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Title:
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Date:
2025-01-01

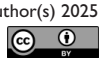
Citation:
Fehrenbacher, D. D. & Soderstrom, N. S. (2025). Does ESG information draw more visual attention than financial information?. Australian Journal of Management, 51 (2), pp.416-437. https://doi.org/10.1177/03128962251319724.

Persistent Link:
https://hdl.handle.net/11343/369250

Article

UNSW SYDNEY Business School

Australian Journal of Management
2026, Vol. 51(2) 416–437



DOI: 10.1177/03128962251319724
journals.sagepub.com/home/aum


Does ESG information draw more visual attention than financial information?

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Abstract

Recent disclosure mandates focus on reporting information about nonfinancial dimensions of performance regarding corporate environmental social and governance (ESG) activities and impacts. Unlike financial information, few programs teach students how to read and interpret ESG disclosures. Further, ESG information tends to be nonfinancial, non-standardized, and lacks a consistent measurement basis (e.g. tons of emissions or kilowatt hours of energy). This makes it difficult for decision-makers to aggregate and process ESG information. In a laboratory experiment employing eye-tracking technology, we find that participants expend more effort processing ESG information. The additional processing is focused on understanding which metrics are disclosed. Further analysis indicates that familiarity with evaluating ESG performance is associated with how decision-makers include ESG information in overall performance evaluations. Our results have implications for both standard setting and future accounting curricula.

JEL Classification: M41

Keywords

Experiment, eye-tracking, goal preferences, stakeholder decision-making, standard-setters, sustainability reporting

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Final transcript accepted 16 January 2025 by Stijn Masschelein (AE Accounting).

1. Introduction

In response to the demand for "sustainability" information[1] to facilitate decision-making, an increasing number of organizations are providing sustainability-related information in the form of standalone sustainability reports and information on websites. Historically, the extent and format of disclosure have largely been voluntary due to an absence of a generally accepted or required format for the reports. Recently, however, standard setters in many jurisdictions have mandated sustainability-related disclosures in annual statutory reports, including new requirements for entities participant to reporting under International Financial Reporting Standards (IFRS)[2] and the European Union (EU)'s European Sustainability Reporting Standards (ESRS).[3] The US Securities and Exchange Commission (SEC, 2022) has also developed proposed climate-related disclosures in company annual reports.[4] Reported environmental social and governance (ESG) information is quite diverse, including both quantitative (financial and non-financial) and qualitative disclosures. As these new reporting standards evolve, standard setters must grapple with complexities associated with providing diverse ESG information to support decision-makers' consideration of sustainability-related issues.

Psychology literature provides evidence that decision-makers' use of information depends not only on *what* is reported, but also on *how* it is reported (e.g. Hogarth and Einhorn, 1992; Tversky and Kahneman, 1974). Bucaro et al. (2020) find that providing corporate social responsibility (CSR) measures disclosed in a separate sustainability report rather than integrated into the financial report is more likely to impact investor judgments.[5] However, increasing efforts encourage companies to provide financial and ESG information within a single report. This idea was initially promulgated by the International Integrated Reporting Council's (IIRC, 2013) Integrated Reporting guidance and is largely reflected in current regulatory mandates.[6] Regulatory discussions continue to include both what should be disclosed and how it should be disclosed, along with where the information should be located. In this article, we focus on how decision-makers process ESG versus financial information presented within a single report when making performance evaluation judgments.

Based on current regulatory efforts to include sustainability-related information in annual reports, it is important to develop a more nuanced understanding of how decision-makers process ESG versus financial information presented within the same report. We ask the research question: Does ESG information draw more visual attention than financial information?

Participants in our study evaluate the overall performance of a company based on a series of financial and ESG indicators. The indicators are typical of those reported in the "Key Highlights" scorecard within sustainability reports or in similar portions of an Integrated Report (IIRC, 2013).[7] The measures employed in our study were adapted from actual disclosures from a company and comprise typical financial and ESG-related performance metrics. The measures and values reported are the same across treatments.[8] We capitalize on the strengths of employing a laboratory experiment by varying the order of information presentation. This controls for possible order effects that occur in real-world reports, in which financial data are often reported first. As a further control, we vary the decision-maker type, which controls for how different decision-makers might use the information. Our primary analysis employs eye-tracking, which allows us to understand how the different types of information affect the amount of time spent on and processing of the information. Although the purpose of having participants provide performance evaluations of the focal firm is to provide a decision context to drive their focus on the information, the performance evaluations themselves provide an opportunity to develop a more in-depth understanding of how the participants use the different types of information in their decision-making.

To explore how the different types of information are incorporated into decision-making, we need to design a setting where we can detect differences in information usage across treatments.

We set the ESG information in our study as predominantly negative and the financial information to be positive. This approach allows us to infer participants' relative weighting of the ESG and financial information as performance evaluations should be increasing in reliance on the (positive) financial information and decreasing in reliance on the (negative) ESG information. We employ the resulting performance evaluations to provide further insights into the results from our eye-tracking analyses.

We assign the participants to roles and provide case background to stimulate preferences of either an investor ("Investor"), who primarily focuses on performance related to building shareholder value, or of an environmental regulatory agent ("Environmental Regulator"), who focuses on performance based on the concerns of a broader range of stakeholders including multiple elements of sustainability. In the experiment, Investors are told they are considering the focal firm's industry for new investment opportunities and Environmental Regulators are told they are in the process of developing new regulations for the focal firm's industry. Both groups are asked to evaluate the performance of the focal firm as a first step in achieving their objective.

Our eye-tracking results indicate that overall, ESG information is more difficult for decision-makers to process than financial information. Not only do participants have longer fixations on the ESG information, but the longer fixations are focused on the ESG data labels rather than for the corresponding numeric values. This is consistent with decision-makers processing the ESG information deliberately.[9] We argue that the apparent greater difficulty is at least in part due to the general lack of consistency in reporting and relative unfamiliarity of ESG information relative to financial information.

In our analysis of participants' performance evaluations, we find that those who are more familiar with ESG are more likely to place higher reliance on the ESG information in their valuation decisions, with resulting lower performance evaluations. Participants who find evaluation of ESG performance to be more difficult are less likely to consider ESG information in their valuation decisions, with resulting higher performance evaluations.

This article contributes to the accounting literature on sustainability accounting and has implications for both disclosure policy and accounting curricula. Current regulatory efforts (e.g. promulgation of IFRS S1 and S2, ESRS) are based on the premise that ESG information is material input for investor decision-making. Our results provide evidence that decision-maker processing of ESG information is more effortful than processing of financial information. The additional effort appears to be related to understanding which ESG metrics are being disclosed. Further, our results indicate that decision-makers who are more familiar with ESG information are more likely to include it in their decision-making. These issues could potentially be addressed by development of accounting curricula to teach users of corporate disclosures how to understand and evaluate ESG disclosures and by increasing the standardization of mandatory ESG disclosures to help manage decision-makers' information processing costs. The EU sustainability taxonomy is a step in this direction.

2. Theoretical development

Interpreting data and forming a judgment requirs significant mental effort. Financial and ESG information differ from each other along several dimensions, which likely makes forming judgments about performance different for the two types of information (Church et al., 2019). Financial information is denominated in monetary units. This allows individual data items to be easily combined to form a summary measure (such as net income), which can then be evaluated. Further, unlike ESG information, financial information is highly standardized, with agreed-upon definitions for each item (based on generally accepted accounting standards) and agreement on what information should be reported. Interpreting financial information is regularly taught in accounting

and finance courses, so the method of formulating judgments about performance is relatively well-understood and communicated.

ESG metrics employ diverse units (e.g. tons of carbon, kilowatts of energy used, employee turnover rate, accidents per 10,000 employees, etc.).[10] This makes combining the metrics into a summary measure problematic. Disclosure and measurement of ESG-related metrics are largely voluntary. Even where there is some guidance related to disclosures, whether mandatory or voluntary, the focus is typically on reporting of those metrics that are material to a given organization, which can differ across organizations and industries (e.g. Global Reporting Initiative (GRI), 2023; IFRS, 2023a). Thus, there is no constant and comparable set of data from which to evaluate ESG performance. Given the relatively recent and evolving nature of ESG reporting, there is also a lack of a standard pedagogy for teaching ESG performance evaluation. Indeed, because there are no set criteria for ESG performance, rating organizations that provide ratings to investors vary widely in their evaluation of companies and can even give conflicting advice (Berg et al., 2022). Chatterji et al. (2016) find an average correlation of only 0.3 across the ratings from six major rating organizations. Because of the relative unfamiliarity and lack of standardization of ESG information, decision-makers using ESG information must expend effort to understand which metrics are reported and how they are measured before they can form a judgment about what the reported quantities imply about performance.

Research has indicated that limited cognitive and attentional resources are not fixed but depend on decision-maker characteristics and task demands (Kahneman, 1973, 2012). For example, the higher the difficulty level of tasks, the more attentional resources are required (Fehrenbacher and Djamasbi, 2017; Klingner et al., 2011). Due to differences in characteristics between financial and ESG information, we expect that processing of information will require greater decision-maker effort and cognitive resources for ESG information overall than for financial information overall.

Cho et al. (2017) note that use of eye-tracking experiments can provide inferences regarding the use of CSR information in decision-making. Eye-tracking technology can record the amount of time that a participant fixates on specific data while performing a task. Fixation duration is related to amount of cognitive effort that the participant is using to process the data and serves as a valuable metric for assessing the attention devoted to visual stimuli (Fehrenbacher et al., 2018; Horstmann et al., 2009; Just and Carpenter, 1976). Thus, researchers frequently rely on fixation duration as an essential eye-tracking metric to explore cognitive processing and visual attention (Holmqvist et al., 2011; Lynch and Andiola, 2019; Vasseur et al., 2023).[11]

We expect that the greater effort to process ESG information will result in longer fixation on the ESG information than on the financial information. Furthermore, we expect that this difference should be particularly evident for fixations for the information labels versus the associated values. Labels provide a context for interpreting the reported values. This context is particularly important for ESG information due to the lack of standardization in ESG reporting.

Hypothesis 1a: *Fixation duration on ESG data is longer than on financial data.*

Hypothesis 1b: *Fixation duration is longer on ESG data labels than on financial data labels.*

3. Method

We designed a scenario asking participants to evaluate the overall performance of a company. Information from which to derive the performance evaluation consisted of a company description and information on financial and ESG measures. The performance measures were presented in the format of a "Key Figures" scorecard, with all data presented on the same screen (Figure 1). This decision context allows us to explore differential attention given financial versus ESG information.

Key Figures financial year end 2016 compared to financial year end 2015

	2016 (30.06)	2015 (30.06)	Change
Financial Performance:			
Sales (in Mio. Dollars)	66,034	60,012	+10.0 %
Operating profit (in Mio. Dollars)	22,057	18,527	+19.1 %
Free Cash Flow (in Mio. Dollars)	17,914	14,256	+25.7 %
Share Performance:			
Share Price	33.35	30.01	+11.1%
Dividend per Share	3.57	3.32	+7.5%
Market Capitalization (in Mio. Dollars)	315,059	301,089	+4.6%
Social Performance:			
Donations (in Mio. Dollars)	58.6	69.5	-15.7%
Employee Turnover	17.2%	12.3%	+4.9%
Relevant Employees trained in Business Ethics	7.1%	10.5%	-3.4%
Environmental Performance:			
Energy Consumption (1,000 GJ)	2,634	1,987	+32.6%
Water Consumption (1,000 m^3)	2,221	2,021	+9.9%
CO2 Emissions from Energy consumption (1,000 tons)	105	95.45	+10%

Figure 1. ESG measures and financial measures.

While our focus is on fixations across types of information, to provide more generalizable results, we employ an experimental design that incorporates controls for the order in which the information is presented and for the decision frame. The experiment is 2 × 2 fully crossed between participants, resulting in four conditions in which we vary the *Order of Measures* (ESG first, or Financial first) and *Role* of the participants (an employee of an investment firm, "Investor," or a staff member at an environmental regulatory agency, "Environmental Regulator").

3.1. Procedure and case material

The task was performed in a behavioral laboratory at a major Australian university.[12] We employed eye trackers to capture how participants processed the information that was presented to them. The laboratory contains separate cubicles, each equipped with a Tobii TX300 eye-tracking machine. In addition, we used photo-cells (StimTrackers) to precisely track when participants viewed an area of interest. Participants were asked to take a seat in one of the cubicles. A 9-dot calibration technique was used to calibrate the eye-tracking machines. Once the calibration was complete, the survey program randomly assigned participants to one of the four treatments.

After random assignment to an experimental treatment, participants received online case materials. The materials include information about their role and their organization to help them develop preferences appropriate to their assigned role. Appendix 1 provides the instrument. Role information for Investor participants focuses on creating positive impact and long-term value for investors. Including long-term value in the stated objective helps to elicit consideration of ESG-related issues in addition to pure financial considerations. Role information for Environmental Regulator participants indicates that their agency focuses on human health and the environment. Economic growth is included as a priority in the description of the agency's policy concerns to elicit consideration of financial considerations by the Environmental Regulator participants.[13]

All participants are told that to perform their task, they need to understand performance of individual companies in the automobile industry and that they will subsequently be asked to evaluate the overall performance of a company named Auto Ltd. For the purposes of either future investment opportunities (Investor) or future development of regulations for the auto industry (Environmental Regulator). Participants are then informed that they will be presented with excerpts of annual reports from 2015 and 2016 and that they will see information on the change in the values from 2015 to 2016. The instructions explain that the sign "+" or "–" indicates whether there was a year-on-year increase (+) or decrease (–) of a particular measure, but not whether the development should be interpreted positively or negatively.

On the next screen, participants are presented with a chart of Key Figures for 2015 and 2016 that are excerpted from Auto Ltd. Company's annual report. This information comprises six measures related to the company's financial performance and six measures related to ESG performance. Figure 1 provides the performance data.[14] As shown in Figure 1, ESG performance declines between 2015 and 2016 (lower social performance and higher energy consumption).[15] Financial performance, however, improves (higher financial performance and higher share performance). Because the financial performance and ESG performance changes are in opposite directions, in addition to examining fixations for our hypothesis tests, we can compare resulting performance evaluations to gain insight as to how participants use the financial and ESG measures in their performance evaluations.[16] Figure 2(a) depicts the blocks of information that change based on the order manipulation. Participants see both financial and ESG measures, with either the financial performance measures as the top block of measures (labeled "First Information" in the Figure) or the ESG performance measures as the top block of measures, with the remaining measures provided in the lower block (labeled "Second Information" in the Figure). Figure 2(a) and (b) depict the treatment where participants receive financial information first and ESG information second.

3.2. Empirical model

Our primary dependent variable for testing our hypotheses is *Fixation*, which is the fixation duration on the area of interest. Consistent with literature in psychology and accounting (Dalla Via et al., 2019; Fehrenbacher et al., 2018; Horstmann et al., 2009; Rotaru et al., 2018), we interpret the eye-tracking measure of *Fixation* as an indicator of processing effort. This measure helps us to observe processing effort on the different types of information presented in an unobtrusive and relatively natural way. The model we estimate is:

$$Fixation_i = \alpha + \beta_1 * ESGDummy_i + \beta_2 * Role + \beta_3 * Order + \beta_4 * Gender + \varepsilon \quad (1)$$

Fixation is the length of fixation in the area of interest. Each participant enters into the regression twice: once for their fixation on the ESG information and once for their fixation on the financial information.[17] The information blocks depicted in Figure 2(a) and (b) describe the blocks of the screen that comprise the fixation areas of interest. *Fixation* is the amount of time in seconds that the participant spent looking at the area of interest. Our dependent variable for testing hypothesis 1a is the overall fixation duration for ESG/financial information (Figure 2(a)). For hypothesis 1b, we focus on fixation duration for ESG/financial labels (Figure 2(b)). *ESGDummy* is an indicator variable for observations that takes value 1 for ESG fixations and is 0 otherwise. Both hypotheses predict a positive coefficient of *ESGDummy*. Although not addressed in the hypothesis, as a further test we explore fixation differences for ESG values and financial values.

Equation (1) includes a number of control variables. *Role* is a dummy variable that takes value 1 for participants taking the role of an environmental regulator and 0 for those with the role of an

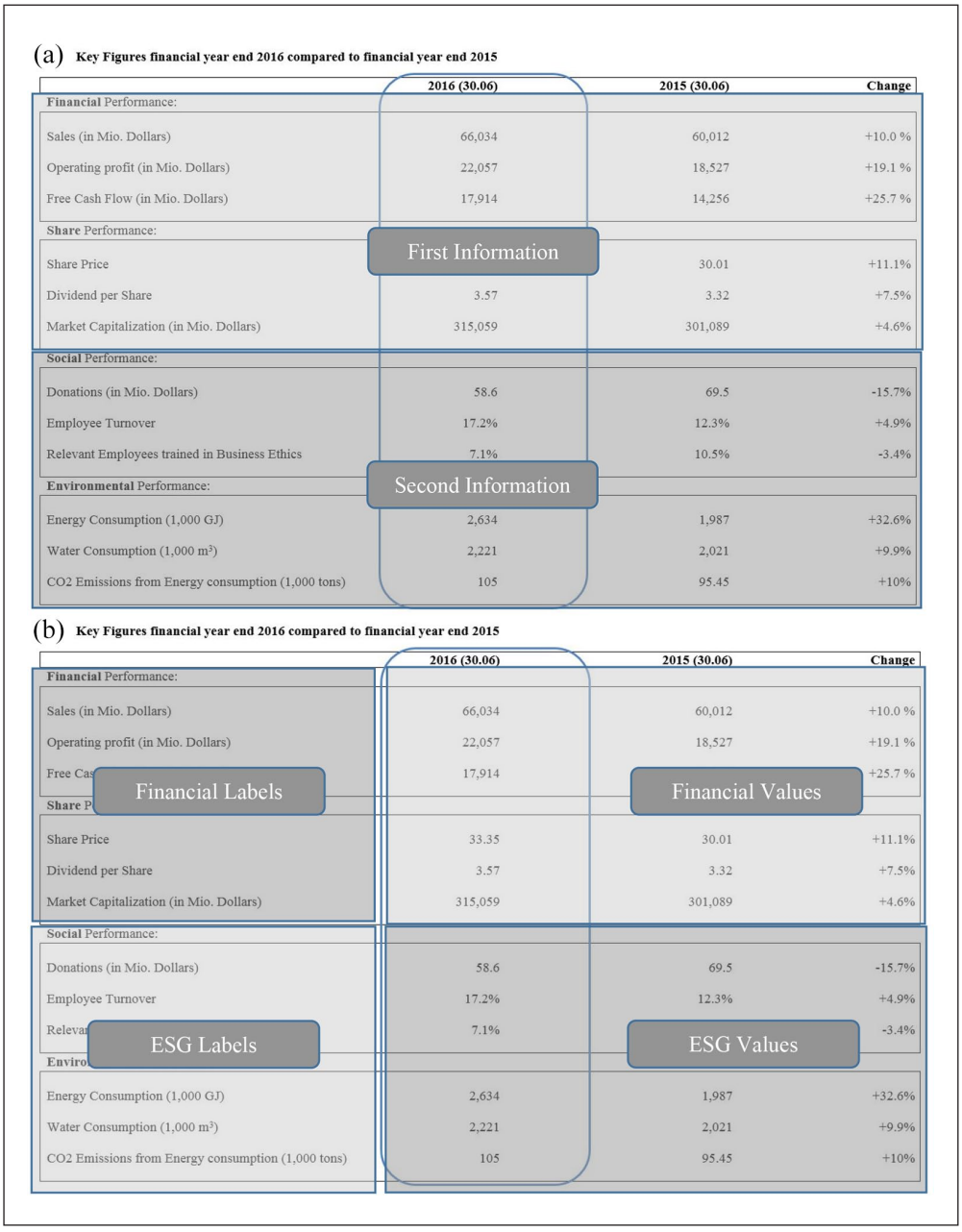

Figure 2. (a) *Order of Measures* manipulation and definition of area of interest and (b) definition of area of interest: ESG labels versus ESG values.

investor. *Order* is a dummy variable that takes value 1 for participants whose scorecards had the ESG information first (financial information second) and 0 for participants who had the financial information first (ESG information second). *Gender* takes value 1 for participants indicating their gender is female, and 0 otherwise.

In addition to the base model in (1), we augment the model to include additional independent variables that allow us to investigate factors associated with the difference in fixations across types of information. *ESG Familiarity* is the participant's response to the question: "What is your level of familiarity with Corporate Social Reporting? 1–7 (Not at all familiar–Very familiar)." *FinDifficulty* is the participant's response to the question: "How difficult was it to you to evaluate the financial and share performance of the Auto Ltd. Company – (0–Not at all difficult to 100–Very difficult)." *ESGDifficulty* is the participant's response to the question: "How difficult was it to you to evaluate the social performance and environmental performance of the Auto Ltd. Company–(0–Not at all difficult to 100–Very difficult)." *TopicDifficulty* is *FinDifficulty* for observations related to financial fixations and *ESGDifficulty* for observations related to ESG fixations.

3.3. Participants

We recruited graduate students from a major business school to participate in our study. One-hundred six (106) participants took part in the study. Our analysis is based on 100 participants, because we did not receive fixation data on all areas of interest from six participants. Reasons for not being able to determine fixation data include calibration problems and/or head movements. Of the 100 participants, 23 (77) were male (female) and the mean age (in years) was 24.7. Based on our randomization across treatments, the participants were split evenly across the regulator and investor roles (*Role*). In terms of *Order*, 53 (47) saw the financial (ESG information first). Almost all of the participants (94 out of 100) plan to invest at some point in the future. Among different investment options, participants are most likely to invest in shares, investment funds and real estate. Fifty-four stated that they have investment experience. The average familiarity with ESG (*ESGFamiliarity)* was 4.69. Compared to a theoretical midpoint of the Likert-type scale (3.5), this indicates that the participants were relatively more familiar than unfamiliar with ESG. There are no significant differences with respect to age, gender, plan to invest, familiarity of ESG and familiarity of integrated reporting across experimental conditions (all p values > 0.1). Since we measure processing effort (i.e. fixation duration), we also test for potential language effects, but find no significant differences across experimental conditions with respect to whether the country of birth has English as an official language ($p > .92$). We take this as evidence that our randomization procedure has led to a balanced distribution across experimental conditions.

4. Results

4.1. Manipulation and understanding checks

To ensure that the participants understand their role, after introducing the organization's mission and goals, we asked participants in an open text field to briefly describe their employer's mission statement in their own words. Around 97% gave meaningful statements. Because our order manipulation presented the same content on the same screen, but only in a different order, we did not incorporate a manipulation check for this variable.

In a subsequent step, we asked participants to recall information presented in the case, before they were presented with the ESG and financial information. Such an ex-ante understanding check is similar to Tafkov (2013) and Bol et al. (2015). We presented participants with three statements that had to be answered correctly before they were allowed to proceed. If the participant's answer was incorrect, participants were asked to review the case information and attempt the question again. This ensures that participants understood the case.

Table 1. Analysis of fixation differences between ESG and financial information.

Panel A: Descriptive Statistics and *t*-Tests.[a]

	ESG Information (1)	Financial Information (2)	ESG Information—Financial Information (3)
Total fixation duration (sec.)	14.51 (1.46)	10.44 (0.96)	4.07*** (4.90)
Label fixation duration (sec.)	7.56 (0.78)	4.32 (0.44)	3.24*** (6.70)
Value fixation duration (sec.)	6.94 (0.73)	6.12 (0.58)	0.82* (1.92)
Difficulty in evaluating the topic (0–100) *TopicDifficulty*	45.55 (2.29)	35.20 (2.30)	10.35*** (3.89)

Panel B: Regression.[b]

Variable	ESG/financial **total** fixation (1)	ESG/financial **label** fixation (2)	ESG/financial **value** fixation (3)
ESGDummy	4.0686*** (4.85)	3.2428*** (6.63)	0.8258* (1.90)
Role	0.5047 (0.22)	0.5653 (0.49)	−0.0607 (−0.05)
Order	2.0758 (0.84)	1.4433 (1.18)	0.6326 (0.48)
Gender	−0.0882 (−0.04)	0.1360 (0.11)	−0.2243 (−0.17)
Constant	9.2779*** (3.97)	3.2536*** (2.90)	6.0242*** (4.67)
N	200	200	200
F	6.76	13.09	0.94
Prob *F*	0.0001	0.0000	0.4417
Adj. R^2	0.0341	0.0759	0.0065

ESG: environmental social and governance.

[a]Notes: This table reports descriptive statistics for Fixation Duration in seconds for ESG (Column 1) and financial information (Column 2) (total, labels, and values) and the answer to the questions "How difficult was it to you to evaluate the social and environmental (financial and share) performance of the Auto Ltd. Company?" Cells contain means and (standard deviations). Differences between the ESG and Financial means are presented in Column (3), along with paired *t*-tests (*t*-values in parentheses) of the differences between ESG and financial information. ***indicates $p < .01$ and * indicates $p < .10$.

[b]This table reports results of regression estimations of (1) with the dependent variables ESG/financial total fixation (Column 1), ESG/financial label fixation (Column 2), ESG/financial value fixation (Column 3). Variables are described in the section "Empirical Model." All models employ subject-level clusters since each subject is represented twice in the dataset. Cells contain coefficients and *t*-statistics in parentheses. (standard deviations) (Column 3). ***indicates $p < .01$; and * indicates $p < .10$.

4.2. Hypotheses testing

Table 1, panel A presents descriptive statistics for fixations (*Fixation*) and the reported difficulty of evaluating the information presented (*TopicDifficulty*). Total fixation on ESG information was on average 14.51 seconds and total fixation on Financial information was on average 10.44 seconds. Consistent with Hypothesis 1a, total ESG fixation is significantly longer than the Financial fixation (4.07 seconds, $p < .01$). Results are also consistent with Hypothesis 1b, with fixation on labels significantly longer for ESG information (7.56 seconds) than for Financial information (4.32 seconds), (3.24 seconds, $p < .01$). While not specifically hypothesized, we also find a marginally significantly longer fixation on ESG values than financial values ($p < .10$). Participants indicated that the ESG information was significantly harder to evaluate than the financial information (difference = 10.35, $p < .01$). We note that these results stem from simple within-participant *t*-tests for the

Table 2. Fixation differences between ESG and financial information including topic difficulty.

Variable	ESG/financial **total** fixation (1)	ESG/financial **label** fixation (2)	ESG/financial **value** fixation (3)
ESGDummy	5.0734*** (5.05)	3.7788*** (6.42)	1.2947 (2.56)
TopicDifficulty	−0.0971** (−2.51)	−0.0518** (−2.61)	−0.4531** (−2.19)
Role	0.5372 (0.24)	0.5827 (0.52)	−0.0455 (−0.04)
Order	2.4595 (1.02)	1.6479 (1.38)	0.8116 (0.62)
Gender	1.2366 (0.51)	0.8426 (0.69)	0.3940 (0.31)
Constant	11.4785*** (4.55)	4.273*** (3.63)	7.0512*** (5.05)
N	200	200	200
F	5.69	10.10	1.66
Prob *F*	0.0001	0.0000	0.1517
Adj. R^2	0.0635	0.1065	0.0296

Notes: This table reports results of regression estimations of equation (1) with the dependent variable ESG/financial total fixation (Column 1), ESG/financial label fixation (Column 2), ESG/financial value fixation (Column 3) and inclusion of TopicDifficulty as an additional independent variable. Variables are described in the section "Empirical Model." All models employ subject-level clusters since each subject is represented twice in the dataset. Cells contain coefficients and t-statistics in parentheses (Standard deviations). ***indicates $p < .01$ and ** indicates $p < 05$.

significance of the differences in mean fixations. Although no controls are used in these univariate tests, the strength of the analysis stems from the experimental design in which participants are randomly assigned to treatments, and we vary the information presentation order as well as the participant's role. Such control would be hard to achieve in the real world, where financial data are often reported first.

Table 1, Panel B, Column 1 presents a test of Hypothesis 1a based on total *Fixation* for ESG and Financial information. The regression model employs subject-level clusters since each subject is represented twice in the dataset, once for their fixation on ESG information and once for their fixation on Financial information. Results for equation (1) in Column (1) indicate that fixations on the ESG information are significantly longer than fixations on Financial information, with a significantly positive coefficient of *ESGDummy* ($p < .01$). This supports Hypothesis 1a.

The remaining columns of panel B examine decompose *Fixation* into fixation on labels (Column 2) and fixation on values (Column 3). The model in Column 2 provides our test of Hypothesis 1b. Consistent with our expectations, in Column 2, the coefficient of *ESGDummy* is positive and significant ($p < .01$ in all columns). In Column 3, the coefficient of *ESGDummy* is positive and marginally significant ($p < .1$). Because equation (1) only contains controls for treatment and gender, these results parallel the univariate results presented in Table 1, Panel A. Below we expand the regression models reported in Panel B to further explore factors associated with fixations.

4.3. Additional analysis: topic difficulty

To better understand how difficulty perception of disclosed information influences fixations, in Table 2, we report results of regression estimations of equation (1) including *TopicDifficulty* as an additional independent variable. As before, these regression models employ subject-level clusters since each subject is represented twice in the dataset. Column 1 reports on total fixations, Column 2 on label fixations and Column 3 on value fixations. The negative coefficient of *TopicDifficulty* across all three columns indicates that participants who find the financial and ESG topics more

Table 3. Analysis of ESG Fixations: total fixation, label fixation, and value fixation.

Variable	ESG **Total** Fixation (1)	ESG **Label** Fixation (2)	ESG **Value** Fixation (3)
ESGFamiliarity	3.2372*** (2.71)	1.4123** (2.18)	1.8429*** (3.08)
Role	1.8836 (0.66)	1.2273 (0.79)	0.6563 (0.46)
Order	3.9023 (1.37)	1.9334 (1.25)	1.9688 (1.39)
Gender	−0.5734 (−0.17)	−0.2653 (−0.14)	−0.3080 (−0.18)
Constant	−3.0104 (−0.44)	−0.3795 (−0.10)	−2.6309 (−0.78)
N	100	100	100
F	2.41	1.73	2.92
Prob *F*	0.0548	0.1499	0.0253
Adj. R^2	0.0538	0.0286	0.0719

ESG: environmental social and governance.
Notes: This table reports results of regression estimations with the dependent variable ESG Total Fixation (Column 1), ESG Label Fixation (Column (2) and ESG Value Fixation (Column 3) and the inclusion of ESGFamiliarity. Variables are described in the section "Empirical Model." Cells contain coefficients and *t*-statistics in parentheses. (standard deviations) (Column 3). ***indicates $p < .01$; ** indicates $p < 05$; and * indicates $p < .10$.

difficult have significantly shorter fixations ($p < .05$), thus spending less time processing the ESG information and Financial information, respectively. *ESGDummy* continues to be positive and significant ($p < .01$) in column 1 and 2, supporting Hypothesis 1a and 1b, respectively.

4.4. Additional analysis: ESG fixations

The models in Table 1, panel A and Table 2 include fixations on both ESG and financial information. In Table 3, we focus on ESG fixations to better understand how familiarity with ESG information impacts the amount of attention participants pay to the ESG information. We estimate the model:

$$ESGFixation = \alpha + \beta_1 * ESGFamiliarity + \beta_2 * Role + \beta_3 * Order + \beta_4 * Gender + \varepsilon \quad (2)$$

ESGFixation is the length of fixation on ESG information, with separate model estimations for fixation on total ESG information (Column 1), ESG labels (Column 2), and ESG values (Column 3).[18]

Across all models, the participant's familiarity with ESG information is significantly positively associated with fixations. In Table 3, Column (1), total fixation on ESG information is significantly associated with the participant's familiarity with ESG ($p < .01$), in Column (2) label fixation on ESG information is significantly associated with the participant's ESG familiarity ($p < .05$), and in Column (3) value fixation on ESG information is significantly associated with the participant's ESG familiarity ($p < .01$). These last results suggest that participants who are more familiar with ESG pay more attention to interpreting the ESG values because they understand how to do so.

4.5. Additional analysis: performance evaluations

Although our hypotheses and related tests focus on fixation duration, the valuation task for which we analyzed fixation duration allows us to gain insights into how the ESG and financial information are included in the participants' performance evaluations.

Table 4. Factors associated with performance evaluations.

Variable	Total Fixations (1)	Label and Value Fixations (2)
ESGFamiliarity	−2.5917** (−2.21)	−2.7181** (−2.27)
ESGDifficulty	−0.0678 (1.05)	−0.0658 (−1.02)
FinDifficulty	0.1053* (1.68)	0.1021 (1.60)
ESGTotalFixation	0.3083* (1.74)	
ESGLabelFixation		0.2288 (0.51)
ESGValueFixation		0.4335 (0.90)
FinTotalFixation	−0.3488 (−1.32)	
FinLabelFixation		−0.9325* (−1.49)
FinValueFixation		0.0428 (0.09)
Role	−7.4358*** (−2.78)	−7.1449*** (−2.67)
Order	−1.7483 (−0.64)	−1.0115 (−0.035)
Gender	0.5674 (0.17)	0.9624 (0.29)
Constant	78.9654*** (10.95)	78.6935*** (10.44)
N	100	100
F	2.05	1.85
Prob *F*	0.0495	0.0638
Adj. R^2	0.0779	0.0787

Notes: This table reports results of regression estimations of equation (3) with the dependent variable Performance, the response to the question, "Please evaluate the overall performance of the company from 0 (Very Low) to 100 (Very High)." Variables are described along with equations (1) and (3). Cells contain coefficients and t-statistics in parentheses. ***indicates $p < .01$; ** indicates $p < 05$; and * indicates $p < .10$.

Because ESG familiarity and topic difficulty appear to affect fixations, we investigate how these factors (along with fixations) are reflected in performance evaluations. The model we estimate is:

$$\begin{aligned} Performance \;=\; & \alpha + \beta_1 * ESGFamiliarity + \beta_2 * ESGDifficulty + \beta_3 * FinDifficulty + \\ & \beta_4 * ESGFixation + \beta_5 * FinFixation + \beta_6 * Role \; + \beta_7 * Order + \beta_8 * Gender + \varepsilon \end{aligned} \tag{3}$$

Performance is the participant's answer to: "Please evaluate the overall performance of the company from 0 (Very Low) to 100 (Very High)." Based on the contrast in valence between the financial information (more positive) and the ESG information (more negative), valuations will reflect the implicit weights the participants use for each type of information and should be lower when the participants place a greater emphasis on the ESG information.

Table 4 provides results from a regression estimation of (3). In column (1), *ESGFixation* and *FinFixation* is total fixation on ESG information and Financial information respectively (*ESGTotalFixation* and *FinTotalFixation*). In Column (2), we split total ESG and Financial fixations into labels and values (*ESGLabelFixation*, *ESGValueFixation*, *FinLabelFixation* and *FinValueFixation*). Across both models, *ESGFamiliarity* is negatively associated with performance evaluations ($p < .05$). Since the ESG information is relatively negative, this result indicates that participants who are more familiar with ESG place a higher weight on the ESG information in their performance evaluations. Furthermore, across both models, *ESGDifficulty* is not significantly associated with performance evaluations ($p > .10$). In Column (1), the coefficient of *FinDifficulty*

is marginally significantly positive ($p < .1$), but is not significant when we split fixations into labels and values (Column (2)).

It is unclear ex ante whether fixations will be associated with performance evaluations. Although eye-tracking research assumes a close eye-mind relationship (Wedel and Pieters, 2006), the relation of effortful processing and judgment is context-dependent and multi-faceted. It may be that an individual processes a piece of information deliberately and thinks hard about it, but then discounts the value of the information for final judgment.[19] In Column (1), fixation on ESG information is marginally significantly (positively) associated with performance evaluations (1). In Column (2), fixation on financial labels is marginally significantly (negatively) associated with performance evaluations ($p < .10$). We do not have an explanation for this result. Consistent with the preferences associated with their role and a stronger emphasis on ESG performance, results in Columns (1) and (2) indicate that participants who are environmental regulators have significantly lower performance evaluations ($p < .01$).

5. Discussion and conclusion

Organizations are responding to stakeholder demands by increasing their sustainability disclosures. In addition to this voluntary disclosure, standard-setters and other regulators around the world are increasingly mandating ESG disclosures in annual corporate reports. ESG-related information is different from the typical financial information provided in annual reports. The structure of financial reporting is well-established and has been taught in business schools for many decades. ESG-related disclosures are much more recent, are less standardized, and have not traditionally been included in business education. These characteristics of ESG-related information can pose challenges for standard setters to develop disclosure mandates that fulfill the objective of providing ESG information to support decision-making.

In this study, we find that ESG information is more effortful and difficult for decision-makers to process than financial information. We conduct an experiment that measures participant use of sustainability disclosures based on a psychophysiological measure of the participant's fixation duration on each type of information. Fixation duration is related to the amount of time that an individual spends mentally processing information. Analysis of fixation duration helps us to understand how participants use information while making their judgments. Fixation duration reflects underlying mental effort by participants (Fehrenbacher et al., 2018; Just and Carpenter, 1976). Consistent with its complexity and relative unfamiliarity, we find that participants have a significantly longer fixation duration on ESG information than on financial information. Furthermore, likely because ESG information presentation is less standardized, we find evidence that participants spend significantly more time on the labels of the ESG information than on the labels of the financial information. The difference in attention on values between ESG and financial information is smaller.

We also find that participants who found evaluating ESG information to be more difficult spent less time processing the ESG information. Interestingly, participants do not rate ESG measures to be less useful or less useful than financial measures. In response to the questions "Which type of information did you find more important (useful) for your evaluation of the overall performance of the Auto Ltd. Company?" (0 = *Only the financial and share performance information was important (useful)*; 100 = *Only the social and environmental information was important (useful)*), participants did not view either type of information as being significantly more important (useful). Untabled importance ratings averaged at 49.15 (SD. = 13.03); usefulness ratings averaged at 49.60

(SD = 10.12). This is despite our evidence that weighting of the two measure types for performance evaluation differed by the participant's familiarity with ESG.

Overall, our evidence indicates that participants' processing of ESG information was more effortful than financial information and that familiarity with ESG impacted their decisions. Participants who were unfamiliar with ESG information were less likely to consider the ESG information in their performance evaluations. These results argue for an increased focus on educating decision-makers about ESG information. Furthermore, because participants spent additional time examining ESG labels without the additional fixations affecting performance evaluations, our results also suggest that it could be beneficial to have more standardized measures.

While our laboratory experiment offered the opportunity to study the processing of ESG information relative to financial information, thereby controlling for factors hard to control for in the real world (e.g. order of information presentation), our study is subject to several limitations. For example, while we provide our participants with a combination of financial and ESG information, we cannot replicate the complexity of financial and ESG disclosures in the laboratory setting. Furthermore, based on our design choice to have opposing valences for the ESG and financial information, the generalizability of our results may be limited.

Key practical and research implications:

- Decision-makers must expend more effort to evaluate ESG information than financial information. Decision-makers who are shown both financial and ESG information spend more time processing the ESG information, particularly to understand what specific measures are being disclosed.
- Although decision-makers find ESG information more difficult to understand, they believe that ESG information has similar importance to financial information for valuation decisions.
- Familiarity with evaluating ESG performance is associated with how decision-makers include ESG information in overall performance evaluations. In particular, decision-makers who are more familiar with ESG information are more likely to include it in their valuation decisions.
- Based on the lack of standardization for ESG disclosures, the difficulty of understanding the information, and the relative unfamiliarity of ESG information for decision-makers, we argue that business curricula should include more ESG content so that ESG information is properly included in decision-making.

ESG: environmental social and governance.

Acknowledgements

The authors thank the research seminar participants at Australia National University, Florida International University, Maastricht University, Kobe University, Leuven University, the University of Queensland, the University of New South Wales and the University of Sydney for constructive suggestions. They further thank Eddy Cardinaels, Wai Fong Chua, Mandy Cheng, Kerry Humphreys, Michael Davern, Xinning Xiao, Yee Shih Phua, and Khim Kelly for thoughtful comments on various stages of the project. They thank the participants at the 2019 AMIS conference (Romania) and the 2021 European Accounting Association Conference (online). They also thank the Monash Business School and Australian Research Council (ARC LIEF grant LE130100112) for funds associated with the equipment used in the Behavioral Laboratory. This paper was developed from an earlier working paper by the same co-authors entitled, "Effect of CSR Information Presentation Order on Stakeholder Decision-Making."

Contributor agreement

All financial support has been acknowledged above, and we have not signed any agreements that might compromise the impartial reporting of data.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical considerations

The experiment was approved by Monash University's ethics committee and all participants approved their informed consent.

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Data availability

Data are available upon request from the first author.

Notes

1. For the purposes of this paper, we will use the terms "Corporate Social Responsibility" ("CSR"), "Environmental Social and Governance" ("ESG") and "Sustainability" to refer to the social and environmental activities of organizations. We do not consider governance aspects of ESG.
2. See IFRS (2023a, 2023b).
3. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464
4. The SEC issued rules in March 2024 https://www.wsj.com/finance/regulation/sec-climate-disclosure-greenhouse-gases-d57de27c but within less than two weeks, the rules were halted subsequent to a US Appeals court ruling https://www.wsj.com/articles/u-s-appeals-court-temporarily-halts-sec-climate-disclosure-rules-456f2f4c?mod=Searchresults_pos2&page=1. The rules are unlikely to be implemented under the Trump Administration.
5. Focusing on manager responses to how CSR information is reported, Johnson (2019) finds that relative to stand alone CSR reporting, incorporating CSR into financial reports results in a greater prioritization by managers of projects with financial rather than CSR benefits.
6. Although voluntary reporting in most of the world, Integrated Reporting is now mandatory for corporate reporting by publicly traded companies in South Africa. However, Integrated Reporting comprises a set of reporting principles rather than a detailed framework or standard. In 2020, the IIRC merged with the Sustainability Accounting Standards Board (SASB) under the auspices of the Value Reporting Foundation (VRF). Subsequently, the VRF along with the Climate Disclosure Standards Board (another provider of voluntary disclosure standards) has been consolidated into the ISSB, which has promulgated sustainability reporting standards (IFRS S1 and IFRS S2). Ideas underlying efforts by the IIRC, SASB, and CDSB to increase voluntary disclosure played an important role in development of the IFRS Sustainability reporting standards.
7. Given the recent regulatory focus on increasing social and environmental factors rather than more general governance, our scorecard only contains metrics related to social and environmental performance.
8. Related research on the Balanced Scorecard explores decision-makers evaluating multiple performance metrics, focusing on how decision-makers use scorecards with measure that differ across the individuals/

units being evaluated (e.g. Banker et al., 2004; Lipe and Salterio, 2000). The focus of our study is comparing the processing of financial versus nonfinancial ESG performance metrics. As a result, the performance metrics correspond to a single unit and are identical across treatments.

9. When we use deliberate, we mean effortful and conscious information processing. Deliberate processing has been associated with eye-tracking measures in psychology and accounting literature (see Fehrenbacher et al., 2018).
10. For example, a typical environmental performance measure reported by companies relates to carbon emissions. In our experiment, the label for reporting this dimension of performance is "CO2 Emissions from Energy Consumption (1000 tons)" and the value for 2016 is 105.
11. The longer the fixation duration, the higher the intensity of attention tends to be. With regard to eye-tracking, fixation duration can only be an approximation of attention, as individuals may look at something while thinking something else. There is an ongoing discussion in the accounting literature about when fixation duration can serve as a mediating variable when studying the effect of an accounting artifact on judgment and decision-making. Ko et al. (2023) and Kramer and Maas (2020) and explain that the lack of a direct relationship between intensity of attention and final judgment in their settings can be because higher-intensity levels of attention can be used by higher visual attention of decision-makers in various ways, leading to context-dependent outcomes and processing purposes. Fehrenbacher et al. (2019) classify these processing purposes as positive reasoning (e.g. processing confirming information, active discounting of disconfirming information) and negative reasoning (e.g. processing disconfirming information, active discounting of disconfirming information).
12. We applied for and received Ethics approval from the institution.
13. Role information primarily comprised mission statements for the participant's employer that state key goals. The mission statements provided are adapted from public information about the mission of the US Environmental Protection Agency (EPA) for the regulatory agency and the Blackstone Group for the investment company.
14. Numbers were adapted from Novo Nordisk's 2016 Integrated Report.
15. Participants need to develop an understanding whether a positive (+) or negative (−) trend means a positive or negative development for the firm for the financial and the CSR measures. For example, in the financial information a positive development in cost of equity can mean a negative development for the company. We did not include cost of equity as a measure but made participants specifically aware that each measure should be interpreted based on context by noting: "The sign [(+) or (−)] does not indicate whether the development is to be interpreted positively or negatively."
16. While there are negative and positive data CSR reported (see GRI), companies frequently disclose negative CSR trends (Pinnuck et al., 2021). Arnold et al. (2018) note that positive and negative CSR information have a differentiated impact on valuations by investors. Research indicates a stronger stock price reaction to negative CSR news than to positive CSR news (Karpoff et al., 2005; Klassen and McLaughlin, 1996).
17. Equation (1) compares fixations within participant across the two types of information. Estimating the model with participant fixed effects is not possible due to the small sample size. We therefore employ subject-level clusters since each subject is represented twice in the dataset—once for their fixation on ESG information and once for their fixation on Financial information.
18. In these models, N = 100 since we limit our analysis to the participant's fixation on the ESG information.
19. In untabulated results, we find that although there is a significant association between ESG performance evaluation and ESG fixations, this effect is subsumed by the impact of ESG familiarity on ESG performance evaluation. These results support the argument that longer fixations alone do not necessarily result in information being incorporated into the final decision.

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Appendix 1

Experimental instrument

The appendix shows the experimental materials for both the regulatory agency ("Environmental Regulator") and the investment company ("Investor") condition.

The information shown in the regulatory agency condition is displayed in { }

The information shown in the investment company condition is displayed in [ ]

Explanations are put in the brackets as per below

SCREEN BREAK

{You work at an environmental regulatory agency. The regulatory agency defines its mission as follows:

"Environmental protection is an integral consideration in our implementation of policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and these factors are similarly considered in establishing environmental policy.

Our objective is that all individuals are protected from significant risks to human health and the environment where they live, learn and work.

In short, our mission is to protect human health and the environment."}

[You work at an investment firm. The investment company defines its mission as follows:

"Our investments are designed to preserve and grow the partners' capital, provide financial security for millions of retirees, sovereign wealth funds, and other institutional and individual investors, and contribute to overall economic growth.

We are one of the world's leading investment firms. The firm seeks to create positive economic impact and long-term value for our investors, the companies it invests in, and the communities in which we work.

We do this by using extraordinary people and flexible capital strategies to help companies solve problems."]

Restate in your own words your employer's mission statement:

SCREEN BREAK

{Your task at the regulatory agency

You are in the process of developing new regulations for the automobile industry. One step in this process is to understand the overall performance of individual companies within the industry. This is a very important step, because it informs you about the state of the industry. In sum, to help inform the development of the regulation, you need to examine the performance of a sample of companies from the automobile industry.}

[Your task at the investment company

You are in the process of deciding whether the automobile industry is a good place to seek new investment opportunities. One step in this process is to understand the overall performance of individual companies within the industry. This is a very important step, because it informs you about the state of the industry. In sum, to help inform your investment decision, you need to examine the performance of a sample of companies from the automobile industry.]

In the following you will be presented with excerpts from the 30 June 2016 and the 30 June 2015 annual reports for the Auto Ltd. Company.

In addition, you will be given information on the change of the figures from 2015 to 2016. The signs "+" or "–" indicate whether there was a year on year increase (+) or decrease (–) of a particular measure. The sign does not indicate whether the development is to be interpreted positively or negatively.

Your task is to interpret the measures and results. Based on your interpretation you will be asked to develop a summary evaluation.

Your task is to evaluate the overall performance of the Auto Ltd. Company.

{Check your understanding: please review the three statements below and tick the correct statements based on the information provided on this screen.

In the case you are employed by a regulatory agency. TICK IF TRUE

The case states that the regulatory agency needs to save costs. TICK IF TRUE

You are asked to evaluate the overall performance of the Auto ltd. Company. TICK IF TRUE}

[Check your understanding: please review the three statements below and tick the correct statements based on the information provided on this screen.

In the case you are employed by an investment company. TICK IF TRUE

The case states that the investment company needs to save costs. TICK IF TRUE

You are asked to evaluate the overall performance of the Auto ltd. Company. TICK IF TRUE]

* If the ticks are not correct the following error message is shown: "You did not tick the appropriate statements. Please review the information and try again. Please ask the facilitator if you need help." Participants can only proceed if they tick the correct statements. *

Your task now is to evaluate the overall performance of the Auto Ltd. Company.

SCREEN BREAK

Display of annual report in two conditions: Financials First vs Financials Second

Key Figures financial year end 2016 compared to financial year end 2015

	2016 (30.06)	2015 (30.06)	Change
Financial Performance:			
Sales (in Mio. Dollars)	66,034	60,012	+10.0 %
Operating profit (in Mio. Dollars)	22,057	18,527	+19.1 %
Free Cash Flow (in Mio. Dollars)	17,914	14,256	+25.7 %
Share Performance:			
Share Price	33.35	30.01	+11.1%
Dividend per Share	3.57	3.32	+7.5%
Market Capitalization (in Mio. Dollars)	315,059	301,089	+4.6%
Social Performance:			
Donations (in Mio. Dollars)	58.6	69.5	-15.7%
Employee Turnover	17.2%	12.3%	+4.9%
Relevant Employees trained in Business Ethics	7.1%	10.5%	-3.4%
Environmental Performance:			
Energy Consumption (1,000 GJ)	2,634	1,987	+32.6%
Water Consumption (1,000 m^3)	2,221	2,021	+9.9%
CO2 Emissions from Energy consumption (1,000 tons)	105	95.45	+10%

Please evaluate the overall performance of the company from 0 (Very Low) to 100 (Very High).

	0 = Very Low		100 = Very High
Performance:	0–100 scale (SLIDER)—Interval of 5		

SCREEN BREAK

How difficult was it to you to evaluate the financial and share performance of the Auto Ltd. Company? (0—Not at all difficult to 100—Very difficult)

	0 = Not at all difficult		100 = Very Difficult
Difficulty to evaluate Financial and Share Performance:	0–100 scale (SLIDER)—Interval of 5		

How difficult was it to you to evaluate the social performance and environmental performance of the Auto Ltd. Company? (0—Not at all difficult to 100—Very difficult)

	0 = Not at all difficult		100 = Very Difficult
Difficulty to evaluate Social and Environmental Performance:	0–100 scale (SLIDER)—Interval of 5		

SCREEN BREAK

Overall, assess the level of financial performance and share performance of the Auto Ltd. Company from 0 (Very Low) to 100 (Very High).

	0 = Very Low		100 = Very High
Financial and Share Performance	0–100 scale (SLIDER)—Interval of 5		

Overall, assess the level of social performance and environmental performance of the Auto Ltd. Company from 0 (Very Low) to 100 (Very High).

	0 = Very Low		100 = Very High
Social and Environmental Performance	0–100 scale (SLIDER)—Interval of 5		

SCREEN BREAK

Which type of information did you find more important for your evaluation of the overall performance of the Auto Ltd. Company?

	0 = Only the financial and share performance information was important	50 = The financial and share information and the social and environmental information were equally important	100 = Only the social and environmental information was important
Information Importance:	0–100 scale (SLIDER)—Interval of 5		

SCREEN BREAK

Which type of information did you find more useful for your evaluation of the overall performance of the Auto Ltd. Company?

	0 = Only the financial and share performance information was useful	50 = The financial and share information and the social and environmental information were equally useful	100 = Only the social and environmental information was useful
Information Usefulness:	0–100 scale (SLIDER)—Interval of 5		

SCREEN BREAK

What is the likelihood you would invest your income into the following investment categories?

Cash 1–7 (Not at all likely to Very likely)
Bonds 1–7 (Not at all likely to Very likely)
Shares 1–7 (Not at all likely to Very likely)
Investment Funds 1–7 (Not at all likely to Very likely)
Real Estate 1–7 (Not at all likely to Very likely)

Have you invested your income in at least one of the categories above? YES/NO

Do you plan to invest your income in at least one of the categories above in the future? YES/NO

SCREEN BREAK

What is your level of familiarity with Corporate Social Reporting? 1–7 (Not at all familiar to Very familiar)

What is your level of familiarity with Integrated Reporting? 1–7 (Not at all familiar to Very familiar)

SCREEN BREAK

What is your gender?

How old are you?

Please tick the degree you are in:

- Master
- Bachelor

Please write the name of your degree: _____

How many years of work experience do you have (part time and full time): _____

For which unit are you doing this study?

What is your country of birth?