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How do visual cues in ESG reports affect investors' decisions and company outcomes in terms of financial performance and ESG score?"

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Abstract:

This paper aims to show the impact of visual cues (images) in ESG reports on the behavior's investors, the ESG score, and the company's performance. We manually counted the number of times that images (for aesthetic and not infographics) appeared in a large collection of 1,667 ESG reports between 2007 and 2020. Firstly, we find that the impact of the number of images in ESG reports on companies' ESG scores is not significant. However, the use of images seems to negatively influence the social pillar score. Secondly, we find that visual cues impact the investors' decision-making in the long-term (60 days around the release of the ESG report) but not in the short-term (1-2 days around the release). Thirdly, we show that more evidence is needed to understand the specific influence of visual cues on financial performance. Overall, this paper contributes to prior literature by showing that there exists a link between the number of visual cues in ESG reports and investors' decision-making processes and offering practical implications for companies seeking to enhance their ESG performance and attract socially responsible investors. It also offers valuable insights for companies engaged in ESG reporting, an area where there is currently a lack of standardized regulations.

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1. Introduction

In the rapidly evolving landscape of contemporary finance, a significant shift has been observed as investors increasingly align their financial goals with their personal values (Eccles et al., 2012). ESG investors seek to ensure the companies they fund are responsible stewards of the environment, good corporate citizens, and are led by accountable managers (Investopia, 2023). “Environmental, social, and governance (ESG) refers to the three central factors in measuring the sustainability and ethical impact of an investment in a company or business” (Market Business News, 2023). These criteria help to understand better the risks and opportunities associated with a company and its impact on stakeholders, including investors. ESG investing involves integrating environmental, social, and governance considerations into investment decision-making, with the aim of generating both financial return and positive societal impact.

As the importance of ESG factors in investment decision-making continues to grow, researchers have extensively explored various dimensions of ESG disclosure, such as textual information and narrative attributes, in shaping investor perceptions and actions (Brammer et al., 2020; Chen et al., 2021; Dhaliwal et al., 2011). Several studies have also examined the relationship between the aesthetics of the image and investor decision-making. For example, visual cues are associated with the information’s readability. In fact, Ben-Rephael et al (2021) highlight the importance of visual readability for information assimilation. Over time, firms have increasingly included texts accompanied by more, graphs, charts, and images in their disclosures to improve readability. However, more evidence is needed regarding the potential influence of visual cues in ESG reports on investor decision-making and their subsequent effects on the company's performance.

Given the extensive use of images in ESG reports, it is essential to understand their role and influence on investors’ behavior and companies’ performance. This paper, therefore, seeks to fill this gap by investigating the relation between visual cues in ESG reports and investor behavior as well as a company's financial and ESG performance.

ESG reports, or environmental, social, and governance reporting provide an ideal laboratory to conduct this analysis for several reasons. Firstly, ESG reporting is a growing trend in the business world. It involves companies communicating their performance and impact in these three areas. ESG reports have also gained significant importance in the finance sector, serving as a crucial source of information for investors (Hawkins and Kolk, 2019). Secondly, as sustainable investing becomes more prevalent among the public, ESG reports play a vital role in conveying a company's commitment to environmental, social, and governance practices

(Clark et al., 2020). Thirdly, despite a few standardization initiatives such as the Global Reporting Initiative (GRI) and the EU Taxonomy, there is still a lack of regulation in this area, which allows companies a certain amount of freedom in presenting their ESG performance (KPMG, 2020).

This article is an empirical analysis to determine whether visual cues provide information value to investors and if the use of images can influence companies' performance. The research question is the following: "***How do visual cues in ESG reports affect investors' decisions and company outcomes in terms of financial performance and ESG score****?"*

In carrying out this research, we manually collect the number of images in each single report of a sample of 1,667 ESG reports from 2007 to 2020. Our primary prediction was that companies with poor ESG scores would have a reporting strategy with more images. However, we did not expect that companies with a good ESG score have a reporting strategy with as many images as those with a poor ESG score.

We further look at the influence of the visual cues in ESG reports on investors' decisions and on companies' financial performance as we know that infographics in financial reports influence the decision-making of investors (Cox & Goeij, 2020). Bertrand and Morse (2011) demonstrate through investors' cognitive biases that infographics in financial reports were effective in highlighting information, giving it greater weight in decision-making.

This thesis contributes to prior literature in several ways. First, it shows the link between the visual cues in ESG reports and investors' decision-making processes. Secondly, it assesses the impact of the use of images in ESG reports and the ESG score of the company, by also highlighting the fact that the use of images is conducive to the social pillar in ESG reports. Finally, it offers practical implications for companies seeking to enhance their ESG performance and attract socially responsible investors.

This paper is further organized as follows. In the first part, we will conduct a literature review and present our hypotheses. This section will present a thorough examination of the existing body of research on the topic, followed by a discussion of the hypotheses that we have drawn from this research. The second section will be dedicated to sample selection and data description. We will explain how and why we selected our sample and provide a detailed description of the data that we will be using in our analysis. Next, we will present the research design and the empirical analysis as well as the results. We will detail the methodology we have used for our study, the analysis we have conducted, and the findings that have emerged We will

close this analysis by answer to our 3 hypotheses. The following section will be devoted to the limitations of our research. We will discuss the factors that might limit the scope or validity of our findings. Finally, we will conclude by summarizing our main findings and evaluating their implications. We will also discuss the conclusions that can be drawn from our research and the questions it raises for future studies.

2. Literature Review & Hypothesis

2.1 Companies that use a high number of images in their ESG reports have a poor overall ESG score. What impact does the use of images in ESG reports have on the E (environmental), S (social), and G (governance) pillars separately?

The first hypothesis focuses on the fact that companies that use more images have a poor ESG score. It is also interesting to see the impact of the use of images in ESG reports on the different E, S, and G scores separately.

ESG reports do not simply transmit financial data, they are intended to communicate multiple and complex messages to stakeholders for a variety of purposes (Friske et al., 2020). The ESG ratings assess the impact of environmental, social, and governance factors on a company and a company's impact on the outside world. The ESG score of companies is calculated using several methods and can differ depending on the method. Indeed, the same company may receive very different scores from one agency to another (L'echo, 2022). In this research, we will concentrate on the MSCI method. To calculate the ESG score, the analysts look at the company's exposure to industry-specific risks, based on its business activities, the size of its operations, and where it operates. Then they look at how a company is managing its risks. They first collect the most relevant, publicly and disclose data, and use a precision approach, designed to ensure that the MSCI ESG rating highlights the most significant risks a company faces. After, they consider controversies that may indicate performance failures. In the end, they assign percentage weights to each ESG risk, according to the assessment of their time horizon and impact. The ESG scores are then combined and normalized relative to industry peers to achieve the overall ESG rating (MSCI, 2023)

ESG relies on third-party rating organizations to assess the bonafides of companies, but there is no single, unified standard or methodology behind ESG ratings. Inconsistencies have blurred the criteria for adherence to ESG principles, which can leave some investors unsure whether their money is really supporting an ethical and sustainable company. Moreover, studies have shown that more and more ESG funds include companies that are far from paragons of social and environmental responsibility (Forbes, 2022).

Concerning the visual content of the company report, there is a range of varied and complementary approaches to analyzing visual elements in ESG reporting (Martin, 2014).

Recent literature has studied the important role of visual artifacts (e.g., graphic elements, images, photos, and drawings) (Ewenstein & Whyte, 2009) and in disseminating promotional messages to organizational audiences (Van den Bosch et al., 2005). Furthermore, in the field of psychology, the role of images in communicating information has been widely studied. (Paivio, 1971). This has implications for ESG reports, as these documents, which are often intended for non-technical audiences (stakeholders), can benefit from the use of images to simplify complex information. In the ESG context, Elsbach and Kramer (1996) argue that images can be used to reinforce a company's image of social responsibility. In fact, properly managed, images related to the "social" aspect can be a considerable advantage for recruiting, retaining and engaging employees, and translate into a tangible driver of your employee value proposition. These images also demonstrate company's commitment to diversity, equity and inclusion, employee health and safety initiatives, workplace culture, etc. (OBATA, 2023)

Invernizzi et al. (2021) have shed some light on the visual content of ESG reports. In their study "Form and substance: The visual content of CSR reports and investor perceptions". The researchers carried out an in-depth content analysis of 11,211 pages of reports, revealing an average of 100.10 pages, 56.97 images, and 39.25 infographics per report. The images mainly depicted people, products, and operational contexts, with many illustrating the environmental and social aspects of CSR. The study showed that these images were mainly used to communicate positive messages and to foster a perception of trust in the publishing organization, in line with the principles of legitimacy theory (Suchman, 1995, p. 574). To better understand what legitimacy in this context is, we can refer to the conception of Burlea & Popa, where legitimacy theory "has the role of explaining the behavior of organizations in implementing and developing voluntary social and environmental disclosure of information in order to fulfill their social contract that enables the recognition of their objectives."

The legitimacy theory in this context is not positive. Indeed, the use of images and photos in CSR communication can be used to strategically improve stakeholders' perception of the organization, for example by mitigating the perception of unethical behavior or improving the perception of the positive impacts resulting from its activities (Joireman et al., 2018). Moreover, images conveying negative or inadequate performance are particularly rare, suggesting a strategic use of visuals to emphasize positive CSR activities and downplay less favorable aspects (Invernizzi et al., 2021).

CSR communications can be taken to extremes, for example by manipulating the company's image using greenwashing policies (Gatti et al., 2021; Lee et al., 2018). In fact, we are capturing an aspect of greenwashing whereby companies manipulate their ESG reports to appear "green" and give a positive image of their activities or ESG results (Dye et Sridhar, 2004). Previous literature has provided several definitions of greenwashing. Delmas et Burbano (2011, p. 65) define greenwashing as "the intersection of two behaviors: poor environmental performance and positive communication about environmental performance".

Furthermore, Lyon et Maxwell (2011, p. 9) define greenwashing as "the selective disclosure of positive information about a company's environmental or social performance, without full disclosure of negative information on these dimensions, to create an overly positive image of the company". It is easier to artificially manipulate an organization's image than to improve its sustainable development performance or value system (Dowling & Pfeffer, 1975). The use of images is one of the common techniques of companies that practice greenwashing. "Companies use images relating to ecology, nature, animals, humans, etc. to give the impression that they're environmentally conscious, eco-friendly, or socially responsible" (Greenly Institute, 2023). We can thus suggest that a high number of these images, particularly in the Environmental or Social pillar, can be a sign of greenwashing, so it can negatively influence the ESG score of companies because ESG score are calculated based on the disclosed and publicly available data (MSCI, 2023). But there is no evidence in previous research that the visual cues in ESG reports can directly influence the ESG score of the company.

2.2 Investors react negatively to the use of images in ESG reports.

This second hypothesis focuses on investor behavior toward the use of visual cues in sustainability reports. We posit that investors react negatively to sustainability reports with more visual cues. Given that investors base their decisions on the information contained in sustainability reports, and that this information is unverified, voluntary, and unregulated (Allen et Ramanna, 2013), it is interesting to understand how they react to the visual content found in ESG reports.

The use of images in sustainability reports has been identified as an important piece of information likely to influence investor judgment (Elliott, Grant & Rennekampa, 2014). Davison (2013, p. 58) argues that "visualization can provide important framing and impression management when receiving information and thus influence decision-making". Impression

management refers to “the process by which managers try to control, more or less consciously or intentionally, the transmission of their image in order to be perceived, evaluated, and treated as favorably as possible” (Bozeman & Kacmar, 1997). Moreover, Godfrey, Mather and Ramsay (2003) attest that impression management is implemented when management induces bias in the information it reveals and presents it in a visually structured way in order to distort readers' perceptions (illusion effect) of the company's performance, in an attempt to maintain or improve the company's image (Cho, 2009; Livesey & Kearins, 2002; Merkl-Davies & Brennan, 2007).

However, the studies diverge. On the one hand, Cho et al. (2015) found that the use of emotional images in sustainability reports could increase investor engagement. Previous psychological literature also supports this view that images are easier to remember than words and that it does not seem to matter whether meaning is extracted from an image or its verbal label, meaning that "an image can serve as a word in context". (Nelson & Castano, 1984; Li & Xie, 2020) and occupy a more important place than words in cognitive memory (Davison, 2014). Indeed, Davison, 2007 and Warren, 2002, argue that the presentation of information enriched by the media can be a more effective means of communication than pure text. In addition, visual cues and their psychological implications have been recognized as essential elements in the decision-making process. Research has shown that our brains process images 60,000 times faster than text and that 90% of the information transmitted to the brain is visual (Rayner, 1998).

On the other hand, the use of photos and other forms of visual communication can potentially be used to distract or mislead readers (Lewis, 1984; Preston et al., 1996). According to Cho et al. (2009), the use of more images could in fact serve to obscure the true content of the disclosure and, as such, be used to mislead readers, thereby contributing to a distorted perception of the company's social performance. The use of images can sometimes distract from the main message, particularly when the image is not directly related to the content. (Lewis, 1984; Preston et al., 1996). This distraction may be a company reporting strategy to hide a lack of data to report. A key challenge in communicating CSR is how to minimize skepticism (Bhattacharya, 2011). Stakeholders can perceive CSR motives in two ways: intrinsic, in which the organization is viewed as acting out of genuine concern; or extrinsic, in which the organization is viewed as attempting to increase its profits (Bhattacharya, 2011).

In the context of ESG reports, the salience effect can also negatively influence investors' decisions through the disproportionate emphasis on visually striking images or graphs. Salience bias, also known as the salient effect, is a “cognitive bias that describes our tendency to focus on items that are more prominent or emotionally striking and ignore those that are unremarkable, even though this may not be objectively rational” (Hirshleifer, 2001). For example, a company might use prominent, emotionally appealing visuals to highlight certain positive achievements, while downplaying or ignoring less favorable aspects of their ESG performance. This can lead investors to focus too heavily on these visual cues, overshadowing textual information and comprehensive data that may be more vital for a well-rounded evaluation.

As a result, the visual cues could misguide investors, drawing their attention to superficial elements rather than underlying fundamentals. This can affect investment choices by emphasizing aspects of a company's ESG performance that may not correlate with long-term financial stability or ethical sustainability (Yalcin et al., 2016). Images are often employed in reports for aesthetic reasons, as a storytelling element, they may lack the credibility that documentary images hold because they can be altered to provide a fabricated depiction of reality. But aesthetic has proven to be an important aspect of communication that positively impacts the perceptions of stakeholders (Legendre et al., 2020). However, by relying too much on visually engaging content, investors may overlook critical details, leading to potentially suboptimal or even detrimental investment decisions. This might, therefore, raise concerns about the transparency, authenticity, and reliability of ESG reporting, and its alignment with investors' actual needs and values (Yalcin et al., 2016).

2.3 Companies with poor financial performance have a reporting strategy with more images.

In recent years, environmental, social, and governance (ESG) factors have become important considerations for companies. A series of studies underline the positive link between ESG performance and a company's financial performance (Du et al, 2017, et de Fombrun et al, 2000). Several studies have examined the performance of ESG investments compared to traditional investments. Some studies have found that ESG investments can outperform traditional investments, while others have found no significant difference in performance. However, most studies have found that ESG investing can provide long-term financial benefits, such as reduced risk and improved returns (Eccles & al., 2014).

Eccles, Ioannou & Serafeim (2014) conducted ground-breaking research in which they analyzed the long-term performance of companies committed to sustainability compared with those that were not. The authors found that companies with a strong focus on sustainability outperformed their counterparts over the long term, both in terms of stock market performance and accounting criteria. This study suggests that commitment to sustainability, a key aspect of ESG performance, can improve a company's overall financial performance. Orlitzky, Schmidt et Rynes (2003) have published a meta-analysis that found a general positive correlation between the social and financial performance of companies. This study highlights that companies that actively address the 'social' pillar of ESG tend to enjoy better financial performance.

Now that we have highlighted the link between ESG performance and financial performance, we want to know what previous researchers say about the link between the impact of visual cues on financial performance.

As we pointed out in the previous section, investors can be influenced by visual cues in ESG reports. Zekri, I. (2005) highlights in her article that investors' decisions have a significant impact on companies' financial performance. When investors are optimistic about a company's future, they are more likely to buy its shares, which increases the share price. This can lead to higher revenues and profits for the company, as it can sell more shares at a higher price. In addition, optimistic investors are more likely to invest in the company, which can provide it with the funds it needs to grow and prosper. However, when investors are pessimistic about a company's future, they are more likely to sell its shares, causing the share price to fall. This can lead to lower revenues and profits for the company, as it can sell fewer shares at a lower price. In addition, pessimistic investors are less likely to invest in the company, which can cause it to lose valuable funds. There is evidence that the investors play a big role in business performance.

According to Davison and Skerratt (2007), UK companies with high intangible asset values were more likely to use visual and stylistic aspects in their financial reporting. In the article “When and how aesthetics influences financial decisions”, the authors Townsend & Shu (2010) investigates the influence of aesthetics on financial decision-making. The authors find that the aesthetics of an annual report have a significant impact on a company's valuation by the investors. Which can be also the same case for the ESG reports.

Overall, based on prior literature, visual cues influence investors' decision and indirectly it also influence the financial performance of the firm. However, company financial performance is a complex concept to evaluate, given the different ways it can be measured and the factors that can influence it (Clark et al., 2006; de Waal, 2002). For this research, we choose the Return on Assets (*ROA*) as an indicator of the company financial performance.

3. Sample selection & data description

To investigate the impact of visual cues in ESG reporting on investors' reactions, company performance, and the ESG score, we have constructed a sample based on available online data. In this section, we describe the sample selection and the characteristics of the data used for our study.

3.1 Sample selection

This paper focuses on stand-alone ESG reports provided by firms between 2007 and 2020. Our sample includes all the firms in the MSCI ESG database between 2007 and 2020. The sample contains 1,667 reports for 416 unique firms. We reduced the sample to 1,166 reports because the number for the variable "Lack of content & aesthetic" was missing. We deleted 501 rows to avoid errors in the model.

Focusing on stand-alone ESG reports instead of integrated reports offers advantages in terms of specificity, transparency, comparability, and the ability to track the evolution of sustainability practices over time. Stand-alone reports provide dedicated and detailed information on a company's ESG performance, making comparisons easier and facilitating research (Miranda Partners, 2021).

3.2 Data description

The variables used in our study come from various reliable data sources (Compustat, IBES, and CRSP). We selected the most interesting data for this research. The variables used in our regressions are dependent, independent, and control variables (which are also independent variables).

3.2.1 Control variables

The control variable is a variable that is not of interest to the research's objectives but is controlled in the regression because prior literature has shown that it influences the outcomes

(dependent variable). Control variables can help prevent model biases like omitted variable bias from affecting your results (Bhandari, 2021).

We establish an extensive range of control variables based on prior literature, which examines factors that affect the investor's decision, ESG score, and financial performance of the company. We first control firm performance variables. Firstly, one of the key variables we have analyzed is Return on Assets (*ROA*), which is an important indicator of a company's profitability. *ROA* is calculated by dividing net profit by total assets at the end of the previous year. It is a measure of how effectively the company is using its assets to generate profits. (Investopedia, 2021). The second variable, *MOMENTUM*, refers to the continuous tendency of a stock to move in a particular direction. It's defined as "the one-year cumulative abnormal return from the [-375, -10] trading day window, where the event is the ESG reporting date" (Thewissen, 2023). Next, *SURPRISE* is a variable that represents the gap between a company's actual results and market expectations (Investopedia, 2021). Finally, the *EPSdecline* is a measure of the change in a company's earnings per share from one period to the next. *ESPdecline* equals one if the EPS declined in the current year, and zero otherwise. Each of these variables provides valuable information about a company's financial and operational performance, and by controlling them we can gain a better understanding of how these factors interact and influence overall company performance. Company size, *SIZE* variable, is measured as the natural logarithm of total assets at the end of the current year (Thewissen, 2023). A company's size can influence many aspects of its performance, including its profitability, its ability to take risks, and its resilience to economic shocks. Larger firms often have more visibility and receive greater stakeholder pressure to engage in ESG disclosure (Bushman and Smith, 2003).

When we talk about the market's reaction to information about companies, various variables come into play. The *R&D* variable is a company's investment intensity in the creation of new products or services or the improvement of existing offerings. It represents the research and development expenses deflated by sales during the year (Thewissen, 2023). The *LIQUID* variable refers to the liquidity of the company's stock. More liquid shares are generally preferred by investors because they can be quickly converted into cash if necessary. In this work, *LIQUID* is calculated as the number of shares traded divided by the total number of shares outstanding for the same year (Thewissen, 2023). The variable *FIN*, on the other hand, represents the company's financing activities, which can be linked to factors such as outstanding debts, capital expenditure, and cash flow needs. We calculate *FIN* as the firm's net debt amount and raised equity capital (i.e., the sum of the net sale of common and preferred shares and net long-term

debt issuance) during the year scaled by total assets at the year-end (Thewissen, 2023). *NoA* is measured as the natural logarithm of one plus the number of financial analysts at the end of the same year (Thewissen, 2023). This measure is used to normalize company size distributions and make comparisons more meaningful. The *GEOsegments* and *BUSsegments* variables represent the number of geographic and business segments of a company (=operating complexity). Following Huang et al. (2013), we control for the operating complexity of the firm and include the logarithm of one plus the number of geographical *(1+GEOsegment)* and business segments *(1+BUSsegment)* (Thewissen, 2023).

Regarding information uncertainty, the *LEV* (leverage) variable is an indicator of a company's level of debt. It's calculated as total debt (the long-term plus short-term debt) divided by total assets at the year-end (Thewissen, 2023). Finally, we control for earnings uncertainty *VOLATILITY* as a measure of the fluctuation in a company's share price. It's calculated as the standard deviation of *ROA* for a period of five years (Thewissen, 2023).

We also include a series of text-based variables from the ESG report. The *FOG* variable, based on Robert Gunning's FOG index, is used to assess the readability of a text (Du and Yu, 2020). The FOG index measures the complexity of a text in terms of the length of sentences and the difficulty of the words used. "It provides the reader with the number of years of education that he hypothetically needs to understand and digest a particular text on the first reading" (Corporate Finance Insitute, 2020). FOG is measured as the average number of words per sentence added with the percentage of words per sentence (Thewissen, 2023). The *WC* refers to the length of the report, measured in words. A longer report may contain more information, but it may also be perceived as more difficult to read or understand. We also include the tone of the ESG report, *TONE* reflects the overall feeling of the text. A more positive tone may indicate a positive company attitude towards ESG issues, while a more negative tone could indicate concerns or problems. It is measured as the spread in the number of positive and negative words, scaled by the number of words in the ESG report (Thewissen, 2023). We define the ESG emphasis measure (ESGemph) as "the sum of the ESG-specific words from the Baier et al. (2020) list, divided by the total number of words in the ESG report. ESGemph measures the degree of emphasis placed on ESG issues in the report" (Thewissen, 2023). A greater emphasis may signal a stronger commitment by the company to ESG practices, which could be perceived positively by ESG-conscious investors.

We further control the specificity and uncertainty of the ESG report. *SPECIFIC* refers to the specificity of the information provided in the report. More specific information can help investors better understand a company's ESG practices and make more informed decisions. It

is measured as the total number of unique named entities detected by NER (Named Entity Recognition) automated tool (Apache NER) that "identify the terms mentioning named entities, such as a person, organization, location, percentage, monetary value and date" (Thewissen, 2023). The *UNCERTAIN* variable assesses the degree of uncertainty expressed in the report. This variable indicates the percentage of uncertain words in the text based on Loughran and McDonald (2014)'s lists of uncertain words (Thewissen, 2023). Greater uncertainty may be of concern to investors as it could signal future risks or challenges. Finally, the forward-looking (*FWDLOOK*) variable refers to the extent to which the report focuses on prospects rather than past achievements. A more forward-looking report can be viewed positively, as it shows that the company is focusing on planning for and adapting to future challenges. Bozanic et al. (2018) show that "disclosures with more forward-looking information are associated with a stronger market reaction". Based on the method adopted by Henry (2008); Henry et al. (2021) and Athanasakou and Hussainey (2014) to identify forward-looking sentences, the *FWDLOOK* is calculated as the proportion of forward-looking sentences (Thewissen, 2023).

By combining these measures, we can gain a better understanding of how the company communicates its ESG practices and how these communications may be perceived by investors. Moreover, by controlling and analyzing all these variables, we can gain a more detailed and nuanced view of a company's performance and how it is perceived by the market.

3.2.2 Dependent variables

The dependent variable is the variable that is being measured or tested (Cherry, 2022). In this work, we will measure any resulting changes to the dependent variable. We have dependent variables |to test the investor's reaction (|*CARj*|), the ESG Score (*ESGscore*), and the financial performance of the companies in our regressions (*ROA*).

3.2.3 Investor's reaction

To assess investors' reactions to the use of visual cues in ESG reports, we measure the absolute cumulative abnormal return around the release of the ESG report. |CARj| represents the total cumulative abnormal return around the release date of the firm j's ESG report (Thewissen, 2023). We consider three periods;|CAR [-1,+1]| means that we calculate the cumulative abnormal return on the company's shares over a period of three days: the day before the event (-1), the day of the event (0), and the day after the event (+1). Similarly, |CAR [-2,+2]| refers to an observation period of five days, two days before the event, the day of the event, and two days after the event. |CAR [+1,+60]|, on the other hand, means that we calculate the cumulative abnormal return on the company's share over a period of 60 days, starting the day after the event

(+1) and ending 60 days after the event. By taking the absolute value of these CAR values, we are interested in the magnitude of the price change, regardless of the direction (up or down) of the change. This allows us to focus on the overall impact of the release of the ESG report on the share price, regardless of whether it had a positive or negative effect.

3.2.4 ESG score

In our regression model, the primary dependent variable is the *ESGscore*, which represents a company's comprehensive performance in terms of Environmental, Social, and Governance (ESG) factors. The *ESGscore*, in this case, specifically refers to the MSCI ESG score, calculated by the MSCI ESG Research LLC, a globally recognized provider of ESG (Environmental, Social, and Governance) data and analysis (MSCI, 2023). The *ESGscore* is calculated by MSCI using a seven-point scale, from AAA (the best) to CCC (the worst). This score is derived based on the firm's exposure to industry specific ESG risks and how well the firm manages those risks compared to its peers. The calculation considers both positive practices that mitigate risks and controversies that might indicate risk exposure (MSCI, 2023). The MSCI ESG score considers several key metrics across three major 'pillars' or dimensions: the MSCI_GOVERNANCE_PILLAR, MSCI_SOCIAL_PILLAR, and MSCI_ENVIRONMENTAL_PILLAR.

The MSCI_GOVERNANCE_PILLAR score evaluates how well a company is managed, with emphasis on corporate governance factors like board structure, executive compensation, corruption issues, financial transparency, and shareholder rights. A higher score on this pillar implies better governance and risk management practices in the company (MSCI, 2023).

The MSCI_SOCIAL_PILLAR score assesses a company's ability to manage its relationships with employees, suppliers, customers, and the communities in which it operates. This includes factors such as labor management, health & safety, human capital development, product safety & quality, and privacy & data security (MSCI, 2023).

Lastly, the MSCI_ENVIRONMENTAL_PILLAR score measures a company's impact on the environment and its management of environmental risks. It considers factors such as climate change, natural resources, waste and pollution, environmental opportunities, and the firm's overall carbon footprint (MSCI, 2023).

These three pillar scores are crucial in understanding a firm's ESG performance more granularly, as they highlight different aspects of the firm's ESG risk management and practices. In our regression model, these three pillar scores serve as dependent variables, allowing us to understand their respective impacts on the company's ESG performance and potentially the company's value but also to assess if the use of images is more related to one of these pillars.

3.2.5 Financial performance

In our regression model, another dependent variable is the Return on Assets (ROA), a commonly used profitability ratio that gives us an idea of how effective a company is at using its assets to generate earnings (Investopedia, 2023).

The ROA is measured as the income before extraordinary items divided by total assets at the end of the previous year (Thewissen, 2023). The resulting figure, expressed as a percentage, reflects the company's ability to convert the money used to purchase assets into net income or profits. In essence, ROA tells us how much profit a company generates for each unit of assets. A high ROA signifies that the company is more efficient at using its assets to produce a profit. When comparing companies in the same industry, a higher ROA could indicate a competitive advantage.

In our study, we're interested in assessing the impact of the use of visual cues (images) in ESG reports on financial performance. Therefore, we're evaluating whether there's a correlation between the number of images in ESG reports and the company's ROA. The goal is to determine if visual presentation in ESG reports, as a part of the company's sustainability communication strategy, can have a measurable effect on the company's financial performance.

4. Research design

4.1 Regression model

We estimated three multilinear regression models to analyze the impact of the selected variables on company performance, ESG score, and investors' reactions. The variables used in these models include:

- ESG score (ESGscore)
- Mesure de la qualité de la gouvernance d'une entreprise. (MSCI_GOVERNANCE_PILLAR_SCORE)
- Évalue l'impact environnemental d'une entreprise (MSCI_ENVIRONMENTAL_PILLAR_SCORE).
- Évalue les pratiques sociales d'une entreprise (MSCI_SOCIAL_PILLAR_SCORE).
- Firm size (SIZE)
- Firm's return on assets (ROA)
- financial leverage (LEV)
- Financing activities (FIN)
- Stock liquidity (LIQUID)
- Research and development intensity (RD)
- Analyst following (log_NoA)
- Operating complexity (BUSsegment)
- Operating complexity (GEOsegment)
- Earnings surprise (SURPRISE)
- Earnings uncertainty (VOLAT)
- Momentum (MOMENTUM)
- The absolute cumulative abnormal return around the release date of the firm j's ESG reports (CAR1.W, absCAR2.W, absCAR60.W)
- The logarithm of the total number of words in the document (WC.W)
- Readability (FOG.W)
- The tone of the ESG report (TONE.W)
- The percentage of uncertain words in the text is based on Loughran and McDonald (2014)'s lists of uncertain words. (UNCERTAIN.W)
- Specificity of the text (SPECIFIC.W)
- The proportion of forward-looking sentences (FWDLOOK.W)
- ESG emphasis measure (ESGemph.W)
- The number of images in ESG reports (LACK OF CONTENT & AESTHETICS)

The study utilizes a quantitative approach to investigate any correlation between the use of visual cues in ESG reports and the investors' reaction, the company's financial performance, and ESG scores. These regression models, produced using R studio software, account for relevant control variables for the specific factors impacting the dependent variables. In summary, our study uses a rigorously selected sample and a variety of variables to analyze the impact of visual cues in ESG on company performance, ESG score, and investors' reaction.

4.2 Summary of Statistics and Correlation Matrix

4.2.1. Statistics

	Mean	Median	Standard deviation	Minimum	Maximum
Dependent Variables					
|CAR[−1,+1]|	1.38	0.99	1.34	0.00	6.24
|CAR[−2,+2]|	1.88	1.28	1.90	0.00	9.34
|CAR[+1,+60]|	7.69	5.10	8.38	0.03	33.18
ESGscore	5.33	5.42	2.18	0.00	10.00
ROA#	6.36	5.66	6.58	-29.58	34.93
Independent Variables					
LACK OF CONTENT & AESTHETICS#	57.27	40.00	109.67	0.00	3201.00
BUSsegment#	1.47	1.39	1.03	0.00	3.18
GEOsegment#	1.78	1.95	1.03	0.00	3.85
SURPRISE	0.00	0.00	0.01	-0.18	0.05
VOLAT	4.03	2.13	17.55	0.03	553.03
LEV	27.32	25.98	16.16	0.00	85.99
FIN	-1.83	-1.66	8.23	-84.92	44.34
LIQUID	2.29	1.83	1.64	0.07	20.48
RD	4.95	0.83	7.74	0.00	40.06
SIZE#	62754.03	15637.95	161299.07	218.83	1951757.00
WC.W#	13147.72	9422.50	12493.05	187.22	61734.72
FOG.W	23.64	22.93	4.08	16.94	44.69
MOMENTUM	-0.01	0.00	0.50	-3.37	2.28
UNCERTAIN.W	0.47	0.44	0.25	0.00	1.52
ESGemph.W	6.37	6.37	1.48	1.97	11.06
SPECIFIC.W	2.83	2.61	1.07	1.18	8.41
FWDLOOK.W	5.11	4.52	3.54	0.00	17.47
NoA#	15.56	15	7.23	3	47
TONE.W	1.06	1.04	0.73	-0.84	2.86
MSCI_GOVERNANCE_PILLAR_SCORE	5.80	5.60	1.81	0.40	10.00
MSCI_ENVIRONMENTAL_PILLAR_SCORE	5.71	5.60	2.27	0.00	10.00
MSCI_SOCIAL_PILLAR_SCORE	4.71	4.60	1.72	0.00	10.00 [1]

The first part of this table provides the mean and median of the dependent variables. Concerning the cumulative absolute abnormal returns (|CAR[j]|), the average cumulative absolute abnormal returns during the 1-day (|CAR [−1,+1]|) is equal to 1.38%. For the cumulative absolute abnormal returns during the 60-day (|CAR [+1,+60]|), the average is equal to 7.69%. These numbers show that investors react late. These findings also verify the long-term effect on the stock price surrounding the publication of the ESG report, as indicated by Thewissen (2023).

The mean and the median for the *ESGscore* are respectively 5.33 and 5.42 (out of 10), which means that the ESG score of the companies in our sample is mainly considered as "average" according to MSCI (Techtarget, 2023). In fact, the average rating has a score between 2,857 and 5,713. It also indicates a balanced distribution of ESG scores among the entities studied.

[1] Note: This table presents the summary statistics (mean, median, standard deviation, minimum and maximum) of variables.
# denotes that we use the natural logarithmic values in the regression models.

However, the presence of a standard deviation of 2.18 suggests some variability in the scores, which could reflect significant differences in ESG practices between the different companies.

The average financial performance of firms in our sample (*ROA*) equals 6.36%, which means that these companies have a moderate return on their assets. However, the standard deviation of 6.58 and the range of values from -29.58 to 34.93 indicate a large variability in return on assets, which could be due to differences in operational efficiency and asset management between companies.

The other part of this table reports the descriptive statistics of our control variables. We can divide our control variable into two categories. The first category includes all the variables about the firms' performance. The second category concerned all the variables related to the ESG reports of these firms. For the control variables related to the firms' performance, the average firm in our sample has a market capitalization (*SIZE*) of $62,754 million, 4.03% of volatility (*VOLAT*), and leverage (*LEV*) of 27.32%. These companies are followed by an average of 15.56 financial analysts. The average number of business (*BUSsegment*) segments is 1.47 and geographical segments (*GEOsegment*) is equal to 1.78. Finally, the average liquidity of their stock is 2.29%. If we look at the three pillars of ESG separately, it shows that our sample score on average is 5.8 for the governance pillar, 5.71 for the environmental pillar, and 4.71 for the social pillar.

Concerning the control variables related to the firms' ESG reports, the average ESG report contains 13,147 words (*WC. W*). The average FOG index (*FOG.W*) for our sample is 23.64, which means that it's too hard for readers to understand (Ubiquity, 2022). The ESG reports contain 5.11% of forward-looking sentences (*FWDLOOK.W*), while the number of uncertainty words (*UNCERTAIN.W*) is equal to 0.47%, out of the total number of words. For the tone of the ESG reports (*TONE*), the means is equal to 1.06% which shows that the disclosures tend to be on the positive side. The table shows that the ESG emphasis (*ESGemph*) for the reports in our sample is 6.37%. The average number of images present in the disclosures (*LACK OF CONTENT & AESTHETICS*) is 57,27 and the median is 40.00. This suggests that most ESG reports have a high number of images. This descriptive analysis revealed valuable information about the distribution and variability of the sample.

4.2.2. Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
(1) Abs CAR1																												
(2) Abs CAR2	0.633***																											
(3) Abs CAR60	0.227***	0.232***																										
(4) Lack	-0.050	-0.052	-0.070*																									
(5) BUSsegment	0.079**	0.060*	0.117***	0.015																								
(6) GEOsegment	0.103***	0.058*	0.147***	0.001	0.275***																							
(7) SURPRISE	-0.012	-0.034	-0.009	0.002	0.082**	-0.021																						
(8) EPSdecline	0.041	0.032	0.071*	-0.017	0.013	0.064*	0.080**																					
(9) VOLAT	-0.032	-0.019	-0.027	0.047	-0.020	0.023	0.042	0.096**																				
(10) LEV	0.026	0.059*	-0.045	0.089**	-0.030	0.028	0.034	0.044	0.012																			
(11) FIN	-0.028	-0.008	-0.033	0.022	0.034	-0.014	0.008	0.072*	-0.001	0.141***																		
(12) LIQUID	0.171***	0.168***	0.152***	-0.064*	-0.042	0.009	0.064*	0.227***	0.125***	0.116***	-0.016																	
(13) RD	0.051	0.020	0.054	-0.005	0.177***	0.344***	0.035	0.112***	0.065*	-0.095**	-0.083**	0.024																
(14) SIZE	-0.003	-0.022	-0.050	0.095**	-0.000	-0.091**	-0.061*	-0.127***	-0.099***	-0.066*	0.049	-0.283***	-0.036															
(15) WC	-0.003	-0.003	-0.041	0.225***	0.008	-0.035	0.010	-0.046	0.004	0.059*	-0.007	-0.061*	-0.053	0.252***														
(16) FOG	-0.032	-0.021	0.020	0.023	0.045	0.062*	-0.007	0.015	-0.006	-0.054	0.017	-0.067*	0.114***	-0.000	-0.131***													
(17) MOMENTUM	-0.020	-0.038	0.009	-0.021	0.006	-0.029	-0.027	0.035	0.000	-0.050	0.016	0.013	-0.009	-0.045	-0.042	0.067*												
(18) UNCERTAIN	-0.016	0.008	-0.093**	0.036	-0.056	-0.088**	-0.045	0.044	0.019	0.033	0.029	-0.049	-0.110***	0.198***	0.234***	-0.059*	-0.002											
(19) ESGemph	0.026	0.017	-0.034	-0.110***	0.024	0.129***	-0.017	0.101***	0.061*	0.028	-0.055	-0.050	0.103***	-0.070*	-0.115***	0.229***	0.050	-0.117***										
(20) SPECIFIC	0.023	-0.012	0.039	-0.114***	0.078**	-0.017	0.011	-0.032	-0.011	-0.050	-0.000	-0.003	-0.004	-0.068*	-0.538***	0.119***	0.079**	-0.304***	0.056									
(21) FWDLOOK	0.043	0.024	0.004	0.054	0.105***	0.039	-0.038	0.013	0.005	0.062*	0.038	-0.014	-0.025	0.082**	0.267***	0.114***	-0.039	0.075*	-0.079**	-0.084**								
(22) NoA	0.103***	0.103***	0.093**	0.053	0.005	0.045	0.021	0.004	-0.051	-0.085**	-0.101***	0.202***	0.188***	0.437***	0.106***	-0.032	0.001	0.019	-0.056	-0.039	0.001							
(23) ESGscore	0.004	-0.032	-0.068*	-0.036	-0.095**	0.067*	0.005	-0.057	0.001	-0.032	-0.044	-0.083**	0.079**	0.092**	0.109***	0.038	0.017	0.005	0.123***	-0.035	-0.026	0.073*						
(24) ROA	-0.005	-0.008	-0.021	-0.013	0.023	0.110***	-0.036	-0.522***	-0.034	-0.090**	-0.274***	-0.094**	0.155***	-0.083**	-0.065*	-0.044	-0.043	-0.130***	-0.015	0.022	-0.074*	0.131***	0.078**					
(25) TONE	-0.019	-0.019	0.006	0.098***	-0.055	-0.041	0.016	-0.041	-0.046	-0.073*	-0.027	0.021	0.015	-0.021	-0.197***	-0.040	-0.029	-0.261***	-0.049	-0.006	0.011	0.074*	-0.035	0.037				
(26) MSCI E	-0.015	-0.032	-0.025	-0.016	-0.029	0.128***	-0.045	-0.100***	-0.040	0.030	0.010	-0.108***	0.047	0.192***	0.021	0.054	0.018	0.001	0.052	0.006	-0.031	0.071*	0.370***	0.057*	0.013			
(27) MSCI S	0.032	-0.014	-0.008	-0.076**	-0.070*	0.088**	0.033	-0.038	-0.002	-0.061*	-0.047	0.054	0.084**	0.019	0.093**	-0.007	0.004	0.029	0.066*	-0.045	-0.086**	0.060*	0.567***	0.062*	-0.064*	0.099***		
(28) MSCI G	-0.004	0.033	-0.031	-0.049	0.059*	-0.037	-0.019	-0.000	0.011	-0.053	-0.017	0.075*	-0.009	-0.115***	-0.032	-0.008	0.008	-0.010	-0.015	0.023	0.045	-0.006	0.256***	0.000	0.052	-0.096**	0.043	

[2]

This table represents the Pearson correlations of the main variables. It is important to note that correlations are not necessarily indicative of causal relationships, but they do provide indications of linear relationships between variables. The ***, **, and * symbols typically indicate the level of statistical significance in a correlation matrix, with *** being the most significant (usually $p < 0.01$), ** being moderately significant (usually $p < 0.05$), and * being less significant (usually $p < 0.1$). The absence of a symbol suggests the correlation is not statistically significant (EDQM, 2023).

The overall feeling of the text (*TONE*) shows a strong positive correlation of 9.8% significant at a 99% level with the number of images in the reports (*LACK*). In addition, the social pillar score (*MSCI S*) is strongly correlated (-0.076) with the number of images in the reports and is significant at the 95% level. The negative relationship shows that when the number of images tends to increase, the MSCI social pillar score tends to decrease. This shows the impact of the use of images on the social pillar score.

LACK also has a strong negative correlation at the 99% level with the ESG emphasis (*ESGemph*) and the specificity of the information provided in the report (*SPECIFIC*) of -11% and -11.4%. This negative effect shows that the more you use images in ESG reports, the less the focus of ESG and the specificity of information in reports. This can reflect the impact that images have on the credibility of information perceived by investors. It is also interesting to note that the negative correlation between ESGemph and SIZE of -0.070* implies that larger companies tend to place less emphasis on ESG in their reports. With these two results in mind,

[2] Note: This table presents the correlation matrix between the dependent variables and the control variables. The table shows Pearson correlation coefficients with significance levels 10 percent, 5 percent, and 1 percent denoted with ∗, ∗∗ and ∗∗∗, respectively.

we can look at the correlation between SIZE and LACK. The Pearson correlation shows a strong correlation between the LACK variable and the SIZE variable of 9.5%, significant at the 95% level. Companies with a larger market capitalization, therefore, use more images in their reports. There is an interesting link here between the fact that companies that use more images in their ESG reports place less emphasis on ESG in their reports. We also observed a weak but significant negative correlation at the 90% level of -7% between LACK and |CAR [+1,+60]|.

Note also that the ESG score is strongly correlated with company liquidity (*LIQUID*), investment in research and development (*RD*), market capitalization (*SIZE*), and the number of words in ESG reports (*WC. W*) as well as ESG emphasis (*ESGemphasis*). However, given that LACK and ESGemph are correlated and that ESGemph and ESGscore are also correlated, there may be an indirect link between LACK and ESGscore. This is what we will try to investigate in the analysis.

In conclusion, our analysis of the correlations between these variables provides valuable insights into the potential relationships between them. However, to determine causal relationships and fully understand how these variables interact, more in-depth analyses, such as multivariate regression, are required. This is what we are going to find out in our analysis.

5. Empirical Analysis & Results

We will divide our analysis into 3 points (each covering one hypothesis). To answer our hypotheses, we carried out several multilinear regressions to look at the link between our dependent variable (the one we are testing) and the independent variable (the one that could explain the dependent variable). Each of the regressions also considers control variables that have been shown to influence our dependent variable.

5.1 Companies that use a high number of images in their ESG reports have a poor overall ESG score. What impact does the use of images in ESG reports have on the E, S, and G pillars separately?

To assess the impact of the use of images in ESG reports, we first compute a linear regression with the dependent variable ESGscore. The results in Table 1 show that the LACK variable is not significant at the usual confidence level (0.1, 0.05, or 0.01). This suggests that, based on the data at our disposal, there is insufficient statistical evidence to conclude that companies that use a lot of images in their ESG reports have a poor overall ESG score. In other words, the use

of images in ESG reports does not appear to have a significant impact on a company's ESG score.

However, several other variables appear to have a significant effect on a company's ESG score. For example, BUSsegment (an indicator of the operational complexity of the company) and LIQUID (an indicator of the liquidity of the company's shares) have a negative coefficient of -0.175 and -0.137 respectively and are highly significant at the 99% level. In contrast, the total number of words in the document (WC. W) and ESG emphasis (ESGemph) have positive coefficients of 0.141 and 0.109 and are highly significant at the 99% level, suggesting that companies that write longer ESG reports and place more emphasis on ESG in their reports tend to have a higher ESG score.

The MSCI social score (MSCI_SOCIAL_PILLAR_SCORE) is the variable that most influence a company's ESG score in this model, with a regression coefficient of 0.646. This suggests that the S pillar has the greatest impact on the ESG score. This confirms the results obtained in the Funds study, which states that the S pillar has been the best performer in recent years (Funds 2020). The social dimension covers aspects such as the company's relationship with its employees, its contribution to the community, employee diversity, etc. Strong social performance can indicate good human resource risk management, commitment to the community, and attention to equity and social justice (OBATA, 2023). These elements can have a positive impact on a company's reputation and other factors that contribute to financial and non-financial performance, such as ESG scores. The MSCI's environmental and governance scores also have a significant impact on the ESG score, with regression coefficients of 0.314 and 0.343 respectively.

We did not stop there. Having seen in the correlation matrix that the variables LACK and MSCI S had a significant correlation coefficient, we then ran 3 linear regressions using the three MSCI pillars as dependent variables, see Table 2. We kept the same control variables as explanatory variables. The results of these regressions show that the impact of the LACK variable on ESG scores is different for the Environmental, Social, and Governance pillars.

For the environmental pillar (MSCI_ENVIRONMENTAL_PILLAR_SCORE) and for the governance pillar (MSCI_GOVERNANCE_PILLAR_SCORE), the LACK variable has a coefficient of -0.080 and -0.104, but these values are not significant. Given the negative relationship, it would negatively influence the score of these two pillars but we cannot conclude

in a statistically significant way that the use of images in ESG reports has an impact on the company's environmental and governance scores.

However, for the social pillar (MSCI_SOCIAL_PILLAR_SCORE), the LACK variable has a coefficient of -0.156***, which is significant at the 99% level. This suggests that the increased use of images in ESG reports has a negative impact on the score of the social pillar. This could mean that companies that use more images in their ESG reports tend to have lower social scores. This validates the findings of Lewis, 1984; Preston et al., 1996 that the use of images can serve companies to distract attention from their poor social performance.

To answer this first hypothesis, according to our results, the impact of the use of images in ESG reports on companies' ESG scores is not significant. However, the number of images negatively influence the social pillar score. This can be explained by the "greenwashing" (Lyon et Maxwell, 2011). Also, as we saw in Table 1, the variable MSCI S has a significant impact on the ESG score. Based on this relation, visual cues could indirectly influence the overall ESG score of company.

5.2 Investors react negatively to the use of images in ESG reports.

To try to answer this hypothesis, we conducted a linear regression which include only the control variables as explanatory variables (same as for hypothesis 1 & 3). The results show that several variables are significantly related to the absolute cumulative abnormal returns (|CAR|), which represent the investors' reaction, mostly in the long term (60 days), see Table 3. The variables LIQUID, BUSsegment, and GEOsegment show a significant positive relationship at the 99% level. NoA also has a significant positive correlation at the 95% level. While the variables LACK, UNCERTAIN and ESGemph show a significant negative correlation at the 95% level. The regression output revealed that investors react negatively to the number of images in ESG reports in the long term (|CAR [+1,+60]|), as indicated by the coefficient of -0.601, which is significant at the 95% level. The significant cumulative absolute abnormal returns corroborate the findings of Du et al. (2017) and suggest that investors do react to ESG reports. Moreover, the negative relation is aligning with the theory of Cho et al. (2009), that images can distract or mislead the readers.

In practical terms, this could mean that investors prefer to see ESG reports that contain detailed and accurate information about a company's environmental, social, and governance performance, rather than reports that are aesthetically pleasing. They may perceive the lack of informative content as a sign that the company is not sufficiently transparent or serious about ESG issues, which could affect their confidence in the company and influence their investment decisions. This confirms the Impression Management theory largely explored in prior research.

However, it is important to note that this variable is not statistically significant in the short-term models (absCAR1.W and absCAR2.W, see table 3), which could suggest that investors' reaction to visual cues only manifests itself in the long term. Investors may need time to fully analyze and understand the content of the reports.

Share liquidity (LIQUID) has a positive and highly significant effect on all the dependent variables. For example, LIQUID has a coefficient of 0.613 on the variable AbsCAR60.W It is therefore likely that companies with greater share liquidity have a better reaction from investors following the publication of their ESG reports.

It should also be noted that the variables UNCERTAIN and ESGemph have significant negative effects on |CAR [+1, +60] |. This suggests that uncertainty in the ESG report, measured by the proportion of uncertain words, and emphasis on ESG, measured by the degree of emphasis placed on ESG issues in the report, may have a negative influence on investor reaction in the long term. The coefficient between NoA and |CAR [+1, +60] | is positive and significant at level 95% and equal to 1.339, suggesting that companies with a greater number of analysts following them tend to have a better long-term investor response. This can be seen as a symbol of credibility.

However, variables such as ESGscore, MSCI_ENVIRONMENTAL_PILLAR_SCORE, MSCI_SOCIAL_PILLAR_SCORE, and MSCI_GOVERNANCE_PILLAR_SCORE are not significant in this model. This indicates that they have no discernible effect on investor reaction, at least in the context of this analysis.

To answer this second hypothesis, the number of images in the ESG reports has a significant impact on investor reactions over the long term (60 days), but there is no impact around the release of the ESG reports in short term (1-2 days). Furthermore, this significant relationship is negative, which confirms our hypothesis that investors react negatively to the heavy use of

images in ESG reports. This could indicate that investors value substantial and relevant information in ESG reports more than visual aesthetics. However, this trend does not seem to be manifesting itself in the short term. This suggests that, in the short term, investors do not detect the feeling of hypocrisy, manipulation or greenwashing.

5.3 Companies with poor financial performance have a reporting strategy with more images.

This third hypothesis, therefore, focuses on the impact of the visual cues (*LACK*) in ESG reports on financial performance (*ROA*). The linear regression with the dependent variable, *ROA*, showed a positive coefficient of 0.063, which means in other words, that holding all other variables constant, for each unit increase in image per report, we expect the *ROA* to increase on average by 0.063% see in table 4. However, the p-value associated with this variable is not significant (since it is not less than 0.1, 0.05 or 0.01). Although we observe a positive association between these two variables, this could simply be due to mathematical arrangements and not be present in the overall population.

Regarding the other variables, we note that the MSCI environmental, social, and governance scores are not significant in our model, which means that these variables do not have a significant effect on *ROA*. However, some variables do have a significant effect. For example, the coefficient for *EPSdecline* is significant and negative (-13.626***), which means that if *EPS* increases, *ROA* decreases. Similarly, we observe that the variables *FIN, LIQUID, SIZE, WC, SPECIFIC* and *UNCERTAIN* also have a very significant negative effect on *ROA.* As opposed to the variables *RD* and *NoA*, that have a very significant positive effect on *ROA.*

It is also interesting to discuss the relationship between the *ESGscore* variable and *ROA.* The result is not significant, but it does show a positive relationship between the two variables. This confirms previous research highlighting the link between ESG performance and a company's financial performance (Du et al, 2017; Fombrun et al, 2000).

To answer this third hypothesis, we cannot confirm that companies with poor financial performance have a reporting strategy with more images. Although previous studies have demonstrated the influence of images in annual reports on financial performance, none of the articles show the influence of the use of images in ESG reports on companies' financial performance. However, this analysis is in line with the review literature on the influence of our control variables.

5.4 Robustness

As the results of our multilinear regression were not very significant, we wanted to test another model to see if we obtained different results. To refine our test of the hypothesis of influence on the ESG score, we used logistic regression as a robustness test, see Table 5.

First, we identified companies that were in a situation with a "high number of images in the ESG report," which means they had more than 57 images in their report. We based this average on a study conducted by Invernizzi et al. (2021) where they describe that the average number of images in ESG reports of approximately 100,6 pages is 57 and 39 for infographics.

Next, we created two new binary variables. The first binary variable represents the ESG score. ESG score that is higher than 5.714 (on a scale from 0 to 10) is considered as high based on the MSCI scale average (MSCI, 2023). Therefore, the number “1” represents companies with a score above 5.7, and “0” represents those with a score below. The second binary variable reflects the number of images. To know the percentage of images in the reports, we calculated the proportion of aesthetic images to the total number of images contained in the report, such as infographics, graphs, maps, etc. We then assigned “1” to companies with more than 57% aesthetic images in their report, and “0” for those with less than 57%. This combination could suggest an attempt to mask ESG underperformance through greater use of visual cues.

We thus conducted a logistic linear regression with the binary dependent variable "high ESG score." The regression used a "high number of images" as an explanatory variable. The results are not significant, but it shows that there is a negative coefficient associated with the variable "LACK OF CONTENT & AESTHETICS" (-0.005), indicating that the LACK variable pushes the ESGscorehigh coefficient towards 0. This suggests that a high number of images can influence the ESG to be below 5.7. For more details, please refer to Table 5.

The binary variable "ESGscoreHigh" proved to be a useful tool for assessing the impact of images on companies with high ESG scores compared to those with lower scores. This approach highlighted significant differences in the visual characteristics of companies at different levels of ESG scores.

6. Boundaries

We acknowledge some limitations in our research. First, ESG reports are a relatively new research subject. This means there is a limited amount of research available on this topic. Most research into investor reactions is psychological. Very few quantitative articles focus on investor reactions, making it more challenging to put the results into perspective and compare them. Furthermore, this limits the ability to establish connections with previous work or to discuss practical implications.

Secondly, the number of ESG reports analyzed in this study was initially 1,667 reports from 416 different companies but data concerning the variable "lack of content & aesthetic" was collected manually by different people, based on their appreciation. This led to us having to discard over 500 data as they were biased or not present. After deleting all these biased data, our sample accounted for 1,166 reports. This sample size may be considered as a small sample, which is not necessarily representative of the population. Consequently, this can affect the representativeness and generalizability of the results and may also heavily skew the outcomes.

Thirdly, the frequency of ESG report publication. It is possible that companies that publish their ESG reports more frequently tend to include a larger number of images and graphics in their publications. This trend could skew the results of our analysis.

Furthermore, in this study, financial performance has been considered as ROA, which may be perceived as a limitation. A more nuanced approach might have involved selecting another financial indicator. Business performance is a complicated concept to assess, given the various ways it can be measured and the factors that can influence it (Clark et al., 2006; de Waal, 2002). By considering financial performance only with the ROA variable, we may have missed important nuances and details that could be crucial to understanding the interactions between the visual elements of reports and business performance.

Finally, the research focused on a single—although fundamental—aspect of visual disclosure, that is, the number of images. Using our framework, future research could explore the causal effect of different visual elements on investors' perceptions.

In conclusion, these limitations, while important, do not necessarily invalidate the conclusions of the study. Rather, they suggest areas where further research might be beneficial.

7. Conclusion

In conclusion, this study sheds light on the nuanced role that images play by investigating the correlation between visual cues in ESG reports and investor behavior, as well as the company's financial and ESG performance. The findings provide a deeper understanding of how visual cues can influence ESG scores, investor decisions, and financial performance. Similar to prior literature about visual content in finance and infographics in ESG reports, our results are descriptive and illustrate associations rather than causal relationships. However, as the occurrence of ESG reports increases and the regulations evolves, our findings are central to companies, academics, investors, and regulators.

We have shown that the use of images in ESG reports on companies' ESG scores is not significant but a higher number of images in ESG reports can influence the ESG score to be lower than average. We also find that visual cues seem to be specific to the social pillar and the relation between the use of images and the social MSCI score is significant and negative. The increased number of images in ESG reports has a negative impact on the social pillar score, suggesting that companies that use more images in their ESG reports tend to have lower social scores. Furthermore, we have identified a notable reaction of abnormal returns to the use of images. Consequently, the number of aesthetic images in ESG reports emerges as a valuable signal for investors' decision-making in the long-term (60 days around the release of the ESG report) but not in short-term (1-2 days around the release). We encourage managers to strike a balance between design and content and to deliberately choose the number of images they use. We recognize that there are other factors to consider when selecting images (Chong et al., 2019), such as particular colors or content (Thewissen, 2023) that the literature tends to associate with CSR.

ESG reports represent a significant part of corporate information disclosure, as ESG criteria becoming increasingly vital in investors' capital allocation process considerations (Eccles et al., 2011). However, ESG reports are characterized by limited regulation, leading to questions about the role and informative value of these unverifiable voluntary disclosures. In a landscape where sustainable investing is becoming increasingly prevalent, and where companies have a certain amount of freedom in presenting their ESG performance, understanding how investors respond to this information (images) remains an empirical challenge. Moreover, although the use of images can be useful to manage the reputation of the company, it can have negative consequences if stakeholders are aware of this strategy. We encourage further exploration of

the strategic use of images in cases of irresponsible behavior in terms of business ethics and stakeholders' behavior.

This research provides valuable information on the dynamics of ESG reporting, but it did not yield the expected results, namely that the number of images in ESG reports has a significant impact on companies' ESG score. However, future research in environmental, social and governance (ESG) reporting could address the difference of the types of images used in ESG reporting, such as the presence of nature, human elements, the color "green", etc., and to assess their impact. Understanding how these different types of visual cues influence readers' perceptions and reactions could lead to more effective design and communication strategies in ESG reports. This research could address questions such as: How do images of nature influence investors' perceptions and reactions? How do images of nature versus human affect reader perception? Does the use of specific color such as green create a more positive impression?

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9. Appendix

Table 1: Regression results – ESG Score

	Dependent variable:
	ESGscore
Log(1+LACK OF CONTENT AESTHETICS)	0.017
	(0.051)
Log(BUSsegment)	−0.175***
	(0.047)
Log(GEOsegment)	−0.022
	(0.050)
SURPRISE	6.031
	(6.657)
EPSdecline	0.266
	(0.220)
VOLAT	0.002
	(0.003)
LEV	0.002
	(0.003)
FIN	−0.001
	(0.006)
LIQUID	−0.137***
	(0.033)
RD	0.006
	(0.007)
Log(SIZE)	0.018
	(0.040)
Log(WC.W)	0.141***
	(0.055)
FOG.W	0.006
	(0.012)
MOMENTUM	0.035
	(0.091)
UNCERTAIN.W	−0.194
	(0.208)
ESGemph.W	0.109***
	(0.033)
SPECIFIC.W	0.035
	(0.053)
FWDLOOK.W	0.008
	(0.014)
log(NoA)	0.113
	(0.110)
ROA	0.013
	(0.009)
TONE.W	−0.037
	(0.068)
MSCI_ENVIRONMENTAL_PILLAR_SCORE	0.314***
	(0.021)
MSCI_SOCIAL_PILLAR_SCORE	0.646***
	(0.027)
MSCI_GOVERNANCE_PILLAR_SCORE	0.343***
	(0.025)
Constant	−3.716***
	(0.781)
Observations	1,166
R^2	0.520
Adjusted R^2	0.510
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 2: Results regression – MSCI pillars

	Dependent variable:		
	MSCI ENVIRONMENTAL PILLAR SCORE	MSCI SOCIAL PILLAR SCORE	MSCI GOVERNANCE PILLAR SCORE
	(1)	(2)	(3)
Log(1+LACK OF CONTENT AESTHETICS)	−0.104	−0.156***	−0.080
	(0.073)	(0.056)	(0.060)
Log(BUSsegment)	−0.159**	−0.175***	0.141***
	(0.066)	(0.051)	(0.054)
Log(GEOsegment)	0.357***	0.178***	−0.111*
	(0.070)	(0.053)	(0.057)
SURPRISE	−6.114	10.679	−8.926
	(9.503)	(7.277)	(7.765)
EPSdecline	−0.687***	−0.433**	−0.122
	(0.259)	(0.198)	(0.212)
VOLAT	−0.002	−0.002	0.001
	(0.004)	(0.003)	(0.003)
LEV	0.008*	−0.007**	−0.006*
	(0.004)	(0.003)	(0.003)
FIN	0.002	−0.003	−0.00002
	(0.008)	(0.006)	(0.007)
LIQUID	−0.052	0.085**	0.043
	(0.046)	(0.035)	(0.038)
RD	0.006	0.015**	−0.003
	(0.009)	(0.007)	(0.008)
Log(SIZE)	0.301***	0.018	−0.172***
	(0.055)	(0.042)	(0.045)
Log(WC.W)	0.047	0.248***	0.017
	(0.077)	(0.059)	(0.063)
FOG.W	0.025	0.002	−0.003
	(0.017)	(0.013)	(0.014)
MOMENTUM	0.140	0.009	−0.009
	(0.129)	(0.099)	(0.106)
UNCERTAIN.W	−0.052	0.236	0.254
	(0.297)	(0.227)	(0.242)
ESGemph.W	0.048	0.075**	−0.003
	(0.047)	(0.036)	(0.038)
SPECIFIC.W	0.043	0.058	0.037
	(0.076)	(0.058)	(0.062)
FWDLOOK.W	−0.034*	−0.051***	0.026*
	(0.020)	(0.015)	(0.016)
Log(NoA)	−0.060	0.019	0.163
	(0.154)	(0.118)	(0.126)
TONE.W	0.106	−0.055	0.140*
	(0.097)	(0.074)	(0.079)
Constant	1.465	2.213***	6.857***
	(1.059)	(0.811)	(0.865)
Observations	1,166	1,166	1,166
R^2	0.085	0.071	0.037
Adjusted R^2	0.069	0.055	0.021
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 3: Regression results – Investor's reaction

	Dependent variable:		
	absCAR1.W (Model abs1)	absCAR2.W (Model abs2)	absCAR60.W (Model abs3)
Log(1+LACK OF CONTENT AESTHETICS)	−0.055	−0.099	−0.601**
	(0.044)	(0.063)	(0.272)
Log(BUSsegment)	0.083**	0.107*	0.709***
	(0.041)	(0.058)	(0.250)
Log(GEOsegment)	0.105**	0.076	1.074***
	(0.043)	(0.061)	(0.263)
SURPRISE	−4.940	−13.205	−36.739
	(5.731)	(8.143)	(35.346)
EPSdecline	−0.034	−0.130	0.784
	(0.189)	(0.269)	(1.167)
VOLAT	−0.004*	−0.003	−0.016
	(0.002)	(0.003)	(0.014)
LEV	0.001	0.006	−0.024
	(0.003)	(0.004)	(0.015)
FIN	−0.004	−0.002	−0.035
	(0.005)	(0.007)	(0.031)
LIQUID	0.143***	0.169***	0.613***
	(0.028)	(0.040)	(0.174)
RD	0.001	−0.003	−0.031
	(0.006)	(0.008)	(0.035)
Log(SIZE)	0.024	−0.018	−0.168
	(0.035)	(0.049)	(0.213)
Log(WC.W)	0.0001	−0.012	0.035
	(0.047)	(0.067)	(0.291)
FOG.W	−0.014	−0.006	0.064
	(0.010)	(0.014)	(0.062)
MOMENTUM	−0.054	−0.147	0.062
	(0.078)	(0.111)	(0.481)
UNCERTAIN.W	0.001	0.118	−2.726**
	(0.179)	(0.255)	(1.105)
ESGemph.W	0.030	0.037	−0.362**
	(0.028)	(0.040)	(0.174)
SPECIFIC.W	0.039	−0.023	0.033
	(0.046)	(0.065)	(0.283)
FWDLOOK.W	0.017	0.008	−0.015
	(0.012)	(0.017)	(0.073)
log(NoA)	0.136	0.337**	1.339**
	(0.095)	(0.135)	(0.585)
ESGscore	0.016	−0.009	−0.170
	(0.025)	(0.036)	(0.157)
ROA	−0.003	−0.005	−0.058
	(0.008)	(0.011)	(0.048)
TONE.W	−0.027	−0.044	−0.114
	(0.059)	(0.083)	(0.362)
MSCI_ENVIRONMENTAL_PILLAR_SCORE	−0.017	−0.018	−0.033
	(0.020)	(0.028)	(0.121)
MSCI_SOCIAL_PILLAR_SCORE	0.004	−0.022	0.031
	(0.029)	(0.041)	(0.176)
MSCI_GOVERNANCE_PILLAR_SCORE	−0.020	0.022	−0.186
	(0.024)	(0.033)	(0.145)
Constant	0.418	0.934	8.770**
	(0.679)	(0.967)	(4.194)
Observations	1,166	1,166	1,166
R^2	0.058	0.047	0.078
Adjusted R^2	0.038	0.027	0.058
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table 4: Regression results – Financial performance

	Dependent variable:
	ROA
Log(1+LACK OF CONTENT AESTHETICS)	0.063
	(0.167)
Log(BUSsegment)	0.016
	(0.154)
Log(GEOsegment)	0.375**
	(0.162)
SURPRISE	−8.792
	(21.725)
EPSdecline	−13.626***
	(0.594)
VOLAT	0.003
	(0.009)
LEV	−0.008
	(0.009)
FIN	−0.150***
	(0.018)
LIQUID	−0.357***
	(0.106)
RD	0.106***
	(0.021)
Log(SIZE)	−1.002***
	(0.127)
Log(WC.W)	−0.523***
	(0.178)
FOG.W	−0.096**
	(0.038)
MOMENTUM	−0.334
	(0.296)
UNCERTAIN.W	−1.492**
	(0.678)
ESGemph.W	−0.027
	(0.107)
SPECIFIC.W	−0.345**
	(0.174)
FWDLOOK.W	−0.019
	(0.045)
log(NoA)	2.656***
	(0.351)
ESGscore	0.134
	(0.097)
TONE.W	−0.389*
	(0.222)
MSCI_ENVIRONMENTAL_PILLAR_SCORE	0.001
	(0.074)
MSCI_SOCIAL_PILLAR_SCORE	−0.026
	(0.108)
MSCI_GOVERNANCE_PILLAR_SCORE	−0.110
	(0.089)
Constant	18.882***
	(2.512)
Observations	1,166
R^2	0.438
Adjusted R^2	0.426
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 5 : Robustness test – Logistic regression

	Dependent variable:
	ESGscoreHigh if >5.5
LACK OF CONTENT AESTHETICS)	−0.005
	(0.014)
BUSsegment	−0.038***
	(0.013)
GEOsegment	0.001
	(0.013)
SURPRISE	1.992
	(1.780)
EPSdecline	0.048
	(0.059)
VOLAT	0.001
	(0.001)
LEV	0.001
	(0.001)
FIN	−0.001
	(0.002)
LIQUID	−0.036***
	(0.009)
RD	0.002
	(0.002)
SIZE)	0.009
	(0.011)
WC.W)	0.043***
	(0.015)
FOG.W	−0.001
	(0.003)
MOMENTUM	0.001
	(0.024)
UNCERTAIN.W	−0.005
	(0.056)
ESGemph.W	0.029***
	(0.009)
SPECIFIC.W	−0.012
	(0.014)
FWDLOOK.W	−0.008**
	(0.004)
Log(NoA)	0.027
	(0.029)
ROA	0.002
	(0.002)
TONE.W	0.024
	(0.018)
MSCI_ENVIRONMENTAL_PILLAR_SCORE	0.053***
	(0.006)
MSCI_SOCIAL_PILLAR_SCORE	0.117***
	(0.007)
MSCI_GOVERNANCE_PILLAR_SCORE	0.055***
	(0.007)
Constant	−1.218***
	(0.209)
Observations	1,166
Log Likelihood	−600.382
Akaike Inf. Crit.	1,250.765
Note:	*p<0.1; **p<0.05; ***p<0.01