UNIVERSITÄT BERN

Essays Examining How Non-Professional Investors Use Financial Disclosures in Investment Decisions

Inauguraldissertation zur Erlangung der Würde eines

DOCTOR RERUM OECONOMICARUM

der Wirtschafts- und Sozialwissenschaftlichen Fakultät

der Universität Bern

vorgelegt von

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2021

Die Fakultät hat diese Arbeit am 04. November 2021 auf Antrag der beiden Gutachter Prof. Dr. Alexis H. Kunz und Prof. Dr. Michael Burkert als Dissertation angenommen, ohne damit zu den ausgesprochenen Auffassungen Stellung nehmen zu wollen.

ACKNOWLEDGEMENTS

I express my deepest gratitude and appreciation to all who have supported me throughout my PhD studies and have helped me complete this dissertation.

First and foremost, I am extremely grateful to my advisor, Professor Alexis Kunz, for his invaluable and excellent guidance and for sharing his profound expertise. My research has benefited greatly from the insightful feedback that he has provided and his advice has been instrumental in my development as an academic. I am also deeply indebted to him for offering me generous support for attending conferences and seminars, allowing me to share my research with the international accounting research community.

Further, I wish to thank Professor Markus Arnold for encouraging conversations and for providing constructive suggestions that helped improve my research. I would also like to thank Kristina Rennekamp and Ryan Guggenmos for being great co-authors. I greatly enjoyed working with them on Essay 1 of this dissertation. I am also very appreciative to Kristina Rennekamp for offering me the opportunity to conduct a research stay at Cornell University.

I would like to extend my thanks to my colleagues at the University of Bern for maintaining a motivating collegial environment. Special thanks go to Matthias Gnägi and Andrea Probst for their constant support. I am also indebted to the accounting faculty and students at Cornell University for their warm welcome during my stay. In particular, I thank Bob Libby and Rob Bloomfield for letting me participate in their PhD seminars.

Individual parts of this dissertation have benefitted from helpful feedback provided by Alexis Kunz, Markus Arnold, Joachim Gassen, Yanjia Yang, Matthias Gnägi, Kai Bauch, Mariza Chavez Steinmann, Benedikt Laska, participants at the 22nd Annual FRBC Conference 2018, EAA Annual Congress 2019 and the Doctoral Colloquium of the EAA 2021. I also gratefully acknowledge the Swiss National Science Foundation for providing financial assistance during my research stay at Cornell University.

Finally, I am forever grateful to my family and friends for their unwavering support and encouragement during this time. Thank you.

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PREFACE

This dissertation consists of three essays examining how non-professional investors use financial disclosures when making investment decisions. Each essay answers a distinct research question and sheds light on an important gap in the literature, ranging from non-GAAP reporting to the digital preservation of prior-period disclosures, and cautionary disclaimers on forward-looking disclosures. All essays rely on experimental methods to address fundamental research questions in accounting. Experiments are particularly well suited to investigate investors' use of financial disclosures because they allow researchers to closely observe investors' decision-making and to identify causal relationships.

In the first essay (co-authored with Ryan Guggenmos and Kristina Rennekamp), we examine how investors use the GAAP to non-GAAP reconciliation. Concerns have been voiced about the reconciliation's accessibility and information quality, questioning to what extent the reconciliation facilitates investors' decision-making. We use an experiment to investigate whether a signpost to the reconciliation (i.e., a navigational aid referring to complementary information located elsewhere) helps investors locate the reconciliation more easily. We also test whether the signpost strengthens investors' reaction to the level of disaggregation in the reconciliation. Consistent with our expectations, we find that investors who see a signpost locate the reconciliation more quickly and spend more time reviewing a disaggregated than an aggregated reconciliation, relative to investors who do not see a signpost. Unexpectedly, however, we do not find that these effects carry over to investors' willingness to invest. Our findings offer important initial evidence on how signposting and disaggregation in the reconciliation enhance investors' use of the reconciliation. Thus, the study suggests possible means to regulators and standard setters for improving non-GAAP reporting quality.

In the second essay, I focus on how investors evaluate a firm's current-period disclosures when the firm also preserves prior-period disclosures in a digital disclosure archive on its website. Regulators recommend that firms do not present the archive highly visible on their websites to avoid confusing investors with outdated information. I address regulators' concerns by examining how archive visibility (i.e., visual prominence of the archive on the website) affects investors' assessments of firm value. I also test whether the effect of archive visibility is more pronounced by firms' use of normative statements to emphasize the importance of informed decision-making when they reference the archive in their earnings releases. In a 2 × 2 between-participants experiment, I manipulate the visibility of the digital disclosure archive on the firm website (high vs. low) and the type of reference provided in the earnings release

(normative vs. neutral). I predict and find that investors increase their firm valuations when the archive is highly visible compared to less visible, and this effect is stronger when a normative reference is provided. Supplemental analyses indicate that a highly visible archive leads investors to believe that they are more knowledgeable about the firm and thus enhances investors' firm valuations, although investors do not actually have more knowledge about the firm. My study offers timely and relevant evidence, corroborating regulators' concerns about the detrimental effect of archive visibility on investor judgment. Moreover, my findings provide a word of caution to regulators and investors about the use of normative statements.

Finally, in the third essay, I investigate how the presence of the cautionary disclaimer on forward-looking disclosures and its linguistic style affect investors' valuation judgments. The cautionary disclaimer is a regulatory warning notice listing material risk factors to warn investors about the uncertainty inherent in forward-looking disclosures (i.e., earnings forecasts, operative business plans or similar future-oriented statements). The disclaimer's effectiveness is highly debated. I use a controlled 1 × 3 between-participants experiment to evaluate how investors respond to forward-looking disclosures in (1) the absence of the disclaimer, (2) the presence of an assertively written disclaimer, or (3) the presence of a tentatively written disclaimer. My results show that investors decrease their firm valuations when the disclaimer is present, consistent with the disclaimer making investors aware of the uncertainty in forward-looking disclosures. However, the impact of the disclaimer is significantly mitigated when the disclaimer uses tentative rather than assertive language, thereby undermining the disclaimer's effectiveness. Tentative language impairs investors' information processing, reducing investors' attention to the risk factors. Overall, my study informs regulators that the cautionary disclaimer can effectively warn investors about potential risk factors, but my study also alerts regulators to the potentially misleading (yet unregulated) use of the disclaimer's linguistic style to influence investors' judgments.

Together, all three essays contribute significantly to the accounting literature by advancing the current knowledge on how investors use financial disclosures for decision-making purposes. The essays also offer important implications for regulators, standard-setters and firm managers who all benefit from an enhanced understanding of investors' decision-making.

ESSAY 1

GAAP to Non-GAAP Reconciliations: How Signposting and Reconciliation Disaggregation Affect Willingness to Invest

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Abstract

To help investors understand firms' non-GAAP reporting, regulators require firms to provide GAAP to non-GAAP reconciliations. However, concerns about the reconciliation's accessibility and information quality cast doubt upon its effectiveness. We use an experiment with non-professional investors to examine how investors respond to (1) a signpost to the reconciliation and (2) disaggregation of the reconciliation. Unobtrusive process evidence shows that the signpost directs investors' focus on the reconciliation, thereby strengthening the positive impact of disaggregation on investors' processing. However, we do not find that these effects of investors' information search also manifest in investors' subsequent investment judgments. Our findings offer important initial evidence on how a signpost and disaggregation in the reconciliation affects investors' judgments, potentially mitigating regulators' concerns.

Keywords: Signposting; Disaggregation; GAAP to Non-GAAP Reconciliation; Investor Judgments

I. INTRODUCTION

Out of concern that firms may mislead investors by using opportunistic non-GAAP measures, regulators require firms to provide a reconciliation between their non-GAAP measures and their equivalent GAAP measures (SEC 2002). The reconciliation is intended to help investors identify potentially misleading uses of non-GAAP reporting. However, critics question the reconciliation's effectiveness, stating concerns that the reconciliation is difficult to locate for investors and does not provide sufficient disaggregation of reconciling items (CFA Institute 2016; Ciesielski and Henry 2017). In this study, we address these concerns by examining how a signpost to the reconciliation (i.e., a navigational aid referring to complementary information presented elsewhere) and the reconciliation's level of disaggregation influence investors' willingness to invest.

Examining this research question is important for at least two reasons. First, regulators consider the reconciliation a critical tool to mitigate investors' susceptibility to opportunistic non-GAAP reporting. However, if the reconciliation's accessibility is inadequate, investors might overlook the reconciliation and make suboptimal investment decisions. Regulators are unlikely to prescribe a specific placement for the reconciliation because non-GAAP measures are highly dispersed across disclosures and this could impair the textual flow, making it unclear whether investors would benefit from a common placement requirement. Therefore, examining a potential alternative solution to address accessibility concerns – signposting – seems warranted.

Second, regulators and standard setters worldwide have indicated growing concerns about firms' non-GAAP reporting practices and are now deliberating on how to improve non-GAAP reporting quality (Bricker 2016; CSA 2021; ESMA 2019). An empirical investigation of individual investors' reactions to the reconciliation thus offers timely evidence to inform regulators' ongoing efforts.

Drawing on information gap theory (Loewenstein 1994), we predict that signposting and disaggregation in the reconciliation will jointly affect investors' willingness to invest. Information gap theory holds that when individuals become aware of an information gap (i.e., a difference between what they currently know and what they want to know), individuals will seek out additional information to close the information gap. If they find the missing information, individuals experience a positive response from feeling like they have a more complete picture of the information whereas they will remain in an unpleasant state of uncertainty if they are unable to close the information gap.

Applying this theory to our setting, we predict that signposting alerts investors to the fact that non-GAAP earnings differ from GAAP earnings, and that investors do not yet know the reasons underlying this difference. Consequently, investors are more likely to search for and review the GAAP to non-GAAP reconciliation. Because signposting directs investors' focus on the reconciliation, investors are also likely to respond more strongly to the disaggregation in the reconciliation. Specifically, we expect that investors evaluate the disaggregated reconciliation more favorably compared to an aggregated reconciliation because a disaggregated reconciliation is more likely to close investors' information gap about the difference between GAAP and non-GAAP earnings. In turn, we predict that investors will be more willing to invest when the reconciliation is disaggregated compared to aggregated, and that this effect will be stronger in the presence of a signpost than in its absence.

To test our hypothesis, we conduct a 2 × 2 between-participants experiment. We believe an experiment is an ideal method to test our theory. The controlled setting allows us to study the impact of signposting and disaggregation on investors' judgments in isolation. In particular, we can hold constant other informational and formatting factors of the disclosure (e.g., non-GAAP labeling, reconciliation type, or auditability) that might otherwise influence investors' judgments (Anderson, Hobson, and Sommerfeldt 2021; Garavaglia 2020; Gomez, Heflin, and Wang 2020; Hogan, Krishnamoorthy, and Maroney 2017). Given that the use of

signposting and the choice of formatting in the reconciliation are largely within firms' discretion, archival analyses might additionally suffer from self-selection effects and confounding factors, such as managerial incentives, that can be difficult to control for. In the experiment, we can also unobtrusively track investors' information search processes (e.g., time spent reviewing the reconciliation or the viewing order). Having a detailed and in-depth understanding of how investors gather information on non-GAAP reporting is important because of concerns about whether investors are able to locate and use the reconciliation in firms' disclosures.

In our experiment, 111 non-professional investors evaluate a (hypothetical) sportswear firm as a potential investment opportunity. Participants review an earnings release of the firm and learn that it reports GAAP and non-GAAP earnings. We manipulate signposting (absent vs. present) by varying whether an annotated reference to the GAAP to non-GAAP reconciliation is provided when non-GAAP earnings are first mentioned in the release. We also manipulate the reconciliation's disaggregation (aggregated vs. disaggregated) by presenting the reconciling items as one combined adjustment or by presenting each reconciling item individually in the reconciliation. All information on the firm's non-GAAP exclusion items in the release is held constant across conditions. After participants have reviewed the earnings release, they indicate their willingness to invest in the firm, respond to the post-experimental questionnaire and answer demographic questions. We employ customized JavaScript programming to unobtrusively track participants' information search during the experimental task.

Inconsistent with our expectations, the results of our experiment reveal no significant effects of signposting or disaggregation on investors' willingness to invest. Nonetheless, when examining unobtrusive process evidence, we do find that investors' search behavior is consistent with our theory. Specifically, investors who view a signpost locate the reconciliation more quickly in the release than do investors who view no signpost. Further, signposting

encourages investors to devote more time to reviewing the reconciliation, particularly when the reconciliation is disaggregated. These findings highlight the importance of examining the processes underlying investors' judgments to better understand the complexities involved when investors make investment decisions.

Our study contributes to research on investors' use of non-GAAP measures. More specifically, we extend the literature that addresses regulators' concerns about misleading non-GAAP reporting and investigates potential interventions (Anderson et al. 2021; Brown, Elliott, and Grant 2019; Garavaglia 2020). We test the previously unexplored impact of signposting and show that it can help investors locate and review the GAAP to non-GAAP reconciliation. In light of prior research findings that investors are more susceptible to firms' opportunistic non-GAAP reporting when they do not review the reconciliation, our findings propose signposting as an important means to enhance investor protection.

We also contribute to research studies examining how investors search for information within financial disclosures. This is an increasingly important research area because regulators are concerned that investors might overlook material information due to the expanding volume of financial disclosures (Parades 2013). Prior literature has examined the effectiveness of information placement (Koonce, Leitter, and White 2019; Maines and McDaniel 2000) or the use of hyperlinks (Hodge 2001; Kelton and Pennington 2012) to guide investors' search processes. We add a new perspective by investigating how signposting affects investors' search processes. Our experiment shows that signposting does not enhance investors' search efforts overall but rather changes investors' search focus. Furthermore, signposting increases investors' review time of the reconciliation in our study the most when the reconciliation is disaggregated. Thus, signposting might be most effective if combined with disaggregated information or other easy-to-process information. In that regard, we also add to the accounting literature on disaggregation, which finds that features of the information system moderate

investors' use of disaggregated information (Bloomfield, Hodge, Hopkins, and Rennekamp 2015; Kelton and Murthy 2016).

The remainder of the paper is organized as follows. In Section II, we discuss the background and develop our hypothesis. Section III describes our experimental design and Section IV reports the results of our experiment. Finally, Section V concludes.

II. BACKGROUND AND HYPOTHESIS DEVELOPMENT

GAAP to Non-GAAP Reconciliations

Regulators require firms that report non-GAAP measures to provide a quantitative schedule, reconciling historical non-GAAP measures to their most directly comparable GAAP measures (SEC 2002). The reconciliation was introduced as a response to concerns that firms use the discretion inherent in non-GAAP reporting to mislead investors.[1] Regulators believe that the reconciliation helps investors grasp the difference between GAAP and non-GAAP measures more clearly. Indeed, early research suggests that such reconciliations are informative to investors. Specifically, reconciliations help mitigate investors' fixation on non-GAAP earnings (Dilla, Janvrin, and Jeffrey 2014; Elliott 2006; Frederickson and Miller 2004) and reduce mispricing (Aubert and Grudnitski 2014; Zhang and Zheng 2011).

However, the effectiveness of the GAAP to non-GAAP reconciliation has recently been questioned and there are frequent calls from investors to enhance the quality of the reconciliation (CFA Institute 2016). This is in line with current evidence that investors do not always access and read the reconciliation (Dilla et al. 2014; Garavaglia 2020). One potential reason for this behavior could be that reconciliations are relatively difficult to find. Firms rarely present the reconciliation close to non-GAAP measures (Garavaglia 2020) and the reconciliation's placement varies considerably across firms (Campbell and López 2010; PWC

[1] Prior research finds evidence consistent with opportunistic but also informative motives for the use of non-GAAP reporting (for a review see Arena, Catuogno, and Moscariello 2021; Black, Christensen, Ciesielski, and Whipple 2018).

2016).[2] Investor groups and regulators propose the use of signposting to enhance the accessibility of the reconciliation (CFA Institute 2016; CSA 2021; IOSCO 2016). Signposting describes the use of navigational aids to draw users' attention to complementary information that is presented elsewhere in the document (FRC 2018; Grant Thornton 2016). For instance, regulatory guidance suggests that firms add an annotated reference when a non-GAAP measure is first mentioned, identifying the measure as a non-GAAP measure and explicitly disclosing the location of the reconciliation (CSA 2021; IOSCO 2016).

Another concern about the GAAP to non-GAAP reconciliation relates to its level of disaggregation (CFA Institute 2016). Regulatory review of reconciliations highlights that firms do not provide sufficient disaggregation in their reconciliations for investors to fully understand firms' non-GAAP exclusion items (ESMA 2019). Firms have considerable discretion as to how much disaggregation, if any, to present in the reconciliation. Regulators have only recently started to emphasize the benefits of disaggregation in the reconciliation for investors' decision-making and propose an increased level of disaggregation of reconciling items (CSA 2021; ESMA 2019).

While existing accounting research finds that more detailed and more transparent formatting of the reconciliation is associated with positive market outcomes (Aubert and Grudnitski 2014; Brown, Christensen, and Elliott 2012; Chen, Lee, Lo, and Yu 2021; Hogan et al. 2017; Zhang and Zheng 2011), research has yet to examine the potential impact of the reconciliation's disaggregation level on investors' judgments in isolation.[3] We address this gap in research by using an experiment to examine how investors respond to signposting and disaggregation in the GAAP to non-GAAP reconciliation. To develop our predictions about

[2] Regulators do not prescribe a certain placement for the reconciliation, despite early proposals suggesting that the reconciliation should be presented near the non-GAAP measures (Campbell and López 2010). Regulators have solely clarified that the reconciliation must be included in the same document and cannot be hyperlinked to (Knight 2017).

[3] Distinguishing between disaggregation and other formatting choices of the reconciliation is important, as illustrated by regulators' decision to prohibit the use of full non-GAAP income statements (a highly disaggregated reconciliation format) due to concerns of it presenting non-GAAP earnings with undue prominence (Gomez et al. 2020; Hogan et al. 2017).

how these two factors influence investors' judgments, we rely on information gap theory (Loewenstein 1994).

Information Gap Theory

Information gap theory (Loewenstein 1994) describes how individuals respond to uncertainty arising from a gap between what *they currently know* and what *they want to know* (so-called 'information gaps'). Information gaps can also be conceptualized as open questions in one's mind that one wants to know the answer to (Golman and Loewenstein 2018). Information gaps develop when individuals recognize that they are currently missing relevant information. For instance, an information gap is activated when individuals read a reference pointing to additional information being available elsewhere (Bhargave, Mantonakis, and White 2016; Yang, Carmon, Ariely, and Norton 2019).

Because uncertainty from a lack of knowledge is aversive and creates a strong feeling of deprivation, individuals attempt to resolve the uncertainty by gathering the missing information (Berlyne 1960; Litman and Jimerson 2004; Marvin, Tedeschi, and Shohamy 2020; van Dijk and Zeelenberg 2007; van Lieshout, Vandenbroucke, Müller, Cools, and de Lange 2018). Specifically, individuals conduct a directed and targeted information search, focusing on specific information that addresses the information gap (Menon and Soman 2002). Individuals' motivation to resolve the uncertainty can be such a strong drive that it even persists in situations that are likely to yield negative outcomes (Niehoff and Oosterwijk 2020). For instance, people deliberately choose to resolve uncertainty, even if it exposes them to receiving electro shocks or reviewing aversive images (Hsee and Ruan 2016). Nonetheless, individuals are sensitive to the potential cost of information search. That is, they will not engage in information seeking unless they believe that they have the required resources to close the information gap and that they can cope with the expected outcome of uncertainty resolution (Hsee and Ruan 2020; Noordewier and van Dijk 2016; Silvia 2005). Accordingly, individuals do not exert more search

efforts to find missing information, but rather conduct a more directed and targeted search (Menon and Soman 2002).

To the extent that individuals engage in information seeking, individuals will enjoy positive perceptions of reward and satisfaction upon closure of the information gap (Kang et al. 2009; Lee and Qui 2009). That is, the process of moving from the state of 'not knowing' to the state of 'knowing' is a highly pleasant experience, regardless of its actual outcome (Ruan, Hsee, and Lu 2018).[4] Conversely, if the uncertainty cannot be fully resolved, individuals might remain in an unpleasant state of deprivation (Wang and Huang 2018; Wiggin, Reimann, and Jain 2019). Research further shows that individuals' responses to uncertainty resolution carry over to subsequent judgments. For example, consumers are more willing to purchase a mystery product if they can resolve the uncertainty about the product (Hill, Fombelle, and Sirianni 2016). They also report greater liking of a brand whose identity is initially concealed but subsequently fully revealed (Ruan et al. 2018).

Joint Effect of Signposting and Disaggregation in Reconciliations on Investor Judgments

Based on information gap theory, we expect that investors' investment judgments will be more sensitive to the disaggregation in the reconciliation when investors read a signpost relative to when they do not read a signpost. Signposting alerts investors to the fact that non-GAAP earnings differ from GAAP earnings. Therefore, we posit that the signpost will activate an information gap in investors' minds about the underlying reasons for the difference between these two performance measures. Investors are unlikely to know for a specific firm how its non-GAAP earnings are calculated, given that there is a high level of customization in non-GAAP reporting across firms (Black, Christensen, Ciesielski, and Whipple 2021).

[4] Note that individuals experience two distinct sets of utility upon closure of the information gap: (1) utility from resolving the uncertainty (i.e., benefit of having found an answer), and (2) utility from the actual outcome of uncertainty resolution (i.e., actual answer to the question) (Hsee and Ruan 2020). Our manipulations only affect investors' utility from resolving uncertainty while we keep the actual outcome (i.e., information about non-GAAP earnings quality) constant across conditions. Therefore, we focus on consequences of the former in our theoretical development.

Nonetheless, understanding the difference between non-GAAP and GAAP earnings is important to investors because non-GAAP earnings are a relevant input for investment decisions (CFA Institute 2016). Consequently, we expect that signposting leads investors to conduct a targeted information search. Investors should be particularly focused on accessing and reviewing the GAAP to non-GAAP reconciliation, as it should help investors close their corresponding information gap.

Given investors' enhanced focus on the reconciliation in the presence of a signpost, they should also be more sensitive to the reconciliation's disaggregation. Furthermore, we expect that the actual degree of information gap closure, which investors achieve by reading the reconciliation, depends on the reconciliation's disaggregation. When the reconciliation is disaggregated, uncertainty about the difference between GAAP and non-GAAP earnings should be resolved and investors should perceive a positive sense of understanding and satisfaction at having closed their information gap. This is consistent with prior accounting research on disaggregation, which finds that investors perceive disaggregated information to provide more clarity than aggregated information (Elliott, Hobson, and Jackson 2011; Hirst, Koonce, and Venkataraman 2007).[5] In contrast, when the reconciliation is presented in an aggregated format, some uncertainty regarding the specific non-GAAP exclusion items remains, which might be perceived negatively by investors. We therefore predict that, *ceteris paribus*, disaggregation in the reconciliation will increase investors' willingness to invest when a signpost is present.

In the absence of a signpost, we do not expect investors to be particularly attentive to the difference between non-GAAP and GAAP earnings nor to focus on the reconciliation. Firms often use very similar labels for GAAP and non-GAAP measures, making it difficult for investors to recognize the difference if it is not made salient. As the reconciliation and

[5] We acknowledge that disaggregation could also result in worsened rather than improved perceptions of understanding because it can increase investors' cognitive load (Bloomfield et al. 2015; Kelton and Murthy 2016). However, in our setting the level of disaggregation is relatively moderate, suggesting that investors' cognitive load should be similar across conditions.

non-GAAP disclosures are often presented at the end of the press release, investors are unlikely to direct their focus to it. Thus, we posit that disaggregation in the reconciliation will have less of an effect on investors' judgments in the absence of a signpost.

To summarize, we predict that a signpost strengthens the influence of a reconciliation's disaggregation on investors' investment judgments. Specifically, when a signpost is present, investors will respond more favorably to a disaggregated compared to an aggregated reconciliation. In contrast, when the signpost is absent, the positive influence of disaggregation in the reconciliation will be less pronounced. We formally state our prediction below.

> **Hypothesis**: The positive effect of disaggregation in the reconciliation on investors' willingness to invest will be stronger when a signpost is present compared to when a signpost is absent.

III. EXPERIMENTAL METHOD

To test our hypothesis, we conduct a 2 × 2 between-participants experiment, administered using Qualtrics survey software.[6] Participants view a firm's earnings release and make investment judgments based on the information provided. Within the press release, we manipulate (1) the presence of signposting (present vs. absent), and (2) the disaggregation in the reconciliation (aggregated vs. disaggregated). Participants are randomly assigned to experimental conditions.

Participants

Participants in our experiment are 111 MBA students, recruited from a participant pool of a large private U.S. university.[7] On average, participants are 27.82 years old and have 4.62 years of full-time work experience. Fifty percent identify as female. They have been enrolled in 2.35 accounting and 2.95 finance courses. A majority of our participants have

[6] Approval to conduct the experiment was granted by the Institutional Review Board of the university where the experiment took place.

[7] Overall, 139 participants started the study. Because our experimental materials can only be properly displayed on a computer or laptop, 7 participants who used mobile devices to access the study were screened out at the beginning of the study (and before participants were able to view the experimental materials). We also exclude 21 participants with missing responses on our two dependent variable measures.

previously invested (71.56 percent) and read a financial statement (94.50 percent). Participants also indicate being moderately familiar with non-GAAP measures. Specifically, 82.41 percent understand that non-GAAP measures provide firms with greater reporting flexibility compared to GAAP measures. Forty-seven percent of participants have previously read a GAAP to non-GAAP reconciliation and recognize commonly used non-GAAP measures.[8] Participants spend a median time of 11.86 minutes on the study and receive $10.00 compensation for their participation. We also incentivize participants to take the investment task seriously by offering a drawing for one of eight $25.00 bonuses when participants provide reasonable justifications for their investment judgments.

Manipulations

Signposting Manipulation

We manipulate the absence versus presence of signposting as part of the earnings release. The earnings release mentions the firm's GAAP and non-GAAP earnings. After the earnings release first mentions non-GAAP earnings, the following signpost is provided to participants in the *signpost present* conditions:

> Adjusted net income is a non-GAAP financial measure, defined as reported net income adjusted for certain items. Please see section "Reconciliation of GAAP to Non-GAAP Financial Measures" at the end of this news release for information regarding the nature of such excluded amounts and calculation of the company's non-GAAP financial measures.

The signpost is based on the signposts used by real firms in their earnings releases (see Appendix A for real-world examples of signposts). Furthermore, it is also consistent with regulatory guidance on signposting (CSA 2021; IOSCO 2016). Participants in the *signpost absent* conditions do not read the above excerpt.

[8] Specifically, we ask participants to indicate their familiarity with three commonly used (real) and two fictional non-GAAP measures. Forty-one percent of our participants are able to distinguish between real and fictional non-GAAP measures.

Disaggregation Manipulation

We manipulate the disaggregation in the reconciliation at two levels (aggregated vs. disaggregated). In the *aggregated reconciliation* conditions, participants view a reconciliation that presents the non-GAAP exclusions as one single adjustment. In contrast, in the *disaggregated reconciliation* conditions, the reconciliation lists all non-GAAP exclusion items individually (see Appendix B). Therefore, the disaggregated reconciliation provides detailed information, which is not apparent in the aggregated reconciliation. Importantly, however, we hold information content constant across conditions. That is, participants in the *aggregated reconciliation* conditions can also access the individual non-GAAP exclusion items from the accompanying disclosures. In particular, non-GAAP disclosures provide the definition of non-GAAP earnings (i.e., outlining the items that are excluded) and the exclusion amounts are evident from the firm's income statement.[9] Thus, our manipulation only changes the disaggregation of reconciling items while holding the total information available to participants constant across conditions. Therefore, any effect of our manipulations should not be attributable to actual differences in information availability. Note also that we do not manipulate the nature or magnitude of the exclusion items, the placement of the reconciliation in the press release or any other formatting of the reconciliation (except for its disaggregation).

Task and Procedure

In the experiment, participants assume the role of a potential investor in a hypothetical outdoor sportswear firm, NatureWear Inc. Their task is to evaluate NatureWear as a potential investment opportunity. They receive background information about the firm and learn that the analyst consensus forecast of earnings is $42.0 million. Next, participants read NatureWear's quarterly earnings release.[10] The release presents the firm's GAAP and non-GAAP earnings,

[9] Note that this design choice not only keeps all available information constant across conditions, but it is also representative of the natural environment. Specifically, it reflects standard setters' current proposal of moving information from the reconciliation to the income statement (IASB 2019).

[10] Experimental materials are based on the disclosures of a real-world firm in the sportswear industry.

followed by a signpost (in the *signpost present* conditions only). The release shows that the firm's performance has improved compared to the prior year and that the firm reports (GAAP) net income of $39.1 million and (non-GAAP) adjusted net income of $43.1 million for the current fiscal quarter.[11]

The earnings release also outlines management's favorable outlook for the fiscal year and includes the firm's financial statements. Subsequently, a quantitative tabular GAAP to non-GAAP reconciliation is presented (see Appendix B). The reconciliation lists the items that NatureWear excludes from GAAP earnings to arrive at non-GAAP earnings. The exclusion items are presented either aggregated as one single adjustment or disaggregated as several individual adjustments, depending on the experimental condition. The following items are excluded: restructuring charges, amortization of intangibles, stock-based compensation charges, and a gain from an insurance recovery. These exclusion items mirror items that actual firms commonly exclude from non-GAAP earnings (Black et al. 2021). Consistent with regulatory requirements, the reconciliation is accompanied by non-GAAP disclosures providing the definition of non-GAAP earnings and explaining the reasons for using non-GAAP measures.

After reviewing the earnings release, participants make, and subsequently provide justifications for, their investment judgments. Then, they answer process and manipulation check questions and respond to demographic questions. We also unobtrusively track participants' viewing behavior of the press release by employing customized JavaScript programming.

[11] We intentionally choose a setting in which the firm's non-GAAP earnings meet the analyst consensus forecast whereas GAAP earnings do not. This setting commonly arises in practice (Bradshaw, Christensen, Gee, and Whipple 2018) and helps us test our theory. Because of the mixed performance signal, investors should be interested to understand a firm's non-GAAP earnings. Furthermore, investors are likely to hold relatively uniform expectation of non-GAAP earnings quality in this setting (Bhattacharya, Black, Christensen, and Larson 2003).

Dependent Variable

Willingness to Invest

We use two questions to capture investors' willingness to invest in the firm. First, we ask: "How attractive is an investment in NatureWear stock?". Second, we ask: "How likely are you to invest in NatureWear stock?". Participants respond to both questions on a 101-point scale with endpoints 0 ("Very unattractive" / "Very unlikely") and 100 ("Very attractive" / "Very likely"). Following prior literature, we create a combined measure of willingness to invest by averaging the attractiveness and likelihood measures (Cronbach's alpha of 0.89).[12]

IV. RESULTS

Manipulation Checks

To assess the effectiveness of the disaggregation manipulation, we ask participants to assess the level of detail that the reconciliation provides. Responses are recorded on a 7-point scale labeled 1 ("Not at all detailed") to 7 ("Very detailed"). Participants judge the disaggregated reconciliation to provide more details than the aggregated reconciliation (means = 4.19 vs. 3.63, $t = 2.29$, $p = 0.024$).[13] We also ask participants to identify the reconciliation they have seen in the earnings release. Seventy-six percent correctly indicate whether they have seen an aggregated or a disaggregated reconciliation. Responses are significantly associated with the assigned conditions of participants ($\chi^2 = 31.79$, $p < 0.001$). Overall, we conclude that our disaggregation manipulation was successful.[14,15]

[12] Results are inferentially the same if we use either investment attractiveness or investment likelihood rather than the combined measure of willingness to invest in our hypothesis tests.

[13] All p-values are two-tailed unless otherwise specified. We use one-tailed or one-tailed equivalent tests for directional predictions.

[14] We do not ask a signposting manipulation check because it might confuse participants in the *signpost absent* conditions. However, unobtrusive process measures (discussed below) indicate that participants are sensitive to the presence of signposting.

[15] Our analyses include all participants, but our results are robust to excluding participants who failed the disaggregation manipulation check.

Test of Hypothesis

Our hypothesis predicts that disaggregation in the GAAP to non-GAAP reconciliation will have a stronger effect on investors' willingness to invest when a signpost is present than when it is absent. Thus, in statistical terms, we predict an interactive effect of signposting and disaggregation on investors' willingness to invest. Table 1 presents descriptive statistics of investors' willingness to invest by condition.

To test our prediction, we conduct a conventional analysis of variance (ANOVA), followed by follow-up simple effects tests. Statistical results are presented in Panels B and C of Table 1.[16] Inconsistent with our expectations, results of the ANOVA reveal no significant interaction effect or main effects of signposting or disaggregation on investors' willingness to invest (all p-values > 0.101). Follow-up simple effects also indicate no significant mean differences across conditions (all p-values > 0.759). Thus, investors do not respond more favorably to greater disaggregation in the reconciliation, regardless of the absence or presence of signposting. Overall, our results do not provide support for our hypothesis. Given the unexpected nature of our results, we next examine investors' processing of the earnings release to help us better understand what drives investors' reactions.[17]

Process evidence: Investors' Information Search

Although we do not find significant effects of signposting or disaggregation on investors' willingness to invest, our manipulations might have nevertheless affected the process underlying investors' judgments. We focus especially on investors' information search behavior as information gap theory (Loewenstein 1994) proposes that signposting and disaggregation might have a distinct impact on how investors search for information.

[16] A review of the data reveals that the assumption of normality is violated. To address non-normality, we perform a Kruskal-Wallis test, followed by Dunn's group-wise comparisons (presented in Table 2). Inferences drawn from these non-parametric analyses do not differ qualitatively from the results presented in Table 1 (parametric tests). Therefore, the discussion of results in the following sections is based on parametric tests for ease of interpretation.

[17] As part of the post-experimental questionnaire, we also ask participants to indicate their level of investor comfort and their understanding of the firm's non-GAAP reporting. We do not discuss these items, as we do not find significant differences across conditions.

TABLE 1
Willingness to Invest

Panel A: Descriptive statistics: Mean, [median] and (standard deviation)

	Aggregated Reconciliation	*Disaggregated Reconciliation*	Combined
Signpost Absent	Cell 1 58.90 [63.00] (17.83) n = 29	Cell 2 57.39 [65.00] (16.62) n = 27	 58.17 [63.75] (17.12) n = 56
Signpost Present	Cell 3 64.30 [68.25] (17.86) n = 28	Cell 4 63.52 [66.50] (20.81) n = 27	 63.92 [67.50] (19.19) n = 55
Combined	61.55 [66.00] (17.90) n = 57	60.45 [65.75] (18.91) n = 54	61.02 [66.00] (18.32) n = 111

Panel B: Analysis of Variance

Source of Variation	**S.S.**	**df**	**M.S.**	**F-stat**	**p-value**
Signposting	922.53	1	922.53	2.75	0.101
Disaggregation	36.44	1	36.44	0.11	0.743
Signposting x Disaggregation	3.62	1	3.62	0.01	0.918
Residual	35,957.27	107	336.05		

Panel C: Simple Effect Tests

Test	**df**	**F-stat**	**p-value**
Effect of Disaggregation given *Signpost Absent*	1	0.09	0.759
Effect of Disaggregation given *Signpost Present*	1	0.03	0.874

Table 1 presents descriptive statistics, ANOVA results and simple effect tests for investors' *Willingness to Invest*. In the experiment, all participants evaluate a firm based on an earnings release. In the release, we manipulate signposting (absent vs. present) and the disaggregation in the GAAP to non-GAAP reconciliation (aggregated vs. disaggregated). Participants then rate (1) the attractiveness of an investment in the firm's stock, and (2) the likelihood that they would invest in the firm's stock, on 101-point scales ranging from 0 to 100. *Willingness to Invest* is the average score of these two questions (Cronbach's alpha = 0.89).

TABLE 2
Willingness to Invest

Panel A: Kruskal-Wallis Test

	Experimental condition				χ^2-stat	p-value
	Cell 1	Cell 2	Cell 3	Cell 4		
Sum of Ranks	1,529.00	1.343.00	1,691.00	1,653.00	2.56	0.465

Panel B: Dunn's group-wise comparisons

Cell 1 vs. Cell 2	Cell 1 vs. Cell 3	Cell 1 vs. Cell 4	Cell 2 vs. Cell 3	Cell 2 vs. Cell 4	Cell 3 vs. Cell 4
0.347	-0.90	-0.99	-1.23	-1.31	-0.10
(p = 1.000)	(p = 1.000)	(p = 0.970)	(p = 0.659)	(p = 0.570)	(p = 1.000)

Table 2 presents the Kruskal-Wallis test and Dunn's group-wise comparisons for investors' *Willingness to Invest*.

We measure investors' information search by capturing the time that participants spent searching for and evaluating elements of the release. Specifically, we use customized JavaScript programming to unobtrusively track the number of seconds that a particular element of the press release is visible on participants' viewports. The viewport describes the area of a webpage that is displayed on the screen at any given time. Viewport tracking has been found to correlate highly with user attention and has been used extensively to study users' information search in the information systems literature (e.g., Grusky et al. 2017; Lagun and Lalmas 2016; Schmidt and Maier 2020).[18]

Investors' Search for Information about Non-GAAP Earnings

Information gap theory posits that investors should advance more quickly to the reconciliation when a signpost is present (vs. absent) because signposting activates investors' information gap about non-GAAP earnings. Awareness of information gaps results in relatively impulsive and immediate information seeking to resolve the corresponding information gap

[18] Prior studies in financial accounting often rely on separating experimental materials into distinct pages to measure viewing times for each individual element (see for instance Dilla et al. 2014). In contrast, viewport tracking allows us to present the press release as one continuous scrollable document. Thus, we minimize interference with participants' natural information processing and reduce potential demand effects. Moreover, viewport tracking is potentially a more accurate measure of investors' information search as it only takes into account the time that an element is actually visible to investors on their screens rather than capturing the total time that participants spent on a page (during which elements might be temporarily not visible on the screen).

(Marvin et al. 2020). Thus, we first examine how much time passes since participants first see the signpost (or the equivalent invisible element in the *signpost absent* conditions, respectively) until they first view the reconciliation (*Elapsed Time*).[19]

Consistent with our theory, Table 3 shows that participants in the *signpost present* conditions take less time before they initially access the reconciliation than participants in the *signpost absent* conditions (median time = 58.36 vs. 108.90, p = 0.033, one-tailed; Panel B).[20] Similarly, we also observe that investors follow a less sequential search pattern in the presence of a signpost compared to its absence (t = 1.28, p = 0.100, one-tailed).[21] Together, these findings indicate that signposting causes investors to search information on non-GAAP earnings in a directed and targeted manner, consistent with signposting having activated an information gap about the difference between GAAP and non-GAAP earnings.

Investors' Reviewing Time of the GAAP to Non-GAAP Reconciliation

We next examine to what extent our manipulations affect how much time participants spent reviewing the reconciliation (*Reconciliation Review Time*). Prior research finds that individuals direct more attention towards relevant materials that resolve their information gaps (Menon and Soman 2002; van Dijk and Zeelenberg 2007; van Lieshout et al. 2018). Therefore, investors in the *signpost present* conditions should devote more time to reviewing the reconciliation, particularly when the reconciliation is disaggregated. A disaggregated reconciliation makes it relatively easier to obtain information on non-GAAP exclusion items. As individuals are nonetheless sensitive to the cost of information search (Noordewier and van Dijk 2016; Silvia 2005), we expect investors to adapt their review time accordingly.

[19] We test this prediction collapsed across disaggregation levels, because investors do not learn about the different disaggregation levels until they initially access the reconciliation. Therefore, we do not expect *Elapsed Time* to differ across disaggregation levels.

[20] All our time measures display a considerable degree of skewness. Following the recommendation of Whelan (2010), we conduct our analyses based on log-transformed data.

[21] Our customized JavaScript program also captures the order in which participants view the individual elements of the press release. We measure the sequentiality of investors' information search as the amount of element that investors see in the order provided (Blay, Kadous, and Sawers 2012).

TABLE 3
Process Evidence – Elapsed Time

Panel A: Descriptive statistics (collapsed across disaggregation levels)

	Signpost Absent	*Signpost Present*	Combined
Mean	138.10	91.76	115.35
[Median]	[108.90]	[58.36]	[84.97]
(SD)	(153.31)	(104.85)	(133.22)
n	n = 56	n = 54	n = 110[*]

Panel B: Planned Comparison

Test	**df**	**t-stat**	**p-value**
Signpost Absent > *Signpost Present*	108	1.86	0.033[†]

Table 3 presents descriptive statistics and statistical tests for an unobtrusive measure of investors' information search that has been tracked using customized JavaScript programming. *Elapsed Time* captures the time in seconds that elapses since investors first see the signpost (or the equivalent invisible element in the *signpost absent* conditions) until they first access the reconciliation. Because *Elapsed Time* displays a considerable degree of skewness, we conduct statistical analyses based on log-transformed data (Whelan 2010).
[*] For one participant in the *signpost present*/*aggregated reconciliation* condition, Qualtrics did not record customized JavaScript time measures. Thus, our analyses are based only on 110 observations.
[†] One-tailed or one-tailed equivalent consistent with directional predictions.

Table 4 reports descriptive statistics of *Reconciliation Review Time* (Panel A), along with a contrast-coded ANOVA model (Panel B) and simple effect tests with *Reconciliation Review Time* as dependent variable (Panel C). Given that our theoretical predictions suggest an ordinal interaction for investors' *Reconciliation Review Time*, we specify the following contrast weights: +3 in the *signpost present*/*disaggregated reconciliation* condition, and -1 for all other conditions. We observe that the contrast is significant (p = 0.039), and the residual-between cells variance is insignificant (p = 0.362). Figure 1 further illustrates the pattern of results, supporting the visual fit of the contrast model (Guggenmos, Piercy, and Agoglia 2018). As expected, the contrast model is driven by participants in the *signpost present* conditions. Specifically, when a signpost is present, participants spent significantly more time reviewing the disaggregated reconciliation than the aggregated reconciliation (median time = 12.76 vs. 5.12, p = 0.007, one-tailed). When the signpost is absent, there is no significant difference in the time spent reviewing the reconciliation, regardless of its disaggregation level (median

TABLE 4
Process Evidence – Reconciliation Review Time

Panel A: Descriptive statistics: Mean, [median] and (standard deviation)

	Aggregated Reconciliation	*Disaggregated Reconciliation*	Combined
Signpost Absent	17.18 [7.92] (30.06) n = 29	19.70 [6.59] (23.12) n = 27	18.40 [7.32] (26.73) n = 56
Signpost Present	13.90 [5.12] (29.66) n = 27	360.67 [12.76] (1,691.69) n = 27	187.29 [6.78] (1,197.90) n = 54
Combined	15.60 [6.51] (29.64) n = 56	190.19 [8.28] (1,197.40) n = 54	101.31 [6.91] (839.81) n = 110[*]

Panel B: Contrast-coded Analysis of Variance

Source of Variation	**S.S.**	**df**	**M.S.**	**F-stat**	**p-value**
Model contrast [a]	12.49	1	12.49	4.36	0.039
Residual between-cells variance	5.89	2	2.94	1.03	0.362
Error	303.67	106	2.87		
Contrast variance residual, q^2	32.28%				

Panel C: Simple Effect Tests

Test	**df**	**F-stat**	**p-value**
Effect of Disaggregation given *Signpost Absent*	1	0.27	0.605
Effect of Disaggregation given *Signpost Present*	1	6.13	0.007[†]

Table 4 presents descriptive statistics and statistical tests for an unobtrusive measure of investors' information search that has been tracked using customized JavaScript programming. *Reconciliation Review Time* measures the time in seconds that the non-GAAP to GAAP reconciliation is visible inside investors' viewports. Because *Reconciliation Review Time* displays a considerable degree of skewness, we conduct statistical analyses based on log-transformed data (Whelan 2010).

[a] Contrast weights are +3 for the *signpost present*/*disaggregated reconciliation* condition and -1 for all other conditions.

[*] For one participant in the *signpost present*/*aggregated reconciliation* condition, Qualtrics did not record customized JavaScript time measures. Thus, our analyses are based only on 110 observations.

[†] One-tailed or one-tailed equivalent consistent with directional predictions.

FIGURE 1
Investors' Reconciliation Review Time

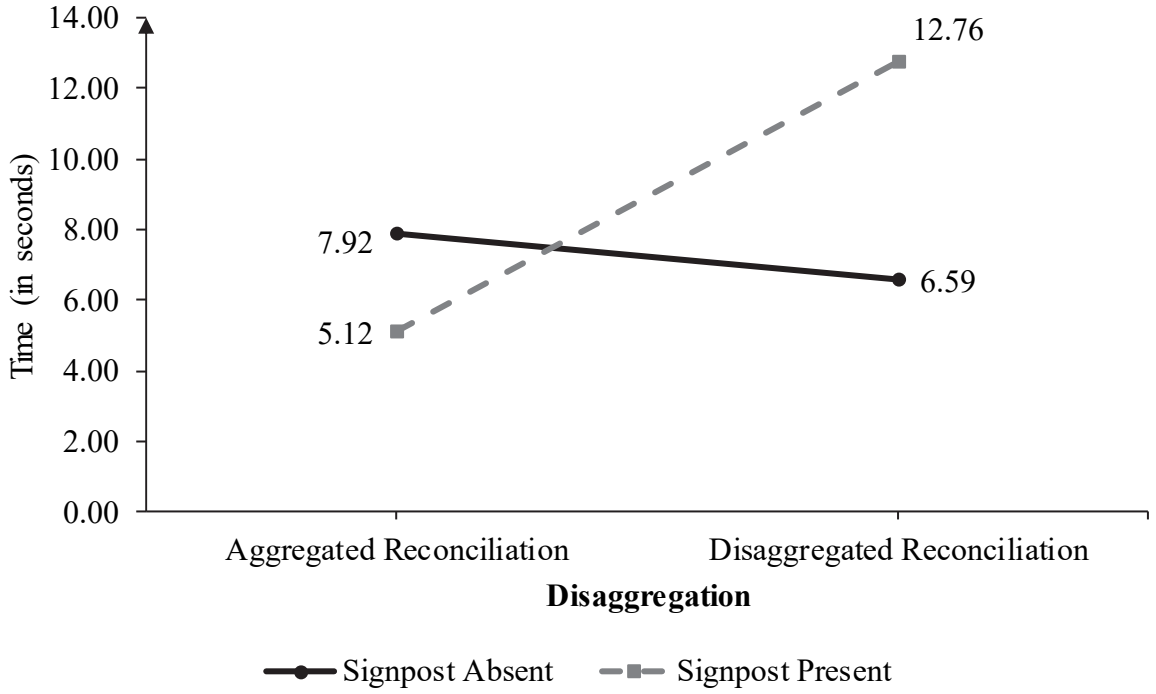

Figure 2 graphically presents the median time that investors spent reviewing the reconciliation by condition (*Reconciliation Review Time*). Viewport tracking is employed to measure the time (in seconds) that the reconciliation is visible in investors' viewports. The viewport describes the area of a webpage that is visible on the screen at a given point in time (Lagun and Lalmas 2016).

time = 6.59 vs. 7.92., p = 0.605). Untabulated analyses further show that we only observe differences in investors' viewing times of the reconciliation, but not for the viewing times of any other part of the press release nor for the total viewing time (all p-values > 0.215). Thus, investors focus their search on elements that close their information gap about non-GAAP earnings rather than exerting greater search efforts overall.

Collectively, our process evidence is in line with our theory and indicates that investors adapt their information search behavior based on signposting and the level of disaggregation in the reconciliation. Nevertheless, the impact of our manipulations does not carry over to investors' willingness to invest in our experiment. We speculate that variation in investors' assessments of non-GAAP earnings quality could be a possible (ex-post) explanation for these unexpected findings.

While our study focuses on the reconciliation as a tool to resolve investors' information gap, investors are likely to use the reconciliation also to assess non-GAAP earnings quality (Hogan et al. 2017). Thus, investors' willingness to invest is likely driven by investors' responses to (1) the resolution of their information gap but also (2) their assessments of non-GAAP earnings quality. In our experiment, we attempt to keep investors' assessments of non-GAAP earnings quality constant by providing a reconciliation with plausible reconciling items, providing all participants with identical information about the firm's non-GAAP earnings and by choosing a setting in which investors should have relatively uniform expectations about non-GAAP earnings quality. However, responses to a comprehension check question reveal that participants are not attentive to this design choice. In particular, we ask them to rank the firm's GAAP earnings and non-GAAP earnings relative to the analyst consensus forecast. Surprisingly, only 14.41 percent of participants correctly recall that NatureWear's non-GAAP earnings beat the forecast whereas GAAP earnings miss the forecast. Instead, we observe considerable variation in how participants assess the relative performance of GAAP and non-GAAP earnings.[22,23] Thus, investors' varying assessments of non-GAAP earnings quality might have introduced considerable noise to our dependent variable, potentially explaining why we fail to find support for our expected hypothesis.

V. CONCLUSION

The GAAP to non-GAAP reconciliation is an important component of regulators' strategy to help investors better understand firms' non-GAAP disclosures (SEC 2002). However, there are concerns about the effectiveness of the reconciliation. In particular, critics

[22] Because there is no normative benchmark to evaluate non-GAAP earnings quality, we expect participants' assessments being driven by their idiosyncratic interpretations of the reconciling items rather than by our manipulations. We do not find that participants' assessments of non-GAAP earnings quality are significantly attributed to assigned conditions ($\chi^2 = 15.34$, $p = 0.428$).

[23] The considerable variation in participants' assessments of non-GAAP earnings quality that we observe is consistent with recent empirical evidence, suggesting that investors struggle to initially evaluate a firm's non-GAAP reporting, but investors' evaluation of non-GAAP earnings quality improves with increasing familiarity (McVay, Rodriguez-Vazquez, and Toynbee 2021).

argue that reconciliations are often difficult to locate and are not presented in a sufficiently disaggregated manner to aid investors' understanding of non-GAAP exclusion items (CFA Institute 2016; Ciesielski and Henry 2017). We address these concerns by examining whether signposting in earnings releases can help direct investors' focus on the reconciliation while we also explore to what extent disaggregation of the reconciling items affects investors' responses to the reconciliation.

Using a controlled experiment, we show that signposting motivates investors to find out more about the firm's non-GAAP reporting. In the presence of a signpost, investors locate the reconciliation more quickly and devote more time to reviewing the disaggregated reconciliation, consistent with predictions of information gap theory. However, we do not find that these effects of investors' information search also manifest in investors' subsequent investment judgments. Overall, our findings provide initial evidence as to how investors respond to signposting and disaggregation in the reconciliation.

As with any study, our study is subject to certain limitations that offer opportunities for future research. First, we operationalize signposting as an annotated reference that explicitly identifies the non-GAAP measure and provides the location of the reconciliation. These features of the signpost correspond to current regulatory proposals for signposting (CSA 2021). Future research could explore to what extent our results are sensitive to the specific features of the signpost (e.g., placement, emphasis, formatting, content).

Second, participants in our experiment view a reconciliation that lists specific non-GAAP exclusion items such as restructuring charges or stock-based compensation. While archival research confirms that such exclusion items are commonly used by firms (Black et al. 2021), we still know relatively little about how individual investors assess the appropriateness of specific exclusion items, particularly when they review a firm's non-GAAP reporting for the first time. Future research could examine whether varying the nature of non-GAAP exclusion items changes the results we observe. Alternatively, future research could also use a

decontextualized reconciliation because this approach might minimize the influence of participants' idiosyncratic interpretations of specific line items (see Anderson et al. 2021 for a similar approach).

Lastly, our investigation is set within the context of non-GAAP reporting. While we believe that our insights might extend to other financial reporting areas, we do not explicitly test this assumption. Regulators are exploring how to improve the navigability and connectivity of information in financial disclosures. For instance, signposting has been proposed as a tool to help investors locate note disclosures (PWC 2014). Signposting could be helpful in a variety of other settings, given that it is easily implemented and applicable to both, paper and electronic formats. Nonetheless, it is unclear whether a signpost would work when directing investors' focus to a disclosure item that is more standardized and more familiar to investors than the GAAP to non-GAAP reconciliation. In that case, investors might not be sufficiently interested in resolving their information gap and thus not encouraged to seek additional information. Exploring boundary conditions for the effect of signposting on investors' search behavior would deepen our understanding of the effectiveness of such navigational aids; thus, providing promising avenues for future research.

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APPENDIX A

Real-World Examples of Signposts to the GAAP to Non-GAAP Reconciliation

HCA Healthcare Inc., 2021 [24]

> Adjusted EBITDA is a non-GAAP financial measure. A table providing supplemental information on Adjusted EBITDA and reconciling net income attributable to HCA Healthcare Inc. to Adjusted EBITDA is included in this release.

Macy's Inc., 2019 [25]

> Adjusted metrics reflect the exclusion of certain items from the respective financial measures. Please see the final pages of this news release for important information regarding the nature of such excluded amounts and calculation of the company's non-GAAP financial measures.

Micron Technology, 2021 [26]

> Non-GAAP represents GAAP excluding the impact of certain activities, which management excludes in analyzing our operating results and understanding trends in our earnings, adjusted free cash flow, net cash, and business outlook. Further information regarding Micron's use of non-GAAP measures and reconciliations between GAAP and non-GAAP measures are included within this press release.

Target Corp., 2021 [27]

> Adjusted EPS, a non-GAAP financial measure, excludes the impact of certain discretely managed items. See the tables of this release for additional information about the items that have been excluded from Adjusted EPS.

[24] https://investor.hcahealthcare.com/news/news-details/2021/HCA-Healthcare-Reports-Second-Quarter-2021-Results-Raises-2021-Guidance/default.aspx

[25] https://www.macysinc.com/investors/news-events/press-releases/detail/1594/macys-inc-reports-third-quarter-2019-earnings

[26] https://investors.micron.com/news-releases/news-release-details/micron-technology-inc-reports-results-first-quarter-fiscal-2021

[27] https://investors.target.com/news-releases/news-release-details/target-corporation-reports-first-quarter-earnings-0/

APPENDIX B

Disaggregation Manipulation

[*Aggregated reconciliation* conditions only]

NATUREWEAR INC.
Supplemental Financial Information
Reconciliation of GAAP to Non-GAAP Financial Measures (1)
(Unaudited)

(in thousands)	Three Months Ended June 30, 2xx2	2xx1
Reported net income (GAAP)	$ 39,101	$ 35,529
Adjustments	5,265	5,348
Tax impact of adjustments	(1,211)	(1,230)
Adjusted net income (Non-GAAP)	$ 43,155	$ 39,647

(1) Management believes that non-GAAP financial measures can provide more information to assist investors in evaluating current period performance and in assessing future performance. These disclosures should not be viewed as a substitute for operating results determined in accordance with GAAP, nor are they necessarily comparable to non-GAAP performance measures reported by other companies. The company calculates adjusted net income by excluding expenses related to the company's restructuring program (professional fees, severance, facility exit and other program expenses), amortization expenses, stock-based compensation expenses and the effects of a recovery in connection with an insurance claim.

APPENDIX B (continued)

Disaggregation Manipulation

[*Disaggregated reconciliation* conditions only]

NATUREWEAR INC.
Supplemental Financial Information
Reconciliation of GAAP to Non-GAAP Financial Measures (1)
(Unaudited)

(in thousands)	Three Months Ended June 30, 2xx2	2xx1
Reported net income (GAAP)	$ 39,101	$ 35,529
Adjustments		
Restructuring program		
Professional fees	1,072	588
Severance costs	834	458
Facility exit costs	—	1,308
Other restructuring expenses	1,619	1,673
Gain from insurance recovery	(17)	—
Amortization of intangible assets	298	298
Stock-based compensation	1,459	1,023
Tax impact of adjustments	(1,211)	(1,230)
Adjusted net income (Non-GAAP)	$ 43,155	$ 39,647

(1) Management believes that non-GAAP financial measures can provide more information to assist investors in evaluating current period performance and in assessing future performance. These disclosures should not be viewed as a substitute for operating results determined in accordance with GAAP, nor are they necessarily comparable to non-GAAP performance measures reported by other companies. The company calculates adjusted net income by excluding expenses related to the company's restructuring program (professional fees, severance, facility exit and other program expenses), amortization expenses, stock-based compensation expenses and the effects of a recovery in connection with an insurance claim.

ESSAY 2

Digital Disclosure Archives: The Impact of Archive Visibility and Reference Type on Non-Professional Investors' Valuation Judgments

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Abstract

I use an experiment to examine how investors' judgments are affected by a firm's choice to preserve prior-period disclosures in a digital disclosure archive on its website. More specifically, I investigate how archive visibility (visual prominence of the archive on the website) and reference type (use of neutral or normative statements to reference the archive in the earnings release) jointly affect investors' assessments of firm value. Consistent with my theory, I find that seeing a highly visible archive has a greater effect on investors' valuation judgments in the presence of a normative, rather than neutral reference. In particular, when a normative reference is provided, investors issue higher valuation judgments with greater archive visibility. This is because a highly visible archive makes investors believe to be more knowledgeable about the firm, although they do not actually have more knowledge about the firm. When a neutral reference is provided, the effect of archive visibility is negligible. This evidence corroborates regulators' concerns that investor welfare may be impaired when firms present the archive highly visible on their websites. Moreover, my study implies that regulators may want to consider the use of normative references cautiously, given that this type of reference exacerbates the harmful effect of archive visibility on investor judgment.

Keywords: Investor Relations Websites; Digital Disclosure Archives; Investor Judgments; Archive Visibility; References

I. INTRODUCTION

Firms commonly maintain digital disclosure archives on their investor relations (IR) websites offering investors access to a broad set of prior-period disclosures. While regulators encourage firms to archive prior-period disclosures online, regulators have also voiced concerns about firms' presentation of the archive on IR websites (SEC 2008). Particularly, regulators recommend that firms restrict the visibility of the digital disclosure archive, as regulators are concerned that investors might be confused and distracted by outdated information when the archive is featured prominently on the website.

In this study, I address regulators' concerns by examining how investors' assessments of firm value are affected by archive visibility, i.e., the visual prominence of the archive on a firm's IR website. I also examine whether investors' responses to archive visibility are moderated by how firms reference the archive in their earnings releases. Firms are required to inform investors in their earnings releases that additional information is available on their IR websites (SEC 2002). While some firms merely state that additional information can be found online ('neutral reference'), other firms also include normative appeals, instructing investors that they should access firms' online archives to make informed decisions ('normative reference'). Such normative appeals mirror regulators' call for investors to do their research before investing (SEC 2012). By emphasizing the importance of informed decision-making, normative references may intensify the effect of archive visibility. Taken together, the purpose of this study is to examine how archive visibility and reference type jointly affect investors' valuation judgments.

Examining this research question is important. While regulators believe that high archive visibility could be detrimental to investors' judgments (SEC 2008), IR professionals commonly stress the importance of providing clear and prominent access to the digital disclosure archive (Guilliland 2020; Payton 2018). In light of these competing views, it is important to examine whether investors' judgments are affected by archive visibility. To the extent that investors are

indeed affected by archive visibility, it could have far-reaching consequences given that IR websites are a key source of information for a majority of investors (FINRA 2019; Mazars 2009). Furthermore, even when archive visibility is low, investors could still be unduly influenced by the type of reference that firms use in their earnings releases because references draw investors' attention to the archive. Nonetheless, the effect of normative references or similar investor instructions is largely unclear (Hamilton and Winchel 2019). Thus, additional research seems warranted.

Drawing on cognitive psychology theory, I predict that archive visibility and reference type will jointly affect investors' valuation judgments by influencing investors' perceptions of how knowledgeable they are about the firm. Perceived knowledgeability describes individuals' subjective sense of how much knowledge they hold about a particular topic (Wallace et al. 2020). Prior psychology research finds that contextual cues, such as how and where information is stored, can heighten individuals' perceived knowledgeability, even when individuals merely learn about the accessibility of additional information but do not actually access it (Fisher, Goddu, and Keil 2015; Hamilton, McIntyre, and Hertel 2016; Sloman and Rabb 2016; Ward 2013). Thus, I expect that greater archive visibility will cause investors to perceive themselves as more knowledgeable about the firm. In turn, investors are likely to increase their assessments of firm value because perceived knowledgeability is associated with a positive affective reaction towards the firm that informs investors' valuation judgments (Hadar, Sood, and Fox 2013; Long, Fernbach, and De Langhe 2018).

Psychology theory further suggests that the effect of archive visibility on investors' valuation judgments is more likely to occur when a normative rather than a neutral reference is provided. A normative reference conveys that investors require sufficient knowledge before making investment decisions and calls investors' attention to their perceived knowledgeability about the firm. Thus, investors should be particularly sensitive to variations in archive visibility in the presence of a normative reference. Correspondingly, I hypothesize that investors who

read a normative reference will issue higher valuation judgments when the archive is highly visible as opposed to less visible on the IR website. In contrast, when the reference is neutral, the effect of archive visibility on investors' valuation judgments should be less pronounced. A neutral reference does not emphasize the importance of investors' perceived knowledgeability about the firm.

I use an experiment to test my theoretical predictions because it offers distinct advantages whereas it might be challenging to address my research question with archival methods. Firms have considerable discretion when choosing how to design their websites and some of these choices seem to be strategic (Bradshaw, Lee, and Peterson 2019; Ettredge, Richardson, and Scholz 2002). Thus, archival data is likely confounded by firms' reporting incentives that are difficult to control for in archival analyses. In contrast, an experiment allows me to vary only archive visibility and reference type while holding firms' reporting incentives but also firms' economics, disclosure content and other website design choices constant. This is important as many of these factors may vary simultaneously with archive visibility or reference type in natural settings, making causal identification difficult in archival analyses. In addition, only an experiment allows me to directly capture investors' perceived knowledgeability and to shed light on investors' judgment processes. Therefore, identifying the joint effect of archive visibility and reference type is best examined in an experiment.

My experiment has a 2 × 2 between-participants design with archive visibility (low vs. high) and reference type (normative vs. neutral) as manipulated independent variables. Participants assume the role of potential investors evaluating an investment in a hypothetical outdoor clothing firm. They first visit the firm's investor relations website. On the website, I manipulate archive visibility by varying the visual prominence with which the digital disclosure archive is presented on the website. In the *low archive visibility* conditions, participants see a link labeled "More results from prior quarters". In the *high archive visibility* conditions, the website displays the digital disclosure archive more prominently by directly listing links to

individual quarter results from previous years. Information access to prior-period disclosures is held constant across conditions. Participants then view an earnings release outlining the firm's current-period quarterly results. In all conditions, the earnings release contains a reference informing investors that they can find additional information on the firm's website. I only vary whether normative appeals are included (*normative reference* conditions) or are not included in the reference (*neutral reference* conditions). Subsequently, participants provide valuation judgments and complete the post-experimental questionnaire.

Results from my experiment support my theoretical predictions. When the earnings release contains a normative reference, investors issue higher valuation judgments when the archive is highly visible than when it is less visible on the IR website. However, the effect of archive visibility is diminished in the absence of the normative reference. Specifically, when the earnings release contains a neutral reference, investors' valuation judgments do not differ based on archive visibility. I also find that the joint effect of archive visibility and reference type on investors' valuation judgments is mediated by investors' perceived knowledgeability about the firm. Supplemental analyses of investors' information processing further show that my manipulations affect only how knowledgeable investors believe to be but do not alter the actual knowledge that investors hold about the firm.

My study has important theoretical and practical implications. First, I contribute to the accounting literature on how investors use IR websites when making investment decisions. This has been an area of renewed interest in the literature as regulators have recently emphasized the importance of corporate websites for investors and are currently deliberating on how greater reliance on websites could simplify the disclosure system in the future (SEC 2016). Prior studies have examined the impact of website characteristics such as interactivity (Brown, Gale, and Grant 2020) or XBRL (Hodge, Kennedy, and Maines 2004). My study extends this research by focusing on whether and how archive visibility on IR websites affects investors' behavior. Despite regulators expressing concerns about the effect of archive visibility on investor

judgment (SEC 2002), the consequences of firms' choices of archive visibility have not been addressed previously.

Second, I also contribute more broadly to the accounting literature that examines the effectiveness of investor instructions. Existing studies find that investors are less susceptible to strategic variation in disclosure formatting when instructions are provided to investors (Garavaglia 2020; Koonce, Leitter, and White 2021). In contrast, my experimental results reveal that normative appeals in references *exacerbate* the influence of archive visibility on investors' judgments. These conflicting findings may result from the different types of instructions examined. Whereas I focus on instructions stating that investors ought to do their research before investing, prior literature investigates instructions that inform investors about firms' reporting discretion. For investor protection purposes, it is important to examine the wide variety of instructions that are prevalent in the financial reporting setting (Hamilton and Winchel 2019).

Lastly, my findings show that two important features of how firms present prior-period disclosures on their websites and in their earnings releases affect investors' current-period decision-making. Thus, my study complements the literature on the usefulness of prior-period disclosures (Drake, Roulstone, and Thornock 2016; Heinrichs, Park, and Soltes 2019) by providing converging evidence that past accounting information is influential long beyond its date of publication.

My findings also offer practical implications for regulators and firm managers. Regulators recommend that the visibility of digital disclosure archives is restricted on IR websites to avoid impairing investors' processing of current-period information (SEC 2008). My results suggest that regulators' concerns seem warranted. Specifically, my results demonstrate the potential of high archive visibility to unduly influence investors' valuation judgments by making investors see themselves as more knowledgeable about the firm. My experimental results further highlight that the increase in perceived knowledgeability about the firm is not accompanied by

an increase in investors' actual knowledge about the firm. Thus, investors' welfare may be adversely affected. Furthermore, because the effect of archive visibility is particularly pronounced when a normative reference is provided, regulators might benefit from considering the use of normative appeals cautiously.

For firm managers, my study highlights the consequences of two firm choices that are unique to digital disclosure archives, i.e., how visible firms feature the archive on their websites and how firms reference it in their earnings releases. My results indicate that managers might want to align their IR website choices with disclosure choices in the earnings release. More specifically, presenting the digital disclosure archive more visible on the website may not result in more favorable investor perceptions unless it is also paired with a normative reference in the earnings release.

The remainder of the paper is organized as follows. Section II provides background information and develops my hypotheses. Sections III and IV, respectively, describe the design and results of my experiment. Finally, section V concludes.

II. BACKGROUND AND HYPOTHESIS DEVELOPMENT

Digital Disclosure Archives on IR Websites

Firms often provide digital disclosure archives on their IR websites that preserve prior-period disclosures such as annual reports or earnings releases from prior quarters or prior years. Regulators strongly encourage firms to maintain digital disclosure archives and to provide access to archived documents beyond what is required by regulation (SEC 2008). Investors also emphasize the importance of the digital disclosure archive as a key resource (FRC 2015; Mazars 2009).[1] Investors rely on prior-period disclosures to contextualize current-period news (Drake et al. 2016) or to compare information across competitors (Heinrichs et al. 2019).

[1] Alternatively, investors could access prior-period disclosures from national repositories (e.g., EDGAR, SEDAR, Unternehmensregister, OeKB). However, survey evidence indicates that non-professional investors rarely use national repositories for information access whereas they rely on IR websites as primary source of information (FINRA 2019; Mazars 2009).

There is also some initial evidence that firms offering a digital disclosure archive on their websites benefit from greater access to capital (Frost, Gordon, and Pownall 2008).

Due to the widespread importance of the digital disclosure archive, firms have incentives to draw investors' attention to the digital disclosure archive. In this study, I examine investors' responses to two potential strategies that firms might employ for this purpose: the visibility of the digital disclosure archive on the IR website and the type of reference that firms use to reference the archive in the earnings release.

Visibility of the Digital Disclosure Archive on IR Websites

Archive visibility describes the visual prominence and salience with which the digital disclosure archive is displayed on firms' IR websites. Elements that are more prominently displayed attract more attention from investors and other market participants (Elliott 2006; Huang, Nekrasov, and Teoh 2018; Maines and McDaniel 2000). Archive visibility varies widely across firms because firms have considerable discretion over how to present their digital disclosure archives on their websites (Guilliland 2020; Payton 2018).[2] Prior literature suggests that firms make strategic website design choices based on firm characteristics and disclosure content (Bradshaw et al. 2019; Ettredge et al. 2002).

Although regulators strongly encourage firms to host digital disclosure archives on their websites, they have also expressed serious concerns in regards to firms' presentation of the archive on their websites. They believe that firms should not prominently feature the digital disclosure archive on their IR websites because it might lead to investor confusion. Specifically, investors might fail to sufficiently acknowledge that prior-period disclosures are outdated and non-current when the archive is presented highly visible on the website (SEC 2000, 2005). Therefore, it is advocated that firms place the archive on a separate webpage, making it less

[2] For example, the IR landing pages of Alphabet Inc. and Apple Inc. exhibit high archive visibility by positioning the archive prominently on the main webpage and allowing investors to directly access prior-period disclosures from the last 2-4 years. In contrast, the IR landing pages of Ford Inc. and Amazon Inc. present their archives relatively less visible by providing only a button hyperlinking to a separate archive webpage.

visible to investors when they first visit a firm's IR website (SEC 2008). This recommendation stands in stark contrast to best practice guidelines of IR professionals who commonly stress the importance of providing clear and prominent access to the digital disclosure archive (Guilliland 2020; Payton 2018). In light of these competing views, it is an open question as to whether and how investors respond to variations in archive visibility.

References to the Digital Disclosure Archive in Earnings Releases

Securities regulation mandates that firms include a reference to the digital disclosure archive in their earnings releases (SEC 2002). Specifically, the reference must state that prior-period information can be found online on firms' IR websites. Thus, investors are made aware of an additional source of information about a firm when they read the firm's earnings release. The SEC has recently reaffirmed the importance of the reference by expanding the provision to foreign private issuers (SEC 2018).

While firms are mandated to include a reference in their earnings releases, it is within firms' discretion as to how they frame the reference. A review of such references indicates that firms commonly use two different types of references in their earnings releases: Some firms simply disclose their website address and state that website access to the digital disclosure archive is available. Other firms, however, rely also on normative appeals in their references. That is, they use statements emphasizing that investors should access the firm's online information to make informed decisions. To distinguish these two types of references and to indicate the absence or presence of normative appeals, I refer to the first type of reference as 'neutral reference' and the latter as 'normative reference' (see Appendix A for real-world examples of neutral and normative references).

Normative references mirror regulators' call for investors to conduct their research before making investment decisions (SEC 2012). While the use of normative appeals in references is voluntary, investor advocates have called for firms to contribute more strongly to investor education efforts. Specifically, it has been proposed that firms add normative appeals to their

disclosures that encourage investors to educate themselves (Fanto 1998). Therefore, it is critical to understand how the use of normative appeals in references affects investors.

Effects of Archive Visibility and Reference Type on Investors' Judgments

Drawing on psychology theory, I predict that archive visibility and reference type will jointly affect investors' valuation judgments. By presenting the digital disclosure archive highly visible on its IR website, a firm reminds investors that prior-period disclosures are accessible to them. Psychology theory suggests that such reminders of information access can lead to favorable impressions. Specifically, archive visibility might increase investors' valuation judgments because it activates in investors' minds the perception of *being knowledgeable about the firm* (Bhargave, Mantonakis, and White 2016; Hadar and Sood 2014). This effect may be particularly pronounced in the presence of a normative reference that emphasizes the importance of informed decision-making.

'Perceived knowledgeability' refers to individuals' "sense of how much knowledge they have about a topic" (Wallace et al. 2020, 710). It describes a metacognitive perception of what individuals think they know (Flynn and Goldsmith 1999). Importantly, perceived knowledgeability is distinct from actual knowledge. That is, investors can believe that they know a lot about a firm despite having only little actual knowledge about it (Alba and Hutchinson 2000). The difference between individuals' actual and perceived knowledgeability often arises because individuals judge their knowledgeability based on contextual cues rather than trying to retrieve facts from memory and basing their evaluation on the results of the retrieval process (Koriat 1993; Schwartz, Benjamin, and Bjork 1997).

Recent psychology studies find that information features, such as how and where information is stored, increase individuals' perceived knowledgeability (Fisher et al. 2015; Hamilton et al. 2016; Müller, Schneiders, and Schäfer 2016; Sloman and Rabb 2016). For instance, individuals report being more knowledgeable about a topic when they access identical information via a more familiar search engine rather than a less familiar search engine (Ward

2013). Interestingly, individuals also believe to be more knowledgeable when they merely learn that additional information is available, but they do not actually obtain the information (Anspach, Jennings, and Arceneaux 2019; Bhargave et al. 2016; Schäfer 2020; Yang, Carmon, Ariely, and Norton 2019).

Applying this theory to my investment setting, I expect that investors believe to be more knowledgeable about the firm when the digital disclosure archive is highly visible as opposed to less visible on the IR website. Higher archive visibility reminds investors more strongly about the accessibility of prior-period disclosures and thus enhances investors' perceived knowledgeability. In turn, I expect investors to issue higher firm valuation judgments. When investors see themselves as knowledgeable about a firm, they are likely to consider the firm a favorable investment. Consistently, prior research finds that investors are more likely to invest in a complex and risky investment option that they are more knowledgeable about (Hadar et al. 2013; Olsen 1997). Perceptions of being knowledgeable about the firm induce a positive affective response towards the firm that investors find informative for their valuation judgments (Long et al. 2018). Thus, investors will evaluate a firm more favorably when the archive is highly visible as opposed to less visible on the IR website.

Psychology theory further suggests that the effect of archive visibility on investors' judgments is more likely to occur in the presence of a normative reference. A normative reference conveys that investors require sufficient knowledge before making investment decisions. Therefore, the normative reference calls investors' attention to their perceived knowledgeability about the firm and provides a normative benchmark against which investors can compare it (Fox and Tversky 1995; Fox and Weber 2002). Specifically, investors might evaluate their perceived knowledgeability as satisfactory (deficient) relative to a normative benchmark when they have previously seen a website that presents the digital disclosure archive with high (low) visibility. Investors might also be particularly likely to use their perceptions of knowledgeability as an input for their valuation judgments, given that normative references

imply that investors should "invest in what they know" (Long et al. 2018, 474). Taken together, I predict that investors will issue higher valuation judgments in response to greater archive visibility when a normative reference is provided.[3] The reason is that investors believe to be more knowledgeable about the firm when the archive is highly visible relative to less visible on the IR website. I formally state my prediction below.

> **H1**: Archive visibility on the IR website increases investors' valuation judgments when the earnings release contains a normative reference.

In contrast, the effect of archive visibility on investors' judgments is less clear when a neutral reference is provided. Psychology studies find that individuals do not spontaneously elaborate on their perceived knowledgeability (Fox and Weber 2002). Thus, in the absence of normative appeals prompting investors' evaluations, investors are less likely to consider their perceived knowledgeability when a neutral reference is provided. Furthermore, even if investors do assess their perceived knowledgeability, investors might struggle to evaluate their perceived knowledgeability levels due to the lack of a normative benchmark. Given this line of reasoning, I expect that archive visibility will influence investors' valuation judgments to a lesser extent when the earnings release contains a neutral reference than when it contains a normative reference. I formalize my prediction in the hypothesis below.

> **H2**: The positive effect of archive visibility on investors' valuation judgments is weaker when investors read a neutral reference compared to a normative reference.

III. EXPERIMENTAL METHOD

To test my theoretical predictions, I implement a 2 × 2 between-participants experiment using Qualtrics survey software.[4] In the experiment, participants visit the investor relations

[3] Note that I examine a setting where the firm reports favorable news. I expect that my theoretical predictions also apply when the firm reports unfavorable or mixed news. While the valence of firm news affects investors' valuation judgments, I do not expect it to change investors' positive affective responses to higher levels of perceived knowledgeability. That is, investors are likely to feel positive about a firm that they are more knowledgeable about, regardless of firm news (Hadar et al. 2013). Nevertheless, I do not explicitly test this assumption in my experiment and leave it to future research to examine whether news valence interacts with investors' perceived knowledgeability to affect investors' valuation judgments.

[4] Approval to conduct the experiment was granted by the Institutional Review Board of the University of Bern.

website of a hypothetical outdoor clothing firm, NatureWear Inc., read the firm's most recent earnings release and then make a valuation judgment. I manipulate (1) the extent to which the digital disclosure archive is visible on the firm's website (low vs. high archive visibility) and (2) the type of reference included in the earnings release (normative vs. neutral reference). Participants are randomly assigned to experimental conditions.

Participants

Two hundred forty individuals from the online labor marketplace Amazon Mechanical Turk (henceforth Mturk) participate in my experiment.[5] On average, participants are 35.42 years old, have 12.63 years of work experience and 48.02 percent identify as female. I use Mturk participants as proxies for non-professional investors because their characteristics align closely with the goal of my experiment (Libby, Bloomfield, and Nelson 2002). In particular, my experiment focuses on the judgments of non-professional investors who obtain a firm's earnings release from the firm's IR website. Prior research finds that Mturk participants show equivalent levels of financial literacy and investing experience as the broader population of non-professional investors (Krische 2019; Owens and Hawkins 2019). Similarly, a majority of my participants have previously invested (73.57 percent), plan to invest in the future (80.18 percent) and have experience in evaluating a firm for investment purposes (85.90 percent). Participants have also been enrolled in 1.42 accounting and 1.41 finance courses on average. Further, Mturk participants generally exhibit high levels of online activity and digital literacy (Berinsky, Huber, and Lenz 2012; Brink, Lee, and Pyzoha 2019; Smith, Roster, Golden, and Albaum 2016). They are likely to be representative of the general investor population that uses

[5] Following common guidance (Robinson, Rosenzweig, Moss, and Litman 2019) I limit participation to Mturk individuals located in the United States with an approval rate of at least 95 percent on 100-500 previously completed tasks. To further ensure data quality, I rely on the CloudResearch platform to block individuals from suspicious geocode locations or with duplicate IP addresses (Litman, Robinson, and Abberbock 2017). Participants are also required to pass an attention check and are screened out for using mobile devices because the experimental instrument can only be properly displayed on computers or laptops.

firm websites to obtain earnings releases. Taken together, these characteristics suggest that my participants are reasonable proxies for non-professional investors in my setting.

Manipulations

Archive Visibility Manipulation

To manipulate archive visibility, I vary how prominently the digital disclosure archive is presented on the website while keeping the remainder of the website identical (see Appendix B for images of my manipulation). In all conditions, the website displays a box to download the current-period earnings release. In the *low archive visibility* conditions, the box is accompanied by a hyperlink labeled "More results from prior quarters". In the *high archive visibility* conditions, the current-period earnings release box is followed by an archive section listing several hyperlinks for prior quarter releases (e.g., "Q2 earnings release"). Therefore, the digital disclosure archive is more visible to investors when they first visit the IR website in the *high archive visibility* conditions relative to the *low archive visibility* conditions. The archive visibility manipulation is informed by the SEC's recommendation that firms should restrict the visibility of their digital disclosure archives by placing them on a separate webpage (SEC 2008). It is also reflective of web design choices that are commonly observed on real firms' IR websites.

Reference Type Manipulation

I manipulate reference type by varying the extent to which normative appeals are included in the reference that is presented as part of the current-period earnings release. In the *normative reference* conditions, the reference states:

> Before you invest in any security, you may want to become an educated investor. Educated investors help protect themselves by carefully reading about a company before investing. If you are interested in our stock, you can learn more about us by reading our latest quarterly reports, recent 8-K filings, the annual report and proxy statements that we have reported over the past year. These financial documents are accessible through our website at investors.naturewear.com. They are also available from the SEC's website at www.sec.gov.

Underlined sections refer to normative appeals and are highlighted for illustration purposes only. In contrast, in the *neutral reference* conditions, such appeals are absent and the reference reads as follows:

> Financial documents that we have reported over the past year, such as our latest quarterly reports, recent 8-K filings, the annual report and proxy statements, are accessible through our website at investors.naturewear.com. They are also available from the SEC's website at www.sec.gov.

Task and Procedure

At the beginning of the experiment, participants assume the role of a potential investor of Nature Wear Inc. and read some background information about the firm. They then visit NatureWear's IR website in order to obtain its most recent earnings release. The IR website contains a short firm description, a download box for the current-period earnings release and the digital disclosure archive. Importantly, all available information on the IR website is held constant across conditions. That is, all participants learn that earnings releases from prior quarters are available on the website but participants cannot access them.

This design choice allows me to test whether archive visibility enhances investors' perceived knowledgeability about NatureWear despite investors being provided with identical information about the firm across conditions. Thus, any effect of my manipulation cannot be explained by the relative information advantage of some investors. My experiment design also rules out self-selection concerns and potential demand effects. Moreover, the archive visibility manipulation affects the actual accessibility of prior-period earnings releases. Preventing investors from accessing prior-period disclosures thus avoids confounding accessibility effects (Cikurel 2020; Gale 2021).[6] While investors are unlikely to face similar restrictions in the real world, my setting nonetheless reflects the empirical finding that non-professional investors frequently do not access available accounting information, even in settings where acquisition

[6] For experiments with a similar design of limited information access, see Anspach et al. (2019) and Schäfer (2020).

costs are reasonably low (Cade, Garavaglia, and Hoffman 2021; Hodge and Pronk 2006; Nielsen 2009; Pennington and Kelton 2016).[7] Specifically, investors might focus their attention and processing capacity on current-period disclosures rather than processing prior-period disclosures (Blankespoor, deHaan, and Marinovic 2020).

After visiting NatureWear's IR website, participants proceed by reading NatureWear's most recent earnings release. The release presents summarized financial information, outlines the CEO's positive outlook for the firm and includes a reference to the digital disclosure archive on the firm's website. Subsequently, participants make a valuation judgment and respond to questions about their perceived knowledgeability about the firm. Finally, they answer manipulation checks and demographic questions (Appendix C presents a timeline of the experimental procedure).

Dependent Variable

Valuation Judgment

My dependent variable captures participants' overall assessments of firm value. Specifically, participants are asked: "What do you believe to be an appropriate stock valuation for NatureWear, ranging from low to high?". Participants respond on a 101-point scale with endpoints 0 ("Low") and 100 ("High"). Given my focus on the judgment of non-professional investors, my dependent variable is well matched to the experimental setting (Asay, Hales, and Rupar 2021).

IV. RESULTS

Manipulation Checks

To assess whether participants attended to my manipulations, I ask participants to identify the IR website and reference type that they have seen in the experimental materials. Seventy-seven percent of participants correctly recall whether they have seen the website that

[7] To provide additional evidence for this premise, I unobtrusively track whether and how often participants click on the (disabled) links to retrieve prior quarter reports in my experiment. I find that a majority of my participants (75.42 percent) never click on any link. Clicking rates do not differ across conditions ($\chi^2 = 3.13$, $p = 0.373$).

displays the digital disclosure archive less or more visible.[8] Further, 76.32 percent correctly indicate the type of reference they have read. Correct responses are significantly related to assigned conditions of participants (both p-values < 0.001) and my results are robust to excluding participants who incorrectly respond to at least one of the manipulation checks.[9] Overall, I conclude that my manipulations were successful.

Tests of Hypotheses

My two hypotheses predict that investors' firm valuation judgments increase with greater archive visibility when the earnings release contains a normative reference (H1) and that the positive effect of archive visibility on investors' valuation judgments is weaker when the earnings release contains a neutral reference (H2). Descriptive statistics for participants' valuation judgments are reported in Panel A of Table 1. Figure 1 illustrates the pattern of mean valuation judgments by condition.

To test H1, I first compare participants' firm valuations for the *low archive visibility* and *high archive visibility* conditions when the reference type is normative. This comparison allows me to establish a baseline effect of archive visibility. Based on the comparison, I can then test whether a neutral reference diminishes the impact of archive visibility. Panel B of Table 1 reports the results of the planned comparison. I find that in the presence of a normative reference, participants issue higher valuation judgments when the digital disclosure archive is highly visible compared to when it is less visible (means = 70.66 vs. 62.40, p = 0.013, one-tailed). Thus, consistent with H1, archive visibility significantly increases investors'

[8] Note that the archive visibility manipulation affects only the archive's visual prominence on the main webpage while holding other website features constant. I examine whether investors have similar perceptions of the IR website in an out-of-sample survey with 99 Mturk individuals. Participants are randomly assigned to either the *high archive visibility* website or the *low archive visibility* website. Subsequently, they are asked to assess the website's usability (Zhang 2020). I do not find that participants' perceptions of website usability are differently affected by the archive visibility manipulation (p = 0.214). Nonetheless, when directly comparing both IR websites side-by-side, participants report that the *high archive visibility* website presents the archive with more visual prominence compared to the *low archive visibility* website, indicating an effective manipulation of archive visibility (p < 0.001).

[9] All p-values are two-tailed except for directional predictions for which I report one-tailed or one-tailed equivalent p-values.

FIGURE 1
Results for Investors' Valuation Judgments

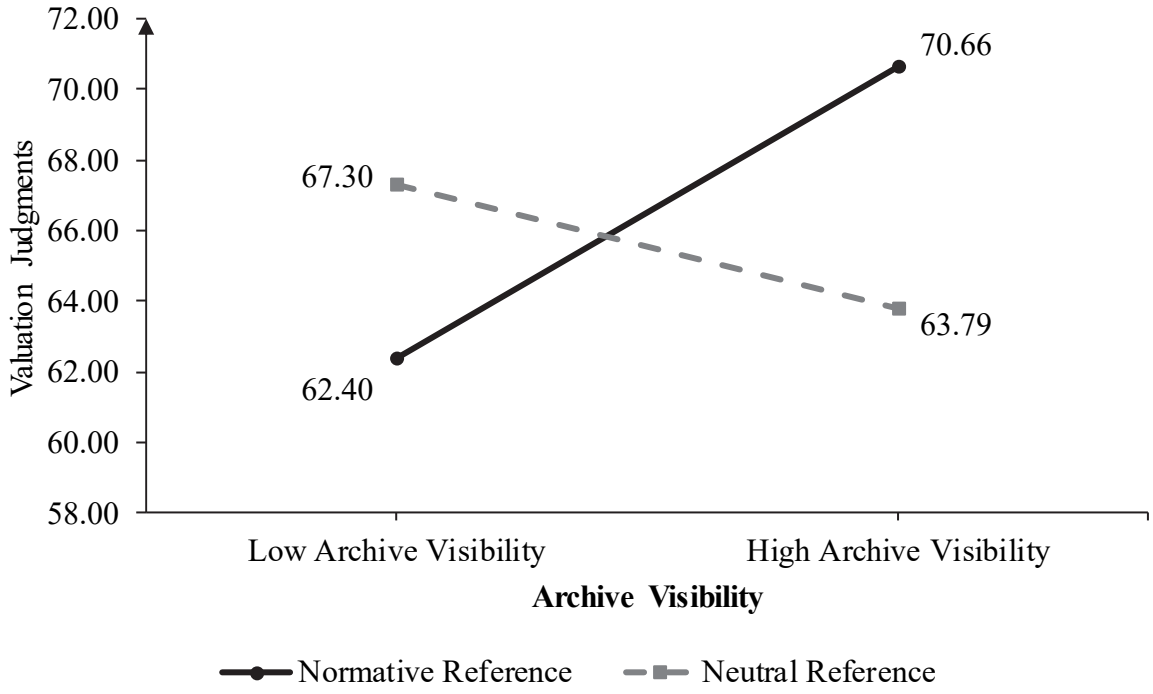


Figure 1 illustrates the pattern of mean values for investors' *Valuation Judgments* by condition. In the experiment, all participants visit a firm's investor relations website and download the firm's most recent earnings release. I manipulate archive visibility on the website (high vs. low) and the reference type in the earnings release (normative vs. neutral). Participants then respond to the question: "What do you believe to be an appropriate stock valuation for NatureWear?". Answers are provided on a 101-point scale ranging from 0 ("Low") to 100 ("High").

valuation judgments when the reference type is normative.

Next, I test the interactive effect predicted in H2 by conducting a two-way analysis of variance (ANOVA) with *Archive Visibility* and *Reference Type* as independent variables and *Valuation Judgments* as the dependent variable. Table 1 reports ANOVA results (Panel C) and simple effect tests (Panel D). I observe a significant interaction effect of *Archive Visibility* and *Reference Type* ($p = 0.018$), indicating that the effect of archive visibility is moderated by reference type. Specifically, simple effect tests reveal that archive visibility affects investors' valuation judgments to a lesser extent in the *neutral reference* conditions compared to the *normative reference* conditions. Whereas investors make higher valuation judgments when the archive is highly visible than less visible in the *normative reference* conditions ($p = 0.011$,

TABLE 1
Valuation Judgments

Panel A: Descriptive statistics: Mean and (standard deviation)

	Low Archive Visibility	*High Archive Visibility*	Combined
Normative Reference	62.40 (21.94) n = 63	70.66 (16.79) n = 53	66.17 (20.10) n = 116
Neutral Reference	67.30 (16.63) n = 61	63.79 (20.40) n = 63	65.52 (18.65) n = 124
Combined	64.81 (19.58) n = 124	66.93 (19.07) n = 116	65.83 (19.33) n = 240

Panel B: Planned Comparison for *normative reference* conditions

Test	**df**	**t-stat**	**p-value**
Low Archive Visibility < *High Archive Visibility*	114	2.24	0.013[†]

Panel C: Analysis of Variance

Source of Variation	**S.S.**	**df**	**M.S.**	**F-stat**	**p-value**
Archive Visibility	338.44	1	338.44	0.92	0.339
Reference Type	57.83	1	57.83	0.16	0.692
Archive Visibility x Reference Type	2,065.67	1	2,065.67	5.61	0.018
Residual	86,899.97	236	368.22		

Panel D: Simple Effect Tests

Test	**df**	**F-stat**	**p-value**
Effect of Archive Visibility given *Normative Reference*	1	5.34	0.011[†]
Effect of Archive Visibility given *Neutral Reference*	1	1.03	0.311

Table 1 presents descriptive statistics and statistical tests for investors' *Valuation Judgments*, as defined in Figure 1.
[†] One-tailed or one-tailed equivalent consistent with directional predictions.

one-tailed), this difference is not statistically significant in the *neutral reference* conditions (p = 0.311).[10] Combined, these results support H2 and indicate that investors' valuation judgments are less sensitive to differences in archive visibility when firms use a neutral reference compared to a normative reference in their earnings releases.

Process Evidence: Investors' Perceived Knowledgeability

I expect that archive visibility and reference type jointly affect investors' valuation judgments because they influence investors' perceptions of how knowledgeable they are about NatureWear. Following prior literature (Hadar and Sood 2014; Hadar et al. 2013), I capture investors' perceived knowledgeability about the firm by asking participants to indicate (1) how informed they are about NatureWear as an investment, (2) how they rate their knowledge about NatureWear, and (3) how confident they are in their knowledge about NatureWear. All responses are recorded on 7-point scales and show adequate reliability (Cronbach's alpha = 0.90). Thus, I average the three individual measures to obtain a composite measure of investors' perceived knowledgeability. I find that greater archive visibility enhances investors' perceived knowledgeability about the firm when they read a normative reference (means = 4.78 vs. 5.06, t = 1.32, p = 0.085, one-tailed) but this effect is considerably weaker when they read a neutral reference (means = 4.82 vs. 4.83, t = 0.05, p = 0.964).[11] This pattern is consistent with my theoretical premise that a normative reference prompts and helps investors to evaluate their level of perceived knowledgeability.

To further test the underlying mechanism that is predicted by psychology theory, I conduct a moderated mediation analysis using structural equation modeling. I investigate whether the mediation effect of perceived knowledgeability varies by reference type as would

[10] H1 and H2 jointly predict an ordinal interaction effect of archive visibility and reference type. A contrast-coded ANOVA with weights +3 for the *high archive visibility/normative reference* condition and -1 for all other conditions, supports the expected pattern (p = 0.040). The between-cells residual variance is insignificant (p = 0.338) and the contrast variance residual q^2 is 16.86 percent.

[11] Participants also respond to questions about their perception of management credibility (trustworthiness and competence). Perceptions of management credibility do not differ across conditions (p = 0.459).

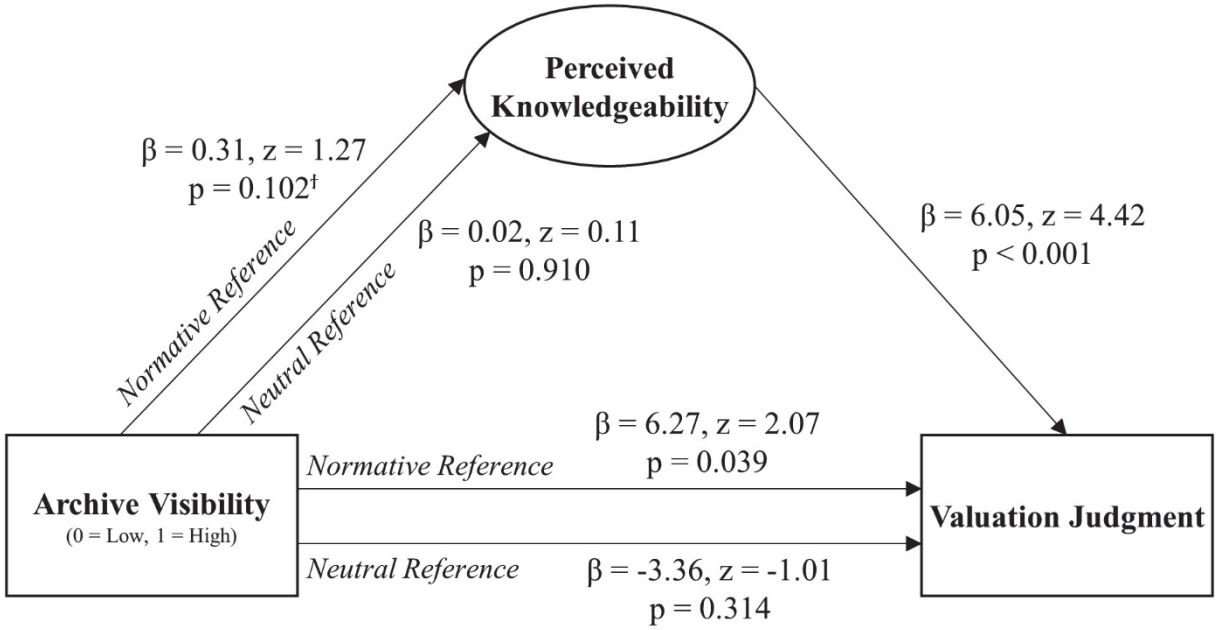
be expected. Specifically, theory predicts that archive visibility will have a positive association with investors' valuation judgments via perceived knowledgeability when the earnings release contains a normative reference, but this effect will be less pronounced when the release includes a neutral reference.

The structural path model is graphically illustrated in Panel A of Table 2. The model includes *Archive Visibility* as the independent variable, *Perceived Knowledgeability* as the latent mediating variable (captured by the three measures discussed above), and *Valuation Judgment* as the dependent variable. Given that the theory suggests that the effect of archive visibility will differ based on reference type, paths are illustrated individually for the *normative reference* conditions and the *neutral reference* conditions. The model shows good model fit as indicated by goodness-of-fit indices surpassing recommended cut-off levels (Browne and Cudeck 1993).

Results reveal that when investors read a normative reference, greater archive visibility enhances investors' perceived knowledgeability (coef: 0.31, $p = 0.102$, one-tailed), whereas there is no evidence of such an indirect effect for the *neutral reference* conditions (coef: 0.02, $p = 0.910$). As expected, investors who perceive themselves as more knowledgeable about the firm, also issue more favorable valuation judgments (coef: 6.05, $p < 0.001$). Tests of the conditional indirect effects in Panel B of Table 2 also confirm a positive mediation effect of *Archive Visibility* on investors' valuation judgments via *Perceived Knowledgeability* when the reference is normative ($p = 0.101$, one-tailed). However, I do not find a significant conditional indirect effect when the reference is neutral ($p = 0.905$). Overall, these findings provide initial process evidence highlighting that archive visibility and reference type jointly affect investors' firm valuations because they alter investors' perceptions of being knowledgeable about the firm.

TABLE 2
Analysis of Moderated Mediation

Panel A: Structural Equations Model



Model Fit:

χ^2	RMSEA	CFI	SRMR
17.73	0.039	0.995	0.095

Panel B: Indirect Effect of Archive Visibility conditional on Reference Type

Reference Type	Indirect Effect	z-stat	p-value	95% Conf. Interval
Normative Reference	1.86	1.28	0.101†	[-0.99; 4.70]
Neutral Reference	0.15	0.12	0.905	[-2-39; 2.69]

Table 2, Panel A, presents the structural equation model examining the process through which archive visibility affects valuation judgments. The model suggests that the effect of *Archive Visibility* on *Valuation Judgments* is mediated by latent variable *Perceived Knowledgeability* and that the indirect effect is moderated by *Reference Type*. *Perceived Knowledgeability* is captured by three questions, asking investors (1) how informed they are about NatureWear as an investment, (2) how they rate their knowledge about NatureWear, and (3) how confident they are in their knowledge about NatureWear. All responses are recorded on 7-point scales and show adequate reliability (Cronbach's alpha = 0.90). For each link, the unstandardized coefficient, z-value and p-value are reported. Estimates are obtained by bootstrapping using 5,000 iterations with replacement. Panel B reports the conditional indirect effect of *Archive Visibility* for the *normative reference* and the *neutral reference* conditions, respectively. Because standardized effect sizes cannot be meaningfully interpreted for dichotomous IVs (Hayes 2018), I report unstandardized effect sizes and path coefficients.

† One-tailed or one-tailed equivalent consistent with directional predictions.

Supplemental Analyses

I perform supplemental analyses to better understand how archive visibility and reference type influence investors' perceived knowledgeability. Psychology theory suggests two main reasons that can explain the impact of contextual factors, such as archive visibility or reference type, on individuals' perceived knowledgeability. First, individuals do not typically self-assess their knowledge based on facts stored in memory but rather base their evaluation on contextual and social cues. Consequently, changes in perceived knowledgeability are often independent of actual knowledge gains (Alba and Hutchinson 2000). Second, individuals rarely reflect on the fact that they might have only limited information (Frederick, Novemsky, Wang, Dhar, and Nowlis 2009). Otherwise, individuals might be able to adjust their initial perceptions of knowledgeability – that are potentially biased by contextual cues – accordingly.

Actual Knowledge about NatureWear

I first consider what actual knowledge participants have about NatureWear when making their valuation judgments. Although the experiment holds all available information constant across conditions, participants might have acquired and processed different amounts of information about NatureWear. For instance, recent accounting studies emphasize that website features can distract investors and result in shallower information processing (Cikurel 2020). To examine this possibility, I capture participants' information acquisition and test their recall of the information presented.

To capture participants' information acquisition, I unobtrusively track the number of seconds that each section of the earnings release is visible on participants' viewports.[12,13] Such viewport times are a reliable indicator of information acquisition (Grusky et al. 2017; Lagun

[12] The viewport describes the visible area of a webpage that is present on the screen at any given point in time (Lagun et al. 2016).

[13] As is common with time data, the viewport times captured in my experiment exhibit considerable skewness. I follow empirical guidance (Whelan 2010) and base my analyses on log-transformed data.

and Lalmas 2016; Lagun, McMahon, and Navalpakkam 2016). I do not observe any statistically significant difference in participants' viewport times across conditions (all p-values > 0.237).

Participants are also asked to recall details about NatureWear's revenue, earnings per share, and its business initiatives. On average, participants answer two of three recall questions correctly. Recall scores do not differ significantly across conditions ($p = 0.823$), suggesting that all of my participants process information about NatureWear similarly, regardless of their perceived knowledgeability levels. Collectively, these findings provide evidence in support of my theory that investors' valuation judgments are driven by investors' *perceived* rather than *actual* knowledge differences about the firm.

Perceived Lack of Information

Next, I examine to what extent investors in my experiment perceive that there is a lack of information about NatureWear. When investors perceive that information is missing, they might feel frustrated and be less willing to invest (Clor-Proell, Guggenmos, and Rennekamp 2020). As part of the post-experimental questionnaire, participants indicate how much they were thinking about missing information when evaluating NatureWear. They respond on a 7-point scale with endpoints 1 ("Not at all") and 7 ("Very much"), adapted from Yang et al. (2019). I find no difference across conditions in participants' perceptions of missing information ($p = 0.428$). Importantly, however, I do find that investors who think more about information being missing, also issue lower perceived knowledgeability ratings (Pearson $r = -0.25$, $p < 0.001$). This result corresponds with psychology research showing that perceptions of missing information undermine individuals' perceived knowledgeability levels (Hadar et al. 2013; Walters, Fernbach, Fox, and Sloman 2017).

Taken together, my supplemental analyses highlight that archive visibility and reference type lead investors to perceive that they are more knowledgeable about NatureWear without them actually having greater knowledge about the firm. This perception can be explained by participants' lack of reflection on the amount of information that is available to them.

V. CONCLUSION

In this study, I examine how the visibility of the digital disclosure archive on a firm's IR website and the type of reference to the digital disclosure archive in the firm's earnings release jointly affect investors' valuation judgments. Results of a controlled experiment with non-professional investors reveal that the effect of archive visibility on investors' valuation judgments depends on reference type. When a normative reference is provided, investors issue more favorable valuation judgments with greater archive visibility. However, this effect diminishes when a neutral reference is provided. In the presence of a neutral reference, I do not observe any difference in investors' valuation judgments based on archive visibility.

My research extends the accounting literature in numerous ways. An emerging stream of literature examines investors' reactions to web-based disclosures (Brown et al. 2020; Hodge et al. 2004). I contribute to this literature by investigating whether investors' valuation judgments differ based on how visible a firm features its digital disclosure archive on its IR website. Despite the importance of IR websites as a dissemination tool for financial disclosures, we still know relatively little about how investors use IR websites and how it affects investors' investment judgments (Lynch and Taylor 2021). I also offer new insights about potential interactive effects between a firm's formatting choices and the use of investor instructions. Specifically, my experimental findings reveal that investors respond more strongly to archive visibility when a normative reference is provided rather than a neutral reference. This finding is noteworthy because existing research mainly finds that instructions *reduce* rather than *strengthen* investors' reactions to a firm's formatting choices (Garavaglia 2020; Koonce et al. 2021). Thus, the impact of instructions on investor judgment may be more nuanced than previously expected.

My results are also of interest to regulators and firm managers. In particular, my study illustrates the potential consequences of regulators' recommendation to present digital disclosure archives with low visibility (SEC 2008). My findings suggest that regulators'

concerns about the detrimental effects of archive visibility may be warranted. In particular, I find that investors increase their assessments of firm value when the archive is highly visible. Importantly, investors do so because they perceive to be more knowledgeable about the firm, although they do not actually have greater knowledge about the firm. Thus, investors' welfare may be adversely affected when firms use archive visibility strategically. Furthermore, I also find that the effect of archive visibility is particularly pronounced when the firm uses a normative reference in its earnings release. While regulators frequently use similar normative appeals, they may want to consider its use more cautiously. For firm managers, my findings improve their understanding of how investors respond to the interplay of corporate websites and earnings releases. My findings suggest that firms may benefit from adopting high archive visibility on their websites combined with normative references in the earning release.

As with any study, my study is subject to certain limitations that suggest directions for future research. First, my experimental setting limits the amount of information that investors receive. In particular, my experiment does not permit investors to access prior-period earnings releases. This setting allows for a clean test of my theory and ensures that differences in investors' judgments cannot be explained by the relative information advantage of some investors. Future research could investigate how archive visibility and reference type affect investors' acquisition of prior-period earnings releases and examine any subsequent effect on investors' judgments. Future research could also explore whether the impact of archive visibility differs depending on the disclosure channel used. My study examines archive visibility in the context of IR websites. I focus specifically on IR websites because they represent a primary source of information for investors (FINRA 2019) and regulators have indicated a renewed interest in firms' use of IR websites for disclosure purposes (SEC 2016). However, investors are increasingly acquiring information from several platforms that display varying degrees of archive visibility. For example, national repositories that are maintained by regulators (e.g., EDGAR or SEDAR) typically exhibit high levels of archive visibility whereas

social media platforms often exhibit low archive visibility. Given that these disclosure channels have characteristics that are distinct from the ones of IR websites, it seems worthwhile to explore the effects of archive visibility also in other contexts.

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APPENDIX A

Real-World Examples of Normative and Neutral References

Panel A: Examples of Normative References [14]

Urban Hydroponics, 2015 [15]

> There are no guarantees about the future performance of the stock market or our stock. Before you invest in any security, you can protect yourself by being an educated investor. If you are interested in our stock, we recommend that, at a minimum, you read our latest public filings with the SEC including our Form 10-K annual report, Form 10-Q quarterly reports and Form 8-K current reports. These and other materials are accessible through this website. They are also available from the SEC's website at www.sec.gov.

Canna Corporation, 2018 [16]

> Although there are no guarantees about the stock market or Canna Corporation common stock, before you invest in any security, you can help protect yourself by being an educated investor. If you are interested in MPGR stock, we recommend that, at a minimum, you read the company's latest proxy statement, annual report and SEC Forms 10-K, 10-Q and 8-K for the past year. It is also advisable to learn more about MPGR and its industry through a variety of public materials. The Company's recent annual reports, 10-K and 10-Q reports and other materials are accessible through this website. Other materials the Company has filed with the SEC are available at: https://www.otcmarkets.com/stock/MPGR/security.

[14] Normative appeals are underlined for illustration purposes only.
[15] https://www.sec.gov/Archives/edgar/data/1336282/000161577415003523/s102281_ex99-1.htm
[16] https://www.sec.gov/Archives/edgar/data/0001582962/000106594919000099/cannaform10k2018.htm

APPENDIX A (continued)

Real-World Examples of Normative and Neutral References

Panel B: Examples of Neutral References

Trilogy Metals Inc., 2020 [17]

> Additional information regarding the Company, including our annual report on Form 10-K, is available on SEDAR at www.sedar.com and EDGAR at www.sec.gov and on our website at www.trilogymetals.com. Information contained on our website is not incorporated by reference.

Golden Matrix Group Inc., 2020 [18]

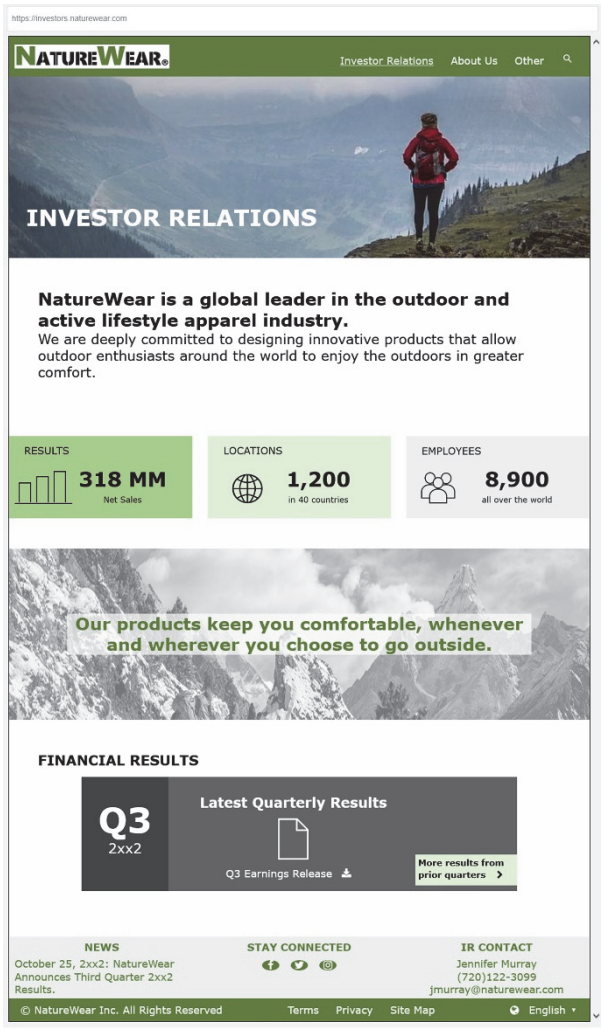
> We file annual, quarterly, and current reports, proxy statements and other information with the SEC. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC like us at http://www.sec.gov (our filings can be found at https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0001437925). Copies of documents filed by us with the SEC are also available from us without charge, upon oral or written request to our Secretary, who can be contacted at the address and telephone number set forth on the cover page of this Report and are also available on our website at https://goldenmatrix.com/investors-overview/sec-filings/ which website includes information we do not desire to incorporate by reference into this Report.

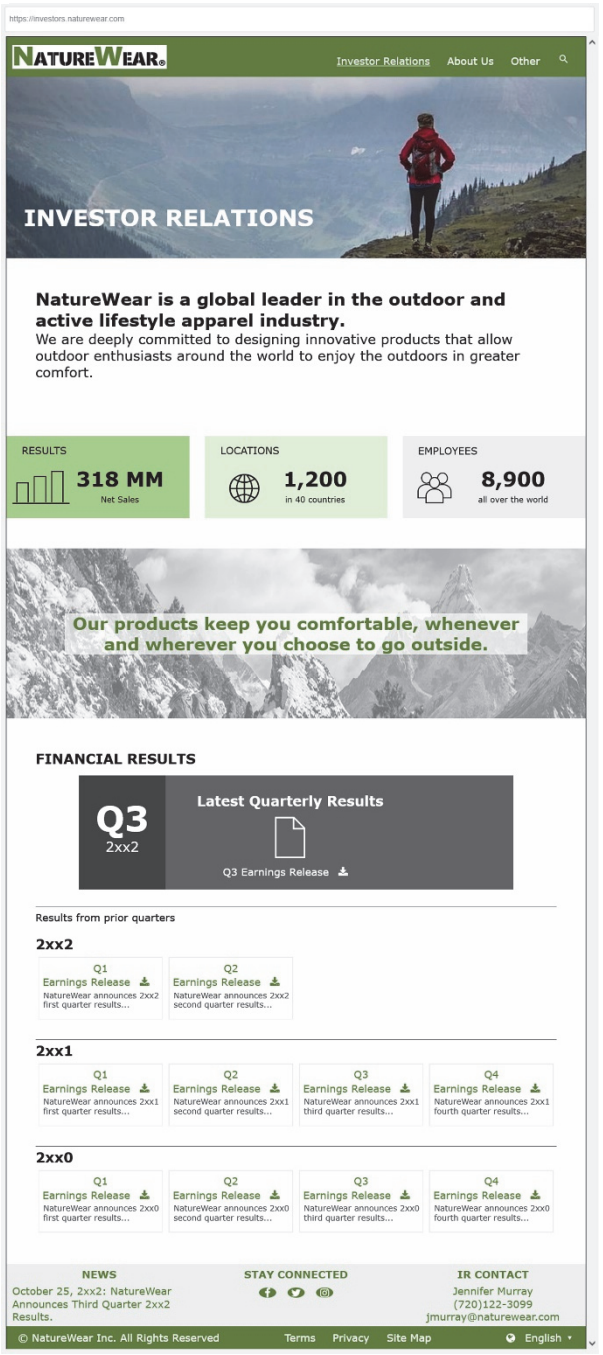
[17] https://www.sec.gov/Archives/edgar/data/0001543418/000155837021004022/tmq-20210228x10q.htm
[18] https://www.sec.gov/Archives/edgar/data/0001437925/000147793220007221/gmgi_10q.htm

APPENDIX B

Archive Visibility Manipulation

[*Low archive visibility conditions*] [*High archive visibility conditions*]

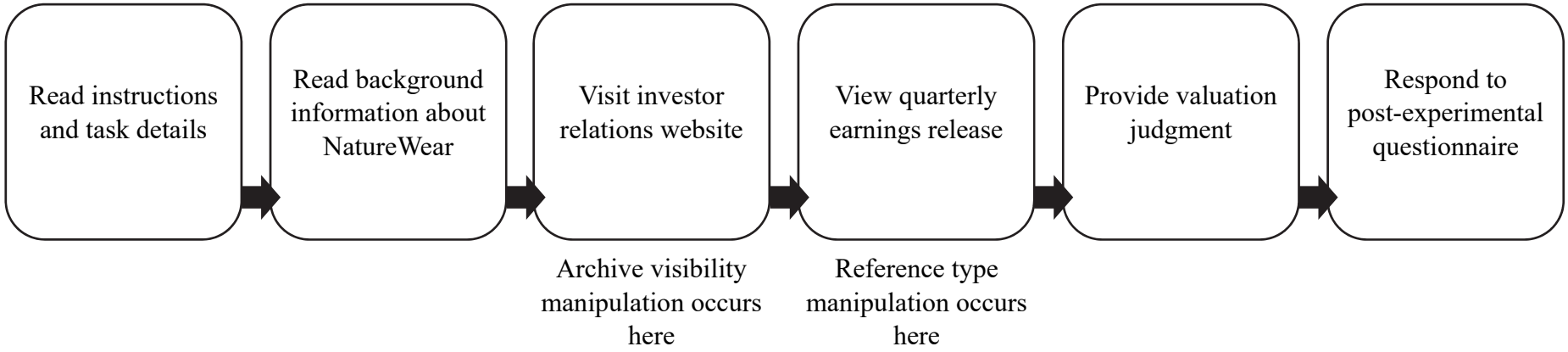




Appendix B displays images of the websites that are presented to participants by condition. The website contains the archive visibility manipulation by varying how prominently the digital disclosure archive is presented on the website.

APPENDIX C

Timeline of Experimental Procedure



ESSAY 3

How a Cautionary Disclaimer and Its Linguistic Style Affect Investors' Valuation Judgments

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University of Bern

Abstract

The Private Securities Litigation Reform Act of 1995 incentivizes firms to accompany forward-looking disclosures with a cautionary disclaimer (i.e., regulatory warning notice). The cautionary disclaimer lists potential risk factors to inform investors about the uncertainty inherent in forward-looking disclosures. In this study, I examine how the presence of the cautionary disclaimer affects investors' valuation judgments. I also investigate whether the use of hedging, a language style conveying tentativeness, in the disclaimer mitigates investors' reactions to the disclaimer. Results of a controlled experiment show that investors decrease their firm valuations in the presence of an unhedged disclaimer, consistent with the disclaimer alerting investors about the uncertainty of forward-looking disclosures. However, this effect is mitigated by hedging, such that investors evaluate the firm more favorably when its disclaimer is hedged compared to unhedged. My findings inform the debate about the effectiveness of cautionary disclaimers on forward-looking disclosures. In addition, my findings also alert regulators and investors that firms could use hedging strategically to weaken investors' responses to the cautionary disclaimer.

Keywords: Cautionary Disclaimer; Linguistic Hedging; Investor Judgments; PSLRA

I. INTRODUCTION

Regulators are concerned that investors are misled by overly optimistic forward-looking disclosures issued by firms. Forward-looking disclosures refer to earnings forecasts, projections of profit or similar statements that are inherently uncertain due to their future-orientation. Therefore, regulators encourage firms to accompany their forward-looking disclosures with a cautionary disclaimer. The cautionary disclaimer is a regulatory warning notice that informs investors about the uncertainty inherent in forward-looking disclosures by listing potential risk factors. However, the effectiveness of the cautionary disclaimer has been frequently questioned and debated (Bloomfield 2012; Romanek 2014). It is an open question whether and how investors respond to the cautionary disclaimer.

I contribute to this debate by examining whether non-professional investors value a firm differently depending on the absence or presence of the cautionary disclaimer. In addition, I also investigate whether hedging, a linguistic style conveying tentativeness, mitigates investors' responses to the cautionary disclaimer. Firms have considerable discretion as how to write the cautionary disclaimer and might exploit their discretion in order to manage investor perception. Overall, the purpose of this study is to assess how the presence of the cautionary disclaimer and its linguistic style affect non-professional investors' valuation judgments.

My research question is important for several reasons. First, the Private Securities Litigation Reform Act (PSLRA) presumes that the cautionary disclaimer effectively warns investors about the uncertainty in forward-looking disclosures, and therefore provides firms with extensive litigation protection (so-called 'safe harbor protection') when firms accompany their forward-looking statements with the cautionary disclaimer. Examining the validity of this presumption is important because the protection offered to firms might otherwise be questionable and might indicate a significant gap in investor protection. In light of recent claims that the disclaimer is ineffective and often ignored by investors (Romanek 2014), my study offers timely and relevant empirical evidence.

Second, it is a common debate in securities class action lawsuits what features the cautionary disclaimer must exhibit to give rise to safe harbor protection (Cornerstone Research 2018; Olazabal 2011; Ripken 2005). Firms have substantial discretion as to how they design the cautionary disclaimer and may use it to their advantage. For instance, prior archival evidence finds that lengthy disclaimers using standardized language are positively associated with more favorable reactions by judges and regulatory oversight bodies (Cazier, McMullin, and Treu 2021). It is still an open question as to how features of the cautionary disclaimer, such as hedging, affect investor judgment. Gaining a better understanding of how investors' responses are shaped by the disclaimer's features, improves regulators' assessments as to whether managerial discretion over the cautionary disclaimer needs to be restricted.

Lastly, regulators currently want to better understand which disclosure characteristics prevent investors from inferring meaningful information from a firm's risk disclosures (SEC 2016). The PSLRA mandates that the cautionary disclaimer call investors' attention to material risk factors. I explore in my research whether linguistic hedging might be a potential barrier to investors' understanding of the risk information presented in the cautionary disclaimer. My study thus informs regulators' current deliberations.

Relying on theories from psychology and linguistics, I predict that investors will issue lower valuation judgments for a firm when the cautionary disclaimer is present compared to when it is absent. This is because the disclaimer presents risk information, highlighting why projections might not realize as expected and emphasizing the firm's riskiness. Correspondingly, investors are likely to assess firm risk as higher and lower their valuation judgment in the presence of the disclaimer. However, when hedging is included in the disclaimer, investors will account for this risk information to a lower extent. Hedging impairs investors' processing of risk information, consequently mitigating the impact of the disclaimer's risk information on investors' valuation judgments. Thus, I also propose that investors evaluate a firm more favorably when they previously see a hedged disclaimer relative

to an unhedged disclaimer. Overall, I expect a negative effect of the disclaimer's presence that is mitigated by the disclaimer's linguistic style.

I test my predictions in an experiment with non-professional investors. Experimentation offers several advantages when examining my research question. Using an experiment allows me to assess the effectiveness of the disclaimer by varying its presence. Because virtually all firms add cautionary disclaimers to their earnings releases and the PSLRA introduced several regulatory changes at the same time, it would be challenging to identify an appropriate control group for archival research (Olazabal 2011). An experiment also enables me to isolate the effect of the disclaimer's linguistic style on investors' firm valuation judgments by keeping constant the disclaimer's content and other linguistic features that might otherwise affect investor judgment. Lastly, in an experiment, I can collect additional process evidence, thereby advancing our understanding of how and why investors respond to the disclaimer. An in-depth understanding of investors' judgment processes is important to help regulators design cautionary disclaimers that are more effective.

My experiment has a 1×3 between-participants design. Participants read a firm's earnings release and are asked to provide a valuation judgment of the firm. I manipulate the disclaimer type at three levels: There is either no disclaimer included in the release (*no disclaimer* condition), a disclaimer without linguistic hedging (*unhedged disclaimer* condition), or a disclaimer that contains linguistic hedging (*hedged disclaimer* condition). The disclaimer informs investors that forward-looking statements are subject to uncertainties and lists potential risk factors. Importantly, the information content is held constant across the two disclaimer types and only the disclaimer's linguistic style varies across the two disclaimer conditions.

Experimental evidence provides support for my theoretical predictions. Specifically, I find that investors reduce the value they place on the firm in the presence of an unhedged disclaimer. Yet, this effect is mitigated by the disclaimer's linguistic style. That is, investors evaluate the firm more favorably when they see a hedged disclaimer relative to an unhedged

disclaimer. Additional analyses show that investors' risk assessments mediate the effect of disclaimer type on investors' valuation judgments.

My study provides significant contributions to the accounting literature. First, I contribute to studies examining the consequences of the PSLRA (Cazier et al. 2021; Cazier, Merkley, and Treu 2020; Johnson, Kasznik, and Nelson 2000, 2001; Nelson and Pritchard 2016). I add to these studies by investigating individual investors' responses to the cautionary disclaimer that is mandated by the PSLRA. Specifically, I extend the study of Asay and Hales (2018) by demonstrating that investors are attentive to the cautionary disclaimer and adjust their firm valuations accordingly. In their study, investors' valuation judgments are unaffected by the presence of a disclaimer. The difference in findings is likely attributable to the different types of cautionary disclaimers examined. Asay and Hales (2018) use a cautionary disclaimer that solely informs investors about the inherent uncertainty of forward-looking statements, whereas I examine a cautionary disclaimer that is more reflective of the PSLRA mandate and also lists potential risk factors in the disclaimer. Therefore, my research also adds more generally to the literature that examines the effects of different disclaimers and warnings aimed at informing investors about uncertainties and biases in disclosures (Elkins, Entwistle, and Schmid 2021; Kelly, Low, Tan, and Tan 2012; Koonce, Leitter, and White 2021; Mercer, Palmiter, and Taha 2010).

Second, my study also complements the accounting literature on rhetorical impression management strategies that has not examined hedging as a potential strategy so far (Brennan and Merkl-Davies 2013). Lastly, my findings also contribute to research on the consequences of narrative disclosure characteristics (Asay, Elliott, and Rennekamp 2017; Asay, Libby, and Rennekamp 2018; Grant, Hodge, and Sinha 2018; Hope, Hu, and Lu 2016; Li 2008; Rennekamp 2012; Rennekamp and Witz 2020). I provide the insight that hedging impairs investors' processing of risk information. My study therefore directly addresses Beattie's (2014) call for

a more comprehensive understanding of accounting narratives and their effects on investor judgment.

My findings also offer important implications for regulators and firm managers. Regulators benefit from knowing that a cautionary disclaimer containing risk factor information can effectively alter investor behavior. Nonetheless, regulators should be alert about the possibility that hedging in cautionary disclaimers can impair investors' processing of risk information. Because investors are unlikely to be aware of how hedging biases their information processing, they are unlikely to self-adjust their judgments. Thus, regulators should be concerned about hedging and its potentially distracting qualities. For firm managers, my study provides empirical evidence on the potential consequences of using hedging in corporate disclosures. My findings suggest that firms could benefit from using hedging in the cautionary disclaimer because it will reduce investors' focus on the firm's risk factors.

In the next section, I briefly outline the institutional setting, discuss prior literature and develop my hypotheses. In section III, the research design and experimental procedures are explained. Section IV reports the results. Finally, Section V concludes.

II. BACKGROUND AND HYPOTHESIS DEVELOPMENT

Cautionary Disclaimer and the PSLRA's Safe Harbor Protection

In 1995, the PSLRA established a statutory safe harbor for firms' forward-looking disclosures. Forward-looking disclosures refer to predictions of future earnings, plans for future operations, or similar future-oriented statements. The safe harbor shields firms from legal liability for allegedly false or misleading forward-looking disclosures as long as disclosures are identified as forward-looking and are accompanied by a meaningful cautionary disclaimer, identifying material risk factors that could cause actual results to differ materially from projections (15 U.S. Code § 77z-2).[1]

[1] Safe harbor protection does not apply to forward-looking statements made within financial statements or a registration statement, made as part of a tender offer, IPO or offering by a partnership (15 U.S. Code § 77z-2(b)).

There is wide variation in judicial opinions as to which features the cautionary disclaimer must exhibit to warrant safe harbor protection (Olazabal 2011; Ripken 2005). In a review of case law on the safe harbor, Rosen and Carey (2016) find that the cautionary disclaimer is generally considered adequate when it provides entity-specific risk factors that are regularly updated to reflect the current environment. Further, firms do not have to disclose any potential risk factors but focus on major risk factors. Apart from these limited guidelines, firms maintain substantial discretion in regards to the formatting, design, and placement of the cautionary disclaimers (Ripken 2005). Specifically, regulators do not regulate the linguistic style that firms use in the cautionary disclaimer.

The PSLRA was enacted with the purpose of preventing abusive securities fraud claims while simultaneously incentivizing firms to disclose forward-looking information (Johnson et al. 2001). This tradeoff illustrates that forward-looking disclosures are considered important to capital markets, even though they are naturally uncertain. Nonetheless, the SEC had previously opposed the disclosure of forward-looking disclosures out of concern that investors do not recognize the innate low reliability of forward-looking information (SEC 1994). The cautionary disclaimer thus fulfills an essential investor protection role by warning investors that actual results might deviate considerably from management's projections (Fine 2016).[2]

Research examining the consequences of the PSLRA finds that the enactment of the PSLRA was associated with positive capital market reactions (Johnson et al. 2000), an increase in the amount of forward-looking disclosures (Johnson et al. 2001) and reduced litigation risk for forward-looking statements (Cazier et al. 2020; Johnson, Nelson, and Pritchard 2007). So far, only little research has been undertaken to examine how individual investors react to the cautionary disclaimer of forward-looking statements that was introduced with the enactment of the PSLRA.

[2] The SEC employs disclaimers as means of investor protection also in other areas. For instance, mutual fund advertisements must include a disclaimer, warning investors that past performance does not guarantee future returns (Mercer et al. 2010).

The Effect of the Cautionary Disclaimer on Investor Judgment

A small number of prior accounting studies examine the impact of disclaimers on investors' judgments and decision-making. Specifically, research investigates whether disclaimers can help investors account for optimistic bias in analyst reports (Kelly et al. 2012), management discretion in financial disclosures (Elkins et al. 2021; Koonce et al. 2021), or uncertainty in mutual fund advertisements (Mercer et al. 2010). These studies find only weak evidence on the effectiveness of disclaimers. Most related to the current study, Asay and Hales (2018) test how investors react to a disclaimer advising investors not to place undue reliance on forward-looking information due to its inherent uncertainty. The authors do not find evidence that the presence of the disclaimer has an impact on investors' valuation judgments. It is possible that investors are already intuitively aware that forward-looking information warrants a certain degree of caution (Bloomfield 2012; Langevoort 1994).

I contribute to this literature by examining whether and how investors respond to the cautionary disclaimer on forward-looking statements, as mandated by the PSLRA. Importantly, the PSLRA requires that the disclaimer not only warns investors about the inherent uncertainty of forward-looking disclosures but also lists potential risk factors. Specifically, the PSLRA mandates that the cautionary disclaimer identifies "important factors that could cause actual results to differ materially from those in the forward-looking statement" (15 U.S. Code § 77z-2(c)). Hence, the risk factors provided in the cautionary disclaimer encourage investors to consider alternative predictions that challenge forward-looking information. Prior research shows that the consideration of such counter-arguments enhances investors' critical thinking and reduces investors' susceptibility to forecast optimism (Heiman 1990; Kadous, Krische, and Sedor 2006; Koehler 1991; Koonce 1992). Accordingly, the presence of the cautionary disclaimer might cause investors to evaluate a firm less favorable by highlighting reasons why actual results might differ from expectations.

Along with enhancing investors' propensity to consider alternative outcomes, the cautionary disclaimer also makes the overall riskiness of the firm more salient by explicitly listing risk factors. Because salient information comes more easily to mind, investors might assess the occurrence of risk factors as more likely (Tversky and Kahneman 1974). Thus, investors might also perceive an investment in the firm to be riskier. Furthermore, the cautionary disclaimer might also reveal risk information that was not previously known to investors. This is because firms have strong incentives to disclose precise and entity-specific risk factors in their disclaimers as otherwise, they might not obtain legal safe harbor protection (SEC 2005, 2016). Further, I expect that investors' risk assessments decrease their firm valuations (Fanning, Agoglia, and Piercey 2015; Hope et al. 2016; Koonce, Leitter, and White 2019; Koonce, McAnally, and Mercer 2005; Nelson and Rupar 2015). Thus, I posit that investors will adjust their valuation judgments downwards in the presence of the cautionary disclaimer.

To sum up, I expect that the unhedged cautionary disclaimer leads investors to evaluate a firm more unfavorable compared to when no disclaimer is present. The reason is that the cautionary disclaimer presents investors with risk information that makes alternative outcomes and the potential risk factors associated with the investment more salient to investors. This prediction is reflected in the hypothesis below.

> **H1**: Non-professional investors will issue lower valuation judgments of a firm when the firm's earnings release is accompanied by an unhedged cautionary disclaimer relative to when no cautionary disclaimer is provided.

The Effect of Hedging in Cautionary Disclaimers on Investor Judgment

Managers might be concerned that the risk information presented in the cautionary disclaimer deters investors' interest in the firm (ACCA 2014). Thus, managers might engage in rhetorical impression management strategies to soften the potential adverse effect of the

cautionary disclaimer on investor judgment (Brennan and Merkl-Davies 2013).[3] Relatedly, prior research finds that firms can effectively reduce their litigation risk by adjusting the formatting and style of the cautionary disclaimer (Cazier et al. 2021; Nelson and Pritchard 2016).

In the context of cautionary disclaimers, one particular strategy that lends itself well to such purpose is hedging. Hedging refers to the use of linguistic devices to convey purposeful tentativeness (Beattie 2014; Crismore and Vande Kopple 1988; Hyland 1996, 2005). The following devices are commonly considered to be hedging: modal verbs ("might", "could"), epistemic verbs ("appear", "seem"), words relating to modality or possibility ("potential", "potentially"), vague quantifiers ("almost", "some"), concessive conjuncts ("although", "however"), conditional clauses, time references and impersonal phrases (Resche 2015; for a more comprehensive review see Fraser 2010).[4]

Hedging serves two main purposes. First, hedging allows authors to signal caution and qualify their commitment to a statement. Thus, authors provide guidance on what degree of caution should be applied while interpreting their texts (Aerts and Yan 2017; Hyland 1996). Second, hedging also enables authors to evade potential negative reactions to disclosures. Especially, authors use hedging to distance themselves from the disclosure and avoid any responsibility for the information presented therein (Aerts and Yan 2017; Guerin 2003; Hyland 1998).

[3] Alternative impression management strategies comprise the omission of relevant risk factors from the disclaimer or the dilution of investors' risk assessments by adding low-probability risk factors (Fanning et al. 2015). However, both strategies might entail considerable drawbacks for the firm. First, the omission of risk factors is the most common reason cited for denying safe harbor (Cazier et al. 2021). Second, the SEC has currently emphasized efforts to reduce lengthy risk factor disclosures, such as in the cautionary disclaimer (White 2013). In contrast, adjusting the disclosure style of the cautionary disclaimer is within management's discretion because the PSLRA does not include any linguistic style requirements. Furthermore, users of financial disclosures are often unaware of the effect of disclosure style on their judgments, limiting potential drawbacks from this impression management strategy to the firm (Rennekamp 2012; Sparks and Areni 2008).

[4] Hedging is distinct from other linguistic styles, such as vividness or linguistic formality. For a discussion on how hedging differs from other linguistic styles, see Fraser (2010).

Hedging is prevalent in numerous financial communication settings, for example in annual business reports (Cassidy 2015; Grabe and Kaplan 1997; Klimczak, Dynel, and Pikos 2016), earnings releases (McLaren and Gurău 2005; McLaren-Hankin 2008), letters to shareholders (Aerts and Yan 2017; Hyland 1998, 2005), analyst reports (Klimczak and Dynel 2018), and auditor disclosures (Hagge and Kostelnick 1989). An initial review of firms' cautionary disclaimers also reveals that firms commonly use hedging in cautionary disclaimers (see Appendix A for examples). Hedging appears to be especially relevant in settings where disclosures serve a strong promotional purpose or where inaccurate forecasts are costly to the firm (e.g., high litigation risk environments). Some initial evidence also indicates that fraudulent firms use hedging more often than non-fraudulent firms (Goel, Gangolly, Faerman, and Uzuner 2010; Humpherys 2010; Humpherys, Moffitt, Burns, Burgoon, and Felix 2011). Overall, these findings are consistent with hedging being employed as a rhetorical impression management strategy to influence investor perception favorably.

Whether hedging in cautionary disclaimers actually alters investors' judgments has not been examined so far. The Elaboration Likelihood Model by Petty and Cacioppo (1986) suggests that linguistic style choices, such as hedging, can moderate the persuasive influence of a message (Areni 2003). In particular, hedging might affect an individual's ability to process the message content (Blankenship and Craig 2011; Sparks and Areni 2008). Previous research in linguistics demonstrates that hedging distracts individuals from considering message arguments and redirects individuals' focus away from the content, thereby undermining individuals' information processing (Blankenship and Holtgraves 2005; Bradac and Street 1989; Gibbons, Busch, and Bradac 1991; Hennecke 2017; Sparks and Areni 2008).

Based on these prior findings, I posit that hedging in cautionary disclaimers will impair investors' ability to fully process the risk information presented in the disclaimer.[5] When

[5] This prediction is consistent with evidence from previous studies that investors' information processing can be impaired by linguistic disclosure characteristics. For instance, readability alters investors' perceptions of the ease with which information is processed (Rennekamp 2012).

investors focus less on the risk factors and spend less time thinking about potential consequences, they might perceive the actual risk of an investment as less severe and less threatening. This prediction is consistent with prior experimental accounting research showing that distraction considerably reduces investors' risk assessments (Nelson and Rupar 2015) and lowers investors' propensity to consider alternative outcomes (Kadous et al. 2006). Therefore, I expect investors to assess firm risk as lower when the cautionary disclaimer includes hedging compared to when the disclaimer is unhedged. In turn, this perception might lead, *ceteris paribus*, to a more favorable firm evaluation in the presence of a hedged disclaimer relative to an unhedged disclaimer. Overall, I posit the following hypothesis below.

> **H2**: Non-professional investors will issue more favorable valuation judgments of a firm when the firm's earnings release contains a hedged cautionary disclaimer relative to an unhedged cautionary disclaimer.

Note that my theoretical framework does not offer any predictions as to how investors' firm valuations differ when investors read a hedged disclaimer as compared to when they do not read any disclaimer. It is ex-ante unclear how strongly hedging undermines investors' information processing. As a result, I do not make a prediction on the incremental effect of a hedged disclaimer relative to no disclaimer on investors' valuation judgments.

III. EXPERIMENTAL METHOD

I use an experiment with a 1×3 between-participants design to test my hypotheses. Participants evaluate a hypothetical sportswear firm as a potential investment. They view the firm's earnings release and assess the firm's valuation based on the information provided. Within the release, I manipulate the type of cautionary disclaimer that is provided as (1) no disclaimer, (2) unhedged disclaimer, or (3) hedged disclaimer. Participants are randomly assigned to experimental conditions.

Participants

I recruit 142 non-professional investors from Amazon's Mechanical Turk platform (henceforth Mturk) to participate in my experiment.[6] I focus on non-professional investors because the cautionary disclaimer is primarily aimed at protecting this particular group of users (SEC 1994). The Mturk investor population exhibits similar characteristics as does the more general investor population, and fundamental accounting findings have been reliably replicated with Mturk investors (Farrell, Grenier, and Leiby 2017; Krische 2018; Owens and Hawkins 2019). Participants spend an average of 9.96 minutes on the task and are paid $1.20 for their participation, earning an hourly rate of $7.25.

On average, participants are 37.78 years old and have 16.30 years of work experience. Forty-one percent identify as female and 93.2 percent are native English speakers. Participants have completed an average of 1.36 accounting and 1.32 finance classes, and 68.52 percent of participants indicate having investment experience or planning to invest in the future. Given that my experimental task is of relatively low integrative complexity, I conclude that my participants represent reasonable proxies for non-professional investors (Elliott, Hodge, Kennedy, and Pronk 2007; Libby, Bloomfield, and Nelson 2002).

Manipulations

Disclaimer Type Manipulation

To create the disclaimer type manipulation, I first design the cautionary disclaimer based on actual cautionary disclaimers used by publicly listed firms in the sportswear industry (Appendix A illustrates examples of firms' cautionary disclaimers). The disclaimer informs investors that forward-looking disclosures are subject to risks and might not materialize as

[6] Following common guidance (Buchheit, Doxey, Pollard, and Stinson 2018), participation in the experiment is restricted to Mturk individuals within the United States who have an approval rate of at least 97 percent on 1,000 or more previously completed tasks. Overall, 195 participants started the study. I exclude 33 participants with missing responses on my dependent variable measures. To ensure data quality, I also exclude 20 participants who fail an attention check question. When analyses are based on the full sample, my results remain inferentially the same.

expected. In particular, the disclaimer lists six risk factors, ranging from competition to difficulties with wholesale partners and IT security breaches.[7]

I then adjust the linguistic style of the cautionary disclaimer to create the hedged disclaimer. Consistent with prior literature in linguistics (Humpherys 2010; Resche 2015), I vary the following language features between the unhedged disclaimer and the hedged disclaimer while simultaneously keeping the disclaimer's information content constant: vague quantifiers ("some", "to some extent"), conditional clauses, modal verbs ("might", "could"), words expressing possibility ("possible", "potential") and conjuncts ("although", "given").[8] Appendix B displays the two cautionary disclaimers used in the experiment.

To ensure a strong hedging manipulation, I pretest preliminary pairs of unhedged and hedged statements in an out-of-sample survey. Specifically, 45 Mturk participants are randomly presented with one statement of each pair and indicate on a 101-point scale how tentative the statement is, with endpoints 0 ("Not at all tentative") and 100 ("Very tentative"). For the main experiment, I then select those statements for which participants' assessments of tentativeness vary significantly between the unhedged and hedged statements (all p-values < 0.050).[9]

Task and Procedure

In the experiment, participants assume the role of a prospective investor, evaluating an investment in FA Sportswear Inc., a hypothetical sportswear firm. Participants begin by reading background materials about the firm.[10] They are then asked to provide an initial assessment of

[7] A review of 100 randomly selected Q1 2018 press releases from S&P 500 firms reveals a wide variation in the number of risk factors listed in cautionary disclaimers, ranging from 1 to 46. In the experiment, I keep the number of risk factors listed constant (6 risk factors) to represent a plausible number of risk factors while still keeping the reading duration of the experimental materials manageable (Libby et al. 2002). This design choice is also consistent with current judicial practice that firms have only to list the most important risk factors but not every potential risk factor (Rosen and Carey 2016).

[8] Prior research has applied similar compound manipulations of disclosure style, varying several linguistic features at the same time (Grant et al. 2018; Rennekamp 2012; Rennekamp and Witz 2020). Given my focus on hedging in the cautionary disclaimer – a written and formal disclosure – I do not include colloquial hedges in my manipulation (Goh and Tan 2021).

[9] I report one-tailed or one-tailed equivalent tests for directional predictions and two-tailed tests otherwise.

[10] The background materials consist of a short description of FA Sportswear Inc. and a brief introduction note about earnings releases issued by publicly listed firms. The note ensures that all participants have similar knowledge of the purpose of earnings releases, and thus serves to minimize noise caused by participants' varying levels of investment experience.

the firm valuation of FA Sportswear. Next, participants read the firm's most recent earnings release. In the release, firm management announces that the firm's historical performance was below expectations but that a positive outlook is expected. I focus on this setting as it reflects a situation in which investors' performance assessments are often overly optimistic (Sedor 2002). Thus, the cautionary disclaimer as a means of investor protection may be particularly warranted. In the *unhedged disclaimer* and *hedged disclaimer* conditions, the earnings release also contains the cautionary disclaimer. The disclaimer is located at the end of the release, following firms' common reporting practice (Asay and Hales 2018). After reviewing the earnings release, participants are again asked to provide a valuation judgment of the firm. They also answer process and manipulation check questions. Finally, participants complete a surprise free recall of the risk factors listed in the cautionary disclaimer (in the *unhedged disclaimer* and *hedged disclaimer* conditions only) and respond to demographic questions.

Dependent Variable

Change in Investors' Valuation Judgments

My dependent variable captures how non-professional investors evaluate the firm's stock valuation. Participants indicate on a 101-point scale what they believe to be an appropriate common stock valuation for FA Sportswear, ranging from 0 ("Low") to 100 ("High"). Following prior literature (Asay and Hales 2018; Koonce and Lipe 2010; Rennekamp 2012), this valuation judgment is elicited twice; once when participants have read background information but before they view the earnings release (*Initial Valuation*) and for the second time, directly following the earnings release (*Revised Valuation*). My dependent variable is the difference between investors' initial and revised valuation judgments (*Valuation Change*). By assessing both investors' initial and revised valuation judgments of the firm, I can evaluate how strongly investors react to the earnings release containing my manipulations. It also allows me to reduce potential noise in the dependent variable that could be caused by investors' idiosyncratic preferences.

IV. RESULTS

Manipulation Checks

To assess the effectiveness of my disclaimer type manipulation, I ask all participants to rate the extent to which the earnings release acknowledges that the firm's future outlook might not be as favorable as expected. Participants respond on a 7-point scale with endpoints 1 ("Not at all acknowledged") and 7 ("Greatly acknowledged"). Consistent with participants being attentive to the disclaimer's presence, I find that participants in the two conditions with a disclaimer present (*unhedged disclaimer* and *hedged disclaimer* conditions) report that the release acknowledges the possibility of future deviations to a greater extent than participants in the *no disclaimer* condition (means = 5.02 vs. 2.89, $t = 7.41$, $p < 0.001$, one-tailed). I also ask participants in the *unhedged disclaimer* and *hedged disclaimer* conditions to indicate how assertive the language in the disclaimer is with 1 ("Not at all assertive") and 7 ("Very assertive"). Participants in the *unhedged disclaimer* condition perceive the disclaimer as more assertive than participants in the *hedged disclaimer* condition (means = 5.13 vs. 4.79, $t = 1.39$, $p = 0.085$, one-tailed). Overall, I conclude that my disclaimer type manipulation was successful.

Tests of Hypotheses

My hypotheses predict that investors receiving an earnings release accompanied by an unhedged disclaimer will provide lower valuation judgments compared to investors receiving only the earnings release (H1). Furthermore, I expect the effect of the cautionary disclaimer to be mitigated when the disclaimer uses hedging (H2). Panel A of Table 1 displays descriptive statistics for participants' initial, revised, and change in valuation judgments. As expected, participants' initial valuation judgments do not differ significantly across conditions ($F = 0.14$, $p = 0.866$). On average, participants revise their valuation judgments downwards, consistent with the earnings release revealing the firm's poor historical performance. Correspondingly, the mean valuation change is negative. Figure 1 graphically depicts the mean valuation change by experimental condition.

FIGURE 1
Results for Investors' Valuation Change

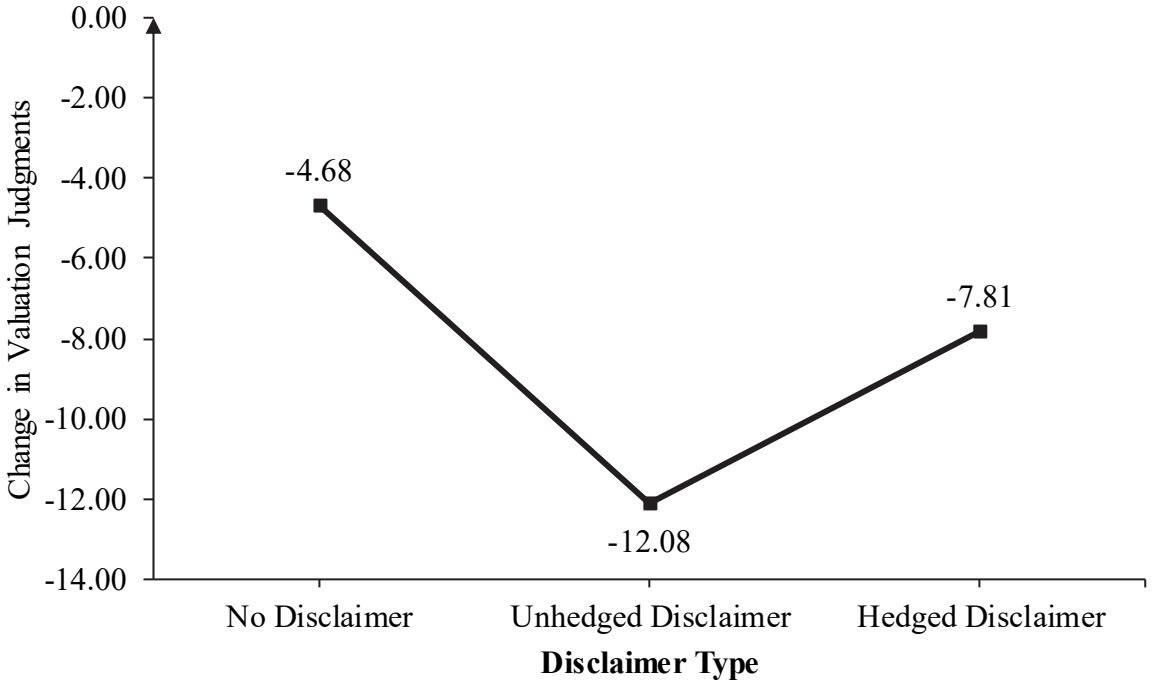


Figure 1 presents the mean *Valuation Change* by condition. *Valuation Change* is defined in Table 1.

A one-way analysis of variance (ANOVA), presented in Panel B of Table 1, reveals significant differences among the three conditions for participants' change in valuation judgments ($p = 0.055$).[11] Thus, participants respond differently to the type of disclaimer provided. To better understand the nature of my results and because I predict specific directional hypotheses, I next conduct planned comparisons (Panel C of Table 1). First, I establish the effect of an unhedged disclaimer by comparing the *no disclaimer* and *unhedged disclaimer* conditions. Consistent with investors decreasing their valuation judgments in response to an unhedged disclaimer, participants' valuation changes are lower in the *unhedged disclaimer* condition than in the *no disclaimer* condition (means = -12.08 vs. -4.68, $p = 0.008$, one-tailed).

[11] Because the analysis of a change measure can have low power (Myers, Well, and Lorch 2010), I repeat my analysis using an ANCOVA with initial valuation judgments as a covariate and revised valuation judgments as dependent variable. My inferences remain unchanged ($F = 2.89$, $p = 0.059$).

TABLE 1
Change in Valuation Judgments

Panel A: Descriptive statistics: Mean and (standard deviation)

	No Disclaimer	*Unhedged Disclaimer*	*Hedged Disclaimer*	Combined
Initial Valuation [a]	52.26 (10.18)	53.65 (13.67)	53.72 (8.21)	53.21 (10.89)
Revised Valuation [a]	47.58 (18.99)	41.56 (19.02)	45.92 (16.09)	44.99 (18.14)
Valuation Change [b]	-4.68 (15.08)	-12.08 (14.49)	-7.81 (15.05)	-8.22 (15.08)
No. of Observations	47	48	47	142

Panel B: Analysis of Variance

Source of Variation	**S.S.**	**df**	**M.S.**	**F-stat**	**p-value**
Disclaimer Type	1,313.08	2	656.54	2.97	0.055
Residual	30,749.16	139	221.22		

Panel C: Planned Comparisons

Test	**df**	**t-stat**	**p-value**
No Disclaimer > *Unhedged Disclaimer*	93	2.44	0.008[†]
Unhedged Disclaimer < *Hedged Disclaimer*	93	1.41	0.081[†]
No Disclaimer vs. *Hedged Disclaimer*	92	1.01	0.317

Table 1 presents descriptive statistics, ANOVA results and planned comparisons for investors' *Valuation Change*.
[a] *Initial Valuation* and *Revised Valuation* are investors' assessments of the appropriate common stock valuation of the firm on a 101-point scale with endpoints labeled 0 ("Low") and 100 ("High"), before and after reading the earnings release.
[b] *Valuation Change* is the difference between *Initial Valuation* and *Revised Valuation*.
[†] One-tailed or one-tailed equivalent consistent with directional predictions.

These findings provide empirical support for H1 and demonstrate that non-professional investors evaluate a firm more negatively when an unhedged cautionary disclaimer is present.

Next, I examine whether the effect of the cautionary disclaimer depends on its linguistic style. In particular, H2 predicts that hedging mitigates the negative valuation effect of an unhedged cautionary disclaimer. As predicted, I find that participants judge the firm less negatively when the disclaimer is hedged relative to unhedged (means = -7.81 vs. -12.08,

p = 0.081, one-tailed). Thus, H2 is supported. Hedging undermines the intended purpose of the cautionary disclaimer by mitigating its impact on investors' valuation judgments.[12] For completeness, I also report the remaining comparison of investors' change in valuation judgments between the *no disclaimer* condition and the *hedged disclaimer* condition. The comparison shows that there is no significant difference in participants' valuation change when participants either do not see a disclaimer or read a hedged disclaimer (p = 0.317). Thus, the presence of hedging appears to have rendered the previously demonstrated disclaimer effect negligible. While this result is interesting, recall that my theoretical framework does not provide any ex-ante prediction as to how investors' valuation judgments would differ between the *no disclaimer* and *hedged disclaimer* conditions.

In summary, my experiment finds that non-professional investors lower their valuation judgments in the presence of an unhedged disclaimer. However, the linguistic style of the cautionary disclaimer attenuates investors' reactions to the disclaimer. In particular, non-professional investors issue more favorable valuation judgments when confronted with a hedged disclaimer relative to an unhedged disclaimer.

Process Evidence: Investors' Risk Assessments

Psychology theory suggests that investors respond negatively to the presence of an unhedged disclaimer because it directs investors' attention to risk factors and thus increases investors' risk assessments. Furthermore, this effect is less pronounced when the disclaimer is hedged, because hedging impairs investors' processing of risk information. Examining the process underlying investors' responses to the cautionary disclaimer is important because it informs regulators on how to improve the disclaimer's effectiveness. I elicit participants' risk assessments in the post-experimental questionnaire by using two questions adapted from prior research (Koonce et al. 2019; Koonce et al. 2005; Rose, Norman, and Rose 2010). First, I ask:

[12] My results are robust to controlling for participants' perceptions of management credibility.

TABLE 2
Risk Assessments

Panel A: Descriptive statistics: Mean and (standard deviation)

	No Disclaimer	*Unhedged Disclaimer*	*Hedged Disclaimer*	Combined
Investment Risk [a]	4.55 (1.27)	4.90 (1.24)	4.53 (1.23)	4.66 (1.25)
Stock Decline [b]	4.70 (1.35)	5.02 (1.30)	4.66 (1.27)	4.80 (1.31)
No. of Observations	47	48	47	142

Table 2 presents descriptive statistics for investors' risk assessments, captured by *Investment Risk* and *Stock Decline* (Cronbach's alpha = 0.76).
[a] *Investment Risk* captures investors' responses to the question: "Overall, how risky is an investment in FA Sportswear Inc.?", on a 7-point scale with endpoints labeled 1 ("Low risk") and 7 ("High risk").
[b] *Stock Decline* reflects investors' assessments of the likelihood of a moderate stock decline within the next year for FA Sportswear Inc., on a 7-point scale with endpoints labeled 1 ("Very unlikely") and 7 ("Very likely").

"Overall, how risky is an investment in FA Sportswear Inc.?". Participants respond on a 7-point scale with endpoints 1 ("Low risk") and 7 ("High risk"). Second, participants are also asked to indicate how likely it is that FA Sportswear will experience a moderate stock decline within the next year, with endpoints labeled 1 ("Very unlikely") and 7 ("Very likely"). Table 2 reports descriptive statistics for these two risk measures. The risk measures show adequate reliability (Cronbach's alpha = 0.76).

In order to examine the hypothesized mediation effect of risk assessments on investors' valuation judgments, I use a structural equation model, as displayed in Table 3. The three experimental conditions (no disclaimer, unhedged disclaimer, and hedged disclaimer) are illustrated by the box labeled *Disclaimer Type*. Specifically, it represents two dummy variables. The first dummy variable is equal to one for the *no disclaimer* condition, and zero otherwise; whereas the second dummy variable equals one for the *hedged disclaimer* condition and zero otherwise. Thus, consistent with my main analyses, the *unhedged disclaimer* condition serves as a baseline category in the analysis and parameter estimates capture the relative difference of the *unhedged disclaimer* condition compared to the *no disclaimer* or *hedged disclaimer*

conditions, respectively. The mediating variable *Risk Assessment* is a latent variable based on the two risk measures. *Change in Valuation Judgments* reflects the dependent variable.

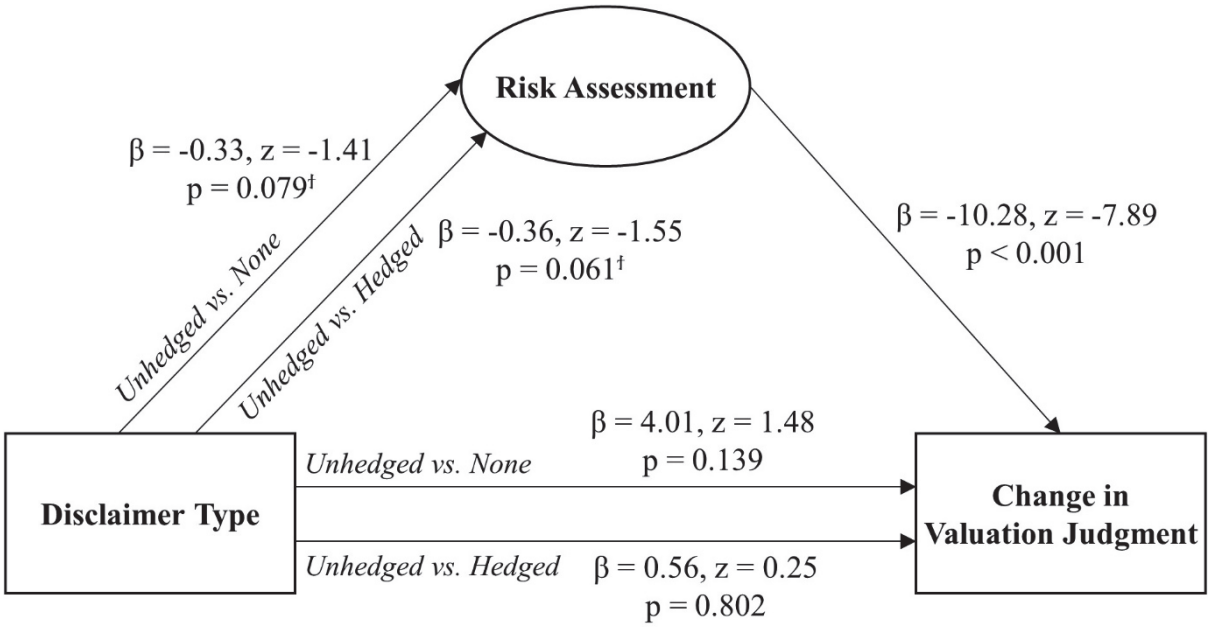
I use bootstrap methods with 5,000 bootstrap iterations to estimate my model because initial tests indicate that the assumption of multivariate normality is violated for my data (Hayes and Preacher 2014).[13] Bootstrapping is a non-parametric resampling procedure that does not assume multivariate normality (Kline 2015). Overall, the model shows good model fit as indicated by goodness-of-fit indices surpassing recommended target levels (Browne and Cudeck 1993).

Based on my theoretical framework, I expect that investors in the *no disclaimer* and *hedged disclaimer* conditions should assess FA Sportswear as less risky than investors in the *unhedged disclaimer* condition. This is because investors focus less on potential risk factors when the disclaimer is absent or when hedging impairs investors' processing of the risk information. Consistent with these predictions, the model results reveal negative path coefficients from *Disclaimer Type* to *Risk Assessment* for both disclaimer type comparisons. Specifically, relative to participants who see an unhedged disclaimer, participants who do not see a disclaimer reduce their risk assessments (coef: -0.33, $p = 0.079$, one-tailed). Similarly, investors' risk assessments are lower in the *hedged disclaimer* condition than in the *unhedged disclaimer* condition (coef: -0.36, $p = 0.061$, one-tailed). I observe a negative association between investors' risk assessments and their valuation judgments (coef: -10.28, $p < 0.001$). Finally, the two indirect effects of disclaimer type on investors' valuation judgments through risk assessments also support the posited mediation process (both p-values < 0.081, one-tailed). Overall, my results suggest that investors' valuation judgments are affected by disclaimer type because it affects investors' risk assessments.

[13] Maximum likelihood estimators are nonetheless relatively robust to violations of normality (Iacobucci, Saldanha, and Deng 2007). Consistently, my inferences remain unchanged when I re-estimate the structural equation model without applying bootstrapping.

TABLE 3
Analysis of Mediation

Panel A: Structural Equations Model



Model Fit:

χ^2	RMSEA	CFI	SRMR
0.02	< 0.01	1.00	0.002

Panel B: Indirect Effect of Disclaimer Type

Disclaimer Comparison	Indirect Effect	z-stat	p-value	95% Conf. Interval
Unhedged vs. *None*	3.40	1.40	0.081†	[-1.35; 8.14]
Unhedged vs. *Hedge*	3.71	1.55	0.061†	[-0.99; 8.42]

Table 3 illustrates the structural equation modeling results for the mediating role of investors' risk assessments. *Disclaimer Type* represents two dummy variables. The first dummy equals one for investors in the *no disclaimer* condition and zero otherwise. The second dummy analogously represents investors in the *hedged disclaimer* condition. The *unhedged disclaimer* condition serves as the reference category. *Risk Assessment* is a latent variable of the two risk measures defined in Table 2. Both risk measures show adequate reliability (Cronbach's alpha = 0.76). *Change in Valuation Judgments* reflects my dependent variable *Valuation Change* as defined in Table 1. Unstandardized coefficients, z-values and corresponding p-values are presented next to each link. Estimates are obtained by bootstrapping using 5,000 iterations with replacement. Because standardized effect sizes cannot be meaningfully interpreted for dichotomous IVs (Hayes 2018), I report unstandardized effect sizes and unstandardized path coefficients.

† One-tailed or one-tailed equivalent consistent with directional predictions.

Supplemental Analyses

My theory assumes that investors react less negatively to a hedged disclaimer relative to an unhedged disclaimer because hedging impairs investors' processing of risk information. In this section, I provide further support for my theory. In particular, I perform supplemental analyses to rule out two potential alternative explanations for the effect of hedging.

Investors' Information Acquisition of Risk Information

I expect hedging to hinder investors' processing of risk information. Consistent with my expectation, I find that participants evaluate the firm as less risky when a hedged disclaimer is present compared to an unhedged disclaimer despite both disclaimer types providing identical risk information. A potential alternative explanation for the observed effect is that hedging impairs participants' information acquisition. If participants in the *hedged disclaimer* condition do not acquire risk information, this might explain why they react less strongly to the disclaimer relative to participants in the *unhedged disclaimer* condition. To test this alternative explanation, I ask participants in the *unhedged disclaimer* and *hedged disclaimer* conditions to complete a surprise free recall test of the risk factors listed in the disclaimer. On average, participants recall 2.79 of 6 risk factors stated in the disclaimer correctly.[14] There is no significant difference in the number of risk factors that participants recall across conditions ($p = 0.620$). Furthermore, an unobtrusive measure of information acquisition, time spent reading the earnings release, provides additional evidence that hedging does not prevent participants from acquiring risk information. Specifically, participants in the *hedged disclaimer* condition spend a comparable amount of time reading the release as participants in the *unhedged disclaimer* condition (mean time = 136.37s vs. 110.70s, $t = 1.17$, $p = 0.244$).

[14] Two raters who were blind to experimental conditions classified recalled items as either (1) risk factors stated in disclaimer, (2) other risk factors implied by the press release, or (3) other issues. Coders initially agreed in 90.26 percent, and Cohen's Kappa (0.585, $p < 0.001$) indicates acceptable agreement (Landis and Koch 1977). Coding differences were reconciled by discussion and analyses are based on these reconciled codings.

Readability of the Disclaimer

A second alternative explanation of my results is that hedging might decrease the readability of the disclaimer. Previous research demonstrates that investors rely less on less readable disclosures (Koonce et al. 2021; Rennekamp 2012). Thus, investors might respond less to a hedged disclaimer because of its potentially impaired readability. To examine this possibility, I ask participants to indicate how easy or difficult it is to read the release, with endpoints 1 ("Very difficult") and 7 ("Very easy"). Participants in the *hedged disclaimer* condition do not indicate that it is more difficult to read than participants in the *unhedged disclaimer* condition ($p = 0.782$). This finding is in line with prior linguistics research that does not find an association between hedging and readability (Aerts and Yan 2017). Additionally, I also find that participants' perceived reliance on the earnings release does not differ across the two conditions ($p = 0.891$).[15] Taken together, these supplemental analyses provide evidence that hedging affects investors' judgments by impairing investors' information processing. The documented impact of hedging on investors' valuation judgments is not attributable to potential differences in investors' ability to acquire risk information, nor to potential differences in the readability of the disclaimer.

V. CONCLUSION

In this study, I examine how the presence of the cautionary disclaimer and its linguistic style influence non-professional investors' valuation judgments of a firm. Findings of a controlled experiment with non-professional investors show that investors decrease their firm valuations in the presence of an unhedged cautionary disclaimer. However, this effect is significantly mitigated by the disclaimer's linguistic style. Investors decrease their firm valuations less when the cautionary disclaimer is hedged relative to when it is unhedged.

[15] Participants' perceived reliance is captured by asking participants how strongly they agree or disagree with the statement "I felt like I could rely on the information in the press release." (Asay and Hales 2018; Rennekamp 2012). Participants respond on a 7-point scale with endpoints labeled 1 ("Strongly disagree") and 7 ("Strongly agree").

Interestingly, I find that investors' firm valuations do not differ in my experiment when investors either read no disclaimer or read a hedged disclaimer. Thus, hedging appears to undermine the intended warning purpose of the cautionary disclaimer, rendering it less effective. Additional analyses shed light on the process underlying investors' responses to the disclaimer and show that it affects how risky investors perceive the firm to be.

My findings are of interest to regulators and firm managers. My study informs regulators that investors attend to the cautionary disclaimer that is mandated by the PSLRA. Given prior claims of the cautionary disclaimer being ineffective and useless, it is important to document investors' reactions to the cautionary disclaimer. However, my study also cautions regulators that investors respond less strongly to the cautionary disclaimer when it includes linguistic hedging. Because firms have considerable discretion about the style of the disclaimer, firms could strategically employ hedging to favorably bias investors' judgments. Regulators might find it worthwhile to issue guidance requiring firms to limit the level of hedging in their cautionary disclaimers in order to obtain safe harbor protection. Such guidance would be similar to current guidelines emphasizing the need for entity-specific risk factors in cautionary disclaimers (SEC 2005, 2016). For firm managers, my findings outline the potential benefits of using linguistic hedging in cautionary disclaimers. While managers could also use alternative impression management strategies in the disclaimer (e.g., omission of risk factors or adding low-probability risk factors), hedging may limit the potential drawbacks to the firm because it is clearly within firms' discretion and may be subtle enough to be unnoticed by investors.

My study is subject to the following limitations that offer opportunities for future research. First, participants in my experiment receive only limited disclosures. Thus, participants might have focused more closely on the cautionary disclaimer than they would have in a more natural setting. However, this potential demand effect is unlikely to fully explain my results, as I would not expect, in that case, to see the difference in investor judgments that I observe for the *unhedged disclaimer* and *hedged disclaimer* conditions. Nonetheless, future

research could explore how strongly investors respond to cautionary disclaimers in a more informationally rich setting. Second, I focus on one particular feature of the cautionary disclaimer: its linguistic style. Future research could extend my findings and investigate how other disclosure choices, for example, the number of risk factors listed in the disclaimer or its placement, affect investors' judgments. Lastly, I do not investigate under which circumstances managers employ hedging as a communication tool. While my experimental evidence suggests that managers may benefit from using hedging in cautionary disclaimers to impair investors' processing of risk information, hedging might be harmful to managers when used to orally communicate firm performance (Goh and Tan 2021). It could be fruitful to examine in future studies when managers use hedging and to test whether investors' reactions to hedging are moderated by disclosure type or communication mode. Overall, there appear to be numerous directions for future research that could significantly enhance the current understanding as to how the presence of the cautionary disclaimer and its linguistic style affect investors' firm valuation judgments.

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APPENDIX A

Real-World Examples of Cautionary Disclaimers in the Sportswear Industry [16]

Under Armour Inc., 2018 [17]

Forward Looking Statements

Some of the statements contained in this press release constitute forward-looking statements. Forward-looking statements relate to expectations, beliefs, projections, future plans and strategies, anticipated events or trends and similar expressions concerning matters that are not historical facts, such as statements regarding our future financial condition or results of operations, our prospects and strategies for future growth, our anticipated charges and restructuring costs and the timing of these measures, […]. In many cases, you can identify forward-looking statements by terms such as "may," "will," "should," "expects," "plans," "assumes," "anticipates," "believes," "estimates," "predicts," "outlook," "potential" or the negative of these terms or other comparable terminology. The forward-looking statements contained in this press release reflect our current views about future events and are subject to risks, uncertainties, assumptions and changes in circumstances that may cause events or our actual activities or results to differ significantly from those expressed in any forward-looking statement. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future events, results, actions, levels of activity, performance or achievements. Readers are cautioned not to place undue reliance on these forward-looking statements. A number of important factors could cause actual results to differ materially from those indicated by the forward-looking statements, including, but not limited to: changes in general economic or market conditions that could affect overall consumer spending or our industry; […] our ability to comply with existing trade and other regulations, and the potential impact of new trade and tax regulations on our profitability; […]

The forward-looking statements contained in this press release reflect our views and assumptions only as of the date of this press release. We undertake no obligation to update any forward-looking statement to reflect events or circumstances after the date on which the statement is made or to reflect the occurrence of unanticipated events.

[16] Hedging devices are underlined for illustration purposes only.

[17] http://www.uabiz.com/news-releases/news-release-details/under-armour-reports-first-quarter-results-0

APPENDIX A (continued)

Real-World Examples of Cautionary Disclaimers in the Sportswear Industry

Columbia Sportswear Inc., 2018 [18]

Forward-Looking Statements

This document contains forward-looking statements within the meaning of the federal securities laws, including statements regarding anticipated results, net sales and net sales growth, […]. Forward-looking statements often use words such as "will", "anticipate", "estimate", "expect", "should", "may" and other words and terms of similar meaning or reference future dates. The company's expectations, beliefs and projections are expressed in good faith and are believed to have a reasonable basis; however, each forward-looking statement involves a number of risks and uncertainties, including those set forth in this document, those described in the company's Annual Report on Form 10-K and Quarterly Reports on Form 10-Q under the heading "Risk Factors," and those that have been or may be described in other reports filed by the company, including reports on Form 8-K. Potential risks and uncertainties that may affect our future revenues, earnings and performance and could cause the actual results of operations or financial condition of the company to differ materially from the anticipated results expressed or implied by forward-looking statements in this document include: loss of key customer accounts; our ability to effectively implement IT infrastructure and business process initiatives and to maintain the strength and security of our IT systems; the effects of unseasonable weather, including global climate change; trends affecting consumer traffic and spending in DTC; our ability to implement our growth strategy;[…] New factors emerge from time to time and it is not possible for the company to predict or assess the effects of all such factors or the extent to which any factor, or combination of factors, may cause results to differ materially from those contained in any forward-looking statement.

[18] http://www.uabiz.com/news-releases/news-release-details/under-armour-reports-first-quarter-results-0

APPENDIX B

Manipulation of Hedging in the Experiment

[*Unhedged disclaimer* condition only]

Forward-Looking Statements

This press release contains forward-looking statements relating to our operational plans, strategies and expectations. We use words such as "anticipate", "believe", "estimate", "expect", and similar expressions to identify forward-looking statements.

Forward-looking statements are not guarantees of future performance. They are subject to specific risks and uncertainties. Our actual results can differ materially from those expressed in the forward-looking statement. The risks include, among others, the following:

- Increased competition from other sport apparel manufacturers causing loss of market shares and pricing pressure;
- Impact of ongoing difficulties of our wholesale partners in North America;
- Our inability to expand our international business to other countries;
- Changes in general market conditions will decline our profitability;
- Security breaches and interruptions which affect our information systems and e-commerce business;
- Failure to open new store locations in a timely manner.

We caution investors not to place undue reliance on the forward-looking statements. No duty is undertaken to update the forward-looking statements after the date of this press release.

[*Hedged disclaimer* condition only]

Forward-Looking Statements

This press release might contain forward-looking statements relating to our operational plans, strategies and expectations. We use words such as "anticipate", "believe", "estimate", "expect", and similar expressions to identify forward-looking statements.

Although we believe that our expectations are reasonable, forward-looking statements might not be guarantees of future performance. They can be subject to some risks and uncertainties. If the risks ever materialize, our actual results might differ, sometimes materially, from those expressed in the forward-looking statements. Potential risks include, among others, the following:

- Competition from other sport apparel manufacturers might unexpectedly increase, potentially indicating a loss of market shares and pricing pressure;
- Potential impact of ongoing difficulties of some of our wholesale partners in North America;
- We might not be able to expand our international business to other countries as expected;
- It is possible that changes in general market conditions decline our profitability to some extent;
- Security breaches and interruptions which possibly might affect our information systems and e-commerce business;
- We might sometimes fail to open new store locations in a timely manner.

Given the risks and uncertainties, we caution investors not to place undue reliance on the forward-looking statements. No duty is undertaken to update the forward-looking statements after the date of this press release.

STATEMENT OF AUTHORSHIP

Ich erkläre hiermit, dass ich diese Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen benutzt habe. Alle Koautorenschaften sowie alle Stellen, die wörtlich oder sinngemäss aus Quellen entnommen wurden, habe ich als solche gekennzeichnet. Mir ist bekannt, dass andernfalls der Senat gemäss Artikel 36 Absatz 1 Buchstabe o des Gesetzes vom 5. September 1996 über die Universität zum Entzug des aufgrund dieser Arbeit verliehenen Titels berechtigt ist.

Bern, 1. September 2021  Dominique C. Wasna