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# Investors' reactions to CSR reputation and disclosure assurance: an experimental analysis

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## Abstract

Corporate social responsibility (CSR) disclosures and a firm's CSR reputation are important bases for retail investors' judgments of legitimacy and their investment decisions. The present experimental vignette study with 300 participants acting as retail investors aims to provide deeper insights into the structure of these judgment processes. Our structural equation model reveals that a favorable CSR reputation and an assurance of the CSR disclosures positively affect whether values-driven motives are attributed to a firm's CSR efforts, the perceived credibility of its CSR disclosures, and perceptions of its corporate social performance (CSP). In turn, perceptions of a firm's CSP reinforces investors' intention to invest, which in the end positively influences the amount of their investment. Our findings disentangle the complex cognitive processes involved, thus contributing to a better understanding of the combined effects of a firm's CSR reputation and CSR disclosures on investors' decision-making. In particular, these findings add to the scarce empirical research on individual legitimacy in investor decision-making and highlight the relevance of CSP as a decision parameter for investors, separate from corporate financial performance (CFP). Finally, the empirical results provide levers for managers to gain support from their firm's investors and offer guidance for standard-setters and regulators regarding new disclosure requirements.

**Keywords** Assurance · Corporate social performance · CSR reputation · Individual legitimacy judgments · Investment decision

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## 1 Introduction

Corporate social responsibility (CSR), which we define as “context-specific organizational actions and policies that take into account stakeholders’ expectations and the triple bottom line of economic, social, and environmental performance” (Aguinis, 2011, p. 855), is attracting increasing attention in all parts of the economy and society. Worldwide, various developments have led to increased regulations for the reporting of CSR topics which affect business practice (e.g., Cohen et al., 2017; Porter & Kramer, 2006).

For example, the EU, who claims a leadership role in this context, issued the Directive 2014/95/EU, which requires large public-interest firms to disclose information about environmental protection, social responsibility and treatment of employees, respect for human rights, anti-corruption, and bribery matters (European Parliament and Council, 2014). This regulation was further tightened by the Corporate Sustainability Reporting Directive 2022/2464 (European Parliament and Council, 2022). Further, the International Financial Reporting Standards (IFRS) Foundation established the International Sustainability Standards Board (ISSB) in November 2021 to develop new reporting standards which would serve as a high-quality, comprehensive global baseline of sustainability disclosures and focus on investors and the financial markets (IFRS, 2021). Finally, in March 2022, the United States Securities and Exchange Commission (SEC) proposed rule amendments requiring climate-related disclosures from domestic and foreign listed firms in their registration statements and periodic reports (SEC, 2022).

In line with this growing awareness of the need for sustainability in society and the increasing pressure exerted by regulators to foster sustainable development in economies worldwide, a growing interest in sustainable investments (impact investment) can also be observed, especially among retail investors who have become increasingly concerned about the seriousness of some firms’ CSR engagement (Nilsson et al., 2010). In order to form a basis for their final decision to invest in these firms, they have to engage in what Elsbach (1994) calls individual legitimacy judgments, i.e., they must judge whether the CSR activities and further actions taken by firms are in line with the current norms set by national and international regulations or derivatives of public debates.

The question thus arises as to how investors process the increasingly provided CSR disclosures and incorporate them into the legitimacy judgments that result in investment decisions. A deeper understanding of the interplay between disclosure attributes, like assurance, and investors’ attributions, is considered to be relevant to both firms and regulators. Nevertheless, behavioral research and empirical findings in this context are scarce (Gödker & Mertins, 2018).

To gain more insight into this question, we need to combine two research streams, namely research on individual legitimacy judgments and research on the impact of CSR disclosures on investors’ decisions. However, not only have there been few empirical studies focusing specifically on legitimacy judgments at the individual level and their consequences in general (Haack et al., 2021; Jahn et al., 2020), but the results of empirical research dealing with the effect of ecological

and social disclosures on investors' decisions are ambiguous. For example, Chan and Milne (1999) find that only negative ecological and social information has an impact on investors' decisions, while positive information does not. According to another study by Milne and Chan (1999), social information hardly affects investors' decisions. In contrast, Holm and Rikhardsson (2008) observe a significant effect of positive ecological information, while Cohen et al. (2017) provide evidence for significant effects of CSR information. Until now, studies pertaining to this research stream do not investigate in detail how the information provided is processed by investors when coming to an investment decision. Thus, a comprehensive, empirically validated model is lacking – one that explains how investors process the information they receive through CSR disclosures.

Our paper aims to fill this research gap by empirically analyzing the mechanisms underlying investors' legitimacy judgments and investment decisions based on information about a firm's CSR activities. Following Finch et al. (2015) and Jahn et al. (2020), we define individual legitimacy judgments as an attitude which is formed based on credibility and the motives attributed to firms exercising CSR (Jahn et al., 2020). We focus on the effects of the assurance of CSR disclosures and CSR reputation on this attitude and investors' final investment decision. In particular, we propose that *the perception of a firm's values-driven motive, the credibility of the received information, and the perceived corporate social performance (CSP)* are the relevant components which determine investors' individual judgments of legitimacy. By values-driven CSR motives, we follow the understanding of Ellen et al. (2006) that CSR commitment is driven by the company's intention to make a genuine contribution to society based on moral, ethical or social standards without focusing on the firm's own benefits resulting from taking this action.

As differing investment motives characterize different investor types (Jansson & Biel, 2011), and, further, investors might differ regarding their individual cognitive processes (Elliott, 2006; Haji et al., 2021), it is reasonable to consider a specific investor type to arrive at clear empirical insights and to keep the analysis parsimonious. In our study, we focus on retail investors, as they are typically not embedded in institutional policies and are less affected by organizational legitimacy judgments and institutional investment procedures. We can thus more clearly elaborate on the components of individual legitimacy judgment processes. Moreover, they represent a significant and growing group of individuals participating in the equity markets of Europe and the United States (Cohen et al., 2011; Pizzetti et al., 2021; Reimsbach & Hahn, 2015).

In general, the effects of certain characteristics of social and ecological disclosures on investors can be analyzed from two methodological angles (Holm & Rikardsson, 2008): Capital market archival studies, which focus on the changes in stock market variables in reaction to social and ecological disclosures, or experimental studies, which provide insights regarding the psychological processes behind investors' reactions to these disclosures. Striving to shed more light on the latter, we conducted an experimental vignette study (Aguinis & Bradely, 2014). A mixed ANOVA indicates the relevance of an assurance of the CSR information and a positive CSR reputation for investors' decisions. Also, the results of our structural equation modeling (SEM) show a significant relation between CSR reputation and assurance on

the one hand, and values-driven attributions on the other – which in turn positively affects perceived credibility. The latter significantly increases perceived CSP, which positively impacts investment intentions. Finally, such intentions then lead to a higher amount of investment.

Our empirical findings indicate a significant relationship between the analyzed constructs, providing a view of the complex processes mediating the relationship between information related to a firm's CSR activities and investors' final investment decisions. These results represent several contributions. First, we extend the literature on investor decision-making especially the individual judgments of legitimacy, both theoretically and empirically. On the one hand, we enlarge prior experimental research on individual legitimacy judgments (e.g., Haack et al., 2021; Jahn et al., 2020), by incorporating a firm's perceived corporate social performance (CSP) as another cognitive element of investors' judgment processes. Based on the assumption that an (retail) investor as rational decision-maker evaluates the total performance, i.e., the financial as well as the nonfinancial performance, of the investment object before making an investment decision, it seems obvious to include CSP as an additional performance measure during individual legitimacy judgments. Our results support this line of reasoning by showing that the values-driven attribution process affects investors' evaluation of the CSP, which in turn influences their investment intention. To the best of our knowledge, our model is the first to consider the relationship between investors' motive attributions, perceptions of the CSR disclosures' credibility, the firm's perceived CSP, and investors' behavioral intentions and decisions. Investigating them in a single study helps us to better understand investors' processes in judging legitimacy and the resulting outcomes from CSR disclosures. Moreover, we enrich the scarce empirical research in this area with one further experiment. On the other hand, our empirical data support the hypothesis that values-driven CSR engagement is recognized as an important determinant in the investment decisions of retail investors. We thus add to research on the relevance of CSR to investment decisions (e.g., Arnold et al., 2020; Cohen et al., 2017; Haji et al., 2021; Verbeeten et al., 2016). Second, we add to prior research on the outcomes of CSR-related motive attributions whose prior focus was mainly in the customer context (e.g., Ellen et al., 2006; Groza et al., 2011; Park & Kim, 2015; Tao & Ferguson, 2015) and revealed that motive attributions help explain attitudinal and behavioral outcomes resulting from a firm's CSR activity. In our setting of retail investors, the empirical results show that values-driven attributions positively affect the perceived CSP – that is, they drive investors' perceptions of a firm's nonfinancial performance regarding CSR. Also, our findings indicate that investors with values-driven motives are more likely to consider the firm's CSR activities as accurately disclosed. Thus, a values-driven attribution positively influences both the perceived credibility of CSR disclosures and the firm's CSP. These findings point to a focal position of the attribution processes within the web of relations between the constructs analyzed in our study. Third, this study contributes to the literature on how assurance of CSR disclosures affects investment decisions (e.g., Cheng et al., 2015; Rivière-Giordano et al., 2018; Shen et al., 2017). In detail, our empirical results provide a new perspective on Bachmann and Ingenhoff (2017) who revealed that corporate credibility regarding CSR disclosures could have an important impact on corporate legitimacy. While

they manipulated the independent variable 'CSR disclosures' by presenting five different categories of CSR activity to the participants, their stimuli did not distinguish between 'assurance' versus 'non-assurance'. In contrast, our study shows that in addition to the level of disclosed CSR activities, a third-party assurance of CSR disclosures also plays an important role when trying to understand the impact of CSR disclosures on legitimacy judgments and investors' decisions.

## 2 Theoretical framework and hypotheses

### 2.1 CSR information, individual legitimacy judgments, and investment decisions

Investors can receive CSR information from various sources (for an overview see e.g., Seele & Lock, 2015), of which we focus on two: CSR reputation and CSR disclosures (Cho et al., 2022).

According to Fombrun et al. (2000, p. 243), corporate reputation can be defined as "a collective assessment of a company's ability to provide valued outcomes to a representative group of stakeholders." Investors base their judgment of a firm's reputation on corporate actions from which they draw inferences about the firm's characteristics and abilities (Basdeo et al., 2006). This in turn affects investors' attitudes and behaviors towards that firm (e.g., Arikan et al., 2016; Helm, 2007). Accordingly, a firm's *CSR reputation* reflects the aggregated view of investors' assessment of the particular firm's CSR engagement over time (Kim & Woo, 2019; Lee, 2016). Therefore, a firm's CSR reputation appears to be a relevant determinant of how investors perceive corporate CSR efforts and also could have an impact on their subsequent investment decision. Important in this context is to answer the question of how investors determine reputation. Ratings are a widely used option, but they are not without criticism (e.g., Larcker et al., 2022; Sarstedt et al., 2013). Against this background, a better understanding of the impact of reputational indicators on investor behavior is important.

Besides building a positive CSR reputation, firms also respond to investors' increasing attention to environmental and social efforts in their investment decision-making processes through *CSR disclosures*<sup>1</sup> (Elliott et al., 2014; Nilsson et al., 2010). Prior archival studies reveal numerous benefits for firms disclosing CSR information, such as favorable stock market reactions (e.g., Griffin & Sun, 2013), higher profitability (e.g., Fischer & Sawczyn, 2013), and increased firm value (e.g., Barth et al., 2017). However, although investors are the main addressees of CSR disclosures, little academic research focuses on how investors process these disclosures if this information is assured and what mechanisms underlie the investors' subsequent decision-making (Gödker & Mertins, 2018; Reimsbach et al., 2018).

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<sup>1</sup> Prior research has used different terms for CSR disclosures interchangeably, for example, "environmental, social, and governance" (ESG) and "(corporate) sustainability" reporting (e.g., Gödker & Mertins, 2018; Ioannou & Serafeim, 2019).

Moreover, scholars discuss whether assurance does actually work as a credibility signal (Casey & Grenier, 2015), which also calls for a deeper analysis.

Investors can draw on a firm's CSR reputation and its possibly assured CSR disclosures when judging a firm's CSR efforts. We therefore propose that both CSR reputation as well as CSR disclosures form the starting point of investors' legitimacy judgments.

Motives attributed to a firm form an important part of the process of judging that firm's legitimacy. The literature distinguishes two primary types of CSR motive<sup>2</sup> that individuals develop when processing information about a firm's CSR activities: self-centered motives that involve potential benefits to the firm or other-centered motives, which refer to potential benefits to society (e.g., Becker-Olsen et al., 2006; Ellen et al., 2006; Forehand & Grier, 2003). We can assume that individuals are aware that firms, as profit-making entities, have basic needs that CSR activities can help fulfill and are thus to a certain extent tolerant of the image-building and profit-making motives that underlie firms' commitment to CSR.

Empirical research using investors' attributions to explain their CSR-related behaviors is scarce. Sen et al. (2006) and Kim and Ramos (2018) show that investors who attribute other-centered motives rather than self-centered motives to a firm are more likely to invest in that firm. In contrast, Kim and Choi (2012) find no significant relationship between a firm's CSR motives, as perceived by investors, and their investment intentions. We follow this research stream with a focus on values-driven motives to further clarify its particular relation with other building blocks of investors' information processing. As the recent changes in CSR regulation aim to ensure that firms act in the interests of society as a whole, a deeper understanding of values-driven motives and their relevance for investors' legitimacy judgements is warranted.

Since CSR disclosures have so far been less regulated than financial disclosures and since the regulation of nonfinancial disclosures still has some way to go, investors might doubt the credibility of CSR information (e.g., Misani, 2017; Muslu et al., 2019). Assurance statements prepared by an independent assurance provider are considered a suitable means of improving the credibility of CSR disclosures (e.g., Clarkson et al., 2020; Pflugrath et al., 2011). However, while Cheng et al. (2015) and Shen et al. (2017) report that CSR assurance increases investment intentions, Rivière-Giordano et al. (2018) find no significant effect. As credibility plays an important role in legitimacy judgments (e.g., Jahn et al., 2020), we propose that it is equally relevant in our judgment situation regarding CSR disclosures and therefore incorporate it as one building block in investors' judgment processes.

While motive attributions and credibility have already been discussed in the literature as part of individual legitimacy judgments (Jahn et al., 2020), investors' perception of a firm's CSP forms a new building block in their judgment processes. CSP is defined as "a business organization's configuration of principles of social

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<sup>2</sup> Prior research has used synonymous terms for these two motives, including society-serving versus firm-serving, sincere versus insincere, extrinsic versus intrinsic, benevolent versus profit-driven, and selfless versus self-interested.

responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships" (Wood, 1991, p. 693). Literature provides evidence that investors frequently consider the firm's CSP (that is, a firm's performance regarding CSR) *in addition to* its CFP (that is, a firm's economic success) when making investment decisions (Barnett, 2007; Elliott et al., 2014). Thus, perceived CSP as a mediating variable becomes a highly relevant factor for understanding the mechanisms underlying the relationship between information on a firm's CSR activities and investors' final decisions to invest in that firm. Pursuing this line, we expand the study by Jahn et al. (2020) on attributed motives and credibility by adding a firm's perceived CSP as an additional building block to provide deeper insights into individual legitimacy judgments.

### 2.2 Overall research model

To better understand the effects of a firm's CSR reputation and CSR disclosures on investors' decision-making, we develop and test the model depicted in Fig. 1 in two steps. First, we analyze the relationship between CSR reputation and assurance of the CSR disclosures on the one hand, and investors' investment intentions and investment decisions on the other. Second, we enter deeper into this relationship and clarify the mediating roles of attributing a values-driven CSR motive, the perceived credibility of CSR disclosures, and perceived CSP.

### 2.3 CSR reputation, assurance, and investors' decisions

Findings in the literature are inconsistent regarding the relationship between CSR and CFP (e.g., Aguinis & Glavas, 2012; Margolis & Walsh, 2003; Orlitzky et al., 2003; Peloza, 2009). Although most of the 128 studies reviewed by Peloza (2009) report a positive association, recent research has not unanimously agreed on CSR's

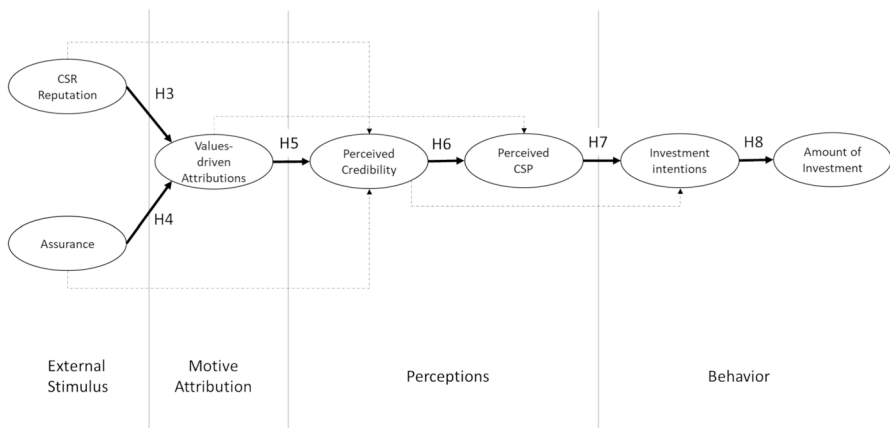


Fig. 1 Research model and hypotheses 3 to 8

favorable effects on CFP (Velte, 2022). We cannot therefore just assume that investors automatically prefer firms with strong CSR claims or performance. Thus far, several authors have tried to shed more light on these inconclusive findings by arguing that (credible) CSR activities have a positive effect on stakeholder relationships, which in turn positively affects CFP (Barnett, 2007; Gardberg & Fombrun, 2006; Godfrey, 2005), thus making such firms more attractive to investors. Godfrey (2005), for instance, discusses the insurance-like protection that CSR activities could provide to firms, leading to enhanced CFP. Along these lines, we propose that current changes in sustainability reporting standards like those initiated by the EU and the ISSB, will increase the importance of CSR activities for investor decisions. A good CSR reputation could thus become a positive signal for investors in terms of favorable CSR activities.

Against this background, we theorize that investors are more likely to invest in firms with a good CSR reputation, leading to the following hypotheses:

**Hypothesis 1a** A firm's favorable CSR reputation positively affects investors' investment intentions.

**Hypothesis 1b** A firm's favorable CSR reputation positively affects investors' investment decisions.

In addition to actually implementing CSR initiatives to meet stakeholders' expectations (Ioannou & Serafeim, 2015; Matten & Moon, 2008), firms also have to communicate their CSR efforts adequately to various interested stakeholder groups that expect to be informed (Hahn & Lülfs, 2014; Kim, 2014; Pérez & del Bosque, 2015). Apart from this general pressure from stakeholders, increasing regulation leads firms to integrate CSR information into corporate disclosures or publish separate CSR reports (e.g., Elliott et al., 2014; Gong et al., 2018; Huang & Watson, 2015). Because financial market participants frequently respond favorably to positive CSR disclosures (e.g., Arnold et al., 2018; Gödker & Mertins, 2018), firms may engage in CSR 'greenwashing', that is, "communications that mislead people into adopting overly positive beliefs about an organization's environmental performance, practices, or products" (Lyon & Montgomery, 2015, p. 225). So far, assurance of CSR reports is not mandatory in most countries (Huang & Watson, 2015; Rivière-Giordano et al., 2018). To prevent investors from questioning the completeness, reliability, or credibility of their CSR disclosures, firms could voluntarily acquire assurance from an independent provider (e.g., Reimsbach et al., 2018; Stuart et al., 2021), which should positively affect both investors' investment intentions and final decisions. This leads to Hypotheses 2a and 2b:

**Hypothesis 2a** An assurance of the CSR disclosures positively affects investors' investment intentions.

**Hypothesis 2b** An assurance of the CSR disclosures positively affects investors' investment decisions.

## 2.4 Values-driven CSR motives, perceived credibility of CSR disclosures, and perceived CSP

This section describes a model intended to provide more detailed insights into investors' reasoning when considering both a firm's CSR reputation and its disclosures. As indicated in Fig. 1, the hypotheses focus on the main paths relating CSR reputation and assurance of CSR on the one hand and investment decisions on the other, covering the way from stimuli, over motive attributions and perceptions to behavior.

Prior studies find that a favorable firm reputation motivates stakeholders to perceive the firm's CSR activities as more society-serving (e.g., Bae & Cameron, 2006; Tao & Ferguson, 2015) and, thus, values-driven. In other words, the information about a positive CSR reputation is cognitively translated into an attribution of values-driven CSR motives to such firms. Moreover, assurance from an independent third party regarding CSR information additionally signals a high level of interest on the part of that firm to seriously pursue the CSR activities presented in these reports (Stuart et al., 2021). We therefore hypothesize the following relationships:

**Hypothesis 3** A firm's favorable CSR reputation fosters investors' attribution of a values-driven CSR motive.

**Hypothesis 4** An assurance of the CSR disclosures fosters investors' attribution of a values-driven CSR motive.

According to the attribution theory, individuals' attributions determine their subsequent thinking, attitudes, and expectations, and influence their affective reactions to the observed behavior (Kelley & Michela, 1980; Weiner et al., 1988). Regarding the attributed CSR motives, prior research has shown that stakeholders are likely to respond more positively if they believe a firm's CSR activity serves the interests of society and they tend to react more negatively if they believe it serves the firm (e.g., Bae & Cameron, 2006; Kim & Choi, 2012). We propose that the cognitive translation of CSR motive attribution into the perceived credibility of CSR disclosures could trigger different reactions.

This proposition is supported by prior research showing a significant effect of attributed motives on a firm's perceived credibility (e.g., Jahn et al., 2020; Pérez & del Bosque, 2013, 2015; Wang & Lee, 2018). Investors attributing a firm's CSR efforts to values-driven motives view this firm as genuine and altruistic (Ellen et al., 2006). As a result, investors perceive the firm's CSR engagement as real and related disclosures as credible (Misani, 2017). This leads to the following hypothesis:

**Hypothesis 5** Investors attributing values-driven CSR motives to a firm fosters their perception that its CSR disclosures are credible.

In turn, Jahn and Brühl (2019) find that the credibility of disclosed CSR information influences stakeholders' judgments regarding whether the firm fulfills its social and environmental responsibility. Drawing on this, we propose that a perceived

credibility of the CSR disclosures has a positive effect on the perceived CSP. Credibility assessments are based on two aspects: perceived trustworthiness and expertise of the firm (Lafferty et al., 2002; Newell & Goldsmith, 2001). If investors perceive a firm's CSR information to be credible, they believe it is trustworthy, that it has a good knowledge of CSR, and implements its CSR activities as described in the CSR disclosures. Therefore, we assume that investors evaluate this firm's CSP favorably and posit the following hypothesis:

**Hypothesis 6** The perceived credibility of the CSR disclosures positively affects investors' perceptions of a firm's CSP.

Prior studies find that firms benefit from superior CSP in multiple ways; for example, by being perceived as a more attractive employer (e.g., Jones et al., 2014) and showing improved innovation performance (e.g., Fischer & Sawczyn, 2013) or by having lower costs of equity (e.g., Dhaliwal et al., 2011). These aspects, in turn, positively affect a firm's financial success. Thus, given that a firm's business success determines the financial return for investors, their evaluation of the firm's CSP should also affect their investment decisions (Elliott et al., 2014; Gardberg et al., 2019; Ioannou & Serafeim, 2012), leading to the following hypothesis:

**Hypothesis 7** Investors' perceptions of a firm's CSP positively affect their investment intentions.

To close this line of reasoning in our model from the external stimuli of CSR reputation and assurance up to the final investment decision, we hypothesize a positive relationship between investors' intentions to invest and their final investment decisions. Our reasoning is grounded in the established Theory of Planned Behavior (Ajzen, 1985), which – albeit not perfect – defines a link between decision makers' intentions and behavior. From this, we state the final hypothesis:

**Hypothesis 8** Investors' investment intentions positively affect their investment decisions.

As cognitive processes are highly intertwined, further relations between the different elements might exist – in addition to our above-described main focus of interest. Particularly, a positive CSR reputation might directly affect perceived credibility, as a positive reputation indicates trustworthiness. Assurance can also be expected to positively affect credibility, as the assuring party has a reputational interest of its own in assuring only true information. Additionally, perceived credibility can positively affect investors' investment intentions indicated by prior research (e.g., Haji et al., 2021; Lee et al., 2019; Shen et al., 2017; Wang & Lee, 2018). And finally, investors attributing values-driven motives to a firm might directly influence its perceived CSP, as investors are more likely to believe that the firm genuinely contributes to society and thus exhibits the good CSR behavior intended by regulation. We

therefore include these lines of inquiry in our final model for a more comprehensive picture.

### 3 Methodology

#### 3.1 Research design

To test our hypotheses, we conducted an experimental vignette study (see Appendix 1 for an overview). We applied a 2×2 between-subjects design by manipulating a firm's CSR reputation (as favorable or unfavorable) and assurance of its CSR report (present or absent). Participants were randomly assigned to one of the four experimental conditions.

Like in previous studies (e.g., Brown-Liburd et al., 2018; Elliott et al., 2014; Reimsbach et al., 2018), we use a fictitious firm to minimize any confounds due to preexisting perceptions of and attitudes toward any existing firms. However, following Aguinis and Bradley (2014), we aimed to achieve a high level of external validity by designing a decision situation that would be as realistic as possible, as described in the following sections.

As explained above, our respondents acted as retail investors. At the beginning of the vignette, the participants were instructed to: “*Imagine that you already own a diversified portfolio with shares in firms from various industries. Recently, you have inherited 50,000 euros and would like to invest this amount in shares of a firm from the laser technology sector. During your research on potential investment objects, you come across Meier Tech AG.*” Following these instructions, participants received information about the firm's economic situation based on publicly available information from real-life firms (see Appendix 2). This information was the same for all participants. To test the effect of information concerning a firm's CSR activities separately from the effect of information on its economic performance, we then collected data on participants' investment intentions and the amount of their potential investment right after they received this economic information and then once again after they had also received the information on CSR reputation and the (presence or lack of) assurance. The items are listed in Appendix 5 and Chapter 3.4.1 “Dependent Variables.”

After the first collection of information regarding their investment intentions and the amount of investment, the test subjects received information about the firm's position in the Reputation Institute's CSR reputation ranking, indicating either a favorable (high ranking position, excellent standards) or an unfavorable (low ranking position, rumors about unsocial and illegal activities) CSR reputation (see Appendix 3).

The respondents were all then provided with the same excerpt from the firm's CSR report, structured according to Global Reporting Initiative (GRI) standards, the most popular framework for CSR reporting (e.g., Huang & Watson, 2015; KPMG, 2017). To ensure that the design of the CSR report vignette is as realistic as possible, the wording is based on publicly available CSR disclosures of actual listed firms. As CSR reports are predominantly positive in tone (Brown-Liburd et al.,

2018; Holder-Webb et al., 2009), the CSR information we provided conveyed an overall positive impression of the firm's CSR engagement (see Appendix 4).

The second manipulation was achieved through the presence or absence of an abbreviated version of a commonly used, limited assurance report by an independent auditor for CSR disclosures from real listed firms (see end of Appendix 4). Like in previous studies (e.g., Pflugrath et al., 2011; Stuart et al., 2021), the instruction preceding the CSR report vignette (for those participants receiving an assurance report) contained the comment, "Please now read the *excerpt* from the CSR report on Meier Tech AG *carefully*. Since Meier Tech AG *has commissioned* an audit of the report's contents, its CSR report is also accompanied by a report from the *independent auditor* (including the audit opinion). Please read this *carefully* as well." Respondents not receiving an assurance report were instructed as follows, "Please read the *excerpt* from the CSR report of Meier Tech AG *carefully*. As Meier Tech AG *has not commissioned an audit* of the report contents, no independent auditor's report is available for its CSR report."

The administration of this information was independent of the provision of the information on CSR reputation, resulting in four different treatments, whereby each participant only received one treatment.

### 3.2 Pre-testing

We pretested the entire material to assess its comprehensibility, internal consistency, and plausibility (Wason et al., 2002). The first pretest involved a group of 18 experienced researchers. They suggested minor changes to the vignettes and the questionnaire to ensure that they were realistic and understandable. We conducted a second pretest to check the manipulations, and any confounding effects due to the choice of industry. Eighty respondents were recruited via Prolific Academic, a United Kingdom-based service for online surveys and experiments, in exchange for payment. The results revealed that the participants correctly judged whether the firm had a favorable or an unfavorable CSR reputation (favorable:  $N=39$ ,  $mean=5.72$ ,  $SD=0.65$ ; unfavorable:  $N=41$ ,  $mean=1.49$ ,  $SD=1.03$ ;  $t(78)=21.91$ ,  $p<0.001$ ). Most respondents also responded correctly regarding whether they received an assurance report (present:  $N=39$ ,  $mean=5.26$ ,  $SD=1.12$ ; absent:  $N=41$ ,  $mean=2.00$ ,  $SD=1.57$ ;  $t(72.45)=10.75$ ,  $p<0.001$ ). Moreover, this pretest showed that the participants had a fairly neutral attitude towards the laser technology industry ( $mean=4.81$ ,  $SD=1.02$ ). However, the respondents' feedback indicated little prior knowledge of CSR reports. We therefore added short explanations of the terms "CSR report" and "assurance" to the instructions. In addition, we slightly modified the wording of the items measuring the motive attributions (see Appendix 5) since some participants had difficulties answering them. We conducted a third pretest to determine whether the modifications led to improvements. Again, 80 respondents were recruited via Prolific Academic in exchange for payment. Their feedback indicated no need for further change to our material.

Finally, to further test the applicability of our measures and the vignettes, we conducted a preliminary study with 300 respondents with the revised material from the

pretests (but without the repeated measurement of investment intentions and investment sum) via Prolific Academic in 2018. In this pre-test, the constructs worked well in terms of reliability and validity according to the criteria suggested by Hair et al., (2017 & 2020). The responses to the manipulation checks did not indicate any misunderstandings. However, we slightly changed the material for the last experiment by introducing the items related to investment intentions and the amount of investment between the presentation of the economic performance and that of the CSR reputation. Moreover, the item related to the amount of investment was also added to the material for the study presented here. The questionnaire can be found in the Online Resource (supplementary material No. 1).

### 3.3 Data collection

The study was conducted via Prolific Academic in December 2021. Prolific Academic is frequently used by academic researchers worldwide as its data quality is considered better than alternative online platforms (Palan & Schitter, 2018; Peer et al., 2017). The only prerequisites for individuals to participate were German as the first language and not being professionally involved with stocks, whereas a positive attitude towards CSR was not required. Three hundred respondents who passed attention checks<sup>3</sup> completed this study in exchange for monetary compensation (£ 2.50 for the whole questionnaire). Table 1 presents the demographic information. As Prolific recruits test subjects anonymously, we cannot completely rule out that some of the subjects were the same as in the pre-test three years before. However, due to the long time period between both studies, we do not expect this to be the case.

### 3.4 Measures

#### 3.4.1 Dependent variables

Operationalizations of the construct were based on multi-item scales established in the existing literature and measured on 7-point Likert scales (1 = strongly disagree, 7 = strongly agree). The scales were slightly adapted by using the firm's name (Meier Tech AG) rather than "the firm". The items are listed in Appendix 5. We measured participants' values-driven motive attributions using a slightly adapted scale from Ellen et al. (2006). The perceived credibility of the CSR disclosures was measured using the scale developed by Lock and Seele (2017). To assess a firm's CSP as perceived by investors, we drew on the four-item scale of Panagopoulos et al. (2016). Investment intentions were measured with four questionnaire items

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<sup>3</sup> During this selection procedure, the experimenter had to determine whether the participants understood or properly read the vignette or the question or whether they made an unintended mistake when filling out the items (Kunz, 2015). Following Kunz (2015), respondents were excluded if they had answered fewer than half of the attention checks (e.g., "The CSR report conveys a positive picture of the firm's CSR activities") correctly. Responses of two participants were rejected and replaced by Prolific Academic.

**Table 1** Demographic information

	Levels	N	Mean	SD	Min	Max
Age		300	30.71	11.49	18	71
Gender	Male	151				
	Female	144				
	Divers	5				
Highest educational level	Still in school	2				
	Secondary school leaving certificate	8				
	Intermediate school leaving certificate	23				
	A levels	122				
	University degree	86				
	Academic title	58				
	No level	1				
Current profession	Pupil	10				
	In training	5				
	Student	113				
	Employee	107				
	Self-employed	31				
	Official	12				
	Unemployed	8				
	Pensioner	8				
	Other	6				

adapted from Grohmann and Bodur (2015) and Trang and Tho (2017). The investment amount was assessed by asking the participants “As described above, you have a sum of 50,000 euros at your disposal. You can invest this money in a call money account with an interest rate of 0% or invest all or part of it in Meier Tech AG today. How much are you willing to invest?”.

As indicated by Asay et al. (2022), unobtrusively measured factors, particularly the observation of behavior, are the gold standard in accounting research when investigating mediating processes. This approach to measuring is seen as being objective and thus does not suffer from any validity threats. However, the focus of our study lies in the investigation of cognitive and perceptual processes, i.e. those processes between a stimulus and the observable behavior. There are thus no objectively observable entities, so we had to apply the measurement processes used in psychological research, i.e. self-reporting scales, with the understanding that they are prone to a subjectivity bias of the test respondents. However, to minimize doubts as to the validity of our constructs as discussed by Asay et al. (2022) we applied validated scales. Moreover, we carefully thought about the timing of the measurement as suggested by Asay et al. (2022), i.e. which scale should be applied when. As our main interest is the cognitive and perceptual processes that take place before the investors’ decisions, we deliberately placed the measurement scales before this decision. To allow for some distraction and to test the attention of the subjects we additionally introduced items like “Please click fully agree”.

### 3.4.2 Control variables and manipulation checks

We controlled for several variables that could have confounded our analyses based on previous research. As more in-depth knowledge and/or interest might influence participants' evaluation of the vignette information (Bearden et al., 2011), we asked about their experience with investing in shares, intention to buy shares in the future, and risk attitude towards financial investments before they read the initial instructions. Since the laser technology industry was the primary focus of this study, we added two items capturing respondents' attitudes towards this industry and the perceived attractiveness of buying shares in laser technology firms (Cianci & Kaplan, 2010; Reimsbach et al., 2018). Following Hodge et al. (2009), another item was included in the questionnaire to control for the potential influence of respondents' familiarity with CSR reports. While no participant was professionally involved in investing in shares, approximately 43.7% of participants had already done so privately, and 71.7% planned to do so in the future. The respondents had a moderate risk attitude (mean = 3.40, SD = 1.63), a fairly neutral attitude towards the laser technology industry (mean = 4.68, SD = 1.07), and rated buying shares in laser technology firms as moderately attractive (mean = 4.17, SD = 1.02). The respondents were not very familiar with CSR reports (mean = 2.21, SD = 1.46), and 86.0% had never read such a report before.

In addition, three control variables assessing the scenario's realism (Dabholkar, 1994) and the ecological validity of the vignettes (Kunz, 2015 & 2020) were added to the questionnaire. The results illustrated that participants rated the scenario as realistic (mean = 4.93, SD = 1.42), understood the presented investment situation very well (mean = 6.15, SD = 1.05), and could easily put themselves in the role of a retail investor (mean = 5.74, SD = 1.28). Following Reimsbach et al. (2018), respondents were asked how relevant the CSR report was for their investment decision. The results indicate that it affected their decision-making considerably (mean = 4.98, SD = 1.67). Finally, the participants answered demographic questions (see Table 1 for results). Tables 2 and 3 provide the correlations between the independent, dependent, and major control variables and the descriptive statistics, respectively. Among other information, the results in Table 2 indicate significant correlations between the variables along the main path of our path model. Moreover, the control variables correlate with several variables in the focus of the present study, for example, attitudes towards the laser technology industry; an interesting path for future research would be investigating further effects in other industries. Table 3 indicates that the average values of values-driven attribution, perceived credibility, perceived CSP and investment intention after the provision of CSR information are above the average, which is 3.5, meaning that the participants tended to judge the investigated variables favorably.

The questionnaire further contained items that either served as distractors and attention tests or were not relevant to the present study but could be seen as a starting point for further studies.

Manipulation checks were included somewhere within a set of questionnaire items presented after each vignette (see Appendix 1), so that the test subjects did not encounter the two manipulation checks *directly* after each vignette. In line with

**Table 2** Correlation matrix (including selected controls)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1 CSR reputation	1																		
2 Assurance	0.007	1																	
3 Values-driven attributions	0.467**	0.167**	1																
4 Perceived credibility	0.466**	0.270**	0.763**	1															
5 Perceived CSP	0.581**	0.143*	0.811**	0.801**	1														
6 Investment intentions 1	0.057	0.029	0.240**	0.295**	0.299**	1													
7 Investment intentions 2	0.431**	0.107	0.587**	0.670**	0.700**	0.654**	1												
8 Amount of investment 1	-0.038	0.011	-0.013	0.126*	0.053	0.444**	0.258**	1											
9 Amount of investment 2	0.312**	0.049	0.356**	0.506**	0.491**	0.396**	0.624**	0.720**	1										
10 Experience investing	-0.034	0.082	0.028	-0.004	0.032	-0.135*	-0.064	0.159**	0.140*	1									
11 Future intentions to buy shares	-0.111	0.026	0.053	-0.012	0.042	0.067	0.050	0.140*	0.086	0.419**	1								
12 Risk attitude	0.043	0.029	0.106	0.028	0.066	0.049	0.050	0.198**	0.124*	0.464**	0.486**	1							
13 Attitude industry	0.090	-0.082	0.181**	0.189**	0.172**	0.205**	0.205**	0.250**	0.233**	0.071	0.100	0.180**	1						
14 Attractiveness of shares	0.104	0.018	0.203**	0.165**	0.188**	0.242**	0.224**	0.135*	0.140*	0.133*	0.254**	0.218**	0.521**	1					
15 Familiarity CSR reports	0.023	0.040	0.161**	0.131*	0.143*	-0.021	0.040	0.024	0.090	0.282**	0.184**	0.170**	0.128*	0.146*	1				
16 Experience CSR reports	-0.038	0.074	-0.003	0.025	-0.007	-0.116*	-0.111	-0.014	-0.010	0.206**	0.104	0.099	0.023	0.103	0.621**	1			
17 Gender	0.035	0.027	0.048	0.075	0.093	0.129	0.043	0.204**	0.142*	0.397**	0.234**	0.379**	0.173*	0.183**	0.095	0.086	1		

**Table 2** (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
18 Age	-0.023	-0.011	0.017	0.040	0.011	-0.056	-0.031	0.099	0.042	0.290**	-0.070	-0.006	0.048	0.000	0.147*	0.066	0.148*	1

\*\*  $p < 0.01$ , \* $p < 0.05$  (two tailed test)

Correlations are calculated depending on their scale level applying Pearson correlation coefficient, point biserial correlation coefficient, eta, phi, or Cramer's V

Investment intentions 1: Measurement of investment intention before the provision of CSR information

Investment intentions 2: Measurement of investment intention after the provision of CSR information

Amount of investment 1: Measurement of investment amount before the provision of CSR information

Amount of investment 2: Measurement of investment amount after the provision of CSR information

prior research (e.g., Jones et al., 2014; Kunz, 2020), respondents were given two statements and asked to indicate their agreement on a scale of 1 (strongly disagree) to 6 (strongly agree): for example, “Meier Tech AG has a good CSR reputation” and “The presented CSR report of Meier Tech AG has been audited by an independent auditor.”

### 3.5 Data analysis technique

We used a mixed ANOVA to test Hypotheses 1a, 1b, 2a, and 2b and structural equation modeling (SEM) to test the remaining hypotheses. In contrast to traditional regression, which requires separate equations to analyze each hypothesized relationship, SEM enables researchers to test relationships between multiple constructs simultaneously (Chin & Newsted, 1999; Nitzl & Chin, 2017). Compared with covariance-based SEM, the variance-based partial least squares (PLS) approach was more suitable for our study, because our research model is rather complex, includes multiple constructs, indicators, and paths, most of the hypothesized relationships have been under-investigated in the prior literature, and assumptions of normal distribution of variables are violated in our data (Hair et al., 2017, 2019; Henseler et al., 2009). We used the SmartPLS 3 software program (Ringle et al., 2015) for the SME model and SPSS 28 for the remaining calculations.

## 4 Results

### 4.1 Manipulation checks

Responses to the manipulation check about the CSR reputation were significantly higher in the condition where the firm had achieved a leading position in the CSR ranking ( $N=150$ , mean = 5.67,  $SD=0.72$ ) than in the opposite condition ( $N=150$ , mean = 1.50,  $SD=1.11$ ;  $t(255.65)=-38.57$ ,  $p<0.001$ ). Similarly, the manipulation check involving the assurance of the CSR report was rated significantly higher by participants receiving an assurance report ( $N=151$ , mean = 5.48,  $SD=0.87$ ) compared to those not receiving this report ( $N=149$ , mean = 1.62,  $SD=1.29$ ;  $t(258.97)=-30.30$ ,  $p<0.001$ ). The manipulation checks thus confirmed that the respondents interpreted the manipulations correctly.

### 4.2 Test of hypotheses 1 and 2

To test Hypotheses 1a and 1b, we conducted a mixed ANOVA containing the repeated measurement of the subjects' investment intentions before and after presentation of the experimental variables (CSR reputation and assurance). The results are indicated in Tables 4 and 5. It indicated significant interactions between the repeated querying of the investment intentions and the information about CSR reputation ( $F(1, 296)=104.70$ ,  $p<0.001$ , partial  $\eta^2=0.261$ ) and assurance ( $F(1, 296)=4.75$ ,  $p<0.05$ , partial  $\eta^2=0.016$ ). Additionally, we performed a mixed

**Table 3** Descriptive statistics (including selected controls)

	Mean	Standard deviation	Min	Max
CSR reputation	0.50	0.50	0	1
Assurance	0.50	0.50	0	1
Values-driven attributions	4.78	1.25	1	7
Perceived credibility	4.57	1.21	1	7
Perceived CSP	4.91	1.40	1	7
Investment intentions 1	4.21	1.26	1	7
Investment intentions 2	4.04	1.67	1	7
Amount of investment 1	17,883.43	12,725.51	0	50,000
Amount of investment 2	16,495.60	13,852.49	0	50,000
Experience investing	1.44	0.50	1	2
Future intentions to buy shares	1.72	0.45	1	2
Risk attitude	3.41	1.63	1	7
Attitude industry	4.68	1.07	1	7
Attractiveness of shares	4.17	1.02	1	7
Experience CSR reports	1.14	0.35	1	2
Familiarity CSR reports	2.21	1.46	1	7
Gender	n.a	n.a	1	3
Age	30.71	11.49	18	71

*n.a.* not applicable

Investment intentions 1: Measurement of investment intention before the provision of CSR information

Investment intentions 2: Measurement of investment intention after the provision of CSR information

Amount of investment 1: Measurement of investment amount before the provision of CSR information

Amount of investment 2: Measurement of investment amount after the provision of CSR information

ANOVA with a repeated measurement of the investment amount to test Hypotheses 2a and 2b. The results showed a significant interaction between the repeated querying of the amount of investment and the information provided regarding CSR reputation ( $F(1, 296) = 89.21$ ,  $p < 0.001$ , partial  $\eta^2 = 0.232$ ), but no significant interaction between the repeated query of the amount of investment and assurance ( $F(1, 296) = 0.99$ ,  $p = 0.321$ , partial  $\eta^2 = 0.00$ ). These results support Hypotheses 1a, 1b, and 2a, but not Hypothesis 2b. Thus, CSR reputation influences both the initial intention to invest in the company and the investor's following decision regarding the level of investment. The assurance of CSR disclosures, on the other hand, only affects an investor's intention, but does not have an impact on the amount of investment spent. While ex post explanations of insignificant results always remain speculative, we would nevertheless like to offer a possible explanation for this observation that could be pursued in future research: Our empirical results indicate that CSR reputation and assurance of CSR disclosures have slightly different effects on investors' cognitive processes. CSR reputation seems to be linked to the whole decision process of an investor, i.e., from the initial willingness to invest up to the determination of the investment amount. In contrast, the assurance is more of a "gatekeeper",

that decides the general willingness to invest but has no impact on the further cognitive processes that determine the exact investment amount. However, overall, the findings indicate that information about the CSR reputation and the assurance of disclosed CSR information does induce changes in investors' decision processes, which warrants a more detailed analysis of the cognitive process that leads to these changes. For robustness tests, we repeated these analyses also with age and gender as covariates, but the results did not change qualitatively and only to a very minor extent quantitatively.

### 4.3 Validity of the measurement model

As suggested by Hulland (1999), we examined the reliability and validity of the measurement model before we assessed the structural model for the tests of the hypothesized relationships.

To verify the adequacy of our reflective measures, we confirmed the measurement quality and tested the reliability and validity following the criteria suggested by Hair et al., (2017 & 2020). First, we examined the outer loadings for each construct (Appendix 5). Indicator reliability is adequate when items show factor loadings above 0.7. Items with loadings between 0.4 and 0.7 should be considered for removal if deleting these items increases composite reliability and average variance extracted (AVE) above the threshold values of 0.7 and 0.5, respectively. We inspected items that did not fit these criteria and realized that their content did not fit well with the other items on their respective scales (VDA\_4, PC\_12 to PC\_16), or they contained more than one statement which could have misled the subjects (PC\_9). Therefore, seven items were deleted one-by-one, and the model was re-estimated. Second, to assess the reliability of each construct, we used Cronbach's alpha and composite reliability. Both show satisfactory reliability, as their values were above 0.7 (Appendix 5) (Henseler et al., 2009; Nunnally & Bernstein, 1994). Third, the AVEs demonstrate adequate convergent validity, ranging from 0.682 to 0.888 (Appendix 5) (Fornell & Larcker, 1981). Fourth, we conducted three tests to assess discriminant validity. The square roots of the constructs' AVEs exceed the diagonal inter-construct correlations (Fornell & Larcker, 1981), as shown in Table 6. The heterotrait-monotrait ratios of correlations (HTMT) are below 0.9 (Table 6) (Henseler et al., 2015). Nevertheless, it should be mentioned that the HTMT of values-driven attributions and perceived CSP is 0.897, and thus close to 0.9. The item cross-loadings show that each item loaded higher on its own construct than on any other construct (Appendix 6) (Chin, 1998). These results support discriminant validity. Overall, the measurement model indicates that the constructs have satisfactory reliability and validity after certain items have been removed.

To examine the structural model, we used bootstrapping with 5000-resampling (Hair et al., 2017). We also assessed the overall model fit. SRMR is 0.056 and thus according to Henseler (2017) in an acceptable range for such models. Moreover, the NFI is 0.868, which is lower than the cut-off point of 0.90. However, as this cut-off point is still debated, particularly with reference to PLS models (Henseler (2017),

**Table 4** Tests of Within-Subjects Effects for the Repeated Measurement of Investment Intention

	Type III Sum of Squares	df	Mean Squares	F	p	Partial Eta Square
Investment intention	4.68	1	4.68	7.81	0.006	0.026
Investment intention * CSR reputation	62.72	1	62.72	104.70	<0.001	0.261
Investment intention * Assurance	2.84	1	2.84	4.75	0.030	0.016
Investment intention * CSR reputation * Assurance	0.02	1	0.02	0.04	0.846	0.000
Error(Investment intention)	177.33	296	0.60			

**Table 5** Tests of Within-Subjects Effects for the Repeated Measurement of Amount of Investment

	Type III Sum of Squares	df	Mean Squares	F	p	Partial Eta Square
Amount of investment	290,228,057.66	1	290,228,057.66	7.51	0.006	0.025
Amount of investment * CSR reputation	3,446,015,902.07	1	3,446,015,902.07	89.21	<0.001	0.232
Amount of Investment * Assurance	38,121,469.73	1	38,121,469.73	0.99	0.321	0.003
Amount of investment * CSR reputation * Assurance	65,170.17	1	65,170.17	0.00	0.967	0.000
Error(Amount of investment)	11,434,392,972.72	296	38,629,705.99			

and as the differences between the cut-off and the value of our model is small, we still assume our model to be acceptable, with all due caution.

#### 4.4 Test of hypotheses 3 to 8

The results confirm each hypothesis, covering not only the main trajectory from stimuli to behavior (Fig. 2), but also the additionally proposed paths. In detail, we found for hypothesis 3 that CSR reputation was significantly positively associated with values-driven attributions ( $\beta=0.466$ ,  $p<0.001$ ,  $f^2=0.288$ ) and with perceived credibility ( $\beta=0.159$ ,  $p<0.001$ ,  $f^2=0.053$ ). Similarly for hypothesis 4, assurance was significantly related to both values-driven attributions ( $\beta=0.165$ ,  $p<0.001$ ,  $f^2=0.036$ ) and perceived credibility ( $\beta=0.152$ ,  $p<0.001$ ,  $f^2=0.060$ ). In turn, for hypothesis 5 values-driven attributions were significantly related to both perceived credibility ( $\beta=0.666$ ,  $p<0.001$ ,  $f^2=0.891$ ) and perceived CSP ( $\beta=0.474$ ,  $p<0.001$ ,  $f^2=0.359$ ). For hypothesis 6 perceived credibility was significantly associated with perceived CSP ( $\beta=0.443$ ,  $p<0.001$ ,  $f^2=0.314$ ) and investment intentions ( $\beta=0.311$ ,  $p<0.001$ ,  $f^2=0.072$ ). For hypothesis 7 perceived CSP was significantly related to the investment intentions ( $\beta=0.450$ ,  $p<0.001$ ,  $f^2=0.150$ ) and for hypothesis 8 investment intentions were significantly related to the amount of investment ( $\beta=0.625$ ,  $p<0.001$ ,  $f^2=0.641$ ). Table 7 shows that Stone-Geisser's  $Q^2$  values of all dependent variables are larger than zero, supporting the structural model's positive predictive relevance.

To further test the observed mediating effects involving values-driven attributions, perceived credibility, and perceived CSP, we ran a bootstrapping procedure of the specific indirect effects following Zhao et al. (2010). Our results (see Table 8) indicate that all mediating effects are significant and, as all direct and specific indirect effects point in the same direction, the mediation is complementary (Zhao et al., 2010).

Finally, we also calculated a model additionally containing paths from the experimental variables to the investment amount. However, these paths were both insignificant (path-coefficient from CSR reputation to investment amount: 0.052 (p-value=0.325), and path-coefficient from assurance to investment amount: -0.016 (p-value=0.715), indicating the robustness of our model.

## 5 Discussion and practical implications

Prior research has demonstrated the usefulness of disclosed CSR information in investors' decision-making (e.g., Arnold et al., 2020; Cohen et al., 2017). Drawing on this, we explore the mechanisms underlying individual legitimacy judgments by analyzing the associations between a firm's CSR disclosures and investors' intention and their final decision for an investment. In doing so, we provide a holistic view of how CSR disclosures affect investors' perceptions of the credibility of a firm's CSR information and its CSP, and how these perceptions affect investors' decisions. To define the different constructs for our vignette study, we compiled knowledge on

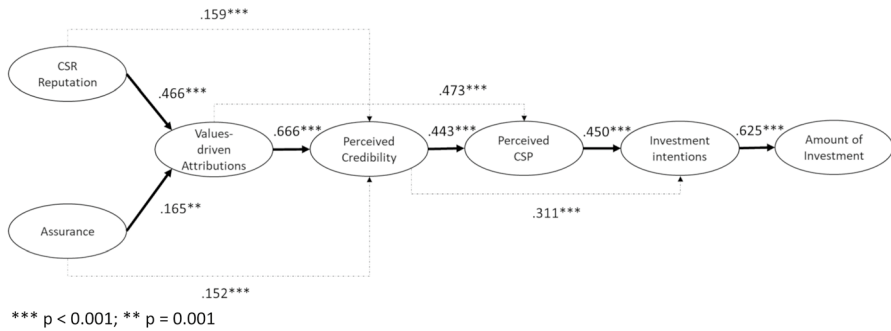
Table 6 Discriminant validity checks

	CSR reputation	Assurance	Values-driven attributions	Perceived credibility	Perceived CSP	Investment intentions	Amount of investment
<b>CSR reputation</b>	<b>1.000</b>	0.007	0.502	0.480	0.597	0.440	0.312
Assurance	0.007	<b>1.000</b>	0.179	0.276	0.146	0.109	0.049
<b>Values-driven attributions</b>	0.467	0.168	<b>0.847</b>	0.842	0.897	0.645	0.383
<b>Perceived credibility</b>	0.471	0.265	0.766	<b>0.826</b>	0.847	0.704	0.521
<b>Perceived CSP</b>	0.581	0.143	0.813	0.805	<b>0.923</b>	0.737	0.506
<b>Investment intention</b>	0.431	0.107	0.584	0.674	0.700	<b>0.942</b>	0.637
<b>Amount of investment</b>	0.312	0.049	0.354	0.508	0.491	0.625	<b>1.000</b>

Diagonal values in bold are the square roots of the AVEs

AVE is suitable to use only for multi-item constructs

Discriminant validity according to the Fornell and Larcker criterion below the diagonal, HTMT criterion above the diagonal (in italics)



**Fig. 2** Structural model

CSR reputation, motive attributions, and assurance from various fields (e.g., marketing, corporate communication, and accounting). We also respond to Moser and Martin's (2012) call to use experiments to investigate factors associated with CSR that are difficult to address in archival studies, such as motive attributions, perceived credibility, and retail investors' assessments of a firm's CSP.

We find that a favorable CSR reputation and assurance of CSR disclosures have a positive effect on values-driven CSR motives, which in turn positively affect the perceived credibility of CSR disclosures. Next, attributed values-driven CSR motives, as well as perceived credibility, positively influence perceived CSP – which positively drives the investor's investment intentions. Finally, these intentions positively affect how much investors' decide to spend for their investment (Fig. 2). Additionally, motives attributed to values-driven CSR positively affect the perceived credibility of CSR disclosures, which in turn directly affects investment intentions. Thus, our findings also indicate a complex mediating role for the attribution of values-driven CSR motives, perceived credibility, and perceived CSP between the provided CSR information and the final investment decision. For corporate practice, our findings have the following important implications:

First, this study enhances the understanding of investors' reactions to CSR disclosures, as they are the key recipients of CSR reports (Reimsbach et al., 2018). In particular, our results reveal that investors use information on a firm's CSR reputation as the basis to frame their perception of that firm's CSR engagement as delineated in its CSR disclosures. To generate supportive investor behavior in response to a firm's CSR efforts, managers should therefore ensure that their firm develops a positive CSR reputation and enlist an assurance service to validate the related CSR disclosures. In that regard, our paper contributes to the scarce literature on the consequences of providing – or not providing – a third-party assurance statement for CSR disclosures (e.g., Clarkson et al., 2020; Stuart et al., 2021). Different from the findings of Rivière-Giordano et al. (2018), our empirical results reveal that providing an assurance statement has a significant positive effect on investors' subsequent investment decisions. Hence, if the disclosed CSR-information is assured, this would also decrease the managers' risk of breaking up the relationships with firm's investors.

**Table 7** Results of the structural model

Hypotheses and structural paths	Coefficient	t statistic	Conclusion
<b>H3</b> CSR Reputation ==> Values-driven Attributions	0.466***	11.291	Supported
<b>H4</b> External Assurance ==> Values-driven Attributions	0.165**	3.445	Supported
<b>H5</b> Values-driven Attributions ==> Perceived Credibility	0.666***	19.381	Supported
<b>H6</b> Perceived Credibility ==> Perceived CSP	0.443***	8.808	Supported
<b>H7</b> Perceived CSP ==> Investment Intentions	0.450***	7.073	Supported
<b>H8</b> Investment Intentions ==> Amount of Investment	0.625***	16.421	Supported
Adjusted R <sup>2</sup> (Q <sup>2</sup> )			
Values-driven Attributions	0.240 (0.173)		
Perceived Credibility	0.621 (0.417)		
Perceived CSP	0.740 (0.625)		
Investment Intentions	0.521 (0.461)		
Amount of Investment	0.389 (0.386)		

\*\*\*  $p < 0.001$ ; \*\*  $p = 0.001$

Second, since favorable motive attributions result in positive attitudes and ultimately stronger supportive behavior from investors, our findings also emphasize the high relevance of CSR reputation for a firm's status as a going concern and future business success. In doing so, managers can positively affect values-driven attributions, perceived credibility, and favorable investment decisions by investors. This implies that firms can professionalize their CSR reporting just as they have done with financial disclosures for decades (Porter & Kramer, 2006).

Third, as a firm's CSR engagement can be considered an important strategic tool for ensuring supportive stakeholder behavior (Arikan et al., 2016), it is vital to convey such engagement adequately to various stakeholder groups. Unlike prior literature in the field, like Hodge et al. (2009) or Cheng et al. (2015), our sample comprises a large group of diversified individuals from the general public rather than a more homogeneous group of students with a background in finance.

Fourth, our case focuses on the high-technology industry, which has become important for macroeconomic development in various countries and regions (e.g., Balboni et al., 2019; Xu & Li, 2019). These empirical findings should thus encourage standard-setters and regulators to address current concerns about the credibility of CSR information (e.g., Chen et al., 2016; Clarkson et al., 2020; Lock & Seele, 2017) and to develop less diverging standards for CSR reporting by mandating third-party assurance.

To summarize, our findings are relevant for firms in different industries as well as for national and international standard-setting institutions, as they indicate that the attribution of values-driven motives, that is, the perception of a firm's true

**Table 8** Specific indirect effects

Specific indirect effects along the main paths	Coefficient	t statistic
CSR Reputation == > Values-driven Attributions == > Perceived Credibility	0.310***	9.207
External Assurance == > Values-driven Attributions == > Perceived Credibility	0.110**	3.384
Values-driven Attributions == > Perceived Credibility == > Perceived CSP	0.295***	8.242
Perceived Credibility == > Perceived CSP == > Investment Intentions	0.199***	5.137
Perceived CSP == > Investment Intentions == > Amount of Investment	0.281***	6.518
CSR Reputation == > Values-driven Attributions == > Perceived Credibility == > Investment Intentions == > Amount of Investment	0.039***	4.349
External Assurance == > Values-driven Attributions == > Perceived Credibility == > Investment Intentions == > Amount of Investment	0.014*	2.717

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.003$ ; \*  $p = 0.007$

willingness to make a valuable contribution in social and ecological terms, exerts an overall positive effect on investors' decisions.

## 6 Limitations and directions for future research

The results of this study offer promising avenues for future research but must be interpreted in light of the following limitations.

One major limitation is that experimental vignette studies may suffer from a lack of internal (Lonati et al., 2018) and ecological validity (Kunz, 2015, 2020), i.e. how well our research set-up reflects real-world settings. As the participants do not invest their own money, it remains unclear whether they would act the same way in real life as they did in the experiment. However, despite the favorable (theoretical) opportunity to invest in a firm with an excellent CSR reputation, participants only invested an average of 20,812 euros of the 50,000 euros "available" to them. As the participants invested approx. 40% of their total budget, we assume they made a real effort to enter into the situation and behave realistically rather than conform to any perceived expectations of the experimenter. In addition, to maximize internal validity, our study was based on a fictitious firm. The vignettes provided information in a straightforward and condensed form about this firm so that participants could complete the task in a reasonable amount of time. This might have limited the ecological validity, since information in the real world is more complex, coming typically comes from different and competing sources. Of course, in real life, investors encounter other investment alternatives when making investment choices (e.g., Elliott, 2006; Pizzetti et al., 2021). Further research could consider other investment options and explore investors' information-seeking behavior regarding CSR issues. Also, as indicated by Thayer (2011), order effects are possible, which could also be addressed in future research.

Because in real life reputation is built over time, the experimental manipulation of a fictitious firm's CSR reputation cannot adequately reproduce this effect (Kim & Woo, 2019). Our participants were not in an actual relationship with the firm. Hence, they might form different perceptions and behave differently in real life than what they report in the questionnaire (Pirson et al., 2017). To improve the generalizability of the results, future research could test our research model using actual firms and other empirical instruments (e.g., surveys, field studies).

To design a realistic CSR report vignette, we extracted most information from the websites of real listed firms and publicly available CSR reports. However, this process can suffer from a subjectivity bias. Another limitation that could merit attention in future studies is that the assurance statement was operationalized as binary. In reality, firms can select from a range of assurance options; the level of assurance

can range from limited to high, i.e. reasonable, and assurance statements can refer to specific parts of the disclosures (Stuart et al., 2021).

The focus on the values-driven attribution constitutes one further limitation of our research model. In the present study we were focusing on its role in the investigated processes. However, as indicated in Chapter 2.1, the literature also discusses other motives that can be considered by investors which are more firm-oriented than society-oriented. For manipulation checking reasons we additionally included items taken from Ellen et al. (2006) reflecting these other values (authors' note: these items are not reported in the paper). Preliminary analyses indicate that our treatments did not instill the perception of any of these motives in our participants. In this sense, we conclude that our experimental setting worked as intended. However, such further motives could also be related to some components of our model and therefore merit further investigation in the future.

While we tested for the effect of the presence or absence of assurance, we did not examine the effects of different levels of assurance. This would constitute one promising path for future research.

Like with any experiment in the laboratory, external validity of the observed effects remains an issue. Regarding this aspect, our results were limited by the nature of the sample, which contained mostly participants with a higher level of educational. Furthermore, only German-speaking respondents were asked to participate in the experiment. Self-selection could also have biased the results since respondents with a higher CSR awareness could have been more willing to participate (Feder & Weißenberger, 2019). Our results cannot therefore be extrapolated to the population as a whole, as perceptions about the importance and valuation of CSR activities may depend on individuals' education and cultural conditioning. For example, Germany is currently governed by a coalition with the participation of a Green Party, which assigns high importance to sustainability issues. However, it should be noted that future regulations regarding CSR reporting, e.g., by the SEC or in the EU, could narrow the diverse perspectives of investors located in different regions. These reservations aside, our results should be generalizable to (retail) investors in comparable cultural environments.

## Appendix 1

See Fig. 3.

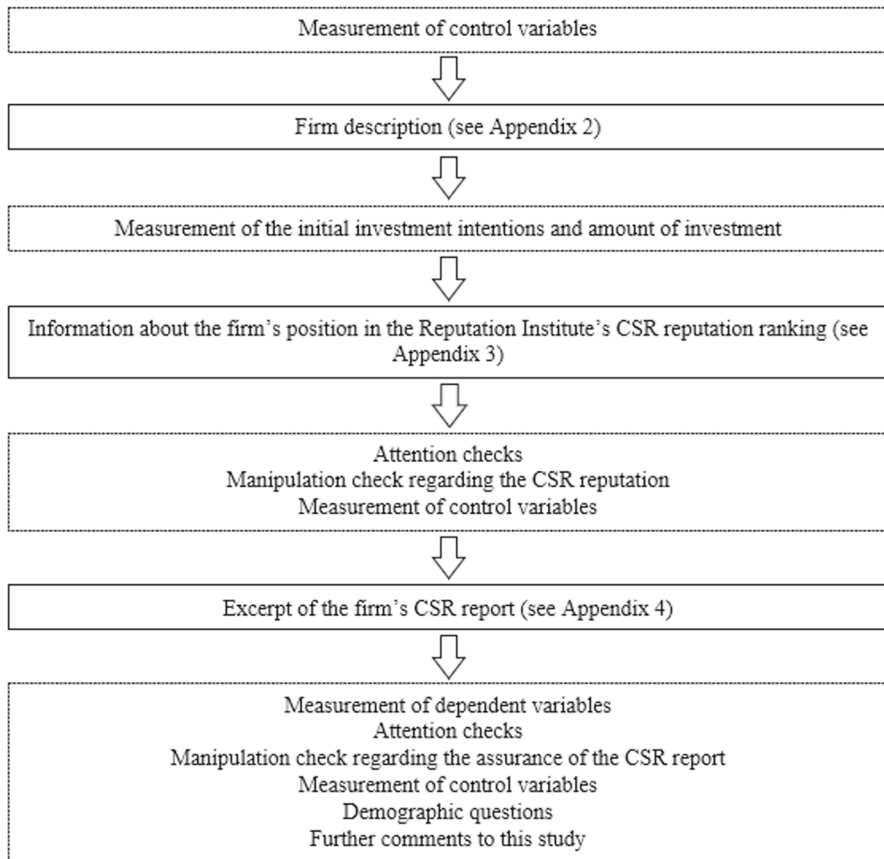


Fig. 3 Experimental vignette study procedure

## Appendix 2

### Firm description

Meier Tech AG is a leading global provider of laser-based solutions with headquarters in Berlin and further subsidiaries in ten countries. The company was founded by Andreas Meier on April 30, 1977. Since June 2008, his daughter, Anna Meier, has managed the company. Before becoming CEO, Anna Meier held various positions in the company, including several years as the CEO of the American subsidiary Lasertronica.

Meier Tech AG offers its customers diverse and high-quality products ranging from laser systems for welding plastics and laser systems to produce thin-film solar modules to ultrashort pulse lasers for industrial micromaterial processing. Meier Tech AG thus serves a broad customer base in more than 70 countries from various industries, including the medical technology, automotive, and solar and plastics processing industries.

Meier Tech AG employs almost 5,000 people. In the past fiscal year, the company achieved sales of 1.4 billion euros. The profit amounted to 52.7 million euros. At the end of the last fiscal year, the share price was 91.56 euros, an increase of 30% compared to the previous year. This development puts the company slightly above the industry average.

[Note: In the experiment, the text was in German.]

## Appendix 3

### Information about the firm's position in the reputation institute's CSR reputation ranking

#### Favorable

In the Reputation Institute's annual CSR ranking, Meier Tech AG occupies a top position, as in previous years. To determine CSR reputations, the Reputation Institute surveys the general public on the three dimensions of companies' corporate social responsibility (CSR): (1) environmentally conscious behavior and support for charitable causes, (2) responsible, ethical corporate governance and transparent presentation of business, and (3) an appealing workplace and fair treatment of employees. The Reputation Institute points out that stakeholder assessments of these CSR issues are becoming increasingly important for a company's sustainable business success.

Kylie Wright-Ford, CEO of the Reputation Institute, attributes Meier Tech AG's excellent ranking result compared to the rest of the industry partly to its consistent CSR orientation. This is particularly evident from the company's waste avoidance, 100 percent use of renewable energy sources and recyclable materials and high level of social commitment. "Our approach at Meier Tech is 360-degree sustainability. This encompasses our employees, suppliers, customers, processes, and products, and our contribution to society as a whole," Anna Meier, CEO of Meier Tech AG, emphasized in a press release. Overall, Meier Tech AG stands out as above-standard in the laser technology industry.

#### Unfavorable

In the Reputation Institute's annual CSR ranking, Meier Tech AG occupies one of the lowest places, as in previous years. To determine CSR reputation, the Reputation Institute surveys the general public on the three dimensions of companies' corporate social responsibility (CSR): (1) environmentally conscious behavior and support for charitable causes, (2) responsible, ethical corporate governance and transparent presentation of business, and (3) an appealing workplace and fair treatment of employees. The Reputation Institute points out that stakeholder assessments of these CSR issues are increasingly important to a company's sustainable business success.

Kylie Wright-Ford, CEO of the Reputation Institute, cites Meier Tech AG's inconsistent CSR strategy and the associated poor integration of sustainability into its core business, as well as the negative headlines in recent years due to suspected illegal wastewater disposal and the exploitation of factory workers at an important supplier as reasons for the company's poor ranking compared to the rest of the industry. After the allegations

became known, Anna Meier, CEO of Meier Tech AG, became concerned and stated, “we will investigate the incidents and, if necessary, take appropriate measures.” Overall, Meier Tech AG is thus far behind the standards of the laser technology industry.

[Note: In the experiment, the text was in German.]

## Appendix 4

### Excerpt from the firm’s CSR report

**CSR at Meier Tech:** We emphasize responsible action to achieve lasting economic success while creating significant added value for society and reducing the negative effect of corporate activities. This attitude is deeply rooted in our corporate DNA. At the same time, we reflect continuously and critically on processes throughout the company and constantly improve them through holistic, sustainable action.

**Ecological sustainability:** We attach great importance to keeping the ecological footprint left by our business activities as small as possible. With our products, we always minimize the negative environmental effects over the entire life cycle. For example, Meier Tech AG uses recycled plastic for the housings of its laser systems. Our laser-based solutions displace chemical processes in many areas, enabling us to contribute to reducing scrap and waste for our customers.

**Energy:** Total energy consumption decreased by 1.5% to 972,000 MWh in the reporting year despite increasing orders. By implementing a wide range of projects, we were able to sustainably reduce our electricity consumption, most recently by 3% compared with the previous year. This reduction is mainly due to the lighting concept developed by an independent energy auditor. Since last year, Meier Tech AG has obtained its electricity entirely from renewable sources.

**Water:** In the year under review, the water consumption of Meier Tech AG was 4,803 m<sup>3</sup> (previous year: 4,232 m<sup>3</sup>). However, this 13% increase is less than the 18% increase in incoming orders. To reduce our freshwater consumption and loss of wastewater, we rely on optimized processes and state-of-the-art technology. The most important measure here, after appropriate treatment, is the repeated re-use of wastewater instead of freshwater.

**Emissions:** In the year under review, Meier Tech AG caused 709 tons of CO<sub>2</sub> emissions, which corresponds to a reduction of almost 50% in the last two years. This is due to our switching to electricity from renewable sources. To further improve Meier Tech AG’s CO<sub>2</sub> balance, video conferences are also increasingly being used instead of business trips.

**Waste:** To minimize the volume of waste, we develop recycling concepts adapted to legal requirements and existing disposal structures. The total weight of waste generated by Meier Tech AG in the year under review was 127.4 tons (previous year: 115.9 tons), of which 86.3 tons were classified as non-hazardous. The recycling and recovery rate increased by three percentage points to 71%.

**Supply chain standards:** We contractually oblige our suppliers to adhere to the same environmental and compliance standards as our own. In the year under review,

Meier Tech AG conducted 71 audits (previous year: 64) to select new suppliers and evaluate existing suppliers. Due to non-compliance with our requirements, nine suppliers were excluded from the contracting process.

**Human rights:** We are fully committed to our responsibility to respect human rights both within the company and along our value chain. In the course of this, Meier Tech AG carried out various assessments at locations worldwide in the year under review. On this basis, we concluded that our activities are in line with the United Nations Global Compact and the conventions of the International Labor Organization (ILO).

**Social commitment:** Meier Tech AG can only be successful in a functioning social environment. Since as a company we are part of society, we have commitments worldwide. We have so far spent around 1.1 million euros (previous year: 1.0 million euros) on our social commitments. This is divided into three main areas: sponsorship in education and science, donations in cash and in-kind for charitable purposes, and support for the volunteering activities of our employees. In the course of this, our employees were given up to three days of paid time off for their commitment to non-profit partner organizations or the implementation of their charitable projects.

**In the case of assurance, the following is added:**

### **Independent Auditor's Limited Assurance Report**

#### **To the Supervisory Board of Meier Tech AG**

We have performed a limited assurance engagement on the CSR Report of Meier Tech AG.

#### **Assurance Conclusion**

Our assurance procedures performed and assurance evidence obtained did not bring to our attention anything that would cause us to believe that the disclosures in the CSR report for the reporting period have not been prepared, in all respects, following the reporting criteria.

#### **Restriction of Use**

This assurance report is issued for the Supervisory Board of Meier Tech AG only. We assume no responsibility concerning any third parties.



Dr. Andrea Huber  
German Public Auditor



Moritz Müller  
German Public Auditor

[Note: In the experiment, the text was in German.]

## **Appendix 5**

See Table 9.

**Table 9** Scales measuring latent variables

Item name	Constructs and items	Mean	SD	Outer loadings	Cronbach's alpha	CR	AVE
<b>Values-driven attributions</b>							
VDA_1	Meier Tech AG pursues various CSR activities because it feels morally obligated to help	4.67	1.463	0.848	0.866	0.910	0.718
VDA_2	Meier Tech AG pursues various CSR activities because it has a long-term interest in the community	5.01	1.522	0.907			
VDA_3	Meier Tech AG pursues various CSR activities because owners or employees believe in this cause	4.76	1.434	0.727			
VDA_4	Meier Tech AG pursues various CSR activities because it wants to make it easier for stakeholders who care about the cause to support it	5.15	1.274	Removed			
VDA_5	Meier Tech AG pursues various CSR activities because it is trying to give something back to the community	4.67	1.493	0.895			
<b>Perceived credibility of the CSR disclosures</b>							
PC_1	I think that the statements in the CSR report of Meier Tech AG are accurate	4.65	1.463	0.819	0.948	0.955	0.682
PC_2	I think that the claims made in the CSR report of Meier Tech AG are correct	4.85	1.386	0.874			
PC_3	I am confident that the statements in the CSR report of Meier Tech AG are true	4.78	1.440	0.848			
PC_4	I think that the CSR report of Meier Tech AG uses the best evidence at hand	4.45	1.582	0.841			
PC_5	The aspects mentioned in the CSR report of Meier Tech AG are justified by facts	4.74	1.483	0.754			
PC_6	The CSR report of Meier Tech AG reflects the genuine intentions of the company	4.07	1.526	0.844			
PC_7	I think that the company's intentions correspond with the CSR report of Meier Tech AG	4.22	1.510	0.866			
PC_8	The CSR report of Meier Tech AG is not misleading	4.62	1.535	0.774			
PC_9	The CSR report of Meier Tech AG fits to the context of the laser technology industry and its social and environmental challenges	4.43	1.221	Removed			
PC_10	As a reader of the CSR report of Meier Tech AG, I feel that the text addresses CSR issues well	4.81	1.301	0.738			
PC_11	I think the CSR report of Meier Tech AG rightfully represents the company	4.52	1.450	0.886			

Table 9 (continued)

Item name	Constructs and items	Mean	SD	Outer loadings	Cronbach's alpha	CR	AVE
PC_12	I understand the CSR report of Meier Tech AG	5.99	1.030	Removed			
PC_13	The CSR report of Meier Tech AG is clearly written	5.70	1.231	Removed			
PC_14	The CSR report of Meier Tech AG is written in an understandable way	5.91	1.099	Removed			
PC_15	I understand the meaning of the CSR report of Meier Tech AG	5.83	1.108	Removed			
PC_16	The CSR report of Meier Tech AG is easy to read	5.56	1.280	Removed	0.942	0.958	0.851
<b>Perceived CSP</b>							
PCSP_1	Meier Tech AG is a socially responsible company	4.81	1.554	0.943			
PCSP_2	Meier Tech AG is concerned to improve the well-being of society	4.67	1.567	0.936			
PCSP_3	Meier Tech AG supports good causes	5.22	1.393	0.886			
PCSP_4	Meier Tech AG behaves responsibly regarding the environment	4.92	1.553	0.925			
<b>Investment intentions</b>							
IInt_1	It is very likely that I will invest my inheritance in shares of Meier Tech AG	4.33	1.718	0.963			
IInt_2	In the future, I am very likely to recommend my friends to invest in Meier Tech AG	3.57	1.773	0.870			
IInt_3	I intend to invest my inheritance in shares of Meier Tech AG	4.11	1.784	0.966			
IInt_4	My willingness to invest the inheritance in shares of Meier Tech AG is high	4.13	1.825	0.966			

$\alpha$  Cronbach's alpha, CR composite reliability, AVE average extracted variance

**Appendix 6**  
See Table 10.

**Table 10** Item cross-loadings

	CSR reputation (experimental variable)	Assurance (experimental variable)	Values-driven attributions	Perceived credibility	Perceived CSP	Investment intentions	Amount of investment
Reputation	<i>1.000</i>	0.007	0.467	0.471	0.581	0.431	0.312
Assurance	0.007	<i>1.000</i>	0.168	0.265	0.143	0.107	0.049
VDA_1	0.363	0.173	<i>0.848</i>	0.607	0.655	0.468	0.246
VDA_2	0.463	0.147	<i>0.907</i>	0.680	0.761	0.509	0.292
VDA_3	0.379	0.073	<i>0.727</i>	0.499	0.590	0.499	0.354
VDA_5	0.374	0.169	<i>0.893</i>	0.699	0.732	0.504	0.313
PC_1	0.381	0.182	0.601	<i>0.819</i>	0.667	0.573	0.424
PC_2	0.383	0.312	0.632	<i>0.874</i>	0.652	0.570	0.459
PC_3	0.387	0.282	0.602	<i>0.848</i>	0.627	0.523	0.464
PC_4	0.310	0.313	0.618	<i>0.841</i>	0.609	0.501	0.434
PC_5	0.261	0.285	0.521	<i>0.754</i>	0.545	0.435	0.331
PC_6	0.398	0.153	0.695	<i>0.844</i>	0.705	0.559	0.396
PC_7	0.469	0.163	0.720	<i>0.866</i>	0.750	0.618	0.439
PC_8	0.391	0.232	0.638	<i>0.774</i>	0.647	0.563	0.376
PC_10	0.413	0.081	0.559	<i>0.738</i>	0.656	0.551	0.383
PC_11	0.458	0.212	0.698	<i>0.886</i>	0.753	0.633	0.473
PCSP_1	0.587	0.153	0.763	0.791	<i>0.943</i>	0.693	0.479
PCSP_2	0.520	0.163	0.791	0.761	<i>0.936</i>	0.641	0.459
PCSP_3	0.453	0.088	0.696	0.657	<i>0.886</i>	0.604	0.415
PCSP_4	0.578	0.119	0.745	0.757	<i>0.925</i>	0.643	0.458
Int_1	0.400	0.108	0.553	0.642	0.690	0.963	0.612
Int_2	0.360	0.083	0.546	0.599	0.615	0.870	0.496
Int_3	0.427	0.112	0.550	0.637	0.670	<i>0.966</i>	0.612
Int_4	0.434	0.100	0.553	0.660	0.664	<i>0.966</i>	0.628
Amount of investment	0.312	0.049	0.354	0.508	0.491	0.625	<i>1.000</i>

The item cross-loadings show that each item loaded higher on its own construct (in italics) than on any other construct

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**Competing interests** The authors have no competing interests to declare that are relevant to the content of this article.

**Declaration of generative AI in scientific writing** As we are no native speakers, we used DeepL to improve the application of English language. Beside this the paper also was checked by a human copy editor (Christine Crozier, Waterloo Manuscript Services). However, we did not apply generative AI to generate content for the paper. After using this tool and service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

**Ethical approval** We declare that the submitted manuscript is compliant with ethical standards. All contributors agreed to participate at the study.

**Consent for publication** All contributors agreed to submit this paper for publication.

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