THE EFFECT OF ENVIRONMENTAL AFFINITY AND ENVIRONMENT-RELATED DISCLOSURE NATURE ON INVESTOR PERCEPTIONS AND JUDGMENTS

A Dissertation
Presented to
The Academic Faculty

by

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In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in Management in the
Scheller College of Business

Georgia Institute of Technology
August 2024

THE EFFECT OF ENVIRONMENTAL AFFINITY AND ENVIRONMENT-RELATED DISCLOSURE NATURE ON INVESTOR PERCEPTIONS AND JUDGMENTS

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ACKNOWLEDGEMENTS

I sincerely thank my dissertation committee chair, Dr. Kathy Rupar, for her continuous help, guidance, patience, and encouragement. Her wisdom, passion, and dedication have not only illuminated my academic research but also inspired me to become a strong and caring person. I deeply appreciate the insightful feedback and warm support from my dissertation committee members, Drs. Xi (Jason) Kuang, Nikki MacKenzie, Jane Thayer, and Kristy Towry. Their profound insights extend far beyond this project, guiding me to develop my academic career as an independent scholar and live a meaningful life as a well-rounded individual. My heartfelt gratitude goes to the accounting faculty and fellow Ph.D. students at Georgia Institute of Technology for creating an intellectually stimulating and emotionally nurturing community that has empowered me to thrive.

I am grateful for the valuable suggestions on earlier versions of this project from Seung Kyo (SK) Ahn, Jeffrey Hales, Charles Irons, Natalia Kochetova, Adam Presslee, Nicholas Seybert, Sandra Vera-Munoz, participants at the 2022 AAA/Deloitte Foundation/J. Michael Cook Doctoral Consortium, the 2023 AAA Sustainability, ESG, and Accounting Conference, Kathy Rupar's Financial Accounting Doctoral Seminar, and workshop participants at Cornell University, Georgia Institute of Technology, Washington State University, and Western Michigan University. I thank Seung Kyo (SK) Ahn and Fengxinyi (Doris) Zhao for their excellent research assistance. I also acknowledge the generous financial support from Scheller College of Business.

I am deeply grateful to my family and friends who have supported me unconditionally through countless challenges over the past five years. Their love and

encouragement have ensured I am never alone. Lastly, I extend my genuine tribute to those who know I am not perfect yet still embrace me for who I am.

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SUMMARY

While financial disclosures are generally deemed important by investors, the value placed on Environmental, Social, and Governance (ESG) matters can vary depending on investors' environmental affinity. This study experimentally investigates whether environmental affinity (low vs. high) interacts with the voluntary vs. mandatory nature of environment-related disclosures to influence investor perceptions and judgments. I predict and find that high-environmental-affinity investors perceive environment-related risks as more significant than low-environmental-affinity investors. I also observe that a mandatory environment-related disclosure, as opposed to a voluntary one, increases investors' perception of environment-related risks. As predicted, this effect primarily exists among investors with low rather than high environmental affinity. A moderated mediation analysis reveals that the perception of regulators' views on environment-related risks mediates this effect. Additionally, I present preliminary evidence suggesting that gender plays a role in this context. This study accentuates how an individual characteristic influences investors' consumption of mandatory disclosures.

CHAPTER 1. INTRODUCTION

Given the global community's rising concerns around sustainability issues and greater availability of Environmental, Social, and Governance (ESG) indicators in company disclosures, investors are becoming more interested in making environmentally and socially responsible investments. However, the unstandardized reporting rules in this realm make it difficult for investors to use ESG data (Amel-Zadeh and Serafeim 2018). As a result, there is a trend toward regulating some ESG disclosures. For example, in March 2024, the Securities and Exchange Commission (SEC) adopted amendments to its rules under the Securities Act of 1933 and the Securities Exchange Act of 1934, requiring publicly traded companies to include mandatory disclosure of climate-related risks affecting the company (SEC 2024). This transition from voluntary to mandatory disclosure has the potential to impact how investors process environment-related disclosures, akin to how prior research shows that investors differently process voluntary vs. mandatory *financial* disclosures (Frederickson, Hodge, and Pratt 2006). Yet, while most investors consider financial disclosures highly relevant to their decision-making, this may not be the case with environment-related disclosures, given that investors vary in how much they value ESG matters. Therefore, I investigate whether investors' environmental affinity (low vs. high) interacts with the voluntary vs. mandatory nature of environment-related disclosures to influence their perceptions and judgments.[1]

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[1] Given a focus on investigating the role of an individual characteristic, this study primarily examines the perceptions and judgments of non-professional investors. However, it is important to note that professional investors also exhibit varying attitudes toward ESG, which can influence their investment decisions. Starks, Venkat, and Zhu (2017) discover that institutional investor preferences regarding ESG profiles largely depend upon investor horizon: Compared to short-term investors, long-term investors prefer companies with higher ESG profiles and are more patient with high-ESG companies (i.e., selling fewer shares after negative

Understanding the joint impact of environmental affinity and disclosure nature on investor perceptions and judgments in an environment-related disclosure context is important for several reasons. First, individual characteristics of information users impact how they process information and form judgments, making it hard to treat all investors uniformly. For example, two types of self-esteem (i.e., self-regard and investing confidence) have opposite effects on investors' willingness to hold on to losing investments – Those with lower self-regard hold on to losing investments longer than those with higher self-regard, while those with lower confidence hold on to losing investments shorter (Kadous, Tayler, Thayer, and Young 2014). Hales (2023) points out that "investors are not a monolith" and that this remains true regarding sustainable investing. Thus, investigating individual characteristics of investors in an environment-related disclosure context offers a nuanced understanding of how different types of investors interpret this disclosure.

Second, environment-related disclosures, especially climate-related disclosures, have recently received increasing attention from regulators (SEC 2024). In its 2024 final rules on "The Enhancement and Standardization of Climate-Related Disclosures for Investors," the SEC points out that reliable, consistent, and comparable disclosures of material climate-related risks facing public companies would benefit both investors and capital markets. Specifically, investors can utilize this information to make risk-adjusted decisions regarding the effect of climate-related risks on current and future investments. Investors' better understanding of climate-related risks could facilitate capital allocation. Furthermore, increased transparency and comparability in climate-related disclosures

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earnings surprises or low stock returns). van Duuren, Plantinga, and Scholtens (2016) report that many traditional asset managers employ responsible investing in their investment process and incorporate ESG information into risk management.

could promote competitiveness in the capital market. However, despite the potential benefits, it may be too early to state whether environment-related disclosures should be voluntary or mandatory, given the unique costs and benefits of each type of disclosure. In addition, the environment-related disclosure nature *itself* may signal information to investors. For example, a mandatory disclosure signals the regulator's stance on the importance of an issue (Frederickson et al. 2006), while a voluntary disclosure allows management to offer its perspective on what investors should consider important.

Notably, environment-related disclosures differ from financial disclosures in that information related to environmental issues may offer different levels of value relevance for different investors. That is, while some investors value companies taking environmental actions (i.e., are high in environmental affinity), others do not (i.e., are low in environmental affinity) (Schroders Global Investors Study 2021; PwC's Global Investor Survey 2023). The need for regulatory intervention also indicates a lack of consensus on this issue (SEC 2024). Although all investors should place weight on environment-related disclosures that present material risks to a company's future financial prospects, high-environmental-affinity investors may place more weight on environment-related disclosures than low-environmental-affinity investors, given how closely these disclosures align with their values. This may also vary across voluntary vs. mandatory disclosures, given the signal within the disclosure nature itself. Mandating a specific disclosure signals its importance, potentially impacting whether low-environmental-affinity investors consider it at all or whether high-environmental-affinity investors consider it a genuine reflection of company values. Furthermore, given their affinity for and interest in environmental causes, high-environmental-affinity individuals are likely to read environment-related disclosures more carefully than low-environmental-affinity individuals. Therefore, by focusing on the interaction of environmental affinity and disclosure nature, I aim to provide a more comprehensive picture of how a voluntary vs. mandatory disclosure of environment-related risks impacts individual investors' judgments. Understanding how different investors process these disclosures can potentially help align perceptions and judgments across varying levels of environmental affinity.

Furthermore, understanding the environment-related disclosure reporting setting may provide insights into the effects of regulating other currently voluntary ESG disclosures. The SEC's final rules on mandatory climate-related disclosure (SEC 2024) indicate an interest in regulating at least some ESG communication. Given a documented spectrum of affinity levels toward ESG matters among investors (PwC's Global Investor Survey 2023), understanding this environment-related disclosure context can shed light on a broader topic: whether and how investors' personal attitudes influence their perception of voluntary vs. mandatory disclosures when making investment judgments.

I first predict that high-environmental-affinity investors will place more weight on environment-related disclosures than low-environmental-affinity investors, given the close alignment of these disclosures with their values. I then rely on signaling theory (Spence 1973) to motivate subsequent predictions. Prior work suggests that mandatory financial disclosure signals what issues regulators consider significant, and therefore, investors should factor them into their investment decisions (Frederickson et al. 2006). However, I argue that in an environment-related disclosure context, the extent to which investors respond to this signal will vary with their level of environmental affinity. Because high-environmental-affinity individuals are more invested in environmental matters, they already consider these issues important and have less need for a regulatory signal to reach that conclusion. In contrast, because low-environmental-affinity investors do not value a firm focusing on environmental issues, a regulator's viewpoint can offer a necessary nudge toward considering this information. Thus, I predict that a mandatory environment-related disclosure, compared to a voluntary one, will increase investors' perception of environment-related risks, especially for low-environmental-affinity individuals. Yet, high-environmental-affinity investors may instead respond to a signal inherent in the voluntary nature of environment-related disclosures. Specifically, they are more likely to believe that management considers environmental practices important and is willing to spend resources on them when this information is offered voluntarily. Making such disclosure mandatory may conceal this signal, given that the disclosure may now exist purely out of adherence to regulatory guidelines and not management's genuine concern for the environment. As a result, mandatory environment-related disclosure may also make the company less appealing to high-environmental-affinity investors, albeit for a different reason than for low-environmental-affinity investors.

Given the above predictions, I expect both groups of investors to reduce their willingness to invest in the firm following a mandatory (relative to a voluntary) environment-related disclosure, though for different reasons. Low-environmental-affinity investors will reduce their willingness to invest following a mandatory environment-related disclosure in line with their higher ratings of environment-related risks. In contrast, high-environmental-affinity investors will respond to the uncertainty surrounding management's genuine concern for environmental causes, reducing their willingness to invest in the company when the disclosure is mandated vs. voluntarily provided by the company.

I conduct a main experiment with a 2 X 2 factorial design, where investors' environmental affinity level (low vs. high) and environment-related disclosure nature (voluntary vs. mandatory) serve as independent variables. For the main experiment, my dependent variables are the perception of environment-related risks, the perception of management's genuine concern for environmental causes, and investment willingness. I conduct a pre-test about 20 days before the main experiment to identify individuals with varying levels of environmental affinity and then invite qualified participants to complete the main experiment (adapted from Church, Jiang, Kuang, and Vitalis 2019). Following the main study, I also collect survey responses from these individuals to gain a better understanding of their level of environmental affinity.

Results confirm that high-environmental-affinity investors perceive environment-related risks as more significant than low-environmental-affinity investors. I also find supporting evidence that a mandatory (relative to a voluntary) environment-related disclosure increases only low-environmental-affinity investors' perception of environment-related risks and that this effect is mediated by the perception of regulators' view of environment-related risks. Although results provide little support for (1) the interaction of environmental affinity and environment-related disclosure nature on investors' perception of management's genuine concern for environmental causes and (2) the main effect of environment-related disclosure nature on investment willingness, I find preliminary evidence that females are more sensitive to this signal from the management than males, which could potentially influence investor perceptions and judgments.

This paper has both theoretical contributions and practical implications. First, it adds to the emerging accounting literature examining how individual characteristics impact stakeholders' reactions to information. One stream of research explores how characteristics of information senders, such as nonnative-accented (vs. native-accented) CEOs, nonwhite (vs. white) CEOs, and alumni-affiliated (vs. non-affiliated) client managers, influence judgments or behaviors of information users (Barcellos and Kadous 2022; Rupar, Wang, and Yoon 2024; Earley, Kuselias, and MacKenzie 2024). Another stream examines how characteristics of information users, such as investors with lower (vs. higher) self-esteem, investors who are customers (vs. non-customers) of a company, employees with high (vs. low) dispositional optimism, and managers who are personally supportive (vs. non-supportive) of CSR, impact how they process and react to information (Kadous et al. 2014; Clor-Proell, MacKenzie, Rennekamp, and Rupar, 2023; Burke, Towry, Young, and Zureich 2023; Church et al. 2019). There is emerging research about how investor type impacts investors' consumption of sustainability disclosures (e.g., Du and Wong-On-Wing 2022; Lyman 2023). My findings expand this stream of literature by highlighting the importance of considering a unique individual characteristic – investors' environmental affinity – in the context of environment-related disclosures.

Second, prior accounting literature investigates how specific content, such as increased forward-looking narratives, clawback enforcement, board size, board reputation, and ESG factors, disclosed by a company offers signals to the market (Hussainey and Aal-Eisa 2009; Cha, Gill, and Wong-On-Wing 2023; Luo and Tang 2014; Certo, Daily, and Dalton 2001; De Lucia, Pazienza, and Bartlett 2020). I focus on examining the *nature* of disclosure itself, i.e., whether it is voluntary or mandatory, rather than its content.

Consistent with research investigating the impact of disclosure nature in the financial disclosure context (Frederickson et al. 2006), this paper confirms that in the environment-related disclosure context, a mandatory disclosure also signals that an independent and well-informed authority believes certain items are important. Furthermore, I extend prior accounting research by identifying a signal inherent in the voluntary (as opposed to mandatory) nature of environment-related disclosures. Unexpectedly, this paper suggests that females may be more likely than males to consider this signal. Though not part of my predictions, this finding is in line with literature indicating that females may rely on more comprehensive vs. selective information processing than males (Meyers-Levy and Loken 2015; Richard, Chebat, Yang, and Putrevu 2010; Hall and Matsumoto 2004; Rosip and Hall 2004).

My findings also contribute to the literature on voluntary and mandatory disclosures. One stream of this literature provides insights into why firms engage in voluntary disclosures and what impacts voluntary disclosures (Ho and Wong 2001; Chau and Gray 2002; Cheng and Courtenay 2006; Elshandidy, Fraser, and Hussainey 2013; Burnett, 2020; Bagnoli and Watts 2007). Another stream mainly examines the pros and cons of each type of disclosure (Zhang, Semba, and Xu 2021; Wendai, Jing, and Bin 2022; Plumlee, Brown, Hayes, and Marshall 2015; Friedman, Hughes, and Michaeli 2018; Hassan, Romilly, Giorgioni, and Power 2009). My study expands this literature by incorporating an important variable – investors' environmental affinity – to show that different levels of environmental affinity impact what information investors infer from the nature of an environment-related disclosure.

Finally, this paper has practical implications for regulators and investors. First, the SEC shifted from voluntary to mandatory climate-related disclosures, intending to offer investors consistent, comparable, and reliable information. However, this study accentuates how individual characteristics influence investors' consumption of mandatory disclosures, potentially fostering alignment in perceptions and judgments across varying levels of environmental affinity. It is also meaningful for investors to be aware of how their personal attitudes toward environmental causes may impact how they view voluntary vs. mandatory environment-related disclosures. While many investors may be aware that their views about the environment will impact their investment judgments, it is less likely that they consider how these views interact with the disclosure nature of a target company when forming their perceptions and judgments about that company.

CHAPTER 2. BACKGROUND AND HYPOTHESES DEVELOPMENT

As the 21st century progresses, business sustainability becomes a more prominent theme (Ng and Rezaee 2015). More and more businesses are pursuing and disclosing the impact of ESG sustainability, while investors are increasingly integrating ESG metrics into their investment analyses. Lauria, Lindquist, Mittnik, and Rachev (2022) present a unified framework for integrating numerical ESG ratings into dynamic pricing theory, in line with the fact that ESG ratings provide quantitative indicators of socially responsible investment.[2] ESG performance is associated with corporate financial performance and company value, as evidenced by nearly 2200 individual studies since the 1970s (Friede, Busch, and Bassen 2015). Notably, most studies report a positive influence of ESG on corporate financial performance, which remains stable over the long term. This paper focuses on the environmental dimension of ESG due to regulators' escalating scrutiny and information users' corresponding reactions, providing a rich context for exploration.

When examining investors' reactions to ESG reporting, it is important to note that individual characteristics of information users may impact their information processing, which shapes their judgments. For example, investors who are customers (vs. non-customers) of a company are more attached and react less negatively to a restatement (Clor-Proell et al., 2023). Employees with high (vs. low) dispositional optimism put less effort into penalty contracts and more effort into bonus contracts when there is payoff ambiguity

[2] While retaining the traditional risk aversion parameter, this framework also incorporates an ESG affinity parameter, representing the weight of the impact of ESG ratings on valuation.

(Burke et al., 2023). In the context of sustainable investing, managers who are personally supportive (vs. non-supportive) of CSR are more responsive to a nonfinancial measurement basis and tend to invest more (Church et al. 2019). Relatedly, I argue that investors' personal attitudes toward environmental causes shape their interpretation of environment-related disclosures.

2.1 Environmental Affinity

Investors vary in their level of affinity toward environmental causes. While some investors believe that environmental matters are of no concern to profit-driven corporations, others may go so far as to choose their investments based on whether a company shares their values around ESG matters. The regulatory intervention in mandating climate-related disclosures reflects that not everyone agrees on the importance of environmental issues (SEC 2024). A survey of over 23,000 investors from 33 locations worldwide (Schroders Global Investors Study 2021) finds that environmental issues are becoming more crucial to investors, with 55% placing greater importance on them. Sixty-eight percent of respondents believe that companies should be responsible for alleviating climate change, while 53% state that this is also the responsibility of investment managers and major shareholders. PwC's 2023 Global Investor Survey of 345 investors and analysts from 30 countries and territories reveals that 66% of respondents agree that companies should spend on ESG issues relevant to their business even if it reduces short-term profitability, while 16% disagree (PwC's Global Investor Survey 2023). I refer to investors who view environmental causes as a social obligation even if they impact firm profitability as having high environmental affinity. In contrast, I refer to investors who think that firms' top priority should be to maximize shareholder interest (Friedman 1962, 1970; Karnani 2010) as having low environmental affinity.[3]

Elliott, Jackson, Peecher, and White (2014) point out that investors may employ the affect-as-information heuristic to evaluate the impact of CSR on a company's fundamental value. A further study indicates that investors are inclined to evaluate CSR issues that are positive and related to peripheral activities using heuristic processing, whereas investors assess CSR issues that are negative or related to core business activities by employing more deliberate and systematic processing (Guiral, Moon, Tan, and Yu 2020). Consequently, regardless of whether investors use heuristic or systematic processing, all should consider environment-related disclosures important if they present risks to the company's future financial prospects. However, I argue that the extent to which investors weigh the disclosed environment-related risks affecting the company depends on their environmental affinity level.

Individuals' broader attitudes toward global issues, such as environmental causes or Artificial Intelligence (AI), may not easily translate into their perspectives on risk disclosures specific to a company. For example, investor comfort with AI varies based on their knowledge of AI; however, a higher comfort level may not lead to a higher perceived

[3] While other terms in prior research may appear similar to "high- vs. low-environmental-affinity," this paper uses these specific terms because existing terminology does not capture the specific focus of this study. For example, Church et al. (2019) similarly distinguish two viewpoints by using "supportive of CSR" for managers who view CSR as a social obligation and "nonsuppurative of CSR" for those prioritizing shareholders' interest. However, this paper focuses on the environmental aspect rather than a broad CSR context, thus emphasizing the "environmental" element in the terminology for clarity. Du and Wong-On-Wing (2022) use the terms "shareholder expense view" vs. "stakeholder value maximization view" to differentiate between perspectives on the value of sustainability activities, considering benefits to shareholders vs. other stakeholders. In contrast, this study emphasizes solely the personal characteristics of investors and does not extend to other stakeholders.

AI risk facing a company. In line with the risk blindness exhibited by individuals who are more knowledgeable about AI (Said, Potinteu, Brich, Buder, Schumm, and Huff 2023), investors with more knowledge about AI may feel more comfortable with AI and thus perceive AI-related issues of a company as relatively low-risk as they focus more on the benefits and potential of AI systems. Estep, Griffith, and MacKenzie (2023) observe that managers whose companies use (vs. not use) AI internally believe that AI-supported audit evidence is more accurate, reducing their doubt about AI use by auditors. These findings align with the literature on investors' familiarity bias, where they view familiar objects and items as more favorable (Lei and Mathers 2023; Clor-Proell et al. 2023). Thus, investors with high rather than low environmental affinity may be more familiar with environment-related issues, which may lead them to view these issues through a more favorable lens and perceive a lower environment-related risk.

According to the Organization for Economic Co-operation and Development (OECD), investors who strongly commit to ESG objectives are likely to place more weight on ESG factors (OECD 2020). By conducting an internet-based global survey, Amel-Zadeh and Serafeim (2018) explore why and how investors use ESG information and find that investors perceive ESG information as providing information primarily regarding risks instead of the competitive positioning of the company. I argue that although all investors should place weight on environment-related disclosures that present material risks to a company's future financial prospects, high-environmental-affinity investors may place more weight on environment-related disclosures than low-environmental-affinity investors, given how closely these disclosures align with their values. This leads to the following prediction:

H1: High-environmental-affinity investors will perceive environment-related risks as more serious than low-environmental-affinity investors.

2.2 Disclosure Nature

While regulators require companies to disclose certain information, many companies go beyond these requirements to voluntarily disclose additional measures. Numerous previous studies have examined why firms engage in voluntary disclosures and what impacts voluntary disclosures. The extent of voluntary disclosures provided by firms is positively correlated with firm characteristics, such as the presence of an audit committee (Ho and Wong 2001), the extent of outside ownership (Chau and Gray 2002), the percentage of independent directors on the board (Cheng and Courtenay 2006), and greater compliance with mandatory regulations (Elshandidy et al. 2013). In contrast, the proportion of family members on the board (Ho and Wong 2001), increased proprietary costs, and instances where accounting information is less important in reducing information asymmetry (Burnett 2020) all reduce the extent of voluntary disclosure provided by firms.

Shifting from voluntary to mandatory disclosures should provide investors with more consistent, comparable, and reliable information. Given the conceptual framework's focus on the relevance and representational faithfulness of company disclosures, investors should find mandatory disclosures useful to their decision-making process. In contrast, investors perceive voluntary disclosures as driven by a mix of management's desire to provide relevant and representationally faithful information and management's motivation to report strategically (Fuller and Metcalf 1978; Hodge 2003). Thus, it may be difficult for investors to determine the true value of such disclosures. Yet, voluntary disclosures have some merit as research has linked them with higher forecast accuracy by management (Zhang et al. 2021), lower cost of equity capital (Wendai et al. 2022), and higher future expected cash flows (Plumlee et al. 2015). In turn, mandatory disclosures have some drawbacks, such as reducing a firm's incentive to obtain and disclose private information (Friedman et al. 2018) and potentially reducing firm value in settings with low enforcement for non-compliance (Hassan et al. 2009)

Existing research investigates the shift from voluntary to mandatory disclosure across different countries and cultures. Under SFAS No.123 and SFAS No. 123R in the US, Frederickson et al. (2006) find that investors assess information to be more reliable when disclosed via a mandatory guideline rather than on a voluntary basis. Chen, Hung, and Wang (2018) find that reporting firms suffered declining profitability after China's 2008 CSR disclosure mandate, although this mandate produced positive externalities, such as reduced wastewater and SO_2 emissions. Related, Gramlich and Huang (2023) suggest that shareholders hold a favorable view of the overall long-term effects of mandatory CSR reports. According to Oware and Iddrisu (2022), adopting mandatory CSR policies by Indian-listed firms increased the value of their moral capital (i.e., the value related to protecting the environment and promoting social welfare rather than increasing profitability). Moreover, van Bommel, Rasche, and Spicer (2022) find that as sustainability reporting evolves, its original emphasis on morality and values may be replaced by a focus on strategy and value creation for the firm.

2.2.1 Signaling Theory and Interactions on Two Perceptions

Company disclosures are primarily intended to mitigate the information asymmetry between companies and stakeholders and thus assist stakeholders in making informed decisions. The field of information economics has focused on signaling as a mechanism for addressing problems due to information asymmetry. Signaling theory proposes that two parties can reduce information asymmetry by sending signals from one party to another (Spence 1973). According to Spence's job market signaling model, prospective employees signal their competence level to their employer by obtaining academic credentials. Therefore, the certificates allow the employer to effectively differentiate between potential employees with low and high abilities. The fact that senders suffer from costs when making a signal (Bird and Smith 2005) should make the signal seem more credible.

In addition to human resource management, signaling theory has also been adapted in various areas, such as financial markets and accounting (Connelly, Certo, Ireland, and Reutzel 2011; Hussainey and Aal-Eisa 2009; Luo and Tang, 2014; Certo et al. 2001; De Lucia et al. 2020). In the marketing realm, Kirmani and Rao (2000) review the literature on signaling unobservable product quality. They point out that market signals can be especially effective when applied to emerging products or products consumers care about but may not fully understand. Similarly, I argue that signaling can be particularly effective when investors try to incorporate environment-related disclosures into investment decisions because this is still an emerging area and because certain types of investors may not be well-informed about it but are relatively sensitive to the quality of environmental practices.

Importantly, signals from the nature of the environment-related disclosure (i.e., voluntary vs. mandatory) may not directly influence how all types of investors perceive this disclosure because investors at different environmental affinity levels vary in their sensitivity to environment-related issues. While both types of disclosures incur costs for the company, they may each send a different signal to investors. Since investors vary in their environmental affinity, each affinity group may be sensitive to a distinct type of signal.

2.2.1.1 An Interaction Effect on Investors' Perception of Environment-Related Risks

Drawing on signaling theory, I argue that the mandatory nature of disclosures *itself* signals that the regulator believes in their importance.[4] Frederickson et al. (2006) suggest that a mandate signals to financial statement users that an independent and well-informed authority believes the disclosed information is important. In an environment-related disclosure context, a mandatory disclosure should signal that regulators believe environment-related risks are important and should be considered when making investment decisions. However, investors' sensitivity to this signal may depend on their environmental affinity. Specifically, compared to high-environmental-affinity investors, low-environmental-affinity investors may pay less attention to a voluntary environment-related disclosure because they care less about the company's environmental practices. Thus, even

[4] I argue that the mere presence of a third-party perspective influences investor perceptions and judgments, regardless of its specific content. For instance, if a non-GAAP measure undergoes third-party auditing, investors will likely perceive the information as more useful in their investment decision, even if the non-GAAP measure itself lacks informativeness (Anderson, Hobson, and Sommerfeldt 2022). They also suggest that investors consider audited information useful for their investment decisions because GAAP is set by standard setters who aim to provide decision-useful information. Similarly, in my context, if a disclosure is mandated by standard setters who aim to provide decision-useful information, investors would infer that the disclosure is useful.

though the disclosed environment-related risks should be factored into their judgment of the company because they may affect its financial prospects, low-environmental-affinity investors put a relatively low weight on environment-related risks mentioned in a voluntary disclosure. However, when environment-related disclosure is mandatory, low-environmental-affinity investors should respond to the regulatory signal and increase their weight and attention to environment-related risk disclosures. In contrast, high-environmental-affinity investors already consider environment-related information important even for a voluntary disclosure; therefore, a corresponding regulatory signal may be unnecessary regarding their perception of environment-related risks.

To sum up, although a mandatory environment-related disclosure, relative to a voluntary one, signals that regulators consider environment-related risks as important and, therefore, investors should as well, low-environmental-affinity investors are more likely than high-environmental-affinity investors to need this signal to shape their perception of environment-related risks when making investment judgments. The above discussion leads to my following prediction:

H2a: A mandatory environment-related disclosure, relative to a voluntary one, will increase investors' perception of the seriousness of environment-related risks, particularly when investors have low rather than high environmental affinity.

2.2.1.2 An Interaction Effect on Investors' Perception of Management's Genuine Concern for Environmental Causes

Prior research provides evidence consistent with individuals caring about management's attitude toward ESG practices. Schuhmacher, Towry, and Zureich (2022) investigate leading by example in socially driven organizations and point out that leader contributions to a social objective signal their concern for that objective, and followers consider this signal when choosing their own contributions. Li, Gong, Zhang, and Koh (2017) point out that ESG disclosure levels positively correlate with firm value, suggesting stakeholders care about the management's real attitude towards ESG practices.

Drawing on signaling theory, I argue that when a company makes a voluntary environment-related disclosure, investors may interpret this voluntary disclosure as a signal that the management voluntarily takes responsibility for the environment, which reveals the management's strong genuine concern for environmental causes. Especially given that sending a signal is costly to the sender (Bird and Smith 2005; Connelly et al. 2011), the cost may make this signal more credible. Management's strong genuine concern for the environment indicates that it genuinely believes in the importance of environmental causes and that engaging in environmental practices is the right thing to do. In contrast, a mandatory disclosure makes it more difficult for investors to determine whether management takes environmental issues seriously since it is no longer voluntarily undertaking the costs to inform them of these matters. Given that low-environmental-affinity investors do not value environmental matters while high-environmental-affinity investors do, a signal surrounding management's genuine concern for environmental causes may be more relevant to the latter group. These arguments lead to my next hypothesis:

H2b: A mandatory environment-related disclosure, relative to a voluntary one, will decrease investors' perception of management's genuine concern for environmental causes, particularly when investors have high rather than low environmental affinity.

2.2.2 An Effect on Investment Willingness

H2a and H2b predict the interaction effects of environmental affinity and disclosure nature on investors' perceptions of environment-related risks and management's genuine concern for environmental causes, respectively. I next consider how the environment-related disclosure nature will ultimately impact the investment willingness of high-environmental-affinity and low-environmental-affinity investors.

First, as investors' perception of environment-related risks increases, their willingness to invest in the firm should decrease. Given my prediction in H2a, this suggests that low-environmental-affinity investors will be less willing to invest given a mandatory rather than a voluntary environment-related disclosure. Second, if management's strong genuine concern for environmental causes is congruent with investors' strong personal affinity towards the environment, investors should be more willing to respond to this and invest in this company.[5] High-environmental-affinity investors can deduce management's level of genuine concern – an inference made easier by the voluntary, rather than mandatory, nature of an environment-related disclosure. Therefore, given my prediction in H2b, high-environmental-affinity investors should also be less willing to invest given a mandatory rather than a voluntary environment-related disclosure, albeit for a different reason than their low-environmental-affinity counterparts. As a result, I make the following

[5] A related study by Church et al. (2019) proposes that nonfinancial measures shift managers' attention to the social benefits of CSR investments, thereby triggering the company's pro-CSR social norms and managers' personal CSR norms. As a result, the effect of this norm activation on managers' investment decisions depends on whether the social norms are consistent with personal norms. Consistent with their prediction, the authors find that nonfinancial measures of CSR investment lead to higher levels of investment than financial measurements, but only if the manager has strong personal norms towards CSR.

prediction on how the environment-related disclosure nature will ultimately impact investment willingness.

H3: A mandatory environment-related disclosure, relative to a voluntary one, will decrease investment willingness.

CHAPTER 3. METHOD

3.1 Participants

I use Prolific investor participants as proxies of non-professional investors. To ensure participants can be considered as investors, I use a Prolific screener asking, "Have you ever made investments (either personal or through your employment) in the common stock or shares of a company?" Participants who respond "Yes" are invited to a pre-test, where I categorize participants based on their environmental affinity and subsequently invite qualified participants to the main experiment. I conduct a pre-test about 20 days prior to the main experiment to identify individuals' environmental affinity (adapted from Church et al. 2019) and randomly assign qualified participants to experimental conditions in the main experiment.

3.2 A Climate-Related Disclosure Context

This paper focuses on the environmental aspect of ESG. To operationalize an environment-related disclosure, I use a climate-related disclosure context, which has recently received increasing attention from both investors and regulators. More and more investors are considering climate-related risks when making investment decisions. In response to this demand, many financial institutes developed investing tools, such as BlackRock's Aladdin Climate and Morgan Stanley's Sustainable Signals Framework, to help investors identify firms well-positioned for managing ESG risks. Offering a regulator perspective, the Financial Stability Oversight Council points out that climate-related risks may put direct financial stress on investors, businesses, and financial institutions and harm the economy as a whole, posing systemic risks to financial systems (FSOC, 2021). Banking authorities have begun considering climate risks in their oversight of financial organizations (OCC 2021), while governments worldwide have committed to transition to a low-carbon economy (Worford 2021). Endeavors to pursue these goals have a material financial impact on public companies, thus making climate-related disclosures a rich setting for my study.

3.3 Design

In a pre-test, I administer a general survey to participants about their opinions regarding various social issues. Participants respond to each item on a 7-point Likert scale with "strongly disagree" and "strongly agree" as the endpoints and "Neither agree nor disagree" as the midpoint. One item in the survey asks participants to rate the following statement: "It is important that companies sacrifice profitability to promote environmental causes (for example, reducing carbon emissions or donating to save wildlife)." This question is intended to measure participants' environmental affinity. It captures the trade-off participants make between firm profitability and environmental practices, namely, how supportive participants are of environmental activities while acknowledging the associated costs. I use the scale midpoint as a cut-off to classify each participant as having high or low environmental affinity. After classification, I recruit an equal number of participants in each environmental affinity group for the main experiment.[6]

[6] First, I treat environmental affinity as a dichotomous variable rather than a continuous one to better separate the behavioral patterns of each group. Results from the main experiment are inferentially identical if I treat environmental affinity as a continuous variable. Second, I use the scale midpoint (i.e., 0) instead of the mean or median as the cutoff to better separate participants with low versus high environmental affinity levels rather than high versus very high environmental affinity levels. To balance the participant count across two environmental affinity groups for the main experiment, I first invite low-environmental-affinity

For the main experiment, I use a 2 X 2 factorial design with investors' environmental affinity level and environment-related disclosure nature as the independent variables. Participants are instructed to assume the role of a prospective investor of a hypothetical firm, GoldWide. I manipulate the environment-related disclosure nature to be either voluntary or mandatory (shown in Appendix A, adapted from Nelson and Rupar 2015). In the voluntary condition, participants are instructed to assume that "The Securities and Exchange Commission (SEC) does *not require* firms to disclose climate-related risks and their response to them. That is, *firms have a choice of disclosing or not disclosing* climate-related issues." In the mandatory condition, participants are instructed to assume that "The Securities and Exchange Commission (SEC) *requires* firms to disclose climate-related risks and their response to them. That is, *firms must disclose* climate-related issues." I measure and classify investors' environmental affinity level (high vs. low) via the pre-test.

3.3.1 Dependent Measures

My three main dependent variables of interest are investors' perception of environment-related risks, perception of management's genuine concern for environmental causes, and investment willingness. I randomize the order of the questions that captures the two perception variables and then measure investment willingness. To capture investors' perception of environment-related risks, I ask the following question: "In your opinion, how significant are the climate-related risks listed in GoldWide's disclosure to the company's performance?"(-3 = "Very insignificant" and +3 = "Very significant"). I measure investors' perception of management's genuine concern for environmental causes

participants, given their smaller population. Once their participation stops increasing, I extend invitations to an identical number of high-environmental-affinity participants.

by asking participants to indicate the extent to which they agree with the following statement using a 7-point scale (-3 = "Strongly disagree" and +3 = "Strongly agree"): "GoldWide's management cares about environmental causes."

I use two measures (i.e., *Investment Favorability* and *Investment Likelihood*) to capture investment willingness. Specifically, participants answer the following two questions using a 7-point scale: (1) "How favorably do you view GoldWide's stock as an investment?" (-3 = "Very unfavorably" and +3 = "Very favorably") (2) "How likely are you to invest in GoldWide's stock?" (-3 = "Very unlikely" and +3 = "Very likely") These two measures capture different dimensions of individuals' holistic perceptions of the company (Asay, Hales, Hinds, and Rupar 2023). *Investment Favorability* measures investors' assessment of the company's stock without asking them to consider investing in the company. *Investment Likelihood*, in turn, incorporates factors that impact participants' likelihood of purchasing the company's stock.

3.3.2 Process Measure

Hypothesis 2a predicts that a mandatory environment-related disclosure, relative to a voluntary one, will increase investors' perception of environment-related risks, especially when investors have low rather than high environmental affinity. To make this prediction, I argue that a mandatory disclosure in an environment-related disclosure context reveals that regulators believe environment-related risks are important to be disclosed and should be considered when making investment decisions. To provide evidence for this potential mechanism, I measure the perception of regulators' view of environment-related risks by asking participants to rate the following statement using a 7-point scale: "In your opinion, and considering the climate-related risks listed in GoldWide's disclosure, how significant do you believe **regulators** view these risks to the company's performance? " (-3= "Very insignificant" and +3 = "Very significant")

3.4 Task and Procedure

Participants complete a Qualtrics survey comprising five stages (as depicted in Figure 1). In the background stage (Stage 1), all participants are instructed to assume that they are prospective investors of a hypothetical firm, GoldWide, and will read some information about it to help them make judgments. They then read a company overview and an earnings press release and are randomly assigned to experimental conditions. In the disclosure nature manipulation stage (Stage 2), participants are instructed to assume that the SEC requires/does not require firms to disclose climate-related risks and their response to them. In the disclosure reviewing stage (Stage 3), all participants read the same piece of climate-related disclosure (shown in Appendix B). In the judgment measuring stage (Stage 4), I measure investors' perception of environment-related risks, perception of management's genuine concern for environmental causes, and investment willingness. In the additional measures and PEQ stage (Stage 5), I measure the perception of regulators' view of environment-related risks and other potentially influential factors. I also ask participants to provide up to 3 reasons to support their choice of investment willingness. In addition to a manipulation check question, I collect responses to demographic information.

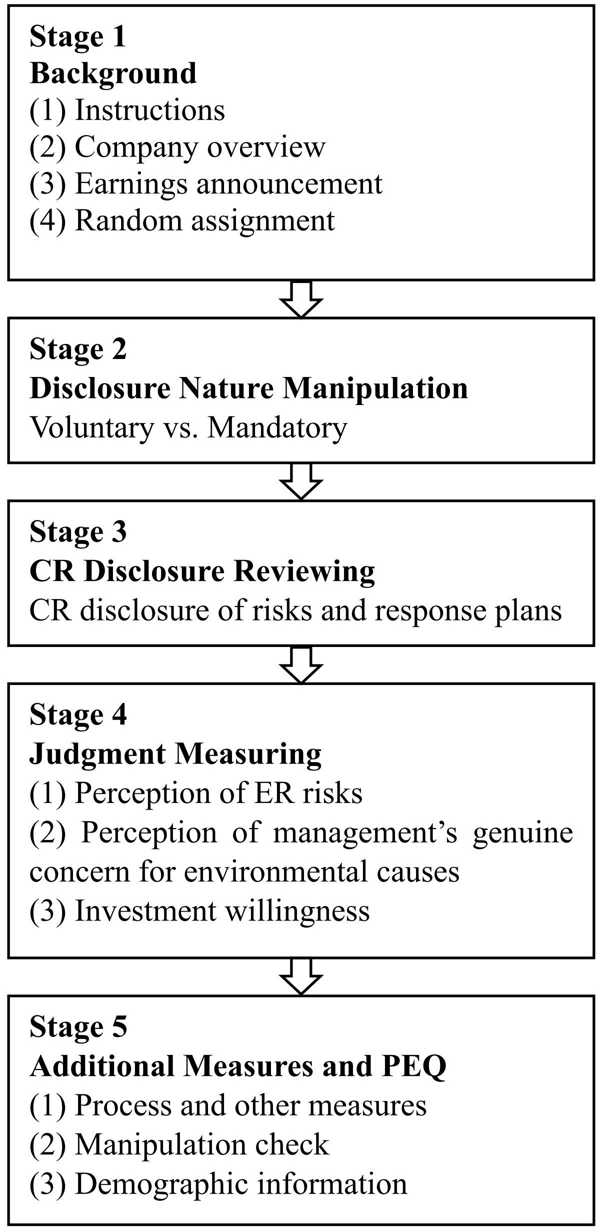

Figure 1 – Procedures

CHAPTER 4. RESULTS

4.1 Pre-test

I recruit 953 Prolific participants for a pre-test meant to identify investors with different levels of environmental affinity. Participants rate the following statement using a 7-point scale (-3= ‘‘Strongly disagree’’ and +3 = ‘‘Strongly agree’’): “It is important that companies sacrifice profitability to promote environmental causes (for example, reducing carbon emissions or donating to save wildlife).”[7] Figure 2 is a bar chart of the frequency of ratings on environmental affinity. The ratings range from -3 to +3, with a mean of 1.26 and a median of 2.00. This indicates that many people care about the environment or believe companies should take environmental causes seriously. I use the scale midpoint (i.e., 0) as a cut-off to classify each participant as having either low or high environmental affinity, which results in 151 low-environmental-affinity individuals, 711 high-environmental-affinity individuals, and 91 individuals who provide a rating of 0. I then send the invitation to the main experiment to all individuals classified as low-environmental-affinity or high-environmental-affinity groups.[8] The data collection concludes when 72 participants from each environmental affinity group are included (i.e., 144 participants in total for the main experiment).

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[7] Although my measure of environmental affinity in the pre-test may capture some socially desirable answers, this should work against finding the predicted patterns in the main experiment.

[8] In additional analyses (Section 4.8.1), I report the results of a follow-up survey that provides insights into the overlap between an individual’s level of environmental affinity and perceptions of whether a company should promote environmental causes if it does not benefit the company in the long run, as well as the individual’s perceptions toward risks in general.

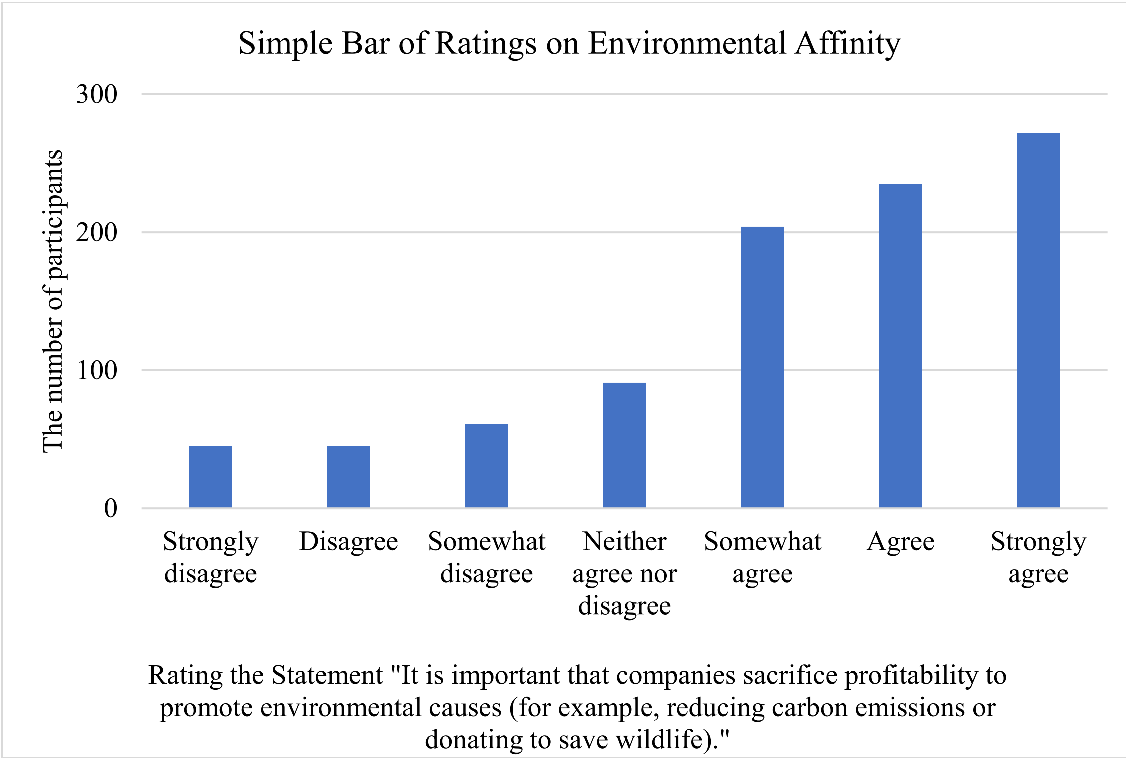

Figure 2 – Frequency of Ratings on Environmental Affinity

4.2 Attention and Manipulation Checks

To confirm participants paid attention, I ask participants to respond with “True” or “False” to two statements as they walk through the survey: (1) “GoldWide is a gold mining company”; (2) “One piece of information that I viewed on a prior screen in this study is GoldWide’s Climate-related Disclosure.” A total of 99.3% of participants correctly answered the first attention check question, while 97.9% correctly answered the second one.

To evaluate the effectiveness of my disclosure nature manipulation, I ask participants the following question: “Previously in this study, I was asked to assume that the SEC ______ firms to disclose climate-related risks and their response to them.” with choices “requires (That is, firms must disclose climate-related issues)” and “does not require (That is, firms have a choice of disclosing or not disclosing climate-related issues)" The fact that 93.8% of participants correctly answered this question indicates an effective manipulation of the disclosure nature.[9]

4.3 Tests of Hypothesis 1

H1 predicts that high-environmental-affinity investors will perceive environment-related risks as more serious than low-environmental-affinity investors. Table 1. A presents descriptive statistics for investors' perception of environment-related risks. The mean risk rating of the low-environmental-affinity condition is 0.694, while the mean risk rating of the high-environmental-affinity condition is 1.625. To test my directional prediction, I conduct an independent sample t-test (presented in Table 1. B) with environmental affinity as the independent variable and perception of environment-related risks as the dependent variable. The result indicates that high-environmental-affinity investors have a significantly higher rating of perception of environment-related risks than low-environmental-affinity investors ($t = -5.101$, $p < 0.001$, one-tailed), supporting Hypothesis 1. Moreover, the ANOVA model (presented in Table 1. C) also provides consistent evidence that the main effect of environmental affinity on the perception of environment-related risks is significant ($F = 26.853$, $p < 0.001$). Thus, Hypothesis 1 is supported.

[9] Results are inferentially identical if I exclude participants who fail attention checks or manipulation checks. Therefore, I retain all participants for analyses.

Table 1 – Descriptive Statistics and Hypotheses Testing, DV= Perception of Environment-Related Risks

Table 1. A: Descriptive Statistics (Means, Standard Deviations, n)

		Disclosure Nature		
		Voluntary	Mandatory	Total
Environmental Affinity	Low	0.444	0.944	0.694
	Std. Deviation	1.403	1.013	1.241
	n	36	36	72
	High	1.833	1.417	1.625
	Std. Deviation	1.000	0.806	0.926
	n	36	36	72
	Total	1.139	1.181	1.160
	Std. Deviation	1.397	0.939	1.187
	n	72	72	144

Table 1. B: Independent Samples T-Test

	df	**T-Statistic**	**p-value**	
Environmental Affinity	142	-5.101	<0.001	ƚ

Table 1. C: Analysis of Variance

Source of Variance	**Sum of Squares**	**df**	**Mean Square**	**F-Statistic**	**p-value**
Intercept	193.674	1	193.674	166.829	<0.001
Disclosure Nature	0.063	1	0.063	0.054	0.817
Environmental Affinity	31.174	1	31.174	26.853	<0.001
Disclosure Nature *Environmental Affinity	7.563	1	7.563	6.514	0.012
Error	162.528	140	1.161		
Total	395.000	144			

Table 1 (continued)

Table 1. D: Simple Main Effects

	F-Statistic	p-value
For Low Environmental Affinity		
Mandatory vs. Voluntary Disclosure	3.876	0.051
For High Environmental Affinity		
Mandatory vs. Voluntary Disclosure	2.692	0.103
For Voluntary Disclosure		
High vs. Low Environmental Affinity	29.909	<0.001
For Mandatory Disclosure		
High vs. Low Environmental Affinity	3.458	0.065

Table 1 provides tests of Hypothesis 1 and Hypothesis 2a using a full sample of 144 participants. This table presents descriptive statistics, independent samples t-test, an ANOVA model, and simple main effects tests. I manipulate the environment-related disclosure nature to be either voluntary or mandatory. Investors' environmental affinity level (high vs. low) is measured and classified in the pre-test. The main dependent variable is investors' perception of environment-related risks. Participants answer the following question using a 7-point scale (-3 = ''Very insignificant and +3 = ''Very significant"): "In your opinion, how significant are the climate-related risks listed in GoldWide's disclosure to the company's performance?"

ƚ indicates a one-tailed test for a directional prediction.

4.4 Tests of Hypothesis 2a

Hypothesis 2a predicts that a mandatory environment-related disclosure, relative to a voluntary one, will increase investors' perception of environment-related risks, especially when investors have low rather than high environmental affinity. Figure 3. A illustrates the predicted pattern of environmental affinity and disclosure nature on investors' perception of environment-related risks.

4.4.1 Primary Analyses

Table 1. A presents the means and standard deviation for investors' perception of environment-related risks under the four conditions. Figure 3. B depicts the observed pattern of the means for perception of environment-related risks. I conduct a two-way ANOVA (presented in Table 1. C) with environmental affinity and disclosure nature as two independent variables and perception of environment-related risks as the dependent variable. The interaction is significant ($F= 6.514$, $p= 0.012$). In line with predictions, Table 1. D reveals that the simple main effect of disclosure nature is significant when conditioning on the low-environmental-affinity group ($F= 3.876$, $p= 0.051$) but insignificant when conditioning on the high-environmental-affinity group ($F= 2.692$, $p= 0.103$). For completeness, the simple main effect of environmental affinity is significant when conditioning on the voluntary disclosure group ($F= 29.909$, $p<0.001$) and marginally significant when conditioning on the mandatory disclosure group ($F= 3.458$, $p= 0.065$). Overall, I find supporting evidence for Hypothesis 2a.

Figure 3. A: Predicted Pattern of Perception of Environment-Related Risks

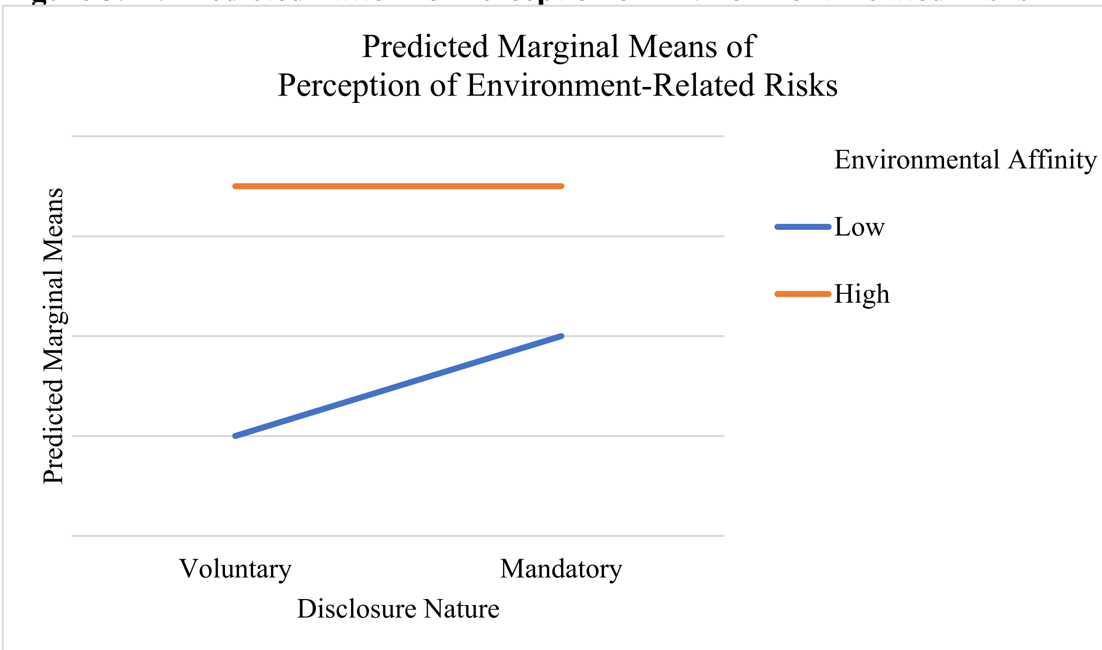

Figure 3. B: Observed Pattern of Perception of Environment-Related Risks

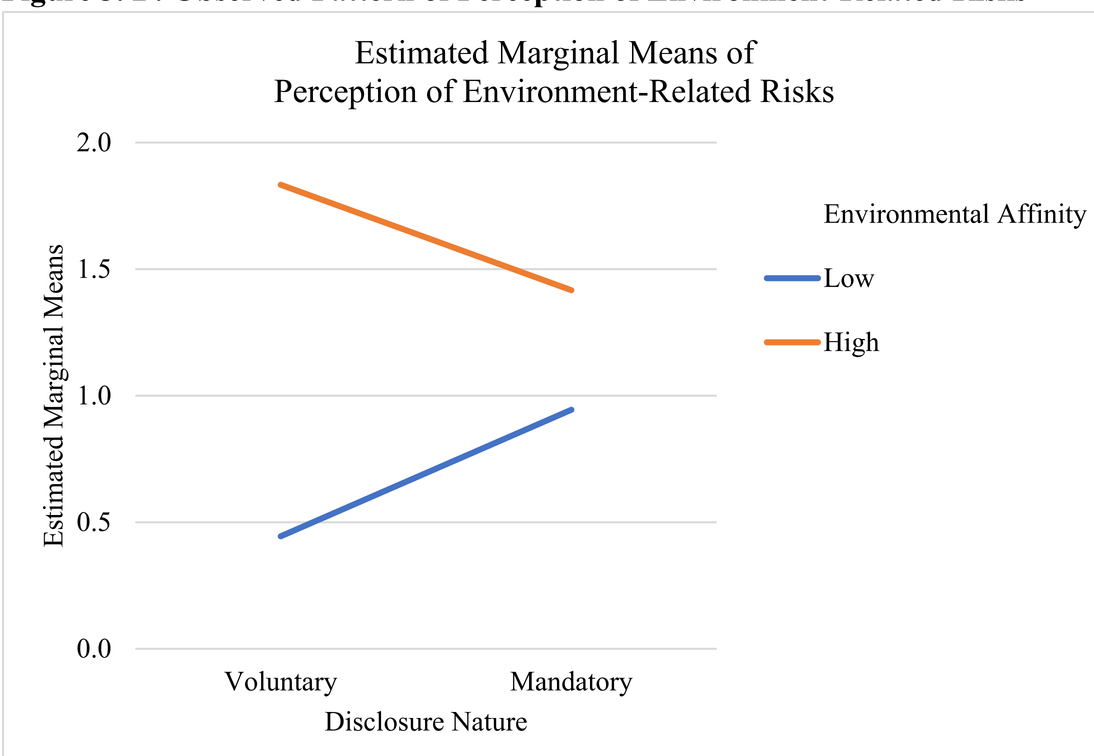

Figure 3 – The Effect of Environmental Affinity and Disclosure Nature on Perception of Environment-Related Risks

4.4.3 *Process Analyses - Role of Perception of Regulators' View of Environment-Related Risks*

Frederickson et al. (2006) find that a mandate indicates to financial statement users that a well-informed independent authority considers the disclosed information crucial in a financial disclosure setting. In an environment-related disclosure setting, I argue that an individual characteristic – environmental affinity – needs to be considered because, compared to high-environmental-affinity investors, low-environmental-affinity investors are in greater need of this signal to shape their own perception of the importance of environment-related risks.

I find that the interaction of environmental affinity and disclosure nature on the perception of regulators' view of environment-related risks is significant ($F=5.617$, $p=0.019$) and that the observed pattern of investors' perception of regulators' view of environment-related risks (as depicted in Figure 4) aligns with the observed pattern of investors' perception of environment-related risks (as depicted in Figure 3. B). To further support the underlying mechanism of H2a, I test whether investors' perception of regulators' view of environment-related risk mediates the effect of disclosure nature on investors' own perception of environment-related risk for low-environmental-affinity vs. high-environmental-affinity groups. Table 2. A specifies a moderated mediation model. I adopt PROCESS Model 7 (Hayes 2018), with the perception of environment-related risks as the dependent variable, disclosure nature as the independent variable, perception of regulators' view of environment-related risks as the mediator, and environmental affinity as the moderator.[10] Table 2. B demonstrates conditional indirect effects of disclosure nature on the perception of environment-related risks. The index of moderated mediation is -0.436, and the bootstrapping confidence intervals do not contain zero, suggesting a significant moderated mediation. When conditioning on the low-environmental-affinity group, both the bootstrapping lower limit confidence interval (BootLLCI) and the bootstrapping upper limit confidence interval (BootULCI) of the indirect effect are greater than 0, indicating a significant positive indirect effect for low-environmental-affinity investors. In contrast, when conditioning on the high-environmental-affinity group, 0 falls between BootLLCI and BootULCI of the indirect effect, suggesting an insignificant indirect effect for high-environmental-affinity investors. Combined, these results suggest that the perception of regulators' view of environment-related risks mediates the effect of disclosure nature on the perception of environment-related risks only for low-environmental-affinity investors but not their high-environmental-affinity counterparts, supporting my proposed underlying mechanism of Hypothesis 2a.

[10] For PROCESS models in this study, I use 5000 bootstrap samples to generate bootstrap confidence intervals at 95%.

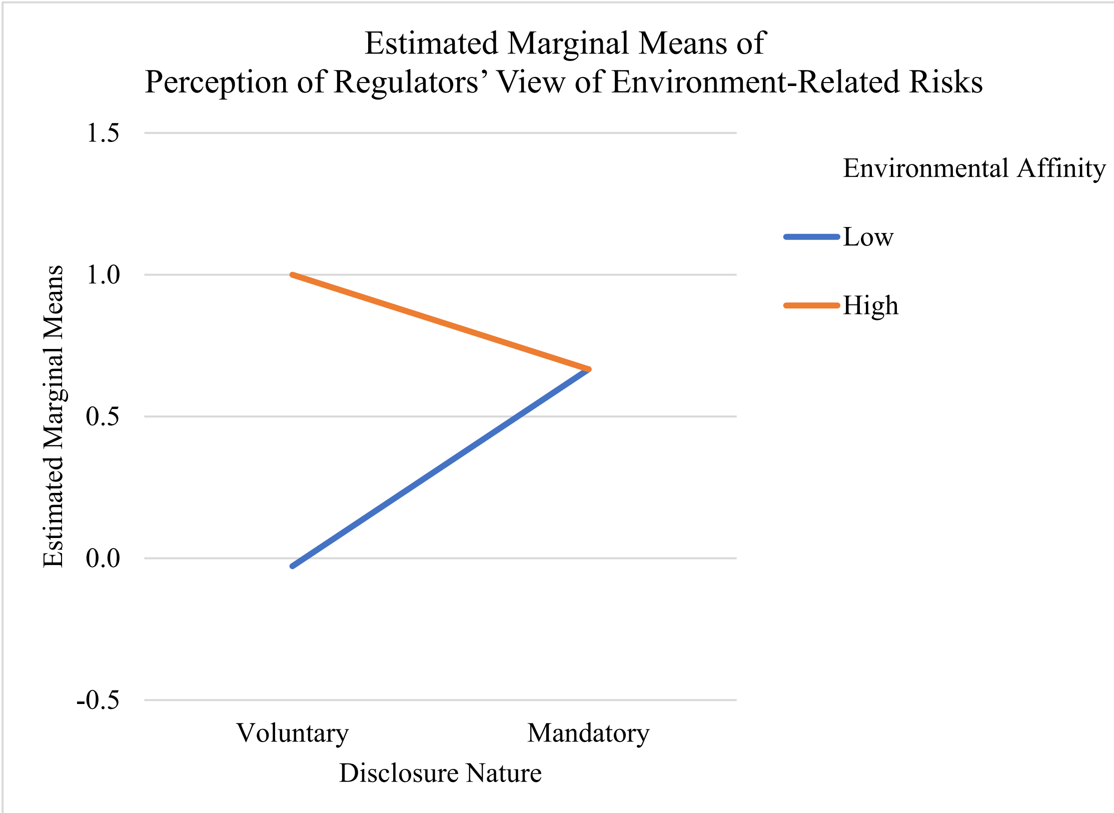

Figure 4 – Role of Perception of Regulators’ View of Environment-Related Risks

Table 2– Moderated Mediation, Mediator= Perception of Regulators’ View of Environment-Related Risks

Table 2. A: Model Specifics

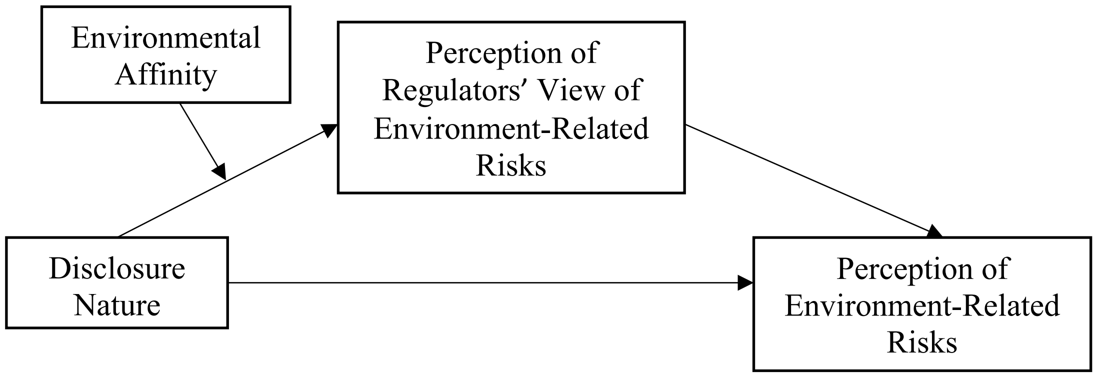

Table 2. B: Conditional Indirect Effects of X on Y

Indirect effect:
Disclosure Nature → Perception of Regulators' View of Environment-Related Risks → Perception of Environment-Related Risks

Environmental Affinity	Effect	BootSE	BootLLCI	BootULCI
Low	0.294	0.150	0.034	0.617
High	-0.141	0.134	-0.419	0.112

Index of moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
Environmental Affinity	-0.436	0.214	-0.903	-0.06

Table 2 reports the results of a moderated mediation model using a full sample of 144 participants. I use 5000 bootstrap samples to generate bootstrap confidence intervals at 95%. I adopt PROCESS Model 7, as specified below.
- The dependent variable is investors’ perception of environment-related risks, which is captured by participants' responses to the following question using a 7-point scale (-3 = ‘‘Very insignificant and +3 = ‘‘Very significant”): “In your opinion, how significant are the climate-related risks listed in GoldWide’s disclosure to the company’s performance?”
- The independent variable is the environment-related disclosure nature, which is either voluntary or mandatory.
- The mediator is investors’ perception of regulators' view of environment-related risks, which is captured by participants' responses to the following question using a 7-point scale (-3 = ‘‘Very insignificant and +3 = ‘‘Very significant”): “In your opinion, and considering the climate-related risks listed in GoldWide’s disclosure, how significant do you believe regulators view these risks to the company’s performance? ”
- The moderator is the investors’ environmental affinity level (high vs. low), which is measured and classified in the pre-test.

4.5 Tests of Hypothesis 2b

H2b emphasizes investors' perception of management's genuine concern for environmental causes. Specifically, H2b proposes that, compared to a voluntary environment-related disclosure, a mandate will decrease investors' perception of management's genuine concern for environmental causes, especially for the high-environmental-affinity group rather than the low-environmental-affinity group.

Table 3. A presents the descriptive statistics for investors' perception of management's genuine concern for environmental causes under the four conditions. Figure 5. A illustrates the predicted pattern of environmental affinity and disclosure nature on investors' perception of management's genuine concern for environmental causes, whereas Figure 5. B depicts the observed pattern of the means. There is a poor visual fit between the predicted and observed pattern of results. Table 3. B presents a two-way ANOVA model with environmental affinity and disclosure nature as the independent variables and investors' perception of management's genuine concern for environmental causes as the dependent variable. The interaction between my two independent variables is insignificant ($F= 1.567$, $p= 0.213$). Table 3. C reveals that the simple main effect of disclosure nature is marginally significant when conditioning on the low-environmental-affinity group ($F= 3.455$, $p= 0.065$), while other simple main effects are insignificant (all $p> 0.1$). Overall, I find little support for H2b. As prior psychology research finds differences in information processing across genders (e.g., Myeres-Levy and Loken 2015), I explore the impact of gender in my setting in additional analyses (Section 4.8.2).

Figure 5. A: Predicted Pattern of Perception of Management's Genuine Concern for Environmental Causes

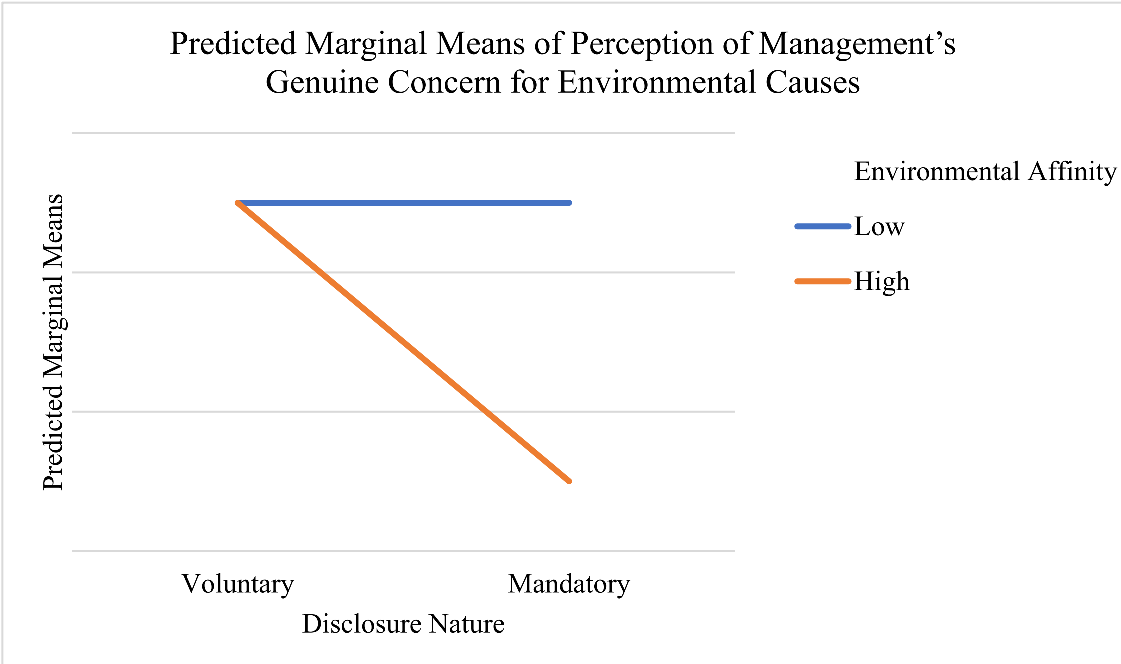

Figure 5. B: Observed Pattern of Perception of Management's Genuine Concern for Environmental Causes

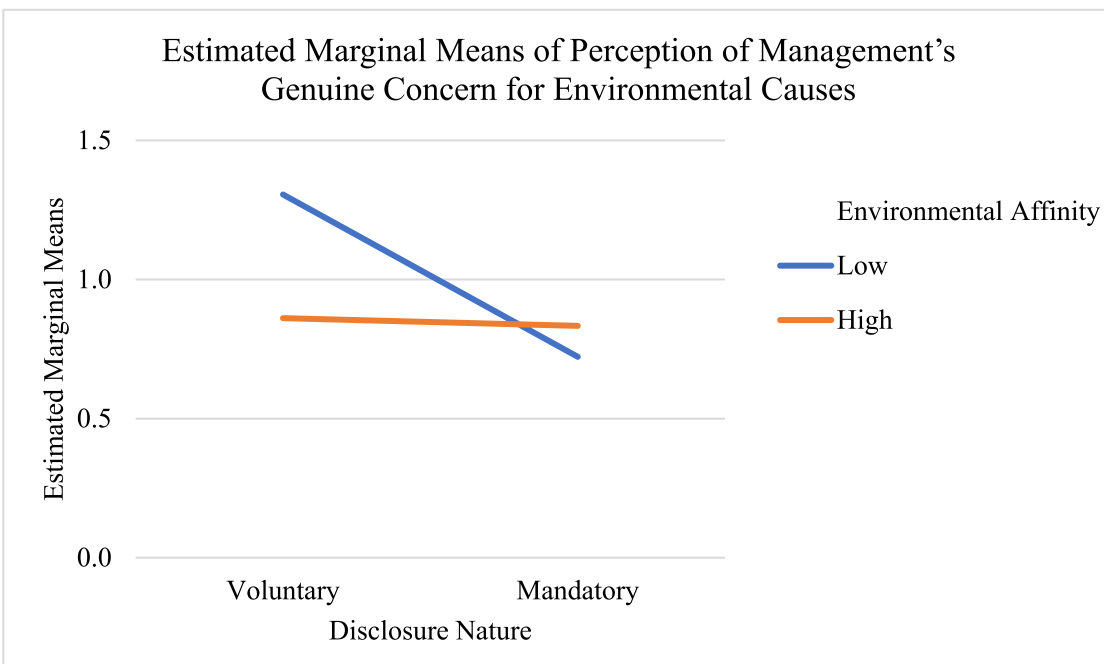

Figure 5 – The Effect of Environmental Affinity and Disclosure Nature on Perception of Management's Genuine Concern for Environmental Causes

Table 3 – Descriptive Statistics and Hypothesis Testing, DV= Perception of Management's Genuine Concern for Environmental Causes

Table 3. A: Descriptive Statistics (Means, Standard Deviations, n)

		Disclosure Nature		
		Voluntary	Mandatory	Total
Environmental Affinity	Low	1.306	0.722	1.014
	Std. Deviation	1.167	1.137	1.181
	n	36	36	72
	High	0.861	0.833	0.847
	Std. Deviation	1.641	1.320	1.479
	n	36	36	72
	Total	1.083	0.778	0.931
	Std. Deviation	1.432	1.224	1.336
	n	72	72	144

Table 3. B: Analysis of Variance

Source of Variance	**Sum of Squares**	**df**	**Mean Square**	**F-Statistic**	**p-value**
Intercept	124.694	1	124.694	70.345	<0.001
Disclosure Nature	3.361	1	3.361	1.896	0.171
Environmental Affinity	1.000	1	1.000	0.564	0.454
Disclosure Nature *Environmental Affinity	2.778	1	2.778	1.567	0.213
Error	248.167	140	1.773		
Total	380.000	144			

Table 3 (continued)

Table 3. C: Simple Main Effects

	F-Statistic	p-value
For Low Environmental Affinity		
Mandatory vs. Voluntary Disclosure	3.455	0.065
For High Environmental Affinity		
Mandatory vs. Voluntary Disclosure	0.008	0.930
For Voluntary Disclosure		
High vs. Low Environmental Affinity	2.006	0.159
For Mandatory Disclosure		
High vs. Low Environmental Affinity	0.125	0.724

Table 3 provides tests of Hypothesis 2b using a full sample of 144 participants. This table presents descriptive statistics, an ANOVA model, and simple main effects tests. I manipulate the environment-related disclosure nature to be either voluntary or mandatory. Investors' environmental affinity level (high vs. low) is measured and classified in the pre-test. The main dependent variable is investors' perception of management's genuine concern for environmental causes. Participants indicate the extent to which they agree with the following statement using a 7-point scale (-3 = ''Strongly disagree'' and +3 = ''Strongly agree''): "GoldWide's management cares about environmental causes."

4.6 Tests of Hypothesis 3

Hypothesis 3 predicts that regardless of investors' environmental affinity level, a mandatory environment-related disclosure, relative to a voluntary one, will decrease investment willingness. The Cronbach's alpha of *Investment Favorability* and *Investment Likelihood* is 0.919, indicating an acceptable internal consistency of these two items (Cortina 1993; Streiner 2003). I compute a variable *Investment Willingness* by averaging *Investment Favorability* and *Investment Likelihood*.

Table 4. A presents descriptive statistics for investment willingness. The mean investment willingness of the voluntary condition is 1.333, with a standard deviation of 1.356. The mean investment willingness of the mandatory condition is 1.319, with a standard deviation of 1.108. Table 4. B presents an independent sample t-test with disclosure nature as the independent variable and investment willingness as the dependent variable. I do not find a significant effect of disclosure nature ($t = -0.067$, $p = 0.946$), thus failing to support H3. In additional analyses (Section 4.8.2), I examine how gender may play a role in this setting.

Table 4 – Descriptive Statistics and Hypothesis Testing, DV= Investment Willingness

Table 4. A: Descriptive Statistics (Means, Standard Deviations, n)

Disclosure Nature	Mean	Std. Deviation	n
Mandatory	1.319	1.108	72
Voluntary	1.333	1.356	72

Table 4. B: Independent Samples T-Test

	df	t-statistic	p-value
Disclosure Nature	142	-0.067	0.946

Table 4 provides a test of Hypothesis 3 using a full sample of 144 participants. This table presents descriptive statistics and an independent samples t-test. I manipulate the environment-related disclosure nature to be either voluntary or mandatory. The main dependent variable is Investment Willingness, which is an averaging of Investment Favorability and Investment Likelihood. Specifically, participants answer the following two questions using a 7-point scale: (1) "How favorably do you view GoldWide's stock as an investment?" (-3 = ''Very unfavorably'' and +3 = ''Very favorably") (2) "How likely are you to invest in GoldWide's stock?" (-3 = ''Very unlikely" and +3 = ''Very likely")

4.7 Ruling out Alternative Explanations

I expect the perception of regulators' view of environment-related risks (as supported in Section 4.4.2) rather than other variables to be the underlying mechanism of H2a. To rule out alternative explanations, I measure the following three potentially influential variables of H2a using a 7-point scale (-3= "Strongly disagree" and +3 = "Strongly agree"). First, although Frederickson et al. (2006) find that a mandate increases disclosure reliability, I do not expect disclosure reliability to be as important as the regulatory perspective in my setting. I consider the perception of increased disclosure reliability to be part of the result of the perceived regulator's viewpoint. In addition, disclosure reliability is not the main reason investors incorporate that disclosure into decision-making. A disclosure may be very reliable but not considered relevant by a certain group of users, such as low-environmental-affinity investors.[11] To alleviate this concern, I measure participants' perceived reliability of the environment-related disclosures by asking them to rate the statement, "GoldWide's climate-related disclosure is reliable."

Furthermore, one alternative explanation to H2a is that investors will consider firms that voluntarily disclose climate risks as having more confidence in dealing with these risks than firms that do not (Owais 2021) and thus will perceive lower environment-related risks. Given Mercer's (2005) findings that more forthcoming disclosures, particularly on

[11] Kadous, Koonce, and Thayer (2012) find a unidirectional relation between assessed reliability and assessed relevance. Specifically, in a fair value context, because reliability is a more accessible attribute than relevance, information users will substitute using factors underlying reliability when assessing the relevance of a fair value. I don't expect this unidirectional relation to exist in an environment-related disclosure context for two reasons. First, reliability and relevance may not vary that much in their accessibility in an environment-related disclosure context as in a fair value context. Second, investors at different environmental affinity levels may vary in their sensitivity to information relevance, making it difficult to generalize one trend to all groups.

negative news, boost management's reporting credibility in the short term, another possible explanation of H2a is that a voluntary disclosure on environment-related risks may boost management credibility and thus lower investors' perception of environment-related risks. However, these two perceptions of management may not play as significant a role as the regulatory perspective in influencing investors' perception of environment-related risks in the context of mandatory vs. voluntary disclosure. Additionally, they may not interact with environmental affinity to impact the perception of environment-related risks. To address these two possibilities, I measure investors' perception of management's confidence in mitigating climate risks by asking participants to rate the statement "GoldWide's management is confident in mitigating the climate risks listed in its disclosure." I measure management credibility by asking participants to indicate the extent to which they agree with the following two statements: (1) "The management of GoldWide is competent." and (2) "The management of GoldWide is trustworthy." The former captures *Management Competence*, while the latter captures *Management Trustworthiness*.

I conduct several two-way ANOVAs with environmental affinity and disclosure nature as independent variables and a potential alternative explanatory variable as the dependent variable. Results show an insignificant interaction on disclosure reliability ($F=0.748$, $p= 0.389$), on investors' perception of management's confidence in mitigating environment-related risks ($F=0.008$, $p=0.928$), and on management credibility ($F=0.144$, $p= 0.705$).[12] Moreover, I test a moderated mediation model that includes these three

[12] The Cronbach's alpha of *Management Competence* and *Management Trustworthiness* is 0.754, suggesting the internal consistency of these two items is acceptable (Cortina 1993; Streiner 2003). Thus, I compute a variable *Management Credibility* by averaging *Management Competence* and *Management Trustworthiness*.

potential alternative variables as parallel mediators, along with the perception of regulators' view of environment-related risks. In this model, the perception of environment-related risks is the dependent variable, disclosure nature is the independent variable, and environmental affinity is the moderator. Results suggest that only the moderated mediation through regulators' view of environment-related risks is significant, while the other three are not significant mediators. Therefore, none of these three variables drives H2a.

Additionally, to ensure that my measure of environment-related risks does not also capture how likely participants believe the company will pollute the environment, I measure the perceived likelihood of polluting the environment by asking participants to indicate the extent to which they agree with the following statement: "GoldWide will pollute the environment." Participants also indicate their familiarity with regulations of current environment-related disclosures by answering the following question using a 7-point scale (-3 = "Very unfamiliar" and +3 = "Very familiar"): "Considering current practice, how familiar are you with regulations surrounding climate-related disclosures?"

A two-way ANOVA with the perceived likelihood of polluting the environment as the dependent variable reports an insignificant interaction ($F=0.108$, $p= 0.743$), indicating that participants do not perceive my measure of perception of environment-related risks as a measure of how likely participants believe the company will pollute the environment. Ratings of familiarity with regulations of current environment-related disclosures in all four conditions are below 0, indicating that environment-related disclosure is still an emerging area for investors to understand. A two-way ANOVA with familiarity with regulations of current environment-related disclosures as the dependent variable reports an insignificant interaction (F= 0.555, p= 0.457). Results of each hypothesis test are inferentially identical if I incorporate familiarity with regulations of current environment-related disclosures as a covariate, suggesting that the main findings of this study are robust to participants' awareness of current environment-related standards (Piercey 2023).

4.8 Additional Analyses

4.8.1 Understanding the Construct of Environmental Affinity

In a follow-up survey, I invite participants from the main experiment to respond to several questions. 52 low-environmental-affinity participants and 55 high-environmental-affinity participants respond. The first question asks them to select the statement they *most* identify with from the following three categories: (1) Companies should sacrifice short-term performance to promote environmental causes, *even if* it *doesn't* benefit the company in the long run. (2) Companies should sacrifice short-term performance to promote environmental causes *only if* it benefits the company in the long run. (3) Companies should not sacrifice short-term performance to promote environmental causes, *even if* it benefits the company in the long run. Figure 6 depicts the observed counts in each category for low-environmental-affinity and high-environmental-affinity individuals, respectively. A higher proportion of individuals from the high-environmental-affinity group identify with the first two categories compared to the low-environmental-affinity group (Chi-Square value= 8.883, Sig.= 0.003), confirming the effectiveness of categorizing participants into high-environmental-affinity vs. low-environmental-affinity groups based on the pre-test. Moreover, among individuals who identify with either of the first two categories, a greater proportion of high-environmental-affinity individuals, as opposed to their low-environmental-affinity counterparts, identify with the first category (Chi-Square value= 35.461, Sig.< 0.001), indicating the strong commitment of high-environmental-affinity individuals to environmental causes, even in the absence of a long-term benefit to the company.

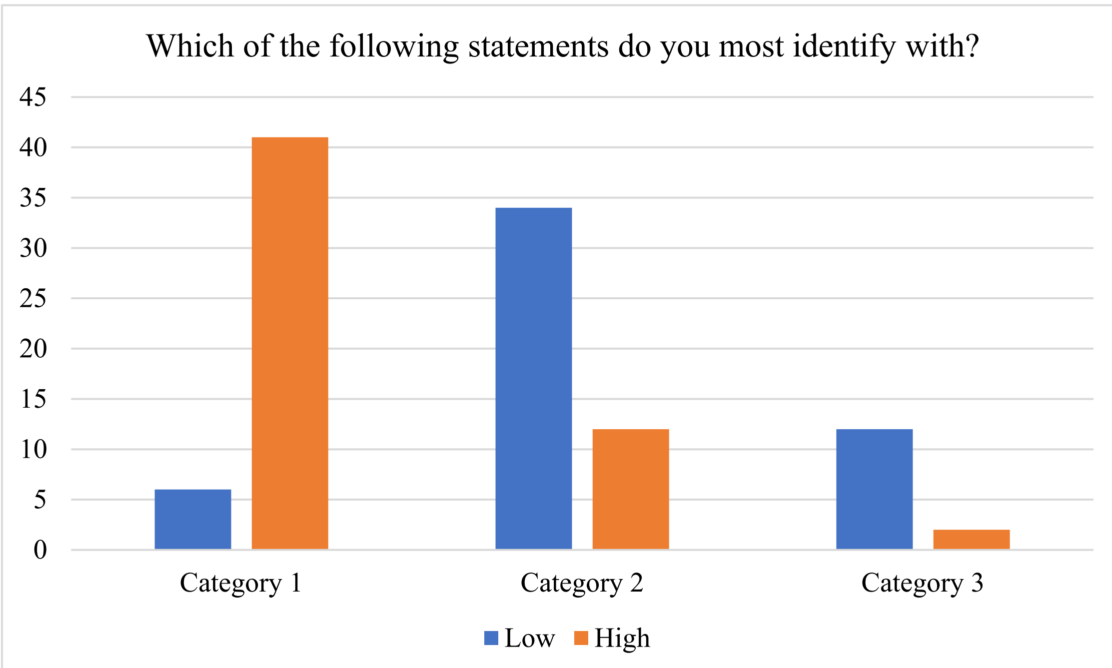

Figure 6 – Environmental Affinity and Whether Companies Should Sacrifice Short-Term Performance to Promote Environmental Causes

This figure plots the distribution of responses from participants in low or high environmental affinity groups to the question, "Which of the following statements do you most identify with?". Each participant selects one of the following three categories.
Category 1: Companies should sacrifice short-term performance to promote environmental causes, even if it doesn't benefit the company in the long run.
Category 2: Companies should sacrifice short-term performance to promote environmental causes only if it benefits the company in the long run.
Category 3: Companies should not sacrifice short-term performance to promote environmental causes, even if it benefits the company in the long run.

To ascertain whether investors in different EA groups exhibit varying risk perceptions, particularly concerning environmental issues as opposed to general risk-related matters, participants respond to the following question on a 7-point scale (1 = "Not serious at all" and 7 = "Extremely serious"): "Assuming you are an investor in a company, please rate the seriousness of each risk listed below based on your personal opinion. (1) Economic Recession; (2) Interest Rate Fluctuations; (3) Cybersecurity Threats; (4) Legal, Regulatory and Compliance Risks; (5) Environmental and Climate Change Risks." The rating of general risks is determined by averaging the ratings of the first four risks. Table 5. A reports descriptive statistics and the independent samples t-test for environmental and climate change risks as the dependent variable. Table 5. B provides the same for general risks as the dependent variable. The high-environmental-affinity group exhibits a significantly higher average rating of environmental and climate change risks than the low-environmental-affinity group (high-environmental-affinity rating= 5.145, low-environmental-affinity rating= 2.961, $t=6.930$, $p< 0.001$). In contrast, the average ratings for general risks do not significantly differ between these two EA groups (high-environmental-affinity rating= 5.377, low-environmental-affinity rating= 5.361, $t=0.099$, $p= 0.921$). This highlights that, compared to the low-environmental-affinity individuals, the high-environmental-affinity individuals perceive greater risks in environment-related issues but not in general risk-related matters.

Table 5 – Environmental Affinity and Perceptions Toward Risks in General

Table 5. A: Descriptive Statistics and Independent Samples T-Test, DV= Environmental and Climate Change Risks

Environmental Affinity	Mean	Std. Deviation	n
Low	2.962	1.737	52
High	5.145	1.520	55

Independent Samples T-Test	df	T-Statistic	p-value
Environmental Affinity	105	6.930	<0.001

Table 5. B: Descriptive Statistics and Independent Samples T-Test, DV= General Risks

Environmental Affinity	Mean	Std. Deviation	n
Low	5.361	0.912	52
High	5.377	0.823	55

Independent Samples T-Test	df	T-Statistic	p-value
Environmental Affinity	105	0.099	0.921

Table 5 provides tests of whether investors in different environmental affinity groups exhibit varying risk perceptions, particularly concerning environmental issues as opposed to general risk-related matters. Specifically, participants respond to the following question on a 7-point scale (1 = "Not serious at all" and 7 = "Extremely serious"): "Assuming you are an investor in a company, please rate the seriousness of each risk listed below based on your personal opinion. (1) Economic Recession; (2) Interest Rate Fluctuations; (3) Cybersecurity Threats; (4) Legal, Regulatory and Compliance Risks; (5) Environmental and Climate Change Risks." The rating of general risks is determined by averaging the ratings of the first four risks.

4.8.2 Impact of Gender

Myeres-Levy and Loken (2015) indicate that judgments may differ across genders because information processing strategies differ. It is possible that I fail to find supporting evidence for H2b and H3 because the two genders may behave differently when forming their perception of management's genuine concern for environmental causes and investment willingness. In the following analyses, I provide preliminary evidence suggesting that gender affects the inferences I can draw from my data.

A three-way ANOVA with disclosure nature, environmental affinity, and gender as independent variables and investors' perception of management's genuine concern for environmental causes as the dependent variable results in a statistically significant interaction ($F= 6.685$, $p= 0.011$). Furthermore, two-way ANOVAs reveal that the interaction of environmental affinity and disclosure nature on investors' perception of management's genuine concern for environmental causes is significant when conditioning on the female group ($F= 8.856$, $p= 0.004$) but insignificant when conditioning on the male group ($F= 0.811$, $p=0.371$). Figure 7 depicts the observed pattern in the female and male groups. Interestingly, the shape of the significant interaction in the female group does not align with H2b. While H2b predicts high environmental affinity investors are more sensitive to the signal of whether the management genuinely cares about environmental causes, the pattern suggests that low environmental affinity females are more sensitive to this signal. Thus, although I fail to support H2b, I find preliminary evidence that how environment-related environmental affinity and disclosure nature jointly impact investors' perception of management's genuine concern for environmental causes may also depend on investors' gender. The significant interaction found in the female group is consistent with the stream of psychology and marketing literature indicating differences in information processing across genders (e.g., Meyers-Levy and Loken 2015; Richard et al. 2010; Hall and Matsumoto 2004; Rosip and Hall 2004).

Figure 7. A: Observed Pattern in Female Group

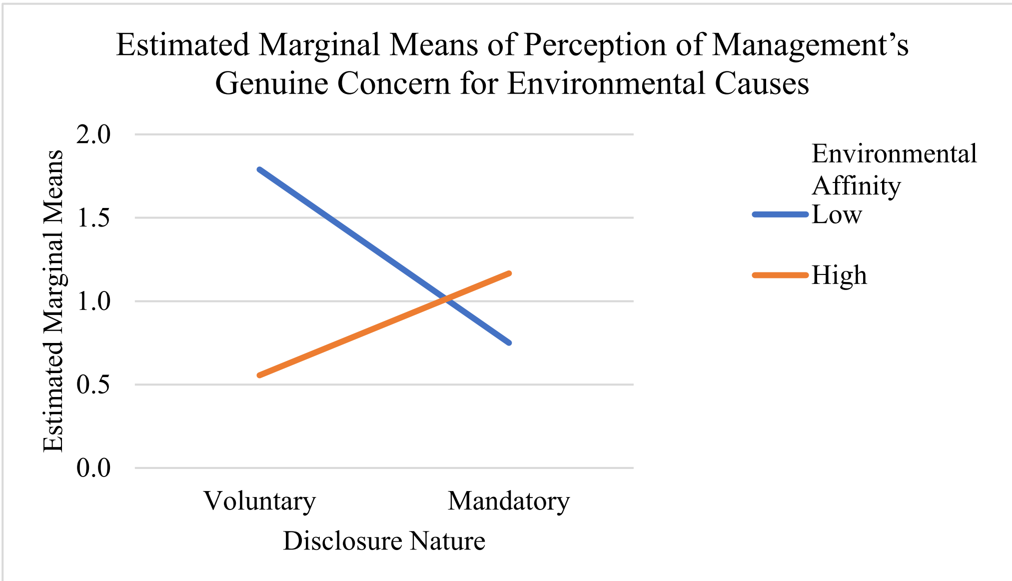

Figure 7. B: Observed Pattern in Male Group

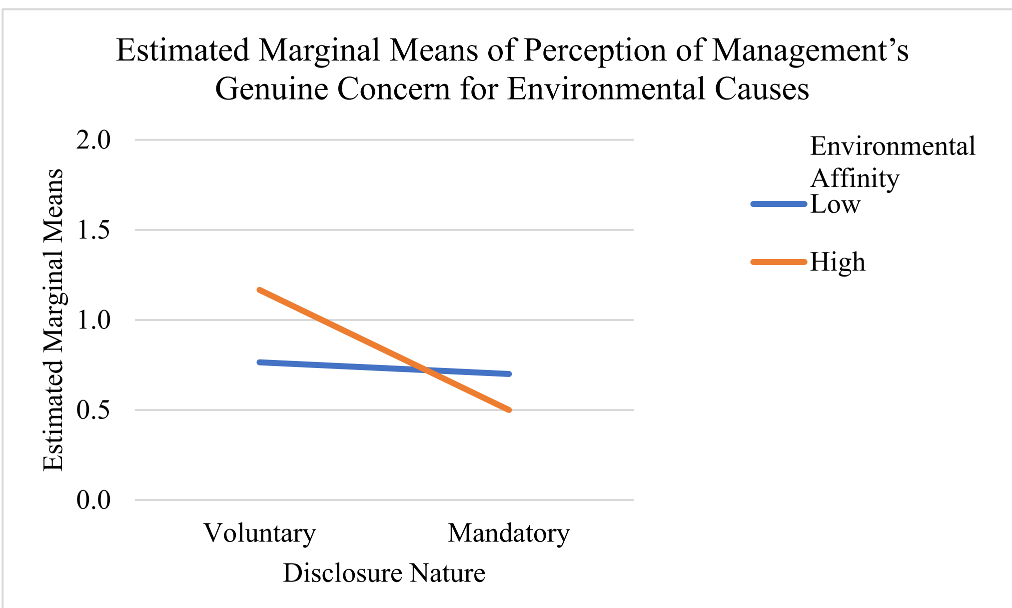

Figure 7 – Impact of Gender, DV= Perception of Management's Genuine Concern for Environmental Causes

Given the impact of gender when examining H2b, I also explore whether there are any gender effects surrounding how investors' perception of management's genuine concern for environmental causes will eventually factor into their investment willingness. A three-way ANOVA with disclosure nature, environmental affinity, and gender as independent variables and investment willingness as the dependent variable results in a statistically significant interaction ($F= 5.934$, $p= 0.016$). Figure 8. A and B present the observed pattern in the female and male groups, respectively. Two-way ANOVAs report that the interaction of environmental affinity and disclosure nature on investment willingness is significant when conditioning on the female group ($F= 5.223$, $p= 0.025$) but insignificant when conditioning on the male group ($F= 1.213$, $p=0.275$). Furthermore, I test a moderated moderated mediation model using PROCESS Model 11 (Hayes 2018). Figure 8. C depicts this model, in which I treat investment willingness as the dependent variable, environment-related disclosure nature as the independent variable, investors' perception of management's genuine concern for environmental causes as the mediator, and investors' environmental affinity and gender as two moderators. The index of moderated moderated mediation is 1.038, and both BootLLCI and BootULCI are positive, suggesting a positive significant moderated moderated mediation. Specifically, low-environmental-affinity females drive the results. The index of conditional moderated mediation by Environmental Affinity is significant for females but not males. Therefore, although H3 is not supported, additional analyses provide preliminary evidence that at least a certain group of investors care about management's genuine attitude towards environmental causes and factor this into their investment decisions.

Figure 8. A: Observed Pattern in Female Group

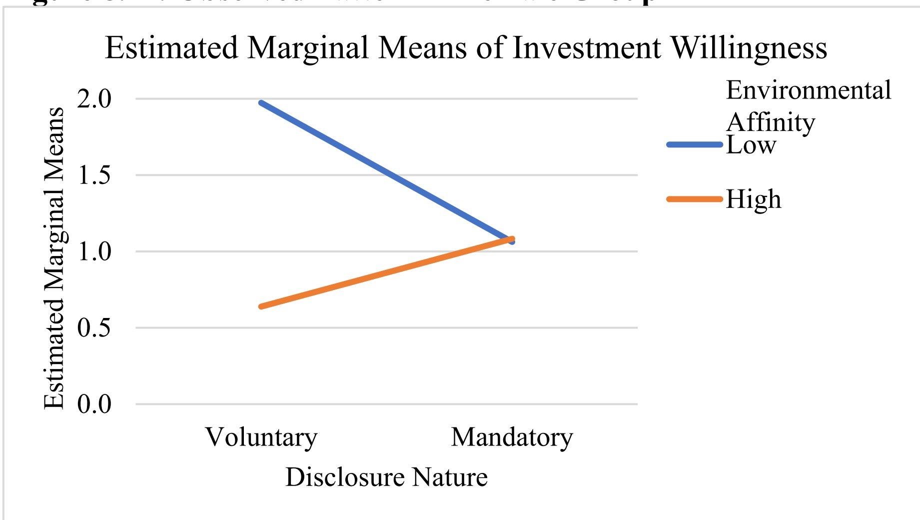

Figure 8. B: Observed Pattern in Male Group

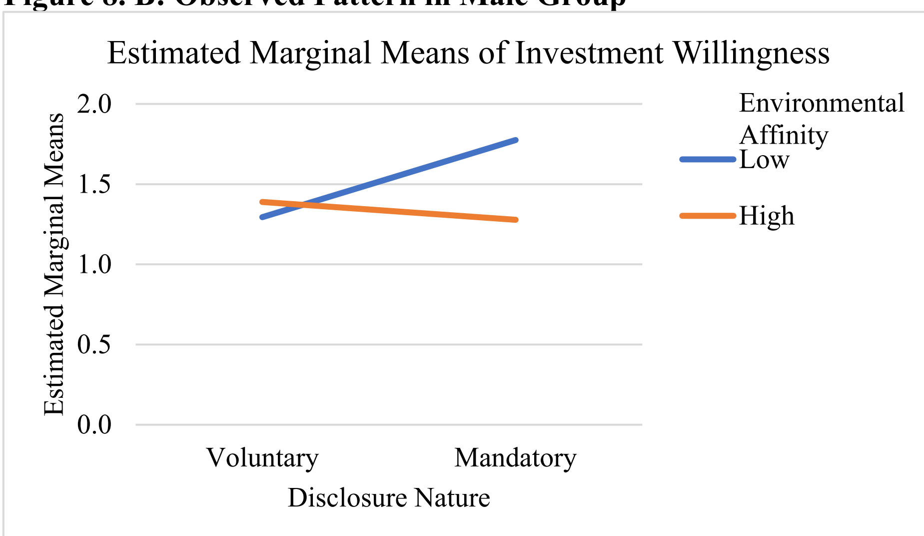

Figure 8. C: PROCESS Model 11, Mediator= Perception of Management's Genuine Concern for Environmental Causes

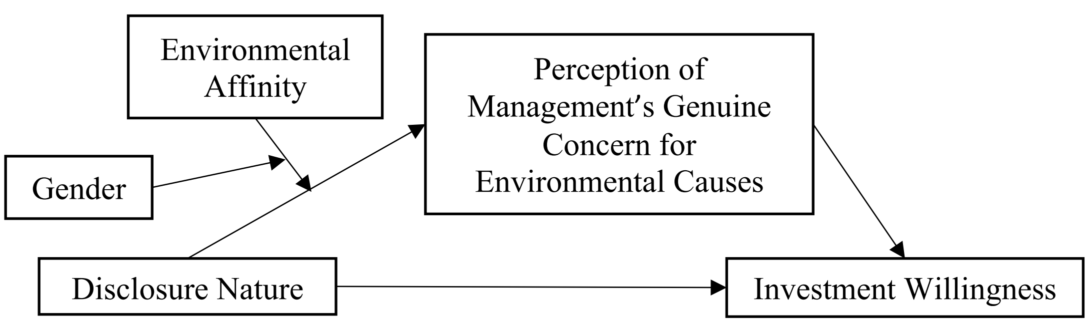

Figure 8 – Impact of Gender, DV= Investment Willingness

4.8.3 ESG Components

In the pretest, aside from measuring environmental affinity, I also assess participants' opinions on social causes and company governance. Participants rate the following two statements on a 7-point scale (-3 = "Strongly disagree" and +3 = "Strongly agree"): “It is important that companies sacrifice profitability to promote social causes (for example, fighting poverty, gender inequality, or childhood obesity).” “It is important that companies sacrifice profitability to improve their governance (for example, focusing on more transparent disclosures or ensuring diversity in the company's leadership).” The first statement captures the social component, while the second captures the governance component.

Table 6 – Ratings on Environmental, Social, and Governance Components

Table 6. A: Correlations

	Environmental Component	Social Component	Governance Component
Environmental Component	1	0.831***	0.871***
Social Component	0.831***	1	0.834***
Governance Component	0.871***	0.834***	1

Table 6. B: Descriptive Statistics (Means, Standard Deviations, n)

ESG Components	**Mean**	**Std. Deviation**	**n**
Environmental Component	0.069	2.208	144
Social Component	-0.264	2.132	144
Governance Component	-0.021	2.019	144

Table 6 reports the correlations and descriptive statistics of ratings on Environmental, Social, and Governance components. Each component is captured by participants' responses to the corresponding statement using a 7-point scale (-3= ‘‘Strongly disagree’’ and +3 = ‘‘Strongly agree’’).

- Environmental Component: “It is important that companies sacrifice profitability to promote environmental causes (for example, reducing carbon emissions or donating to save wildlife).”
- Social Component: “It is important that companies sacrifice profitability to promote social causes (for example, fighting poverty, gender inequality, or childhood obesity).”
- Governance Component: “It is important that companies sacrifice profitability to improve their governance (for example, focusing on more transparent disclosures or ensuring diversity in the company’s leadership).”

*, **, and *** indicate significance at less than 0.10, 0.05, and 0.01 levels, respectively.

Table 6. A presents the correlations of ratings on Environmental, Social, and Governance components in the pretest. Results reveal that each component is correlated with the other at a significance level of less than 0.01. Table 6. B reports that the mean ratings on Environmental, Social, and Governance components are 0.069, -0.264, and -0.021, respectively. All the main findings drawn from the full sample are inferentially identical if I use a reduced sample of 114 participants who exhibit consistent ratings across three components (i.e., ratings of each component are all above 0 or all below 0). This suggests that although I focus on the environmental aspect in this study, some inferences may be generalizable to social or governance aspects. Future research can investigate whether this is actually the case.

As a final analysis, I also average the Environmental, Social, and Governance components and create a new variable, *ESG Affinity*, in which I recode values below 0 as low ESG affinity and above 0 as high ESG affinity. Except for H2b, the main findings remain inferentially identical when using *ESG Affinity* instead of *Environmental Affinity* in hypothesis testing. For H2b, the interaction effect of ESG affinity and disclosure nature on the perception of management's genuine concern for environmental causes shows a similar pattern to the interaction between environmental affinity and disclosure nature but is marginally significant ($F= 3.517$, $p= 0.063$), driven by low rather than high ESG affinity group. Compared to an insignificant interaction when examining *Environmental Affinity*, a marginal significance when examining *ESG Affinity* suggests differences among ESG components. Therefore, it is valuable to separate personal attitudes toward each of the ESG components rather than treating them as one construct.

CHAPTER 5. CONCLUSION

This study investigates whether and how environmental affinity and disclosure nature jointly impact investor perceptions and judgments in an environment-related disclosure context. I find that high-environmental-affinity investors perceive greater environment-related risks than low-environmental-affinity investors and that a mandatory (relative to a voluntary) environment-related disclosure increases only low-environmental-affinity investors' perception of environment-related risks. I fail to find supporting evidence in the general population for (1) the interaction effect of disclosure nature and investors' environmental affinity on investors' perception of management's genuine concern for environmental causes and (2) the main effect of disclosure nature on investment willingness. However, supplemental analyses provide preliminary evidence that participants' gender may play a role in my setting. A possible explanation for the two insignificant effects mentioned above is that gender effects prevent me from finding significant results in the general population. Females and males may respond differently to signals from management, consistent with prior literature on gender and information processing (Meyers-Levy and Loken 2015; Hall and Matsumoto 2004; Richard et al. 2010; Rosip and Hall 2004).

This study makes several contributions. Theoretically, prior research points out that individual characteristics are associated with certain outcomes, such as CFO narcissism correlating with misreporting behavior and auditor narcissism leading to more conservative negotiation outcomes (Ham, Lang, Seybert, and Wang 2017; Church, Dai, Kuang, and Liu 2020), this study enriches the literature on individual characteristics of information users

(Kadous et al. 2014; Clor-Proell et al., 2023; Burke et al., 2023; Church et al. 2019) by emphasizing the importance of environmental affinity in interpreting environment-related disclosures. It also extends the extant literature examining signals within disclosures (Hussainey and Aal-Eisa 2009; Cha et al. 2023; Luo and Tang 2014; Certo et al. 2001; De Lucia et al. 2020) by indicating that the disclosure nature *itself* rather than its content matters when it comes to investor perceptions and judgments. Moreover, the emerging literature on ESG disclosures mainly focuses on how investors incorporate ESG factors into their investment judgments (van Duuren et al. 2016; Starks et al. 2017; Lauria et al. 2022; Elliott et al. 2014; Guiral et al. 2020). I shed light on this stream of literature by demonstrating the importance of incorporating investors' personal attitudes into the picture. Specifically, low-environmental-affinity investors are more sensitive to a regulatory signal inherent in the mandatory nature of a disclosure than are high-environmental-affinity investors. Practically, I point out a potential consequence of the mandatory climate-related disclosure – this mandate will raise the awareness of environment-related risks differently among investors with varying levels of environmental affinity.

The limitations of this study offer opportunities for future research. First, while I find some preliminary evidence around how gender plays a role in low-environmental-affinity vs. high-environmental-affinity investors' processing of environment-related disclosures, future research could explore *why* different genders exhibit such different behavior patterns. Prior work suggests this may be due to gender differences in information processing (Meyers-Levy and Loken 2015). Second, this paper focuses on the environmental aspect of ESG. On the one hand, because of common elements shared among ESG components and because individuals may have a high or low affinity towards environmental causes/ social causes/ governance, findings in the environmental realm can potentially provide some insights into a discussion surrounding the regulation of ESG disclosures in general. However, the differences among ESG components may limit the generalizability of this study. Thus, future studies could further investigate how well findings from the environmental context can generalize to social and governance contexts.

APPENDIX A. MANIPULATIONS OF DISCLOSURE NATURE

Panel A: Voluntary condition

In addition to its earnings press release, you also come across GoldWide's **Climate-related Disclosure**. Before reviewing it, please assume that you have searched for information about this type of disclosure and found the following:

The Securities and Exchange Commission (SEC) does **not require** firms to disclose climate-related risks and their response to them. That is, **firms have a choice of disclosing or not disclosing** climate-related issues.

Panel B: Mandatary condition

In addition to its earnings press release, you also come across GoldWide's **Climate-related Disclosure**. Before reviewing it, please assume that you have searched for information about this type of disclosure and found the following:

The Securities and Exchange Commission (SEC) **requires** firms to disclose climate-related risks and their response to them. That is, **firms must disclose** climate-related issues.

APPENDIX B. CLIMATE-RELATED DISCLOSURE

Below is an excerpt from GoldWide's most recent 2022 **Climate-related Disclosure**. The company lists climate change risks related to its core operations, along with the firm's response plan for each risk. Please read this information before moving on to the next screen.

As part of our business planning processes, we identify risks due to climate change. Below, we categorize risks based on financial impact and time horizon. We also provide information about our response plan to these risks.

See Table 1 for details of the climate change risk and response plan.

Financial impacts

We categorize substantive financial impacts via the following ranges:

Low	Less than $20 Million
Medium	$20 Million - $40 Million
High	Greater than $40 Million

Time Horizons

We categorize time horizons via the following ranges:

Short-term	Up to 1 year
Medium-term	1 - 4 years
Long-term	5 years and above

Table 1: Climate Change Risk and Response Plan

Core Operations	Climate Change Impact	Risk	Magnitude of Financial Impact	Time Horizon	Response Plan
Extraction and deposition	• Increase in storms • Land slides	Intense rains exceed pumping and treatment capacity, potentially compromising slope stability near open-cast mines.	● Low	Short-term	• Implement leading practices for flood prevention and pit slope stability in our communities
Materials handling	• Water scarcity • Increase in storms	Reduced water supply for operations. Higher moisture content of ore.	● Medium	Medium-term	• Increase local water recycling and reduce water withdrawal
Transport	• Increase in storms • Land slides	Interruptions to the transport system leading to bottlenecks in the storage of concentrates.	● High	Short-term	• Increase the storage capacity at mine warehouse and port • Study alternate roads for concentrate transport in local communities

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