following ordinal interaction effect that is also graphically depicted in the left column ("expected patterns") of Figure 3 (we discuss the specific contrast weights used to test this interaction in the Results section):

**H2:** *The effect of the assurance of sustainability information on professional investors' (i) evaluation and (ii) weighting of this information, as well as (iii) their investment-related judgments, is weaker in the case of integrated reporting compared to separate reporting.*

## METHOD

### Participants

Institutional investors represent the most influential providers of financial capital (Ferreira & Matos, 2008) and are thus the main addressees of integrated reporting as advocated by the IIRC. To achieve high external validity, our sample comprised 104 professional analysts and fund managers who serve as proxies for professional investors. We recruited them through various professional social networks (e.g., LinkedIn, Xing, and Unience) and the mailing list of a German-based investors' association. In total, we sent out 778 invitations to participate in the online experiment (with two follow-up e-mails at two-week intervals to those who did not initially respond) and achieved a response rate of 13.4%.<sup>3</sup> Participants did not receive any financial or material incentive for participating. Instead, they were offered an individual profile of their answers and decisions, including comparisons with their fellow professionals, as well as a dossier about recent trends and future outlooks in corporate reporting. Given the profile of the selected group—highly skilled participants with very limited available time—we consider the response rate to be quite high. We tested the results for non-response bias using late responses as a proxy for non-responses (Wallace & Mellor, 1988; Oppenheim, 2000). The results of a chi-squared test did not show significant differences between early and late respondents. Participants mean age was 40.2 years, and the mean time in their professional role was 11.8 years (median 11.0). Thirteen participants (12.5%) had a PhD and 25 (24.0%) a CFA (Chartered Financial Analyst) qualification. Most of the participants were working in Germany (58.7%), probably because of the use of a German-based mailing list and the business social network Xing which

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<sup>3</sup> See also Cox and Reid (2002) on the issues of highly specialized samples and Hodge (2003) and Haar, Starr, and MacMillan (1988) for similar approaches.

has a strong presence in German-speaking countries. The remainder of the participants were working in the US (11.5%), or Spain (9.6%), or in France, the Netherlands, Turkey, Italy, the UK, or Denmark (all <5%). Results of a chi-squared test did not show significant differences regarding the dependent variables between the group of German-based and other participants.

## Design

Our experiment followed a  $2 \times 2$  full-factorial, between-subjects design (Figure 1). All participants were randomly assigned to one of the experimental groups. The two manipulated variables were *integration* and *assurance*. We held constant the sustainability and financial information content in all experimental conditions. Thus, all participants had access to exactly the same general introduction to the company, financial highlights, sustainability highlights, tabulated financial and sustainability key performance indicators, consolidated income statement, consolidated statement of cash flows, consolidated statement of financial position, and external assurance statement (see Appendix A for more details). A Kruskal–Wallis test did not reveal significant differences between the four groups in terms of personal characteristics ( $p$  values > 0.1).

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The independent variable *integration* was operationalized through the presentation format of sustainability and financial information. Half of the participants received financial and sustainability information in a traditional reporting format—the two types of information disclosed in separate documents—reflecting the common practice of a stand-alone sustainability report and a regular annual financial report. The other half received an integrated report that combined financial and sustainability information in a single document, that is, both in the



narrative parts of the reports and the KPIs, thus following the reference of the IIRC.<sup>4</sup> Where financial and sustainability information was mixed, financial data was placed right above sustainability data, mirroring widespread corporate practice in integrated reporting, in which financial information is usually presented first.

For the independent variable *assurance*, we manipulated the presence of an external assurance of the disclosed sustainability information. Other than for the assurance of financial information, external assurance of sustainability information is usually voluntary. The sustainability information presented in the material was either assured or not. For the assured condition, this either meant that a dedicated sustainability assurance statement was included in a separate sustainability report (in the case of separate sustainability and financial reports) or that there was a combined assurance statement for financial and sustainability information (in the case of an integrated report). Furthermore, following examples from corporate practice, a notice next to the sustainability data itself indicated whether the information was assured (see, e.g., CVS Health Corporation, 2015; Samsung Electronics, 2015; Volkswagen AG, 2015). A reasonable assurance level was provided for financial and sustainability information. In the non-assured condition, however, the respective assurance statement covered financial information only.

The dependent variables in this study were geared toward the three levels of information processing, as introduced by Maines and McDaniel (2000). In all four groups, the participants were asked to evaluate the hypothetical company "Beta." Prior research in accounting and psychology indicates that the acquisition of information requires accessing (Hewitt, 2009) and

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<sup>4</sup> Furthermore, integrated reporting according to the IIRC ideally goes beyond combining the different types of information and also takes into account the connectivity and interdependencies. This, however, is often not achieved in current reporting practice (see, for example, the results of a recent descriptive study at <http://integratedreporting.de/>, accessed December 5, 2016).

viewing this information (Dilla et al., 2013) and that successful acquisition can be tested by decision makers' ability to recall the content of specific information items (e.g., Hales, Venkataraman, & Wilks, 2012). Thus, we tracked whether the participants accessed the different reports offered to them, and used manipulation checks to assess whether they correctly stored and recalled specific sustainability information in the material, to analyze the acquisition of sustainability information. With regard to investors' evaluation of sustainability information, the participants were asked to evaluate Beta's sustainability performance (*susp*) on an 11-point scale ranging from 0 (very weak) to 10 (very strong). For the weighting of sustainability information, we adopted the approach by Lachmann, Stefani, and Wöhrmann (2015) (similar to that of Hales et al., 2012), asking the participants to rate the relevance of financial information items (e.g., earnings and cash flows) and sustainability information when making their investment-related judgments, on an 11-point scale ranging from 0 (not at all important) to 10 (extremely important). To standardize the answers, we subtracted the mean of the relevance of financial information items from the scale value attributed to the relevance of sustainability information. This gives us a standardized measure of the weighting of sustainability information relative to the weighting of financial information (*weight*).<sup>5</sup> Finally, to capture participants' investment-related judgments, we followed Cianci and Kaplan (2008) and asked participants to rate the company in terms of investment attractiveness (*invest*) using an 11-point scale ranging from 0 (absolutely not investable) to 10 (top investment).<sup>6</sup>

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<sup>5</sup> Maines and McDaniel (2000) used a different procedure based on testing for differences in coefficients of several bivariate regressions, which is, however, methodologically difficult to achieve. Therefore, subsequent studies, such as Hales, Venkataraman, and Wilks (2012) and Lachmann, Stefani, and Wöhrmann (2015), used other measures of information weighting.

<sup>6</sup> This was complemented by asking participants what recommendation they would deem fair and appropriate on a five-point scale, ranging from "strong buy" to "strong sell." We used the results for robustness checks.

## Task

Our experiment was administered online. The experimental task required the participants to complete several steps (Figure 2). After accessing the webpage, the participants first read the instructions and a brief introduction to the fictitious company Beta, after which they were asked to judge the company and, depending on the experimental condition, were offered access to the respective report. In the separate condition (i.e., separate financial and sustainability reports), participants were presented hyperlinks to PDF files of both reports on the initial page of the online study. The link to the financial report was placed directly above the link to the sustainability report, thus mirroring usual practice in the download areas of company websites. In the integrated condition, only one hyperlink was provided. Throughout the process of forming investment-related judgments, the participants had potential access to the reports, so that they could choose which report(s) to access in order to obtain the required information to complete the task. They were not allowed to proceed until they had answered all the questions, nor were they allowed to go back to the previous page while answering a given question. After completing this task, the reports were no longer accessible. Finally, the participants were asked to respond to manipulation checks and demographic questions (e.g., age, work experience, gender, and mother tongue).

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The experimental material on the fictive company Beta was modeled following actual reports from a real-life company covering the material illustrated above. We chose this company as a model because it had published an integrated report for three consecutive years. To prevent any prior knowledge of the company affecting the participants' judgment, we disguised its identity (as similarly in Holm & Rikhardsson, 2008; Reimsbach & Hahn, 2015). We pretested the entire

material to assess its internal consistency and plausibility (Wason, Polonsky, & Hyman, 2002). Eight professional investors and eight PhD students with a background in finance or sustainability completed the pretest experiment and suggested minor changes to the material to enhance its understandability and ensure the level of appropriateness and realism. We excluded all pretest participants from the final experiment and checked that they were not in contact with any of the final participants.

## RESULTS

### Hypothesis testing

Two factors influenced the acquisition of sustainability information (H1) in our experiment. First, the participants needed to access the report that contained the sustainability information. Although the participants who received the integrated report were automatically provided with sustainability information, those who received separate reports could opt for access to the sustainability report. To check this condition, we observed whether the participants actually accessed the respective files when they performed the experimental task. Second, if the participants accessed the respective report (the sustainability report or the integrated report, depending on the experimental condition), we were interested in whether they stored and recalled the given sustainability information.

Regarding the first premise, approximately one-quarter of the participants who received separate reports did not access the stand-alone sustainability report (14 out of 55, see Panel A, Table 1). To analyze the second premise and provide a holistic picture of information acquisition, we used a post-experimental online questionnaire to discover whether the participants were able

to recall the content and format of several pieces of sustainability-related information. Regarding content, we analyzed whether the participants correctly answered questions about the change in the company's CO<sub>2</sub> emissions and the percentage of women in senior management. To address format-related information acquisition, we analyzed whether the participants correctly recalled that sustainability KPIs were also reported in a tabulated format. The overall level of information acquisition was high; the percentage of correct answers ranged from 81.1% to 100% (see Panel B, Table 1).

To test H1, we used chi-square tests (untabulated) to identify statistically significant differences in the percentage of correct sustainability-related answers between the groups that received integrated and separate reports. In analyzing all 90 participants who accessed sustainability information, we found no statistically significant quota differences between the separate (41 participants) and integrated (49 participants) conditions for two of the three measures of sustainability information acquisition ( $p > 0.1$ ). Only for the CO<sub>2</sub>-related question did the chi-square test indicate (marginally) statistically significant differences ( $\chi^2 = 3.10$ ,  $p < 0.1$ ), with 87.8% (43 out of 49) of the participants in the integrated condition correctly recalling CO<sub>2</sub>-related information, compared to 73.2% (30 out of 41) of the participants in the separate condition who accessed sustainability information.

The results do not support H1. Although the integration of sustainability and financial information generally increased potential access to sustainability information, this did not lead into improved acquisition of sustainability information in our setting. Furthermore, and as expected, the presence or absence of assurance did not affect information acquisition nor did it

interact with the reporting format.<sup>7</sup> However, professional investors show a generally high level of sustainability information acquisition, regardless of the reporting format and the provision of assurance.

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The plotted results for the (joint) effects of integration and assurance of sustainability information on professional investors' evaluation (i) and weighting (ii) of sustainability information, as well as the corresponding investment-related judgments (iii), are depicted in the right column of Figure 3. The left column graphically depicts our qualitative predictions as formulated in H2.

--- INSERT FIGURE 3 HERE ---

Prior literature has already documented the positive effects of assurance of sustainability information on the perception of investors and other stakeholders (e.g., Birkey et al., 2016; Brown-Liburd & Zamora, 2015; Cheng et al., 2015; Coram et al., 2009; Hodge et al., 2009; Pflugrath et al., 2011,) and we can confirm these findings. To test these aspects, we again excluded the 14 participants who did not access the sustainability report, because evaluating and weighting the information required access to the report.<sup>8</sup>

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<sup>7</sup> Specifically, chi-square tests indicate that differences in the ability to correctly recall the change in the company's CO<sub>2</sub> emissions ( $\chi^2 = 0.07$ ,  $p > 0.1$ ) and the percentage of women in senior management ( $\chi^2 = 0.00$ ,  $p > 0.1$ ) are not significant between the assured and non-assured conditions. There are no differences for the manipulation check on the tabulated reporting format because the acquisition rate was 100% in all treatments. Furthermore, and to address potential interaction effects for the binary variable acquisition, we conducted two logistic regressions (also see, Lachmann, Stefani, & Wöhrmann, 2015). However, the interaction terms are insignificant for the CO<sub>2</sub>-related question and the female-manager-related question (each  $p > 0.1$ ).

<sup>8</sup> As a robustness check, we also included in the separate condition participants who did not access the sustainability report. Prior research indicates that the influence of sustainability reporting on investors' judgment and decision making works, at least partly, at the subconscious level (e.g., Elliott, Jackson, Peecher, & White, 2014). Thus, there is a slight possibility that potential access to a sustainability report influences perceived sustainability performance. However, the results remained qualitatively identical.

The mean evaluation of sustainability performance (*susp*) was 6.93 for the participants who received assured sustainability information and 4.98 for those who received non-assured sustainability information (see Panel A, Table 2). The mean standardized value of sustainability information weighting (*weight*) for all participants who acquired sustainability information was -2.53. The negative sign of the standardized values indicates that the participants still regarded the sustainability information as less important than the financial information. The mean *weight* was -3.20 for participants who received non-assured sustainability information and -1.87 for those who received assured sustainability information (Panel A, Table 3). Regarding the investment-related judgments, we analyzed participants' judgments of the overall investment attractiveness of the company (*invest*). The mean *invest* was 5.44 for participants who received non-assured sustainability information and 6.76 for those who received assured sustainability information (Panel A, Table 4).

The ANOVA results further indicate that the effects of assurance of sustainability information on participants' perceived sustainability performance (Panel B in Table 2), on the participants' weighting of sustainability information (Panel B in Table 3),<sup>9</sup> and on the corresponding investment-related judgments (Panel B in Table 4) were all statistically significant ( $p < 0.01$ ). Together with the plotted data (see Figure 3) and an additional series of post-hoc tests (i.e., Scheffé, Bonferroni, and Games-Howell),<sup>10</sup> the results clearly confirm previous findings and

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<sup>9</sup> Mirroring the basic idea in Maines and McDaniel (2000), we also separately regressed participants' investment-related judgments (i.e., our variable *invest*) on their perceived sustainability performance (*susp*) for each of the four experimental conditions. The coefficients on *susp* were supposed to represent the weighting of sustainability information. However, given the small sample sizes, the four confidence intervals of the coefficients on *susp* overlapped; therefore, further interpretation of differences in the coefficients was not appropriate.

<sup>10</sup> We conducted an additional series of post-hoc tests (i.e., Scheffé, Bonferroni, and Games-Howell). This indicated that the mean difference in the perceived sustainability performance, the standardized value of sustainability information weighting, and in the assessment of the firm's investment attractiveness is statistically significant ( $p < 0.05$ ) for all assured (integrated and separate) versus non-assured (integrated and separate) treatments.

reveal that assured sustainability information was always associated with a higher perceived sustainability performance than non-assured information and that participants placed significantly more weight on their sustainability performance evaluation if this weighting was based on assured sustainability information. Furthermore, investors' information processing leads to higher investment-related judgments if these judgments are based on assured sustainability information.

--- INSERT TABLE 2 ABOUT HERE ---

--- INSERT TABLE 3 ABOUT HERE ---

--- INSERT TABLE 4 ABOUT HERE ---

In H2, we predicted that the effect of the assurance of sustainability information on professional investors' evaluations, weightings, and investment-related judgments would be weaker in the case of integrated reporting compared to separate reporting. Therefore, differences in the dependent variables between assured and non-assured information should be less pronounced in the integrated reporting format and more pronounced in the separate reporting format. A visual matching of the expected and actual patterns in Figure 3 supports this notion. As predicted, the actual results (right column, Figure 3) show a rather flat line in all assured conditions and a slope in the non-assured conditions. The difference in participants' evaluations of the firm's sustainability performance between assured and non-assured information drops from 2.76 in the separate reporting treatments ( $= 6.90$  [separate & assured]  $- 4.14$  [separate & non-assured]) to 1.25 ( $= 6.96$  [integrated & assured]  $- 5.71$  [integrated & non-assured]) in the integrated reporting treatments. These differences are significant for the integrated ( $F = 10.74$ ,  $p < 0.01$ ) and the separate ( $F = 24.42$ ,  $p < 0.01$ ) reporting format. We find an almost identical pattern for the weighting and investment-related judgment stages. The difference in the standardized weighting measure drops from 1.58 in the separate reporting treatments ( $= -1.90$



[separate & assured] – -3.48 [separate & non-assured]) to 1.12 (= -1.84 [integrated & assured] – -2.96 [integrated & non-assured]) in the integrated reporting treatments. Again, these differences are significant for the integrated ( $F = 13.25$ ,  $p < 0.01$ ) and the separate ( $F = 14.81$ ,  $p < 0.01$ ) reporting format. Finally, the difference in the perceived investment attractiveness drops from 1.71 in the separate reporting treatments (= 6.85 [separate & assured] – 5.14 [separate & non-assured]) to 0.97 (= 6.68 [integrated & assured] – 5.71 [integrated & non-assured]) in the integrated reporting treatments. Here as well, the differences are significant for the integrated ( $F = 6.01$ ,  $p = 0.01$ ) and the separate ( $F = 15.10$ ,  $p < 0.01$ ) reporting format. These findings are in line with H2.

However, although the ANOVA interaction term (Integrated x Assured) was statistically significant for the participants' perceived sustainability performance (Panel B in Table 2), it was not statistically significant for participants' weighting of sustainability information (Panel B in Table 3) and the corresponding investment-related judgments (Panel B in Table 4). As we had predicted an ordinal interaction, for which ANOVA is less powerful as a statistical tool (see Buckless & Ravenscroft, 1990), we further analyzed the functional form of the interaction using planned contrasts (Buckless & Ravenscroft, 1990; also see Lachman et al., 2015), which increase the statistical power without increasing Type I error rates. We used contrast weights of -3 for the separate & non-assured condition, -1 for the integrated & non-assured condition, and +2 for both assured conditions (i.e., integrated & assured, and separate & assured).<sup>11</sup> This is consistent with

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<sup>11</sup> These contrast weights are commonly applied to test the type of ordinal interaction that we predicted in H2 (e.g., Elliott, Krische, & Peecher, 2010; Lachmann, Stefani, & Wöhrmann, 2015). As a robustness check, we also used some alternative specifications with contrast weights of 3;-2;3;-4 and 2;0;1;-3 for the sequence of our experimental conditions integrated & assured; integrated & non-assured; separate & assured; separate & non-assured. The 3;-2;3;-4 sequence is a more pronounced version of our basic setup (2;-1;2; -3). The sequence 2;0;1;-3 is, for example, applied by Chen and Tan (2013). The results (untabulated) remained qualitatively identical.

our qualitative predictions that assured sustainability information is always associated with (i) a higher perceived sustainability performance, (ii) greater weighting of the sustainability information, and (iii) higher investment-related judgments and that this assurance effect is larger in the case of separate reporting compared to integrated reporting. The results of the planned contrast tests of interaction are reported in Panel C of Tables 2, 3, and 4. All three planned contrasts were statistically significant ( $p < 0.01$ ). Taken together, these results provide ample support for H2 and hint at an ordinal interaction between the reporting format and the provision of assurance.

## DISCUSSION AND CONCLUSION

This study presents the results of an experimental analysis of the effects of the integration and assurance of sustainability and financial information on the investment-related judgments of professional investors. Our distinctive group of participants made investment-related judgments based on financial and (assured or non-assured) sustainability information about a real listed company (with its identity concealed) in either a separate or integrated presentation format.

We specifically tested two hypotheses, and our results indicate that the integration of sustainability and financial information did not lead to an improved acquisition of this type of information (H1). However, the integration increased professional investors' potential access to sustainability information, because readers could not entirely opt out of encountering sustainability-information during their information processing. This in itself remains an important objective of integrated reporting, because, as our experiment indicated, a substantial number of professional investors showed no interest in the separate sustainability report. Those participants who accessed the sustainability information showed good ability to store and recall sustainability information, even in the separate reporting condition. We thus assume that those professional

investors who actively chose to access and read the stand-alone sustainability report deemed sustainability information relevant, with the result that they stored and recalled it, despite the higher cognitive costs associated with the low display proximity of separate reporting. The higher display proximity of integrated reporting thus was not found to have a statistically significant additional effect on the acquisition of sustainability information. We see these findings to be consistent with prior research documenting a specific search strategy for professional investors. Such investors typically use well-defined valuation models and thus often exhibit a directed search strategy focusing on the information that is most important for the task at hand (Hodge, Kennedy, & Maines, 2004). The generally high level of acquisition of sustainability-related information indicates that investors already include this information in their search strategy; this therefore superimposes the missing proximity compatibility in the separate reporting condition, that is, the suboptimal relationship between the cognitive processing and visual presentation of objects during the investment task.

Regarding the three subsequent stages of information processing, our results indicate that the assurance of sustainability information (i) was associated with an increase in the perceived sustainability performance, (ii) resulted in higher weighting of this information, and (iii) led to higher investment-related judgments. These results are in line with previous empirical work on the effects of assurance and non-financial performance (e.g., Birkey et al., 2016; Brown-Liburd & Zamora, 2015; Cheng et al., 2015) and support the notion that sustainability assurance represents a costly signal that enhances the credibility and relevance of the reported information (Connelly et al., 2010; Spence, 1973). The fact that the assurance of sustainability information apparently functioned as a quality surrogate in the evaluation stage, however, carries certain perils. The original purpose of assurance statements was to confirm and verify the accuracy of

information and not the quality of the underlying performance. As mirrored in the results of our experiment, this should lead to a higher weighting of assured sustainability information compared to non-assured information. However, the assurance process does not improve the performance of the company's sustainability performance per se. Instead, the assurance process rather confirms the accuracy of the reported data. Thus, an increased perception of the sustainability performance might be misplaced. However, the assurance effect in the evaluation stage may wear off when the assurance of sustainability information becomes the norm and is no longer useful as a costly quality signal. For large multinational companies, this tendency for isomorphism in sustainability assurance, in which companies gradually align their behavior to ensure legitimacy (e.g., DiMaggio & Powell, 1983), can already be observed (see KPMG, 2015). However, the tendency to attribute increased credibility to assured sustainability information in the weighting stage is not risk-free, because it diverts the problem of uncertain quality of the sustainability content to a third party (i.e., the auditor). Given that the procedure for sustainability-related assurance and its content are still in the development stage, this third party may not be familiar with the topic (see also Kim, Green, & Johnstone, 2016); therefore, the quality of the assurance itself is not always certain (Gürtürk & Hahn, 2016; Junior, Best, & Cotter, 2014). Nevertheless, from a managerial perspective, our results support the notion that companies should seek assurance for their sustainability information to enhance the perceived sustainability performance and achieve a higher investment willingness. This is, as hypothesized and observed in H2, more important if the company issues a stand-alone sustainability report compared to an integrated report.

We specifically expected that the incremental assurance effect would be weaker in the case of integrated reporting compared to separate reporting (H2). The results of our planned contrast analyses clearly support this notion, and the differences between the assured and non-assured

information were less pronounced in the case of integrated reporting. We see these findings as consistent with a cognitive bias in decision making when financial performance and sustainability performance are presented in the same report. We conclude that this bias may be caused by a halo effect emanating from the assured financial information. With the mandatory assurance of financial information, the overall impression of an integrated report may have been that of assured information, even if the sustainability-related information in this report was actually non-assured. Thus, the incremental effect of the voluntary assurance of sustainability information on the perceived sustainability performance was muted. In contrast, in a separate reporting format this halo effect was absent, and the effect of the voluntary assurance of sustainability performance was stronger.

How far this bias might be problematic must be considered independently for the different information-processing stages. For the evaluation phase, we first have to note that the reported sustainability information was identical in all experimental conditions. Thus, that the difference in perceived sustainability performance is less pronounced in the case of integrated reporting seems to be a positive (side) effect of this reporting format at first sight. However, the reduced differences resulted from the fact that the integrated reporting format increased the perceived sustainability performance because non-assured information has likely been perceived as assured. Therefore, one could also argue that the integrated reporting format poses the risk of a too favorable assessment of a company's sustainability performance. Future studies could delve deeper into this question. For the weighting stage, the interpretation is more straightforward. Here, the increased weighting of non-assured sustainability information in the integrated condition is obviously an unwanted effect if non-assured information has been perceived as assured.

Overall, the results should be useful for corporate practice, as well as standard-setters and reporting initiatives. This holds particularly true, given that our results indicate that the choice of reporting format and assurance services also have an impact on investment-related judgments and could trigger capital market effects. Regarding the presentation format effects, the feasibility of the objectives of integrated reporting advocated by the IIRC needs further scrutiny. The IIRC argues that the integrated reporting format is expected to better satisfy investors' information needs and enhance the value relevance of sustainability information (IIRC, 2013). However, in our experiment, the combination of financial and sustainability information in one report did not incrementally improve the (already high) level of sustainability acquisition. Furthermore, additional presentation format effects occurred only when this information was non-assured. Whereas previous studies emphasized the potential benefits of integrated reporting in terms of debiasing effects (e.g., Arnold et al., 2012), the present study illustrates that, in specific settings, there may also be drawbacks (i.e., a biasing effect) in this reporting format.

Our results and conclusions should be considered in light of several limitations related to the experimental method. Most importantly, our study material was necessarily limited regarding the amount of information (see also Lachmann et al., 2015). Thus, the reports (financial and sustainability) may not have contained all the information that investors in reality are confronted with when they make judgments. Furthermore, we provided identical assurance levels for sustainability and financial information (i.e., reasonable assurance) to ensure comparability and avoid weakening our manipulations. Although this is still not the most common assurance practice for sustainability information, this practice is regularly applied by large companies (KPMG, 2015). However, whether, for example, the level of assurance affects investors' judgments could be the subject of future research (see also Cohen & Simnett, 2015). In our

experiment, we also abstracted potential multi-period effects. As outlined above, some of the effects observed in our experiment may have been a temporary phenomenon caused by the relative novelty of sustainability and integrated reporting. Furthermore, we did not use eye-tracking devices in our experiment. Therefore, for example, we were unable to measure whether the participants truly read the specific information items, which would give more depth to the analysis of information acquisition. The same limitation also applies to the sequence of information processing, especially in the separate reporting condition. Although we were able to track whether a participant opened a report, we could not trace the order in which the reports were opened. It is reasonable to assume that professional investors (not specialized in SRI) likely opened the financial report first, but future research could also investigate whether investors who have preferences either for financial or for sustainability information (and thus view the financial statement first or last) differ between each other and compared to investors receiving integrated information. Finally, we conducted an online experiment that allowed us to reach a very distinctive set of professional participants (i.e., analysts), but at the expense of working within a laboratory environment.

## FIGURES AND TABLES

Figure 1: Experimental groups

|  |     | Sustainability information integrated in one report                        |   |
|--|-----|--|---|
|  |     | Yes  | No  |
| External assurance of sustainability information | Yes | Integrated Report with external assurance of sustainability information    | Separate Financial & Sustainability Report with external assurance of sustainability information                    |
|  | No  | Integrated Report without external assurance of sustainability information | Separate Financial & Sustainability Report without external assurance of sustainability information (control group) |

Figure 2: Flow of the experiment

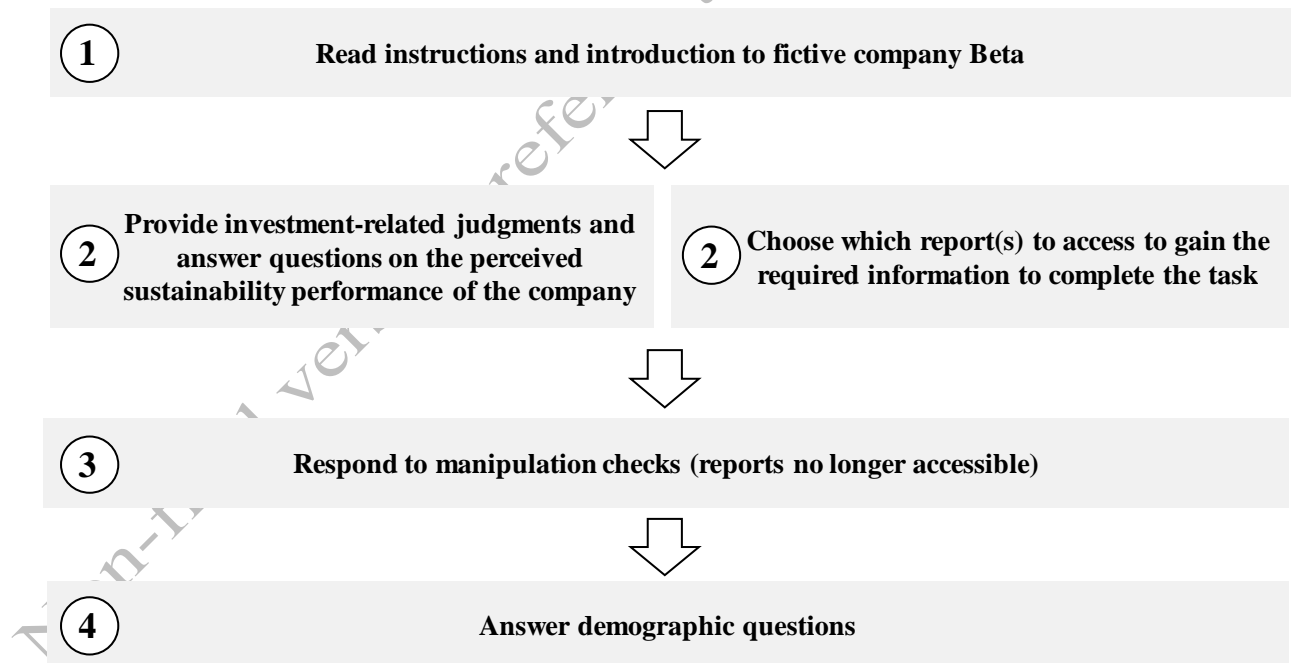
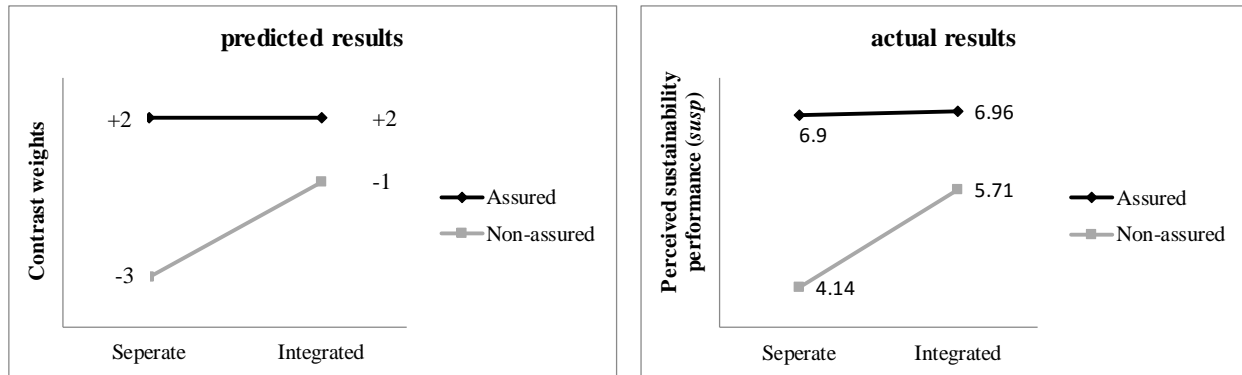


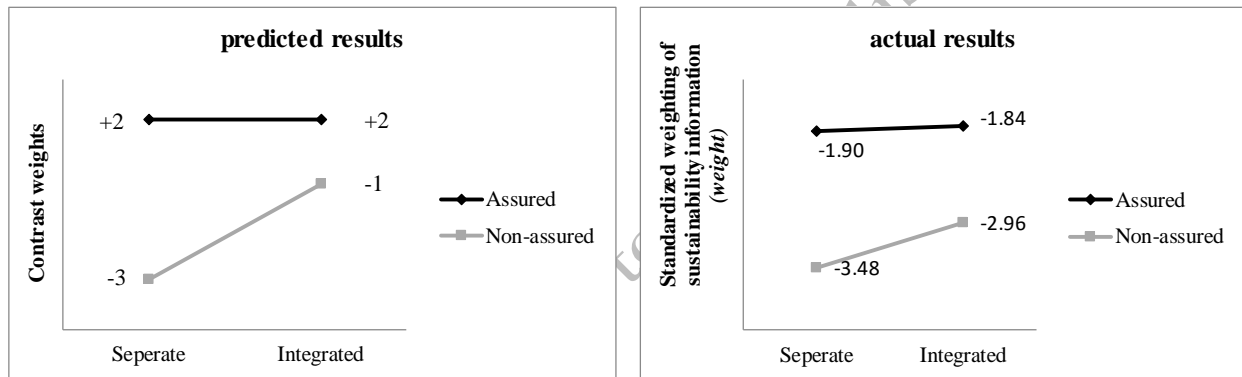


Figure 3: Predicted pattern and plotted results

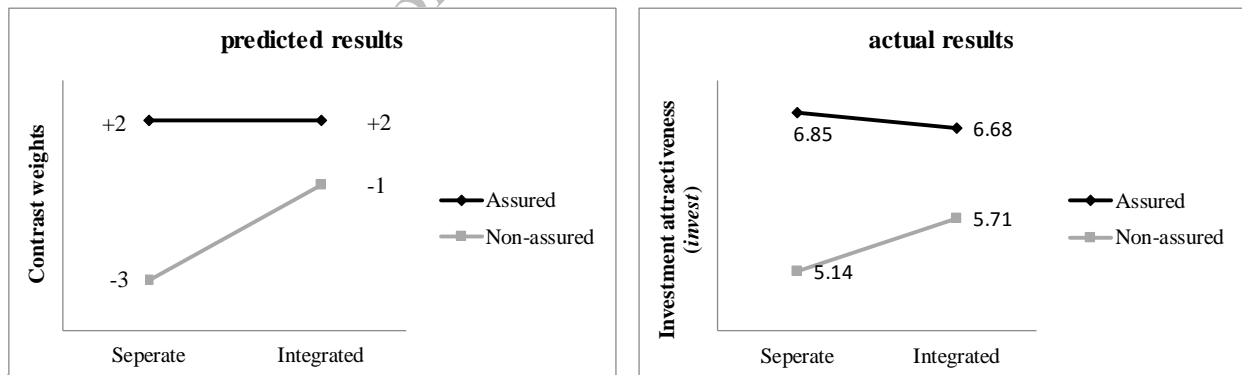
**Panel A: Information Evaluation**



**Panel B: Information Weighting**



**Panel C: Investment-related Judgments**



**TABLE 1: Information acquisition**

| <b>Panel A</b>   |                                 |                                     |                         |                               |                                   |                       |              |
|--|---------------------------------|-------------------------------------|-------------------------|-------------------------------|-----------------------------------|-----------------------|--------------|
|  | <b>Integrated &amp; Assured</b> | <b>Integrated &amp; Non-assured</b> | <b>Total Integrated</b> | <b>Separate &amp; Assured</b> | <b>Separate &amp; Non-Assured</b> | <b>Total Separate</b> | <b>Total</b> |
| <b>Total number of participants</b>  | 25                              | 24                                  | 49                      | 27                            | 28                                | 55                    | 104          |
| <b># of participants accessing sustainability information (in % of total participants)<sup>a</sup></b> | 25 (100.0%)                     | 24 (100.0%)                         | 49 (100.0%)             | 20 (74.1%)                    | 21 (75.0%)                        | 41 (74.5%)            | 90 (86.5%)   |
| <b>Panel B</b>   |                                 |                                     |                         |                               |                                   |                       |              |
| <b># of participants with sustainability access recalling specific sustainability-information:</b>     |                                 |                                     |                         |                               |                                   |                       |              |
| 1) CO2-information (in % of participants with sustainability access) <sup>b</sup>                      | 22 (88.0%)                      | 21 (87.5%)                          | 43 (87.8%)              | 14 (70.0%)                    | 16 (76.2%)                        | 30 (73.2%)            | 73 (81.1%)   |
| 2) female senior management-information (in % of participants with sustainability access) <sup>c</sup> | 22 (88.0%)                      | 21 (87.5%)                          | 43 (87.8%)              | 16 (80.0%)                    | 17 (81.0%)                        | 33 (80.5%)            | 76 (84.4%)   |
| 3) tabulated reporting format (in % of participants with sustainability access) <sup>d</sup>           | 25 (100.0%)                     | 24 (100.0%)                         | 49 (100.0%)             | 20 (100.0%)                   | 21 (100.0%)                       | 41 (100.0%)           | 90 (100.0%)  |

a Participants who received an integrated report had access to sustainability information while those who received separate reports could opt not to access the sustainability report.  
b Participants had to answer whether the overall amount of CO<sub>2</sub> emissions increased or decreased over the past financial year.  
c Participants had to answer whether or not for the current financial year, about one third of Beta's senior management was female.  
d Participants had to answer whether or not Beta provided sustainability key performance indicators in tabulated form.

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**TABLE 2: Information evaluation**

| <b>Panel A: Descriptive statistics (perceived sustainability performance <i>susp</i><sup>a</sup>) (mean [SD])</b> |          |                   |          |                 |          |             |
|---|----------|-------------------|----------|-----------------|----------|-------------|
|   | <b>n</b> | <b>Integrated</b> | <b>n</b> | <b>Separate</b> | <b>n</b> | <b>Σ</b>    |
| <b>Assured</b>  | 25       | 6.96 [1.43]       | 20       | 6.90 [1.02]     | 45       | 6.93 [1.25] |
| <b>Non-assured</b>  | 24       | 5.71 [1.23]       | 21       | 4.14 [2.29]     | 45       | 4.98 [1.95] |
| <b>Σ</b>  | 49       | 6.35 [1.47]       | 41       | 5.49 [2.25]     | 90       | 5.96 [1.90] |

| <b>Panel B: Results of ANOVA (perceived sustainability performance <i>susp</i><sup>a</sup>)</b> |           |                       |                    |          |                            |                            |
|---|-----------|-----------------------|--------------------|----------|----------------------------|----------------------------|
| <b>Source</b>   | <b>df</b> | <b>Sum of Squares</b> | <b>Mean Square</b> | <b>F</b> | <b>p-value<sup>d</sup></b> | <b>Partial Eta squared</b> |
| Corrected Model   | 3         | 113.53                | 37.844             | 15.625   | 0.000                      | 0.353                      |
| Integrated <sup>b</sup>   | 1         | 14.737                | 14.737             | 6.085    | 0.016                      | 0.066                      |
| Assured <sup>c</sup>  | 1         | 89.637                | 89.637             | 37.010   | 0.000                      | 0.301                      |
| Integrated x Assured  | 1         | 12.642                | 12.642             | 5.220    | 0.025                      | 0.057                      |
| Error   | 86        | 208.290               | 2.422              |          |                            |                            |

| <b>Panel C: Planned contrast test of interaction<sup>e</sup></b> |   |         |         |        |       |  |
|--|---|---------|---------|--------|-------|--|
| Contrast 1<br>(assurance by<br>integration)                      | 1 | 110,614 | 110,614 | 45,671 | 0.000 |  |

a We asked participants to assess the company's sustainability performance. Participants answered on a 11-point scale with the endpoints zero (additionally labeled "very weak") and 10 (additionally labeled "very strong").

b Integrated is 1 if participants received an integrated report and 0 otherwise.

c Assured is 1 if the sustainability information is assured and 0 otherwise.

d p-values are two-tailed.

e We use contrast weights of -3 for the separate & non-assured condition, -1 for the integrated & non-assured condition, and +2 for both assured conditions (i.e., integrated & assured and separate & assured).

Non-final version

**TABLE 3: Information weighting**

| <b>Panel A: Descriptive statistics (<i>weight</i><sup>a</sup>) (mean [SD])</b> |          |                   |  |          |                 |                   |
|--|----------|-------------------|--|----------|-----------------|-------------------|
|  | <b>n</b> | <b>Integrated</b> |  | <b>n</b> | <b>Separate</b> | <b>n</b> <b>Σ</b> |
| <b>Assured</b>   | 25       | -1.84 [0.99]      |  | 20       | -1.90 [0.91]    | 45 -1.87 [0.94]   |
| <b>Non-assured</b>   | 24       | -2.96 [1.16]      |  | 21       | -3.48 [1.60]    | 45 -3.20 [1.39]   |
| <b>Σ</b>   | 49       | -2.39 [1.20]      |  | 41       | -2.70 [1.52]    | 90 -2.53 [1.36]   |

| <b>Panel B: Results of ANOVA (<i>weight</i><sup>a</sup>)</b> |           |                       |                    |          |                            |                            |
|--|-----------|-----------------------|--------------------|----------|----------------------------|----------------------------|
| <b>Source</b>  | <b>df</b> | <b>Sum of Squares</b> | <b>Mean Square</b> | <b>F</b> | <b>p-value<sup>d</sup></b> | <b>Partial Eta squared</b> |
| Corrected Model  | 3         | 43.044                | 14.384             | 10.168   | 0.000                      | 0.262                      |
| Integrated <sup>b</sup>                                      | 1         | 1.862                 | 1.862              | 1.302    | 0.254                      | 0.015                      |
| Assured <sup>c</sup>   | 1         | 40.497                | 40.497             | 28.698   | 0.000                      | 0.250                      |
| Integrated x Assured   | 1         | 1.169                 | 1.6169             | 0.829    | 0.365                      | 0.010                      |
| Error  | 86        | 121.356               | 1.411              |          |                            |                            |

| <b>Panel C: Planned contrast test of interaction<sup>e</sup></b> |   |        |        |        |       |
|--|---|--------|--------|--------|-------|
| <b>Contrast 1</b>  |   |        |        |        |       |
| (assurance by integration)                                       | 1 | 42,026 | 42,026 | 29,782 | 0.000 |

a We asked participants to rate the relevance of financial information items (e.g. earnings, cashflows) and sustainability information when making their investment-related judgments on a 11-point scale ranging from 0 (not at all important) to 10 (extremely important). To standardize the answers, we subtracted the mean of the relevance of the financial information items from the scale value attributed to the relevance of sustainability information. We report the standardized values.

b Integrated is 1 if participants received an integrated report and 0 otherwise.

c Assured is 1 if the sustainability information is assured and 0 otherwise.

d p-values are two-tailed.

e We use contrast weights of -3 for the separate & non-assured condition, -1 for the integrated & non-assured condition, and +2 for both assured conditions (i.e., integrated & assured and separate & assured).

Non-final version

**TABLE 4: Investment-related judgments**

| <b>Panel A: Descriptive statistics (<i>invest</i><sup>a</sup>) (mean [SD])</b> |          |                   |          |                 |          |             |
|--|----------|-------------------|----------|-----------------|----------|-------------|
|  | <b>n</b> | <b>Integrated</b> | <b>n</b> | <b>Separate</b> | <b>n</b> | <b>Σ</b>    |
| <b>Assured</b>   | 25       | 6.68 [1.28]       | 20       | 6.85 [0.75]     | 45       | 6.76 [1.01] |
| <b>Non-assured</b>   | 24       | 5.71 [1.49]       | 21       | 5.14 [1.82]     | 45       | 5.44 [1.66] |
| <b>Σ</b>   | 49       | 6.20 [1.46]       | 41       | 5.98 [1.64]     | 90       | 6.10 [1.54] |

| <b>Panel B: Results of ANOVA (<i>invest</i><sup>a</sup>)</b> |           |                       |                    |          |                            |                            |
|--|-----------|-----------------------|--------------------|----------|----------------------------|----------------------------|
| <b>Source</b>  | <b>df</b> | <b>Sum of Squares</b> | <b>Mean Square</b> | <b>F</b> | <b>p-value<sup>d</sup></b> | <b>Partial Eta squared</b> |
| Corrected Model  | 3         | 42.580                | 14.8193            | 7.287    | 0.000                      | 0.203                      |
| Integrated <sup>b</sup>                                      | 1         | 0.872                 | 0.872              | 0.448    | 0.505                      | 0.005                      |
| Assured <sup>c</sup>   | 1         | 40.026                | 40.026             | 20.548   | 0.000                      | 0.193                      |
| Integrated x Assured   | 1         | 3.017                 | 3.017              | 1.549    | 0.217                      | 0.018                      |
| Error  | 86        | 167.530               | 1.948              |          |                            |                            |

| <b>Panel C: Planned contrast test of interaction<sup>e</sup></b> |   |        |        |        |       |  |
|--|---|--------|--------|--------|-------|--|
| Contrast 1<br>(assurance by<br>integration)                      | 1 | 42,257 | 42,257 | 21,693 | 0.000 |  |

a We asked participants to rate the company in terms of investment attractiveness (*invest*) using an 11-point scale ranging from "absolutely not investable" (1) to an "top investment" (10).

b Integrated is 1 if participants received an integrated report and 0 otherwise.

c Assured is 1 if the sustainability information is assured and 0 otherwise.

d p-values are two-tailed.

e We use contrast weights of -3 for the separate & non-assured condition, -1 for the integrated & non-assured condition, and +2 for both assured conditions (i.e., integrated & assured and separate & assured).

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