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**HOW CAUSAL FOCUS AND SPECIFICITY IN RISK FACTOR
DISCLOSURES JOINTLY AFFECT INVESTOR JUDGMENTS**

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SUMMARY

Firms' risk factor disclosures reflect a specific state of uncertainty relating to their future negative outcomes. Theory suggests that investors' perceived nature of knowable (versus random) uncertainty inherent in a risk event and their assessments of management credibility are key mechanisms underlying the effect of risk factor disclosures on investment willingness. Using a controlled experiment, I examine the joint effect of causal focus (the extent to which managers focus on causes versus consequences of risks) and specificity (specific references to names of objects and quantitative values) in risk factor disclosures on investor judgments. Results of my study show that when managers place a greater focus on causes of a risk, a higher level of specificity increases investment willingness due to enhanced feelings of knowable (as opposed to random) uncertainty in a risk and higher assessments of management credibility. In contrast, when managers have a greater focus on consequences of a risk, greater specificity lowers investment willingness due to diminished feelings of knowable uncertainty and lower credibility assessments. Overall, my results identify causal focus as an important attribute in risk factor disclosures and suggest that investors' uncertainty perceptions and management credibility play an important role in mediating the effect of risk factor disclosures on investment judgments.

1. INTRODUCTION

Risk factor disclosures are an integral part of firms' annual reports, and managers have devoted a considerable portion of annual reports to discussing firms' risks.¹ However, practitioners, as well as the Securities and Exchange Commission (SEC), remain critical to the informativeness of risk factor disclosures (Johnson 2010; IRRC Institute 2016; SEC 2016). The concern over risk factor disclosures stems from the fact that the current disclosure rule is not prescriptive, providing managers with wide latitude of discretion; thus, managers are free to use vague and boilerplate languages in risk factor disclosures (Hope, Hu and, Lu 2016; IRRC Institute 2016). In response, the SEC is currently seeking to improve the quality of risk factor disclosures, such as emphasizing the importance of being focused and specific (SEC 2011; 2016). Motivated by this, I examine how causal focus (the extent to which managers focus on causes versus consequence of risks)² and specificity (specific references to names of objects and quantitative values) in risk factor disclosures jointly affect investors' judgments.

While prior research finds that specific risk factor disclosures lead to stronger market reactions such as increased trading volume (Hope et al. 2016),

¹ Recent surveys show that risk factor disclosures represent 7% of the average length of Form 10-K filing by page count, ranging from 4% up to 12% on an industry basis (IRRC Institute 2016). In addition, of the 150 individual topics in Form 10-K, risk factor disclosures are one of the top three increasing topics by length over the period 1996-2013 (Dyer, Lang, and Stice-Lawrence 2017).

² In practice, the term "risk cause" is often used interchangeably with risk source, which is defined as "element which alone or in combination has the intrinsic potential to give rise to risk (ISO 2018)." Throughout this paper, I use "risk cause" as it clearly indicates the opposite of risk consequence in terms of a cause-and-consequence relationship.

no research has examined the effect of causal focus. Investigating causal focus is important for two primary reasons. First, risk statements generally come in the form of the combination of causes and consequences of a risk (ISO 2018; Power 2014) and there is a considerable variation in causal focus, as well as specificity, across firms' risk factor disclosures.³ Second, while the SEC has called for firms to be more forthcoming about causes and consequences of risks (SEC 2011; 2016), the benefits of such a disclosure practice remain unexplored. Whether and how causal focus in risk factor disclosures affects investor judgments are, therefore, subjects of investigation.

My study centers on the *uncertainty* inherent in a risk event, which is reflected through firms' risk factor disclosures.⁴ Drawing on prior studies, I posit that investors' perceived nature of uncertainty in a firm's risk event, and their judgments of management credibility, are key mechanisms underlying the effect of risk factor disclosures. Recent work in psychology finds that making a judgment under uncertainty entails an attribution to two different dimensions of uncertainty, namely: (1) knowable (epistemic) uncertainty, which arises from missing information or gaps in knowledge concerning an event (e.g., uncertainty about the answer for a trivia quiz); and (2) random (aleatory) uncertainty, which arises from an assessment of stochastic behavior (e.g.,

³ See Appendix A for the examples of such a variation.

⁴ According to the SEC, a risk can be defined as a specific state of uncertainty relating to the possibility of loss (SEC 2004; Robbins and Rothenberg 2006). While the notion of risk in my paper is in line with the SEC's risk definition, the term "risk" can be interpreted in various ways such as volatility, the intersection of threats, vulnerability, and consequence, and the deviation from the expected return in various contexts.

uncertainty about the outcome of a coin toss) (Fox and Ülkümen 2011; Ülkümen, Fox and Malle 2016),⁵ and one's perceived nature of knowable versus random uncertainty systemically affects their judgments (Tannenbaum, Fox, and Ülkümen 2017).⁶ In addition, prior research documents that when there is uncertainty in disclosures, investors place a greater emphasis on their perceptions of management credibility, and incorporate them into their assessments of firm value (Elliott, Hodge, and Sedor 2012; Blankespoor, Hendricks, and Miller 2017). In my context, this implies that the effect of risk factor disclosures on investors' judgments depends on whether they perceive managers to be credible.

I predict that when managers place a greater focus on causes of a risk, more specific disclosures lead to enhanced feelings of knowable (as opposed to random) uncertainty and higher credibility assessments among investors, which in turn increase their investment willingness. Specifically, causal reasoning theory (e.g., Einhorn and Hogarth 1986) suggests that focusing on risk causes, coupled with a higher level of specificity, promotes investors' belief that the

⁵ Prior studies use the terms “epistemic” versus “aleatory” and “knowable” versus “random” interchangeably (e.g., Fox and Ülkümen 2011; Bagchi and Ince 2016; Ülkümen et al. 2016; Tannenbaum et al. 2017). In this paper, I use the terms “knowable” (rather than “epistemic”) and “random” (rather than “aleatory”) as they are more intuitive.

⁶ This knowable-random dimension of uncertainty is a construct that is distinct from the level of uncertainty (high versus low uncertainty) (Fox and Ülkümen 2011; Ülkümen et al. 2016). For example, while uncertainties associated with the outcome of tossing a fair coin or rolling a fair dice are purely random, people perceive a lower level of uncertainty when they consider the outcome of a coin toss (1/2) than when they do that of a dice roll (1/6). At the other extreme, while uncertainties concerning the answer to a trivia quiz can be primarily knowable, people feel a lower level of uncertainty when the quiz is less difficult (e.g., at what degrees Celsius does pure water freeze?) than when it is more difficult (e.g., at what degrees Celsius does a half water/half alcohol mix freeze?).

presence of the risk is associated with knowable factors (i.e., specific causes), resulting in investors' perceptions that the nature of uncertainty is more knowable (less random); hence, the risk appears to be more predictable and reducible. In terms of credibility assessments, I posit that investors are likely to view managers as being more credible when the disclosed risk causes are more specific. Enhanced credibility assessments, in turn, lead to higher investment willingness.

In contrast, when managers have a greater focus on consequences of a risk, I expect that a higher level of specificity decreases investment willingness due to diminished feelings of knowable uncertainty and lower credibility assessments. Theory suggests that focusing on consequences hinders investors from inferring why and how a risk may occur. Further, given fundamental uncertainty inherent in risk consequences, managers' specific prediction of risk consequences can be seen as a random guess, promoting the random nature of uncertainty. With regard to credibility assessments, investors will be skeptical of risk factor disclosures when managers use specific languages to describe less verifiable future losses. Thus, investors will perceive managers to be less credible.

I conduct a 2 (causal focus) $\times$ 3 (specificity) between-subjects experiment in which 295 participants recruited from Prolific serve as non-professional investors. Given the SEC's keen interest in cyber risk disclosure practices (SEC 2011; Schwartz 2017), I design an experimental setting in which

participants receive an excerpt of a company's cybersecurity risk factor disclosure, which consists of two causes and two consequences, and make judgments based on the information provided. I manipulate causal focus at two levels: focusing on *Causes* versus *Consequences*. For the *Causes* (*Consequences*) condition, I add a title in terms of causes (consequences) of cybersecurity risk, place the causes (consequences) at the top of the disclosure, and make the causes (consequences) more readable through bulleted sub-headings. Following this, a paragraph containing consequences (causes) is presented in plain text. Specificity is manipulated at two levels: *More Specific* versus *Less Specific*. For the *More Specific* condition, I include information referring to names of organizations, activities, and items, and indicate time in numbers, money values in dollars, and quantitative value in percentages. For the *Less Specific* condition, such information is not provided or replaced with less specific one. I also create a *Less-plus-Footnotes* condition in which participants receive the same information provided in the less specific version and the corresponding more specific information is added in the footnotes.⁷

Consistent with my predictions, I find that when managers place a greater focus on causes of a risk, specific disclosures cause participants to have increased feelings of knowable (versus random) uncertainty, credibility assessments, and investment willingness. When the focus is on consequences of

⁷ Results show that the responses in the *Less Specific* condition are not significantly different from those in the *Less-plus-Footnotes* condition. For parsimony, I mainly discuss the analysis with the *More Specific* versus *Less Specific* condition. Any different findings from the analysis with the *More Specific* versus *Less-plus-Footnotes* condition are discussed in the footnotes.

a risk, however, my results show that a higher level of specificity triggers diminished feelings of knowable uncertainty, credibility assessments, and investment willingness. In addition, a moderated-mediation analysis demonstrates that the joint effect of causal focus and specificity on investment willingness is fully mediated by participants' perceived nature of uncertainty inherent in a risk event and credibility assessments.

My study presents several contributions. First, it contributes to the recent literature investigating the impact of specificity in risk factor disclosures. Although Hope et al. (2016) find that the level of specificity in firms' risk factor disclosures is associated with unsigned abnormal returns and trading volume, they do not examine directional effects of specificity on stock returns “(b)ecause how specific risk factor disclosures affect investors' perception of the mean of the variance of cash flows is uncertain (pp. 1012).” Building on psychological theories, my study advances current understanding of the impact of risk disclosures by showing that specificity can have opposite effects on investors' judgments depending on the causal focus of disclosures. In addition, I identify investors' uncertainty perceptions and credibility assessments as mechanisms through which the joint effect of specificity and causal focus influences investment judgments. From a practical standpoint, my study is likely to be of interest to the SEC, given their emphasis on the importance of risk disclosures being more focused and specific (SEC 2011; 2016). Contrary to the SEC's positive view of specific risk factor disclosures, my findings suggest that when disclosures place more focus on risk consequences, greater

specificity can backfire as it causes investors to believe risks to be less predictable and perceive managers to be less credible; hence, the SEC should jointly consider the impact of specificity and that of causal focus when implementing disclosure guidance on firms' risk factors. Also, my findings provide managers with insights that they can benefit from mandatory risk factor disclosures.

My study also adds to the larger literature on how uncertainty affects investors' decision-making. I provide evidence that investor judgments are affected by their perceived nature of knowable versus random uncertainty. Accounting researchers often assume that uncertainty is a single, unitary construct, such that there only exists high versus low uncertainty, and investors favor firms with lower uncertainty. However, this assumption may not be appropriate, given that investors are able to assess uncertainty in terms of the knowable versus random dimension, which is a key mediator affecting investment willingness. My study points out a previously overlooked source that could have a significant effect on investors' judgments under uncertainty and opens a promising avenue for future research.

In terms of the literature on the effect of linguistic features in management disclosures, my study is the first to identify causal focus as an important feature in firms' risk factor disclosures. Using a textual analysis based on hand-collected data, I demonstrate that there is a wide variation in causal focus across firms' risk factor disclosures, at least for cybersecurity

risks. As discussed above, I provide evidence that causal focus, as well as its interaction with specificity, plays an important role in affecting the way investors view the nature uncertainty inherent in a risk event, management credibility, and their subsequent investment willingness.

The rest of this paper is organized as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the experimental design and procedures. Section 4 presents the results. Section 5 concludes.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Informativeness of Risk Factor Disclosures

Beginning in 2005, the SEC has mandated firms to include a risk factor section in their annual and quarterly financial reports (i.e., risk factor disclosures). Risk factor disclosures are a unique form of information channel as they reveal a specific state of *uncertainty* involving the possibility of loss (SEC 2004; Robbins and Rothenberg 2006). Given the absence of ex-post settling up, however, critics argue that it is difficult to assess completeness and accuracy of risk disclosures (Schrand and Elliott 1998), questioning the decision usefulness of risk factors disclosures.

The concerns over risk factor disclosures have prompted a surge in research as to whether they are value-relevant to investors (see Elshandidy et al. 2018 for a review). Using the keyword-based textual information analysis, the

accounting literature has largely focused on the quantitative aspect of uncertainty in firms' narrative risk disclosures. For example, based on the number of uncertainty- or risk-related words such as 'uncertainty', 'uncertain', 'risk' and 'risky' in their self-constructed dictionary, prior studies find that firms with greater pre-disclosure financial, litigation and tax risks indicate greater uncertainty in the disclosures (Campbell et al. 2014; Filzen 2015; Kravet and Muslu 2013).⁸ They further document that firms with a greater amount of uncertainty are more likely to experience negative abnormal returns, higher stock return volatility, and market-based beta. Overall, archival evidence suggests that risk factor disclosures are informative, and investors appear to incorporate them into their investment decisions.

Nevertheless, practitioners still remain skeptical about the informativeness of risk factor disclosures, a sentiment also echoed by the SEC (Johnson 2010; Hope et al. 2016; IRRC Institute 2016). They point out that the current disclosure rule provides managers with a large discretion over the content of risk factor disclosures. Thus, managers can exploit this discretion by providing vague and boilerplate risk information to fulfill the disclosure obligation. In response, the SEC has requested firms whose risk factor

⁸ While these papers find similar evidence, there is a variation in terms of sample selection. Kravet and Muslu (2013) count uncertainty-related words in the entire Form 10-K from 1994 to 2007 while the other studies focus on risk factor disclosures in annual filings (Campbell et al. 2014), or those in quarterly filings (Filzen 2015) for the period beginning the adoption of mandatory risk factor disclosure in 2005.

disclosures are deemed to be generic to revise these disclosures to be more focused and specific through their comment letter process (Johnson 2010).

The SEC is currently deliberating over potential changes to risk factor disclosures in order to enhance the disclosure quality. As the first step in the rule-making process, the SEC has published a concept release discussing and seeking public comments on measures to improve the risk factor section such as requiring firms to include the effect on performance for each risk factor and to identify the specific facts, and circumstances that make a given risk material to each company (SEC 2016, paras. 146-147). Prior to this, for cybersecurity risks, the SEC has released the disclosure guidance that firms should discuss aspects of firms' business or operations that give rise to material risks (i.e., a causal account) and the potential costs and consequences in the light of each firm's specific facts and circumstances (i.e., specificity with a consequential account; SEC 2011). To shed light on this practical issue, I examine how investor judgments are jointly affected by causal focus and specificity in risk factor disclosures.

Causal Focus in Risk Factor Disclosures

In this section, I explore whether and to what extent causal focus varies across firms' risk factor disclosures. According to *ISO 31000: 2018, Risk management – Guidelines*, a widely used standard for risk management in practice, a risk is the expression of the likelihood and impact of uncertainty

(ISO 2018).⁹ While the key element of a risk statement is uncertainty, it is generally expressed along with *causes* and *consequences* (ISO 2018; Power 2014). For a firm's cybersecurity risks, for instance, it can be expressed as "(c)ybersecurity risks may arise from cyber-attacks by hackers and/or breaches at third-parties (causes). These could result in financial losses and/or damages to the company's reputation (consequences)." While there are guidelines on how the format and content of a risk statement should be, such guidelines are not imperative for firms' risk factor disclosures. Thus, managers likely vary causal focus in line with their disclosure style. For the same risk, for example, some managers may give more emphasis on causes of the risk, while others highlight more of its consequences.

To investigate this, I conduct a textual analysis based on firms' latest annual reports (Form 10-K). In line with the SEC's interest in cyber risk disclosure practices (SEC 2011; Schwartz 2017), I focus on firms' cybersecurity risk disclosures, especially for the top 100 companies in Fortune 500.¹⁰ I start by searching for the subsection(s) of risk factor disclosures related to online activity, data security, electronic systems and technological networks, and analyze the causal focus of the subsection title and its textual content.

⁹ ISO has broadened the scope of the risk definition, which involves 'positive' consequences of uncertainty as well as negative ones (ISO 2018). In my study, however, I focus on negative aspects of risk consequences following the SEC's risk definition (SEC 2004; Robbins and Rothenberg 2006).

¹⁰ The sample size is 92, after excluding 8 non-public companies which do not file the annual report on Form 10-K. All the companies in my sample provide information related to cybersecurity risks in their risk factor disclosures.

In terms of the title of the disclosures, I analyze whether the title contains causes and/or consequences of risks. I find that 54% of the total observations (50 companies) emphasize consequences only (e.g., “cyber-attacks could lead to reduced revenue, increased costs, liability claims, or harm to our competitive position”), 27% of them (25 companies) focus on causes only (e.g., “the company is increasingly dependent upon sophisticated software applications and computing infrastructures”), and 10% (9 companies) discuss both consequences and causes. The remaining 9% (8 companies) do not specify what gives rise to the risk or what would happen if the risk occurs; hence, they are classified as neither causes nor consequences (e.g., ‘risk related to technology’ is an example for this category as it does not have any information about causes or consequences of the risk related to technology). In sum, the result suggests that managers are biased towards highlighting consequences in terms of the title selection, at least for cybersecurity risks.

Next, I use a word-counting approach to examine causal focus of the textual content. I begin by identifying sentences and/or clauses that are relevant to either causes or consequences. Next, I count the number of words appearing in those texts and compute the ratio of the number of cause-related words to the total number of cause- and consequence-related words; the higher the value, the greater managers focus on risk causes (versus consequences) in their risk factor disclosures. Consistent with my conjecture, untabulated analysis shows that there is a substantial variation in my causal focus measure. The mean and the

standard deviation are 0.52 and 0.23, respectively; the 10th and 90th percentiles are 0.24 and 0.85, respectively.

Two Dimensions of Perceived Nature of Uncertainty inherent in Risks

Recall that risk factor disclosures are a reflection of firms' uncertainty relating to future negative outcomes. Recent work in psychology proposes that uncertainty can be classified into the two different dimensions: (1) knowable (epistemic) uncertainty, which relates to missing information or gaps in knowledge concerning an event, and (2) random (aleatory) uncertainty, which is associated with an assessment of stochastic behavior, (Fox and Ülkümen 2011; Ülküme et al. 2016).¹¹ With knowable uncertainty, outcomes of uncertain events are in principle predictable, whereas with random uncertainty, outcomes of those are less predictable. Although the knowable and random dimensions of uncertainty are not mutually exclusive, making a judgment under uncertainty entails an attribution to knowable and/or random sources (Fox and Ülkümen 2011; Bagchi and Ince 2016; Ülkümen et al. 2016). The knowable-random uncertainty dimension can provide interesting insights into the mechanism through which investors incorporate firms' risk information into their investment judgments, given that people are cognizant of the difference between knowable and random uncertainty and are capable of assessing an uncertain subject (i.e., a risk) in terms of these two (Ülkümen et al. 2016). Such

¹¹ Although Fox and Ülkümen (2011) is the first paper that introduces the concept of knowable (epistemic) and random (aleatory) and uncertainty dimensions to the judgment and decision-making literature, these concepts are originally founded by probability theory (Hacking 1975), and have been widely applied to engineering modelling for risk and reliability analyses.

a perceived nature of the knowable versus random uncertainty, in turn, systemically influences people's judgments about the uncertain subject (Tannenbaum et al. 2017).

While psychologists have noted the importance of the knowable and random dimensions of uncertainty, they have received scant attention in the accounting research. This is possibly due to the difficulty in recognizing, measuring and investigating such a qualitative feature of uncertainty in an archival setting. Therefore, while prior archival papers use the number of uncertainty-related words as a proxy for the degree of uncertainty, and tie it with firm outcome variables such as beta, trading volume and stock return volatility (e.g., Kravet and Muslu 2013; Campbell et al. 2014; Filzen 2015; Hope et al. 2016), it is still unknown which uncertainty dimension investors react to, and whether and how their reactions may differ depending on their perceived nature of uncertainty. To this end, I capitalize on the comparative advantages of experiments because I am able to directly measure investors' perception of knowable versus random uncertainty, and examine how the perceived nature of uncertainty influences investment judgments in a controlled setting. I next discuss factors affecting investors' perception of the two uncertainty dimensions, namely, causal focus and specificity.

Joint Effect of Causal Focus and Specificity on Investors' Uncertainty Perceptions

Prior literature on format effects in financial reporting shows that more prominent information has a greater influence on investors' judgments (e.g., Hirst and Hopkins 1998; Maines and McDaniel 2000; Hodder, Hopkins, and Wood 2008). Thus, while both causes and consequences are important elements for the statement of a risk (ISO 2018; Power 2014), a greater focus on causes (consequences) can enhance the weight of underlying importance or relevance of causes (consequences) at the expense of consequences (causes) in the mind of perceivers.

Theory on causal reasoning posits that when people make inferences about an event, they use *cues-to-causality* to assess the logic and strength of a potential causes-consequences relationship (Einhorn and Hogarth 1986; Koonce, Seybert and Smith 2011).¹² Relevant to the risk factor disclosures setting, I predict that causal focus can serve as a cue regarding investors' assessment of a causal relationship between suspected causes and potential consequences of a risk. Prior studies suggest that causes are more influential in people's causal thinking or predictive inferences than consequences (Tversky and Kahneman 1980; Ahn et al. 2000; Proctor and Ahn 2007), because causes provide an explanation why and how an event occurs, whereas consequences are less likely to play such a role (Ahn et al. 2000; Proctor and Ahn 2007). Thus, I expect that the disclosure focusing on causes can facilitate investors'

¹² Prior literature suggests that cues-to-causality can be covariation, temporal order, similarity, congruity (i.e., similarity of length and strength of causes and consequences), and contiguity (i.e., the proximity in location or time in which causes lead to consequences) (Einhorn and Hogarth 1986; Koonce et al. 2011; Greville and Buehner 2007; Koonce, Leitter and White 2017).

envisioning about a causal sequence of a risk in which causes lead to future adverse outcomes, whereas focusing on consequences likely precludes such a causal inference.

The literature on causal reasoning also states that people tend to rely on more than one cue to reduce potential errors in causal inferences, which may arise from the use of a single cue (Einhorn and Hogarth 1986). Given that greater specificity makes information less open to interpretation (Fiske and Taylor 1991; Plous 1993), I propose that when there is a greater focus on the causes of a risk, specific risk information can work as an additional cue for investors to ascertain that causes and consequences are strongly associated.¹³ Thus, investors are more likely to believe that the presence of the risk is associated with disclosed causes, and should the risk occur, predicted consequences will happen as described in the disclosure. To the extent that the risk appears to depend on primarily knowable factors (i.e., disclosed causes), investors will view the risk as entailing more knowable uncertainty and less random uncertainty.

Conversely, when information is less specific, it will leave room for different interpretations about the risk, weakening the strength of a causal link between suspected causes and predicted consequences. For instance, if

¹³ Specificity is conceptually distinct from the idea of concreteness (versus abstractness). Concreteness refers to ‘actual’ or ‘existing in reality’ that can be perceived using the senses (Friedlander 2004; Houghton Mifflin 2011); examples of concrete words are spoon, table, green, hot, and walking, while examples of abstract or non-concrete words are love, freedom, good, moral, and democracy.

managers say that *certain aspects* of their operations are subject to hackers' cyber-attack, rather than indicating which specific aspects of the operations (i.e., electronic data processing), this could be interpreted that the cyber-attack risk is not limited to electronic data processing but applies to any types of their operations. Hence, investors will perceive more random and less knowable uncertainty with respect to the risk.

At the other extreme, when there is a greater focus on consequences of a risk, it is possible that like the focus on causes, greater specificity on the consequences leads to greater knowable uncertainty. However, this is unlikely, and the reverse may occur. A focus on consequences makes it more challenging for investors to infer why and how a risk may occur; for any given consequence, there can be multiple causes. In addition, given the fundamental uncertainty inherent in risk consequences, managers' specific risk predictions can be seen as a random guess, triggering the random nature of uncertainty. In other words, specific consequences are hard to predict, and the more specific the predictions of risk consequences (e.g., specifying financial losses as \$7.11 million versus approximately several million dollars), the less likely they will be accurate since they do not allow for random variations and unforeseen factors that can affect the ex-post realization of risks. Hence, when managers' risk predictions are specific but unlikely to be accurate, this may prompt investors to think about and recognize the possibility of alternative outcomes (e.g., financial losses can be different from the specified amount); this consideration of alternative outcomes can increase the salience of random

uncertainty by making a target event appear more random and less predictable (Tannenbaum et al. 2017).

Conversely, these effects are less likely to occur when such forward-looking risk information is less specific. That is, less specific disclosures of risk consequences can be viewed as managers' general risk predictions based on common-sense and knowable inferences (e.g., it is generally expected that an occurrence of cybersecurity risks will result in firms' financial losses). As a result, investors are likely to perceive that the nature of uncertainty inherent in risks is knowable (or less random). In sum, my first hypothesis is as follows:

H1: *When managers have a greater focus on causes in their risk disclosures, more versus less specific risk factor disclosures increases investors' feelings of knowable (as opposed to random) uncertainty inherent in a risk event. In contrast, when managers have a greater focus on consequences in the disclosures, more versus less specific risk factor disclosures decreases investors' feelings of knowable uncertainty.*

Effect of Uncertainty Perceptions on Investment Willingness

Holding the amount of uncertainty in a risk constant, I anticipate that investors may prefer a risk with knowable uncertainty to one with random uncertainty. Although the former risk likely stems from gaps in managers' knowledge or limited information, it also reflects the fact that the risk is associated with knowable factors (i.e., specific causes), and has the potential to be reduced (i.e., improving risk management programs or consulting risk experts). Thus, investors' enhanced feelings of knowable (as opposed to random) uncertainty will increase investment willingness. In contrast, when the

risk is perceived to entail random uncertainty, investors will feel that the risk is unpredictable and irreducible, resulting in lower investment willingness. In a different context, Koonce, McAnally, and Mercer (2005) examine that how financial statement users think about the risk of various financial items. They find that users perceive less risk when a financial item is known by management, suggesting that knowable (as opposed to random) uncertainty leads to a positive effect on investor judgments.

Joint Effect of Causal Focus and Specificity on Management Credibility and Investment Willingness

Central to my study is that the uncertainty inherent in a risk event plays a key role in explaining how investors react to firms' risk factor disclosures. Prior research suggests that firms' uncertainty can increase the salience of management credibility to investors because more credible managers are better able to communicate information regarding firms' uncertainty to investors (Mercer 2004). In support of this argument, using an IPO setting, Blankespoor et al. (2017) document that when there is uncertainty in disclosures (e.g., an IPO prospectus), investors assign more weight to CEO's competence and trustworthiness for assessing firm value. In an experimental study, Elliott et al. (2012) find that trustworthiness becomes more important to investors when firms have negative news. In the risk factor disclosures setting, I expect that the degree that investors perceive managers to be credible serves as an important cue affecting their investment judgments.

In my context, focusing on causes is likely to prompt investors to think of the cause of a disclosed risk. In this case, investors are likely to take the level of specificity as a cue to infer managers' credibility in analyzing and identifying the source of risks. Thus, managers who place emphasis on risk causes will be perceived as more credible when the disclosed causes are more specific. Increased credibility assessments, in turn, will lead to greater investment willingness.

In contrast, focusing on consequences will shift investors' attention to managers' discussion on potential losses in the future. To the extent that risk consequences entail fundamental uncertainty, investors are less likely to place value on such forward-looking disclosures that are generally viewed as less verifiable (Bozanic, Roulstone, and Van Buskirk 2017). Thus, a higher level of specificity may not have a positive impact on credibility. Rather, investors can be skeptical of risk disclosures when managers use specific languages to describe less verifiable future losses. Hence, they may perceive a higher level of specificity to be of lower credibility. Therefore, my second hypothesis is formally stated as follows:

H2: *When managers have a greater focus on causes in their risk factor disclosures, more versus less specific risk factor disclosures increases investors' assessments of management credibility. In contrast, when managers have a greater focus on consequences in the disclosures, more versus less specific risk factor disclosures decreases management credibility.*

Combined, when there is a greater focus on causes of a risk, specific disclosures will lead to higher investment willingness judgments due to higher

feelings of knowable (versus random) uncertainty inherent in a risk event and greater assessments of management credibility. In contrast, when there is a greater focus on consequences of a risk, specific disclosures will decrease investment willingness because of diminished feelings of knowable uncertainty, and lower credibility assessments. In sum, my third and fourth hypotheses are as follows:

H3: *When managers have a greater focus on causes in their risk factor disclosures, more versus less specific risk factor disclosures increase investors' investment willingness. In contrast, when managers have a greater focus on consequences in the disclosures, more versus less specific risk factor disclosures decrease investment willingness.*

H4: *Investors' perceptions of knowable versus random uncertainty and their assessments of management credibility mediate the joint effect of causal focus and specificity on investment willingness.*

3. EXPERIMENT

Participants

Participants are recruited from Prolific (www.prolific.ac), a web-based crowdsourcing marketplace.¹⁴ Prior studies find that online workers (i.e., Amazon Mechanical Turkers) are not different from traditional MBA subject pools in terms of exerted efforts and numerical skills for accounting-related tasks (Krische 2015; Farrell, Grenier, and Leiby 2017). In addition, given my experimental instrument involves substantive reading in English and requires a

¹⁴ In Prolific, like Amazon Mechanical Turk (AMT), researchers can act as employers; they are able to recruit and compensate individual workers who participate in surveys and/or experimental tasks (Goodman and Paolacci 2017)

basic knowledge of accounting and investment, a reliable screening is critical to the use of online workers as a proxy for non-professional investors. One advantage of Prolific is that participants can be pre-screened based on their pre-registered profiles so that participants' moral hazard problems can be better addressed, compared to using blatant screening questions (i.e., simple yes/no questions) (Goodman and Paolacci 2017).¹⁵ Using pre-screening filters provided by Prolific, I restrict my subject pool to people who are native English speaker, have lived in the United States, and experienced in stock investment, with a previous approval rating of 95% or above. The prescreening process results in 2,051 potential eligible participants, who are then invited via email.

A total of 300 participants take part in my study in exchange for £1.3 (equivalent to \$1.76 as of May 15, 2018). I exclude three participants who do not complete my experiment and two participants who show a suspicious pattern of their responses.¹⁶ This exclusion results in a final sample of 295 participants. The average participant in my study is 35.33 years old with 13.77 years of full-time working experiences. On average, participants have taken 3.28 accounting and 3.57 finance courses. Participants report a moderate level of frequency in terms of their stock investment (the mean rating = 5.27, on an

¹⁵ For example, suppose that participants are asked the following yes/no question: "have you invested in a company's stock in the past?" This leads participants to think that answering 'yes' will gain them access to a study, potentially encouraging the opportunity for deception about their investment experience for a quick cash (Goodman and Paolacci 2017; Wessling, Huber, and Netzer 2017).

¹⁶ Specifically, they choose the highest value on all of my 11-point scales (i.e., choosing 5 on a scale of -5 and 5 or 10 on a scale of 0 and 10) and complete my experiment within three minutes. Thus, it is less likely that they are fully attentive to my study. Inferences do not change if I include those participants in my analysis.

11-point scale where “0” = never and “10” = very frequently). Of participants, 92.5% have referred to a company’s annual report to aid their investment, and 97.3 % indicate that they plan on investing in a company in the future. These participant characteristics are similar to the average profiles of actual retail investors (Elliott, Hodge, Kennedy and Pronk 2007)¹⁷ and those in previous AMT-based studies (e.g., Rennekamp 2012; Koonce, Leitter, and White 2016), suggesting that my participants are a legitimate surrogate for non-professional investors.

Experimental Design and Procedure

To test my hypotheses, I conduct a 2×3 between-subjects design with causal focus (Focusing on *Causes* versus *Consequences*) and specificity (*More Specific* versus *Less Specific* versus *Less-plus-Footnotes*) as the independent variables. Participants are randomly assigned into one of these six conditions by the Qualtrics platform.

The experimental materials begin by instructing participants to assume the role of an investor. As an investor, participants are asked to consider an investment in *ABC Resorts*, a fictitious company in the hospitality industry.¹⁸

¹⁷ Elliott et al. (2007) report that actual retail investors have taken an average of 3.7 accounting and finance courses and 77 percent of them have evaluated a company’s performance using its financial statements more than five times.

¹⁸ According to a recent survey on cybersecurity risks, the hospitality industry is at about the 50th percentile in rank among industries in terms of the frequency of cyber incidents (SecurityScorecard 2016). I choose the median-ranked industry for this study because if I choose the top-ranked industries (e.g., the financial services industry), participants may feel that cybersecurity risks are presumably knowable as cyber incidents in those industries are often the case. In this case, causal focus and specificity may have little incremental effects on investors’ uncertainty perception relating to cybersecurity risks. For a similar reason, I do not choose the

Before viewing the risk factor disclosure, all participants read the background information of the company.

Next, participants are provided with an excerpt of ABC's risk factor disclosure, which describes the company's cybersecurity risk.¹⁹ In this phase of the experiment, I manipulate causal focus and specificity. After reading the disclosure, participants indicate their perceived nature of uncertainty with respect to the company's cybersecurity risk (i.e., whether the company's cybersecurity risk is knowable in advance), assessments of management credibility, and investment willingness. Participants then respond to manipulation check questions and provide demographic information. Below, I discuss how I manipulate specificity and causal focus.

Manipulation of Specificity

I first create a more specific version of a risk factor disclosure by adapting actual risk factor disclosures of several companies operating in the hospitality and retail industries. The disclosure contains two risk causes (cyber-attack by hackers and breaches at third-parties) and two consequences (financial losses and damages to the company's reputation). All participants are

low-ranked industries (e.g., the construction industry) because cybersecurity risks in those industries could be regarded as highly random due to the infrequency of cyber incidents, even before viewing my manipulation.

¹⁹ For a reason similar to that discussed in Footnote 18, I use cybersecurity risks as the experimental setting since general perceptions of cybersecurity risks are a grey area as to whether they are presumably knowable or random. For example, Patel (2018) argues that "a cyber threat is random and malicious and doesn't happen in a predictable statistical fashion," In contrast, Robertson (2016) claims that "the [cyber security] events are targeted and malicious not random."

provided with the same two causes and two consequences with the level of specificity being different depending on the specificity manipulation.

After preparing the more specific version, I develop a less specific version. Specificity is defined as references to names of organizations, activities, and items, and includes identification of time in numbers, money values in dollars, and quantitative value in percentages (IRRC Institute 2016; Hope et al. 2016). Thus, I delete any information relevant to specific references to names of objects and quantitative values or replace such information with less specific one. To illustrate, in the *More Specific* condition, participants are provided with the following: “hackers, acting individually or in a group (i.e., criminal organizations and/or extremist parties) may penetrate our computer systems or our website at www.ABC.com,” and “according to the Cost of Data Breach Survey by Ponemon Institute, the average total organizational cost due to data breaches reached \$7.01 million in 2014 – 2016.” For those in the *Less Specific* condition, the information provided is as follows: “hackers, acting individually or in a group, may penetrate our computer systems or our website,” and “according to a data breach survey by a research institute, the average total organizational cost due to data breaches reached approximately seven million dollars in recent years.” Thus, while I hold information constant in terms of its meaning and context between the two versions, the less specific version is generic, relative to the more specific version.

Nevertheless, the manipulation of specificity does involve a change in information to participants (i.e., specific names of objects and quantitative values only appear in the *More Specific* condition),²⁰ possibly making it less clear whether the effect of the specificity manipulation is driven by the level of specificity or the difference in information, or both. To address this concern, I create a *Less-plus-Footnotes* condition in which participants receive the same information provided in the *Less Specific* condition and the corresponding more specific version of information is added in the footnotes. The footnotes are in a smaller font size and placed at the bottom of the disclosure (See Appendix B for the details of the manipulation of causal focus and specificity).²¹

Manipulation of Causal Focus

Causal focus is manipulated in two ways: (1) title and (2) the layout of the main paragraphs.²² In the *Causes* condition, the title is “Hackers’ cyber-attack and breaches at third parties may expose our company to cybersecurity

²⁰ For instance, in the *More Specific* condition, the disclosure states “In 2016, debit and credit card transactions accounted for the vast majority (87%) of our revenues.” In the *Less Specific* condition, however, the corresponding information is “Last year, debit and credit card transactions accounted for the vast majority of our revenues.”

²¹ It is also likely that a higher level of specificity makes information less readable because it is lengthy and includes technical terms (i.e., ANSI’s encryption standards). Thus, I check whether the specificity manipulation influences participants’ perceived readability. I construct a readability measure by taking an average of participants’ responses to the difficulty to read/understand/ process the company’s risk factor disclosures (on 11-point scales where “0” = not at all difficult and “10” = extremely difficult; Cronbach’s alpha of 0.95). Results indicate that there is no difference in readability measure across specificity conditions (2.63 for *More Specific* versus 2.70 for *Less Specific* versus 2.49 for *Less-plus-Footnotes* condition; $F = 0.19$, $p = 0.831$), suggesting that participants’ perceived readability is not affected by the specificity manipulation.

²² The quantity of information (e.g., the number of words) is not employed for my causal focus manipulation. If there is a difference in the number of words between *Causes* and *Consequences* conditions, it is difficult to disentangle the effect of causal focus from that of more versus less information.

risks.” In the *Consequences* condition, it is “Our performance and reputation could be adversely affected by cybersecurity risks.” Consistent with common practice, the title is presented with bold typeface and bigger-point font. For the main body, following Elliott, Rennekamp, and White (2015), I manipulate the placement of causes and consequences as whichever attribute is shown first is likely to be more attentive. Thus, in the *Causes* condition, the two causes are placed at the top of the disclosure, with an additional sentence that “The cybersecurity risks could arise from the followings.” In addition, for each causal account, I add bulleted sub-headings and put a space between them. This makes the causes more readable, thus making participant to pay more attention to them. Following the causes, I put a paragraph including the two consequences in plain text.

Conversely, in the *Consequences* condition, the two consequences are placed at the top with an additional line that “the cybersecurity risks could result in the followings.” Likewise, I make the two consequences more readable using bulleted sub-headings, along with a space between them. Following the consequences is a paragraph containing the causes in plain text.

4. RESULTS

Manipulation Checks

To assess the effectiveness of the causal focus manipulation, I ask the following question: “To what extent do you think the risk disclosure in the ABC’s annual report mainly focuses on risk causes or risk consequences?”

Participants respond on an 11-point scale from “0” = completely focusing on risk causes to “10” = completely focusing on risk consequences. The mean rating for the *Causes* condition is significantly lower than that for the *Consequences* condition (4.93 versus 6.74; $t = 6.03$, $p < 0.001$), suggesting that the manipulation of causal focus is successful.

Next, to check whether the manipulation of specificity is successful, I ask the following question: “How specific was the risk disclosure provided in the ABC’s annual report?” Participants respond on an 11-point scale where “0” = not specific at all” and “10” = very specific. The results show that the mean rating for the *More Specific* conditions is significantly higher than that for the *Less Specific* condition (6.20 versus 5.20; $t = 2.80$, $p = 0.006$), suggesting that the specificity manipulation is successful.²³

Test of Hypothesis 1

My prediction for H1 is that when managers place a greater focus on causes of a risk in their risk factor disclosures, greater specificity will lead to enhanced feelings of knowable uncertainty; however, when managers have a greater focus on consequences of a risk in the disclosures, more specific disclosures will result in lower feelings of knowable uncertainty. To capture participants’ perceived nature of uncertainty, I employ the Epistemic

²³ I find that the mean rating for the *More Specific* condition is higher than that for the *Less-plus-Footnotes* condition (6.20 versus 5.44; $t = 2.27$, $p = 0.024$). However, the mean rating for the *Less Specific* condition is not significantly different from that for the *Less-plus-Footnotes* condition (5.20 versus 5.44; $t = 0.66$, $p = 0.509$).

(knowable) - Aleatory (random) Rating Scales (EARS), a measure recently developed and validated in various decision-making settings (Ülkümen et al. 2016; Tannenbaum et al. 2017). I selectively adapt questions from the prior studies and modify them for the risk factor disclosures context. I ask participants to indicate: (1) the extent they feel that ABC's cybersecurity risk events are in principle knowable in advance on an 11-point scale, with endpoints from "-5" = not at all knowable in advance to "5" = completely knowable in advance; (2) the extent they agree that ABC's cybersecurity risk events are something that has been determined in advance on an 11-point scale, with endpoints from "-5" = strongly agree to "5" = strongly disagree; and (3) the extent they agree that ABC's cybersecurity risk events are predictable in advance, given enough information on an 11-point scale, with endpoints from "-5" = strongly agree to "5" = strongly disagree. Cronbach's alpha of 0.86 indicates that the three items capture a single construct. In addition, a factor analysis confirms that all the three questions load as a single factor. Hence, I average all three items to form a single measure to capture participants' perceived knowable uncertainty (hereafter, knowability), with a higher value indicating relatively more knowable and less random uncertainty, and a lower value indicating relatively more random and less knowable uncertainty.^{24, 25}

²⁴ Results do not change when I perform the analysis with each individual item.

²⁵ I also ask participants whether the company's cybersecurity risks (1) have an element of randomness, (2) can be determined by chance factors, and (3) could play out in different ways on similar occasions. However, results are not significant when I perform an ANOVA with these items (the p-values for the main effect of causal focus, specificity, and the interaction of them are 0.121, 0.326, and 0.769, respectively; the smallest p-value for simple effects tests is 0.209). Given the fundamental randomness associated with future risks, these items could be

The descriptive statistics of knowability are presented in Table 1, Panel A, and graphically illustrated in Figure 1, Panel A. To test H1, I conduct an ANOVA with causal focus and specificity as the independent variables, and knowability as the dependent variable, results of which are presented in Table 1, Panel B. I find a significant interaction effect of causal focus and specificity ($F = 7.74, p = 0.006$). Neither the main effect of causal focus nor the main effect of specificity is significant ($F = 0.40, p = 0.530$, and $F = 0.01, p = 0.918$, respectively).

[Insert Table 1 and Figure 1 about here]

To check whether the pattern of the interaction is in line with H1, I also conduct simple effects tests, results of which are reported in Table 1, Panel C. I find that when the focus is on causes, participants in the *More Specific* condition exhibit higher knowability than those in the *Less Specific* condition (0.71 versus -0.25; $F = 4.97, p = 0.025$, one-tailed). In contrast, when the focus is on consequences, knowability in the *More Specific* condition is significantly lower than that in the *Less Specific* condition, (-0.01 versus 0.89; $F = 3.78, p = 0.027$, one-tailed).²⁶ These results support H1.

interpreted by participants as asking either *relative* level of random (versus knowable) uncertainty or *absolute* level of random uncertainty. Reliability analysis shows lower Cronbach's alpha (highest $\alpha = 0.72$) when I compute a new composite measure by adding any or all of these items into the knowability measure, implying that they capture a somewhat different aspect of the randomness measure.

²⁶ Results of simple effects tests with *More Specific* versus *Less-plus-Footnotes* condition (Table 1, Table E) show that when the focus is on consequences, specificity has no significant effect on knowability ($F = 0.86, p = 0.357$), although cell means are directionally consistent with my prediction (-0.01 for *More Specific* versus 0.40 for *Less-plus-Footnotes*).

Test of Hypothesis 2

H2 predicts that when the disclosure focuses on causes of a risk, greater specificity increases investors' assessments of management credibility (hereafter, credibility). When the focus is on consequences of a risk, however, a higher level of specificity lowers credibility. Following Mercer (2005), I capture credibility by asking participants to evaluate management competence and trustworthiness on 11-point scales, with endpoints from "0" = not at all competent/trustworthy to "10" = absolutely competent/trustworthy. Given the high correlation between the two items (Pearson correlation = 0.76, $p < 0.001$; Cronbach's $\alpha = 0.87$), I use the average of these two measures as credibility. To test H2, I conduct an ANOVA with causal focus and specificity as the independent variables, and credibility as the dependent variable.

Table 2 shows the descriptive statistics of credibility (Panel A), results of the ANOVA (Panel B), and the simple effect results (Panel C). Figure 1, Panel B graphically depicts the mean credibility, by condition. Specifically, I find that there is a significant interaction effect of causal focus and specificity ($F = 11.09$, $p = 0.001$), and insignificant main effects of causal focus ($F = 0.52$, $p = 0.471$) and specificity ($F = 0.02$, $p = 0.882$). In support of H2, results of simple effects tests indicate that participants in the *Causes/More Specific* condition report higher credibility than those in the *Causes/Less Specific* condition (6.91 versus 5.98; $F = 6.90$, $p = 0.009$, one-tailed). I also find that the mean rating of credibility for participants in the *Consequences/More Specific*

condition is significantly lower than that for those in the *Consequences/Less Specific* condition (5.83 versus 6.68; $F = 5.20$, $p = 0.012$, one-tailed).

[Insert Table 2 about here]

Test of Hypothesis 3

My prediction for H3 is that when managers place a greater focus on causes of a risk, greater specificity will lead to higher investment willingness; in contrast, when the focus is on risk consequences, a higher level specificity decreases investment willingness. To measure investment willingness, I ask participants following questions: (1) “How willing are you invest in ABC’s stock?” on an 11-point scale with endpoints from “-5” = absolutely not willing to invest” to “5” = “absolutely willing to invest; (2) “Please assess the attractiveness of ABC’s stock” on an 11-point scale with the endpoints from “-5” = not at all attractive to “5” = absolutely attractive; and (3) “Suppose you hold ABC’s stock. How will you change your holdings of ABC’s stock?” on an 11-point scale, with “-5” = significantly decrease, “0” = no change, and “5” = significantly increase. Given that these three questions capture the same underlying construct (Cronbach’s alpha of 0.90) and load onto one factor, I use the average of them as a single measure, which I label it investment willingness, with a higher (lower) value indicating greater (lower) investment willingness.²⁷

²⁷ Results do not change when I use each investment willingness measure for the hypothesis test.

The descriptive statistics of investment willingness are presented in Table 3, Panel A, and represented graphically in Figure 1, Panel C. Table 3, Panel B shows results of an ANOVA where causal focus and specificity are the independent variables, and investment willingness is the dependent variable. I find that there is a significant interaction effect of causal focus and specificity on investment willingness ($F = 7.71, p = 0.006$). I also find a significant main effect of causal focus ($F = 5.55, p = 0.020$) and an insignificant main effect of specificity ($F = 0.02, p = 0.889$).

[Insert Table 3 about here]

To examine if the interaction is consistent with H3, I conduct simple effects tests. As presented in Table 3, Panel C, results demonstrate that when the causal focus of the disclosure is on causes, participants in the *More Specific* condition report higher investment willingness than those in the *Less Specific* condition (1.59 versus 0.79; $F = 3.39, p = 0.034$, one-tailed). In contrast, when the focus is on consequences, participants in the *More Specific* condition exhibit lower investment willingness than those in *Less Specific* condition (0.03 versus 0.92; $F = 4.36, p = 0.020$, one-tailed). Therefore, H3 is supported.

Test of Hypothesis 4

My prediction for H4 is that knowability and credibility will mediate the joint impact of causal focus and specificity on investment willingness. Using the biased-corrected bootstrapping method (Preacher and Hayes 2008; Hayes 2013), I conduct a moderated-mediation analysis where causal focus moderates

the effect of specificity on knowability and credibility, which then influence investment willingness. Following the procedures described by Hayes (2013), I use the SPSS process macro (Model 8) to estimate the path coefficients through 10,000 bootstrapped sample with a 90% confidence level.

Table 4 shows results of the moderated-mediation analysis. A graphical representation of the results is presented in Figure 2. As seen in Table 4, Panel A, both the link between the interaction of causal focus and specificity on knowability (Link 1a) and the link between knowability and investment willingness (Link 2a) are significant (coefficient = 1.861, $p = 0.006$, and coefficient = 0.166, $p = 0.013$, respectively). With respect to credibility, the results indicate that the interaction of causal focus and specificity has a significant effect on credibility (Link 1b; coefficient = 1.781, $p = 0.001$), and credibility has a positive impact on investment willingness (Link 2b; coefficient = 0.672, $p < 0.001$). However, the link between the interaction of causal focus and specificity on investment willingness (Link 3) is insignificant (coefficient = 0.174, $p = 0.725$), indicating a full mediation.²⁸

[Insert Table 4 and Figure 2 about here]

Table 4, Panel B presents the indirect effect of specificity on investment willingness through knowability. When there is a greater focus on causes, the

²⁸ When knowability is the only mediator (absent credibility), the link between the interaction of causal focus and specificity on investment willingness is significant (coefficient = 1.325, $p = 0.030$), suggesting a partial mediation. When credibility is the only mediator (absent knowability), I find that the link between the interaction of causal focus and specificity and investment willingness is still insignificant (coefficient = 0.466, $p = 0.350$).

bootstrapped confidence interval for the indirect path from specificity to investment willingness is (0.006, 0.327). As zero does not lie within the confidence interval, this result shows that specificity indirectly increases investment willingness through higher knowability at the (one-tailed) 5% level of significance. Likewise, when there is a greater focus on risk consequences, the bootstrapped confidence interval for the indirect path does not contain zero (-0.417, -0.051), indicating that a greater level of specificity indirectly lowers investment willingness through lower knowability.²⁹

Table 4, Panel C shows results of a bias-corrected bootstrap analysis with respect to the indirect effect of specificity on investment willingness through credibility. Results show that the indirect effect of specificity on investment willingness is significant, with the 90% confidence interval not including zero both when the disclosure focus is on risk causes (0.324, 1.185), and when it is on risk consequences (-0.932, -0.075). Taken together, these results support H4.³⁰

²⁹ Inferences do not change when running a moderated-mediation analysis with *More Specific* versus *Less-plus-Footnotes* condition.

³⁰ To check whether participants' reliance on management disclosures plays a mediating role, I ask them to indicate the extent to which they can rely on the company's risk factor disclosures to make investment decisions, on an 11-point scale where "0" = not reliable at all to "10" = extremely reliable (hereafter, reliance). I repeat the moderated-mediation model by including reliance as an additional mediator. Untabulated results show that the indirect effect of specificity on investment willingness through reliance is insignificant at the one-tailed $p = 0.05$ (the 90 percent bootstrapped, bias-corrected confidence interval for the indirect path through reliance contains zero, either when the focus is on causes: -0.006, 0.320, or when it is on consequences: -0.269, 0.006), but the indirect effects through knowability and credibility remain significant (the confidence intervals do not contain zero), indicating that reliance does not mediate the joint effect of causal focus and specificity on investment willingness. One possible explanation would be that when investors evaluate firms under uncertainty, they place a higher value on managerial attributes (credibility) and the nature of uncertainty (knowability) than the information in risk disclosures that is less verifiable.

Additional Analysis

Effect of Level of Uncertainty

I conduct a follow-up test to examine whether investors' perceived nature of knowable versus random uncertainty is a different construct from their perceived level of uncertainty (e.g., high versus low level of uncertainty) and whether the level of uncertainty has an effect on investment willingness. On an 11-point scale, I ask participants to indicate how much uncertainty there is with respect to ABC' cybersecurity risk events, with endpoints from "0" = no uncertainty at all to "10" = a lot of uncertainty. Cronbach's Alpha of a composite measure combining knowability and the level of uncertainty measure is 0.19, supporting the notion that the dimension of perceived knowable versus random uncertainty is distinct from that of high versus low uncertainty (Fox and Ülkümen 2011; Ülkümen et al. 2016). In addition, I run an ANOVA where causal focus and specificity are the independent variables and the level of uncertainty is the dependent variable. Untabulated results indicate that there is insignificant interaction effect of causal focus and specificity ($F = 0.09$, $p = 0.759$) on the level of uncertainty. I find that an insignificant main effect of causal focus ($F = 0.04$, $p = 0.851$), and a marginally significant main effect specificity ($F = 1.68$, $p = 0.099$, one-tailed).

Next, I regress investment willingness on knowability and the level of uncertainty. Results show that investment willingness is positively associated with knowability (coefficient = 0.21; $t = 3.20$, $p = 0.002$), but not associated

with the level of uncertainty (coefficient = -0.04; $t = -0.62$, $p = 0.536$).³¹ My results suggest that participants' investment willingness is not affected by their perceived level of uncertainty, but influenced by their perceived nature of knowable versus random uncertainty.

Effect of the Order of Causes and Consequences

The manipulation of causal focus involves the natural versus inverse temporal order of causes and consequences. Thus, it is possible that different temporal orders may have an impact on investors' processing fluency, which is a potential mediator for investment willingness (e.g., Rennekamp 2012; Tan, Wang, and Zhou 2015). For instance, to the extent that causes precede consequences, investors may feel easier to process or understand risk factor disclosures when causes are followed by consequences (i.e., the *Causes* condition), compared to when consequences are followed by causes (i.e., the *Consequences* condition).

To examine the ease-of-processing explanation arising from the order effects, I use participants' responses to the questions on the difficulty to read/understand/process the disclosure to capture participants' subjective feelings of processing fluency (see Footnote 21 for more details). I do not observe any significant differences in the average of the three measures between participants in the *Causes* condition and those in the *Consequences*

³¹ Results are robust to including participants' demographic information (years of work experiences, number of accounting/finance courses they have taken, age, and gender) as control variables in the regression.

condition (2.61 versus 2.60; $t = 0.04$, $p = 0.967$) or each individual measure between the two conditions (smallest $p = 0.668$). These results rule out the alternative explanation that the effects of causal focus manipulation are driven by order-induced processing fluency.

Effect of the Salience of Loss Outcomes

Prior studies suggest that investors' risk judgments are based on potential loss outcomes (Slovic 1987; Koonce et al. 2005). Given that consequences directly relate to loss outcomes while causes do not, it is possible that different salience of loss outcomes can influence investors' judgments via its impact on their perceived riskiness. That is, if the salience of loss outcomes is a primary mechanism underlying the joint effect of causal focus and specificity on investment willingness, investors' perceived riskiness should play a mediating role.

To measure participants' perceived riskiness, I ask them to rate the extent to which they feel that an investment in ABC is risky, on 11-point scales ranging from "0" = not risky at all to "10" = extremely risky. Next, I conduct a mediation analysis using the Hayes Process Model, results of which show that the link between the joint effect of causal focus and specificity on perceived riskiness is not significant ($p = 0.170$). In addition, with regard to the indirect effect of specificity through perceived riskiness, the 90% bootstrapped confidence interval contains zero, either when the focus is on causes of a risk (-0.015, 0.512), or when it is on consequences of a risk (-0.403, 0.149),

suggesting that the indirect effect is not significant at the (one-tailed) $p = 0.05$ level. Overall, my results rule out the alternative explanation that the effect of causal focus manipulation is driven by investors' perceived riskiness associated with the salience of loss outcomes.

Follow-up Experiment: Risk Factor Disclosures without Risk Mitigation Information

Recall that the manipulation of specificity changes the information in the risk factor disclosures across the *More* versus *Less Specific* condition. One feature of the manipulation is that risk mitigation information varies such that the *More Specific* condition contains “the National Institute of Standards and Technology (NIST) Cybersecurity Framework” and “the American National Standards Institute (ANSI)’s encryption standards”, none of which is present in the *Less Specific* condition. Thus, some specific words such as “national standards” may have a positive spin, and even though all conditions contain this information, it may be the case that these “authoritative-sounding” words somehow adds a positive bias when they are placed upfront (in the *Causes/More Specific* condition).

To check this possibility, I conduct a 1×2 (specificity) between-participants experiment and re-run the *Causes/More Specific* and *Causes/Less Specific* conditions in the main experiment. I remove all risk mitigation information from both conditions, thereby eliminating all authoritative-sounding words from the original *More Specific* condition. Instead, in the *More*

Specific condition only, I add specific examples of the company's web-based operations, hackers' cyber attack, and security breaches at third-parties (see Appendix C for the details of the manipulation).³²

I recruit 124 subjects from Prolific, who receive £1.3 in exchange for their participation. To check the manipulation of specificity, I ask the same question as in the main experiment ("0" = not specific at all" and "10" = very specific). The mean response in the *More Specific* condition is significantly higher than that in the *Less Specific* condition (6.87 versus 5.89; $t = 2.54$, $p = 0.012$), indicating a successful manipulation. Next, I perform three one-way ANOVAs where specificity is the independent variable, and knowability, credibility, and investment are each dependent variable. Untabulated results show that greater specificity increases knowability (0.89 versus 0.19; $F = 3.18$, $p = 0.039$, one-tailed),³³ credibility (6.52 versus 5.88; $F = 3.88$, $p = 0.026$, one-tailed), and investment willingness (1.05 versus 0.46; $F = 2.48$, $p = 0.059$, one-tailed), ruling out the alternative explanation that the positive effect of specificity can be driven by risk mitigation information.

³² In this experiment, I record participants' time spent on the company's risk factor disclosure using a timer embedded in Qualtrics. In addition, to measure their attention to each cause and consequence, I separate the paragraph related to consequences from the risk factor disclosure (which then contains the title and the paragraph related to causes only), and present the consequence-related paragraph on the following screen. Participants are allowed to move back and forth within the two separate screens. The mean of participants' total time spent on the disclosure is 92.12 seconds, and the means of their time spent on each causes and consequences are 43.42 and 48.70 seconds, respectively.

³³ Similar to the result of reliability analysis in the section on 'Effect of Level of Uncertainty', Cronbach' alpha of a composite measure of combining knowability and participants' perceived level of uncertainty ("0" = no uncertainty at all to "10" = a lot of uncertainty) is 0.29, suggesting that they do not capture a single construct.

In addition, I test whether specificity affects participants' perceptions of risk controllability, and their attention to information about risk consequences. When managers discuss firms' risk causes in a specific manner, it may be that investors perceive that risks are well controlled by management, and they may not pay attention to managers' discussion on potential losses in the future as investors may feel that such controllable risks are less likely to occur. To measure participants' perceptions about risk controllability, I ask them to indicate the extent to which the company's risk events are controllable by management, on an 11-point scale with "0" indicating "not at all controllable" and "10" indicating "completely controllable" (hereafter, controllability). Next, I conduct an ANOVA with specificity as the independent variable, and controllability as the dependent variable. I find that greater specificity marginally increases controllability (5.85 for *More Specific* versus 5.29 for *Less Specific*; $F = 1.74$, $p = 0.095$, one-tailed). With respect to participants' attention to information about risk consequences, however, I do not find any significant difference in their time spent on consequences ($p = 0.256$), or the ratio of the amount of time they spent on consequences relative to their total time spent on both causes and consequences (i.e., participants' relative attention to consequences versus causes; $p = 0.293$). Next, to conduct the mediation analysis, I use the Hayes PROCESS Model to run 10,000 bootstrapped sample with a 90% confidence level, with specificity as the independent variable, controllability as the mediator, and participants' attention to risk consequences as the dependent variable. Results show that the bootstrapped confidence

interval includes zero, either when the dependent variable is participants' total time spent on consequences (-0.132, 21.456), or when it is their relative time spent on consequences versus causes (-0.022, 2.023). These results suggest that investors' perceived risk controllability does not mediate the effect of specificity on their attention to information about risk consequences.

5. CONCLUSION

In this study, I investigate whether investor judgments are jointly affected by causal focus and specificity, which are two important features that vary considerably across firms' risk factor disclosures. Results of a controlled experiment reveal that when managers have a greater focus on causes of a risk, a higher level of specificity increases participants' investment willingness due to enhanced feelings of knowable (versus random) uncertainty in a risk and higher assessments of management credibility. In contrast, when managers place a greater focus on consequences of a risk, greater specificity decreases investment willingness due to diminished feelings of knowable uncertainty and lower credibility assessments.

In addition to identifying causal focus as an important attribute in risk factor disclosures, my study contributes to the accounting literature by showing that investors' perceptions of risk uncertainty and management credibility play an important role in mediating the effect of risk factor disclosures on investment willingness. My findings suggest that when investors make judgments under uncertainty, they consider qualitative natures of uncertainty

and management credibility, which have not been explored in prior studies. Further, my study complements Hope et al. (2016) by showing the directional effect of specificity in risk factor disclosures. Contrary to their contention that specific risk factor disclosures are beneficial, evidence of which is based on increased trading volume and unsinged stock returns, my results suggest that the positive effect of specificity is conditional, with the directional effects varying depending on causal focus.

My study is subject to limitations, although I believe these can be opportunities for future research. First, I examine the effects of risk factor disclosure only in the context of a company's cybersecurity risk. While such a design choice is largely motivated by the SEC's interest in cyber risk disclosures (SEC 2011; Schwartz 2017), examining one facet of risk factor disclosures may limit the generalizability of my findings. Future research could examine whether the results I find would be different for other types of risk or for multi-faceted risks. For example, for a risk in which random uncertainty is presumably salient (e.g., a manager's sudden resignation due to personal reasons), would a prompt to consider knowable uncertainty (e.g., specific risk factor disclosures with a greater focus on causes) result in a positive effect on investor judgments or backfire because they do not believe that such a risk is unlikely to be knowable?

Second, my study focuses on investigating investor judgments within the disclosed risk information setting. While Campbell et al. (2014) argue that

managers provide risk factor disclosures that meaningfully reflect the risk they face (pp. 396), it is possible that they withhold or omit some material risk factors either due to their lack of knowledge or lack of credibility. Future research could examine whether investors consider possible non-disclosed risks and how they take such a possibility into account in making investment judgments.

Finally, this study examines a setting in which the information contained in risk factor disclosures is new to investors. However, a recent textual analysis shows that firms' risk factor disclosures tend to be sticky (Dyer et al. 2017), meaning that managers are likely to copy and paste the same risk information from a prior period. Repeated risk information can be construed as a class of same events, which may promote greater feelings of random uncertainty (Fox and Ülkümen 2011). In addition, repeated disclosures for the same risks may raise questions on management credibility. Future research could explore how investors' perceived uncertainty and associated credibility assessments, as well as investment judgments, are affected when there is repeated verbatim in risk factor disclosures in terms of a multi-period setting.

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Appendix A

Examples of Variations in Causal Focus and Specificity in Risk Factor Disclosures

Panel A: Focusing on Causes / More Specific

An excerpt from risk factor disclosures in Anthem, Inc.'s SEC 10-K filing for fiscal year ended December 31, 2017

An unauthorized disclosure of sensitive or confidential member or employee information, including by cyber attack or other security breach, could cause a loss of data, give rise to remediation or other expenses, expose us to liability under federal and state laws, and subject us to litigation and investigations, which could have an adverse effect on our business, cash flows, financial condition and results of operations.

As part of our normal operations, we collect, process and retain certain sensitive and confidential information. We are subject to various federal, state and international laws and rules regarding the use and disclosure of certain sensitive or confidential information, including HIPAA, the HITECH Act, the Gramm-Leach-Bliley Act, and numerous state laws governing personal information. Despite the security measures we have in place to help ensure data security and compliance with applicable laws and rules, our facilities and systems, and those of our third party service providers, may be vulnerable to cyber attacks, security breaches, acts of vandalism, computer viruses, misplaced or lost data, programming and/or human errors or other similar events.

In February 2015, we reported the discovery that certain of our information technology systems had been the target of an external cyber attack, as more fully described under Note 13, "Commitments and Contingencies - Cyber Attack Incident," to our audited consolidated financial statements included in Part II, Item 8 of this Annual Report on Form 10-K. The attackers gained unauthorized access to certain of our information technology systems and obtained personal information related to many individuals and employees. We have incurred expenses to investigate and remediate this matter and expect to continue to incur expenses of this nature in the foreseeable future. Actions have been filed in various federal and state courts and other claims have been or may be asserted against us, allegedly arising out of the cyber attack. Further, we may be subject to additional litigation and governmental investigations which could divert the attention of management from the operation of our business, result in reputational damage and have a material adverse impact on our business, cash flows, financial condition and results of operations. While we have contingency plans and insurance coverage for potential liabilities of this nature, these may not be sufficient to cover all claims and liabilities.

In addition, we cannot ensure that we will be able to identify, prevent or contain the effects of additional cyber attacks or other cybersecurity risks in the future that bypass our security measures or disrupt our information technology systems or business. As a result, cybersecurity and the continued development and enhancement of our controls, processes and practices designed to protect our systems, computers, software, data and networks from attack, damage and unauthorized access, remain a priority for us. Noncompliance with any privacy or security laws and regulations, or any security breach, cyber attack or cybersecurity breach, and any incident involving the misappropriation, loss or other unauthorized disclosure or use of, or access to, sensitive or confidential member information, whether by us or by one of our third-party service providers, could require us to expend significant resources to continue to modify or enhance our protective measures and to remediate any damage. In addition, this could result in interruptions to our operations and damage our reputation, and could also result in regulatory enforcement actions, material fines and penalties, litigation or other actions that could have a material adverse effect on our business, cash flows, financial condition and results of operations.

Panel B: Focusing on Consequences / Less Specific

*An excerpt from risk factor disclosures in Destination Maternity Corporation's
SEC 10-K filing for fiscal year ended January 31, 2018*

A cybersecurity incident could have a negative impact on our business and results of operations.

A cyber-attack may bypass the security for our IT Systems causing an IT System security breach and lead to a material disruption of our IT Systems and/or the loss of business information and/or Internet sales. Such a cyber-attack could result in any of the following:

- theft, destruction, loss, misappropriation or release of confidential data or intellectual property;
- operational or business delays resulting from the disruption of IT Systems and subsequent clean-up and mitigation activities;
- negative publicity resulting in reputation or brand damage with our customers, partners or industry peers; and
- loss of sales generated through our Internet websites through which we sell merchandise to customers, to the extent these websites are affected by a cyber-attack.

As a result, our business and results of operations could be materially and adversely affected.

Appendix B

Experimental Instrument

Informed Consent:

You are invited to participate in a research study conducted by Prof. Hun-Tong Tan and Mr. G-Song Yoo from Nanyang Business School, Nanyang Technological University. The purpose of this study is to investigate how investors make investors judgments and decisions in practice.

In this exercise, we will present you some background information about a hypothetical public company. You will assume the role of an investor. Based on the information provided, we will ask you to make choices and judgments. We have limited the amount of information presented to limit the time necessary to complete the study. The task is expected to take approximately 15 ~ 20 minutes of your time, and you will be compensated upon your completion of the study.

There is no more than minimal risk during the survey. The probability and magnitude of discomfort anticipated for participation in the proposed research are not greater in and of themselves than those ordinarily encountered in daily life. The information you provide will be kept strictly confidential and anonymous. Responses will be assigned a participant number, so that data files will not contain any identification of the names of individual participants. Your confidentiality is assured.

Results of this experiment may be disseminated in academic workshops, conferences, and/or in academic journals at aggregated levels. Your participation in this study is completely voluntary, and you may withdraw from the study at any time without any penalty.

If you have questions or concerns about this study, you may contact the following researchers:

- Principal Investigator: Hun-Tong Tan, Block S3-01C-78, Nanyang Technological University, 639798 Singapore. Email: ahltan@ntu.edu.sg.
- Co-Investigator: G-Song Yoo, Block S3-01B-73, Nanyang Technological University, 639798 Singapore. Email: gsong002@e.ntu.edu.sg.

For questions about your rights as research participants or ethics considerations, please contact:

- NTU Institutional Review Board (IRB): Block N2.1 B4-07, Nanyang Technological University, 637331 Singapore. Email: irb@ntu.edu.sg.

I have read and understood the above information, and

- I agree to participate in this study.
- I do **not** agree to participate in this study.

Main Experiment:

General Instructions

In this study, you will assume a role of an investor. You are considering *ABC Resorts, Inc.*, (hereafter *ABC*) for your investment. As an investor, you are going to review a description of the company's business and an excerpt of *ABC*'s recent risk factor disclosures, which are an integral part of firms' annual report (aka, Form 10-K).

After reviewing this information, you will be asked to provide a series of investment related judgments. After the assessment, we will then ask you a few more questions that will be helpful in understanding how you came to your judgments.

The information included in the case materials is not intended to be completely representative of what would normally be available when evaluating a company. Providing you with that level of detail would require more time to complete the case than could realistically be requested. Please make the best judgments you can based on the information provided in these materials.

You may now start the study. Thank you again for your participation in this study.

Brief Description of *ABC*

ABC is a hospitality company, offering travelers a wide range of accommodation and food services. The company owns over 30 resorts and hotels in major cities in the United States and throughout the world. *ABC* is listed on one of the major stock exchanges in the United States. Last year, the company generated revenue of \$500 million and net income of \$45 million. While reviewing *ABC*'s recent annual report through its website (www.ABC.com), you came across the company's risk factor disclosures.

In the next page, the details of *ABC*'s risk factor disclosures will be provided. Please read it carefully and answer the following questions. You will be asked attention check questions later.

Manipulation: Causes/More Specific Condition

ITEM 1.A. Risk Factors

Hackers' cyber attack and breaches at third parties may expose our company to cybersecurity risks

Our business is subject to cybersecurity risks such as loss of data, system disruption and security breach. The cybersecurity risks could arise from the followings:

- **Cyber attacks by hackers:** As certain aspects of our operations [(i.e., electronic data processing and digital marketing)] depend on web-based programs, hackers' cyber attack has become a threat to our organization. Hackers, acting individually or in a group [(i.e., criminal organizations and/or extremist parties)]^a may penetrate our computer systems or our website [at [www.ABC.com](#)] and, if successful, this may subject us to cybersecurity risks. Although we maintain a cyber risk management program [(CyRiM)] based on the criteria set forth by certain cybersecurity frameworks, [including the National Institute of Standards and Technology (NIST) Cybersecurity Framework], there is no guarantee that this measure can provide absolute security.^b
- **Breaches at third-parties:** Also, we heavily rely on third parties, [including *SaveData, Inc.*], for electronic payment processing. [In 2016], debit and credit card transactions accounted for the vast majority [(87%)] of our revenues. In addition, we also generated [\$248.5 million of] revenues through [[www.ABC.com](#)] with [398,700] online bookings. While we comply with information security standards, [such as the American National Standards Institute (ANSI)'s encryption standards and the Payment Card Industry Data Security Standard (PCI DSS)], breaches at third-parties could be a source of cyber incidents.

^a [Words in square brackets] are present in the *More Specific* condition only.

^b Such an expression is pervasive in actual risk factor disclosure practice, providing support for the validity of my manipulation. As an illustration, in its recent risk factor disclosures, Choice Hotels International states that “(w)e seek to minimize the impact of these [cyber] attacks through various technologies, processes and practices designed to help protect our networks, systems, computers and data from attack, damage or unauthorized access. However, there are no guarantees that our cyber-security practices will be sufficient to thwart all attacks.” Similarly, La Quinta Holdings note that “(e)ven if we are fully compliant with such legal standards, we may not be able to prevent security breaches involving guest transaction data and identity theft.”

The financial costs related cybersecurity risks could be significant. According to [the Cost of Data Breach Survey by Ponemon Institute], the average total organizational cost due to data breaches reached [\$7.01 million in 2014 – 2016], which include both direct (the direct expense outlays to accomplish given activities, [i.e., engaging forensic experts]) and indirect (the amount spent in time, effort and other organizational resources for relevant activities, [i.e., in-house investigation]) costs. Under [the FTC Act (15 U.S.C. §§41-58)], the cybersecurity events can also result in monetary penalties by relevant regulators, [including the US Federal Trade Commission (FTC)]. In addition, even if we may fully restore customer data that might be impaired due to a cybersecurity event, our reputation can be significantly damaged, possibly resulting in customer dissatisfaction and/or customer turnover. In [the 2015 Consumer Review survey by Deloitte], for instance, more than two-thirds [(73%)] of customers would reconsider using a company if it failed to keep their data safe, and almost half [(36%)] of them actually closed their accounts and stopped dealing with the business they felt was responsible for cybersecurity events.

Manipulation: *Consequences/Less Specific Condition*

ITEM 1.A. Risk Factors

Our performance and reputation could be adversely affected by cybersecurity risks

Our business is subject to cybersecurity risks such as loss of data, system disruption and security breach. The cybersecurity risks could result in the followings:

- **Financial losses:** The financial costs related cybersecurity risks could be significant. According to {a data breach survey by a research institute}^c, the average total organizational cost due to data breaches reached {approximately seven million dollars in recent years}, which include both direct (the direct expense outlays to accomplish given activities) and indirect (the amount spent in time, effort and other organizational resources for relevant activities) costs. Under {the federal privacy law}, the cybersecurity events can also result in monetary penalties by relevant regulators.
- **Damages to the company's reputation:** In addition, even if we may fully restore customer data that might be impaired due to a cybersecurity event, our reputation can be significantly damaged, possibly resulting in customer dissatisfaction and/or customer turnover. In {a recent survey by a professional services firm}, for instance, more than two-thirds of consumers would reconsider using a company if it failed to keep their data safe, and among those consumers, almost half of them actually closed their accounts and stopped dealing with the business they felt was responsible for cybersecurity events.

As certain aspects of our operations depend on web-based programs, hackers' cyber attack has become a threat to our organization. Hackers, acting individually or in a group, may penetrate our computer systems or our website and, if successful, this may subject us to cybersecurity risks. Although we maintain a cyber risk management program based on the criteria set forth by certain cybersecurity frameworks, there is no guarantee that this measure can provide absolute security. Also, we heavily rely on third-parties for electronic payment processing. {Last year}, debit and credit card transactions accounted for the vast

^c {Words in curly brackets} are present in the *Less Specific* condition only.

majority of our revenues. In addition, we also generated {almost half of our total revenues}^d through {our website} with {approximately four hundred thousand} online bookings. While we comply with information security standards, breaches at third-parties could be a source of cyber incidents.

^d To make this information consistent between the *More Specific* and *Less Specific* conditions, prior to viewing ABC's risk factor disclosures, all participants are informed that ABC had revenue of \$500 million last year.

Manipulation: *Consequences/Less-plus-Footnotes* Condition

[Same with the *Consequences/Less Specific* Condition, with additional footnotes below]

¹ The Cost of Data Breach Survey by Ponemon Institute; ² \$7.01 million in 2014 – 2016; ³ i.e., engaging forensic experts; ⁴ i.e., in-house investigation; ⁵ The FTC Act (15 U.S.C. §§41-58); ⁶ including the US Federal Trade Commission; ⁷ The 2015 Consumer Review survey by Deloitte; ^{8, 9} 73% and 36%, respectively; ¹⁰ i.e., electronic data processing and digital marketing; ¹¹ i.e., criminal organizations and/or extremist parties; ¹² CyRiM; ¹³ such as the National Institute of Standards and Technology (NIST) Cybersecurity Framework; ¹⁴ including SaveData. Inc.; ¹⁵ 87%; ¹⁶ \$248.5 million; ¹⁷ 398,700; ¹⁸ such as the American National Standards Institute (ANSI)'s encryption standards and the Payment Card Industry Data Security Standard (PCI DSS)

Questions:

As an investor, you have just reviewed the description of *ABC*'s business and its recent risk factor disclosures. Please use this information to make your investment judgments by answering the questions on the following section.

You can go back to review the materials on the previous page by clicking the back button below.

Question 1

How willing are you to **invest in *ABC*'s stock?**

-5	-4	-3	-2	-1	0	1	2	3	4	5
Absolutely NOT WILLING to invest										Absolutely WILLING to invest

Question 2

Please assess **the attractiveness of *ABC*'s stock.**

-5	-4	-3	-2	-1	0	1	2	3	4	5
Not at All ATTRACTIVE										Absolutely ATTRACTIVE

Question 3

Suppose you hold *ABC*'s stock. How will you **change your holdings of *ABC*'s stock?**

-5	-4	-3	-2	-1	0	1	2	3	4	5
Significantly DECREASE					No Change					Significantly INCREASE

Please answer the following questions related to the case

Question 4

To what extent do you feel that **ABC's cybersecurity risks are something that has an element of randomness?**

-5 -4 -3 -2 -1 0 1 2 3 4 5
Not at all Completely
RANDOM RANDOM

Question 5

To what extent do you feel that **ABC's cybersecurity risk events are determined by chance factor?**

-5 -4 -3 -2 -1 0 1 2 3 4 5
Strongly Strongly
DISAGREE AGREE

Question 6

To what extent do you agree that **ABC's cybersecurity risks could play out in different ways on similar occasions?**

-5 -4 -3 -2 -1 0 1 2 3 4 5
Strongly Strongly
DISAGREE AGREE

Question 7

To what extent do you feel that **ABC's cybersecurity risks are in principle knowable in advance?**

-5 -4 -3 -2 -1 0 1 2 3 4 5
Not at all Completely
KNOWABLE KNOWABLE
in advance in advance

Question 8

To what extent do you agree that **ABC's cybersecurity risks are something that has been determined in advance?**

-5 -4 -3 -2 -1 0 1 2 3 4 5
Strongly Disagree Strongly Agree

Question 9

To what extent do you agree that *ABC's* cybersecurity risk events are predictable in advance, given enough information?

-5 -4 -3 -2 -1 0 1 2 3 4 5
Strongly Disagree Strongly Agree

Question 10

How much **uncertainty** is there with respect to *ABC*' cybersecurity risk events?

0 1 2 3 4 5 6 7 8 9 10

No A LOT OF

UNCERTAINTY UNCERTAINTY

at all

Question 11

To what extent do you feel that an investment in *ABC* is **risky**?

0		1	2	3	4	5	6	7	8	9	10
Not RISKY at all											Extremely RISKY

Question 12

To what extent do you think *ABC*'s management is **competent**?

0	1	2	3	4	5	6	7	8	9	10
Not at All					Absolutely					
COMPETENT					COMPETENT					

Question 13

To what extent do you think ABC's management is **trustworthy**?

0 1 2 3 4 5 6 7 8 9 10
Not at All Absolutely
TRUSTWORTHY TRUSTWORTHY

Question 14

To what extent do you think you can **rely on** ABC's risk factor disclosures to make your investment decisions?

-5 -4 -3 -2 -1 0 1 2 3 4 5
Not Extremely
RELIABLE RELIABLE
at all

Question 15

To what extent do you think ABC's risk factor disclosures are **difficult to read**?

0 1 2 3 4 5 6 7 8 9 10
Not at All Extremely
DIFFICULT DIFFICULT

Question 16

To what extent do you think ABC's risk factor disclosures are **difficult to understand**?

0 1 2 3 4 5 6 7 8 9 10
Not at All Extremely
DIFFICULT DIFFICULT

Question 17

To what extent do you think ABC's risk factor disclosures are **difficult to process**?

0 1 2 3 4 5 6 7 8 9 10
Not at All Extremely
DIFFICULT DIFFICULT

Please answer the following questions based on your participation in the study

Question 18

How **specific** was the risk disclosure provided in the *ABC*'s annual report?

0 1 2 3 4 5 6 7 8 9 10
Not SPECIFIC Very SPECIFIC
at All

Question 19

To what extent do you think the risk disclosure in the *ABC*'s annual report mainly **focuses on**?

-5 -4 -3 -2 -1 0 1 2 3 4 5
Completely Completely
focusing on focusing on risk
risk CONSEQUENCES
CAUSES

We would like to gather some background information about you. Please answer each of the following questions.

1. How frequently do you invest in the stock market?

0 1 2 3 4 5 6 7 8 9 10

NEVER

Very
FREQUENTLY

2. How likely do you plan to make an investment in a company in the future?

0 1 2 3 4 5 6 7 8 9 10

Very
UNLIKELY

Very
LIKELY

3. How frequently do you refer to companies' annual report to aid your investment?

0 1 2 3 4 5 6 7 8 9 10

NEVER

Very
FREQUENTLY

4. How long is your full time working experience? _____

5. What is (or was) your major in college?

- Accounting
- Finance
- Other business major
- Economics
- Others (please specify): _____

6. Please indicate the number of courses (undergraduate and/or graduate level) you have taken or have currently enrolled in:

Accounting courses: _____;

Finance courses: _____;

7. What is your age? _____

8. What is your gender?

- Male
- Female

Thank You for Participating in Our Study.

Appendix C

Manipulation of Language Specificity in the Follow-up Experiment

ITEM 1.A. Risk Factors

Hackers' cyber attack and breaches at third parties may expose our company to cybersecurity risks

Our business is subject to cybersecurity risks such as loss of data, system disruption and security breach. The cybersecurity risks could arise from the followings:

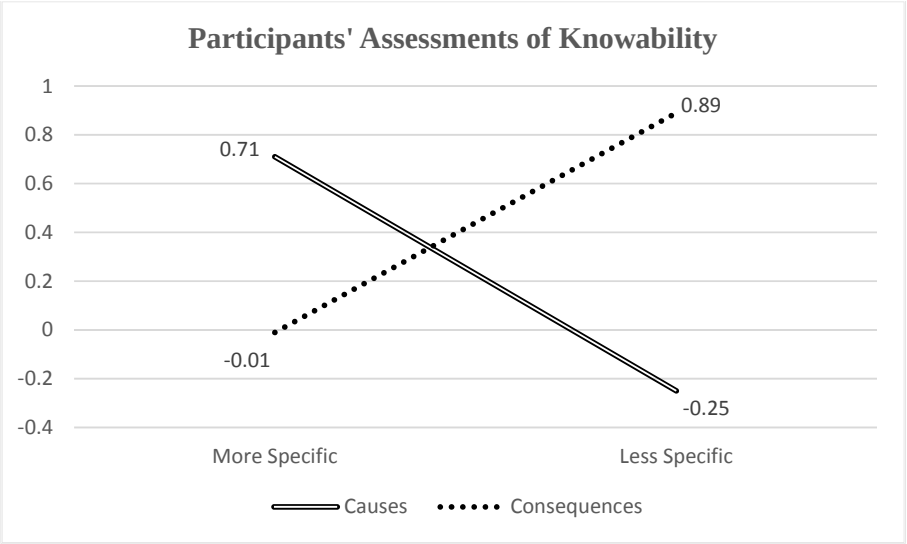
- **Cyber attacks by hackers:** As certain aspects of our operations [(i.e., electronic data processing for hotel services and amenities, including guest check-in and check-out, and membership programs such as ABC[®] Rewards and ABC[®] Family Club)]^e depend on web-based programs, hackers' cyber attack has become a threat to our organization. Hackers, acting individually or in a group [(i.e., criminal organizations, hacktivists, and/or extremist parties)] may penetrate our computer systems or our website [at www.ABC.com through ransomware or denial-of-service (DDoS) attacks], and, if successful, this may subject us to cybersecurity risks.
- **Breaches at third-parties:** Also, we heavily rely on third parties, [including SaveData, Inc.,] for electronic payment processing. In 2017, debit and credit card transactions accounted for the vast majority [(87%)] of our revenues. In addition, we also generated [\$248.5 million] of revenues through [www.ABC.com] with [398,700] online bookings. Security breaches at third-parties [(e.g., unauthorized disclosure of data, modification of data, and denial legitimate access to computing)] could be a source of cyber incidents.

[The above paragraphs are followed by a plain text paragraph containing risk consequences]^f

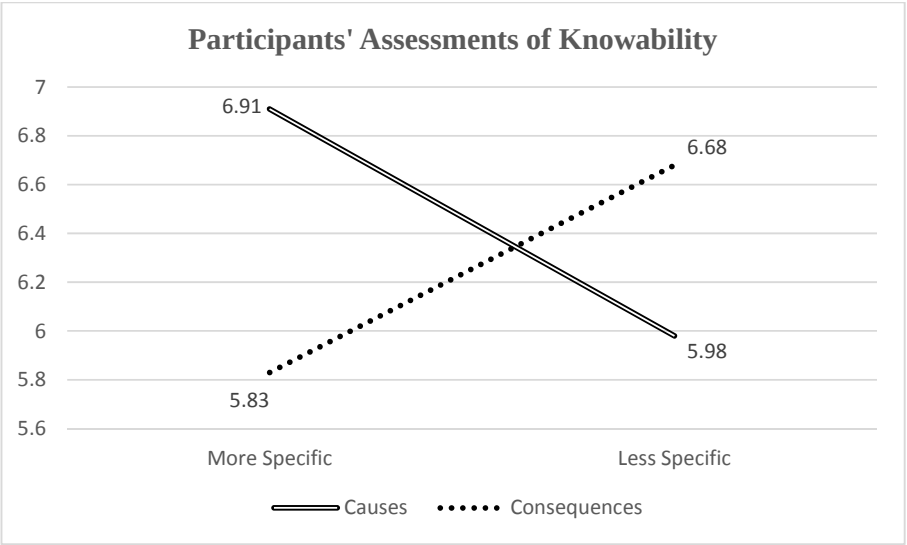
^e [Words in square brackets] are present in the *More Specific* condition only.

^f The paragraph containing risk consequences is identical to that in Appendix B, with the level of specificity being different depending on the *More* or *Less Specific* condition.

FIGURE1
Graphical Representation of Participants' Judgments
Panel A: Participants' Assessments of Knowability



Panel B: Participants' Assessments of Credibility



Panel C: Participants' Investment Willingness

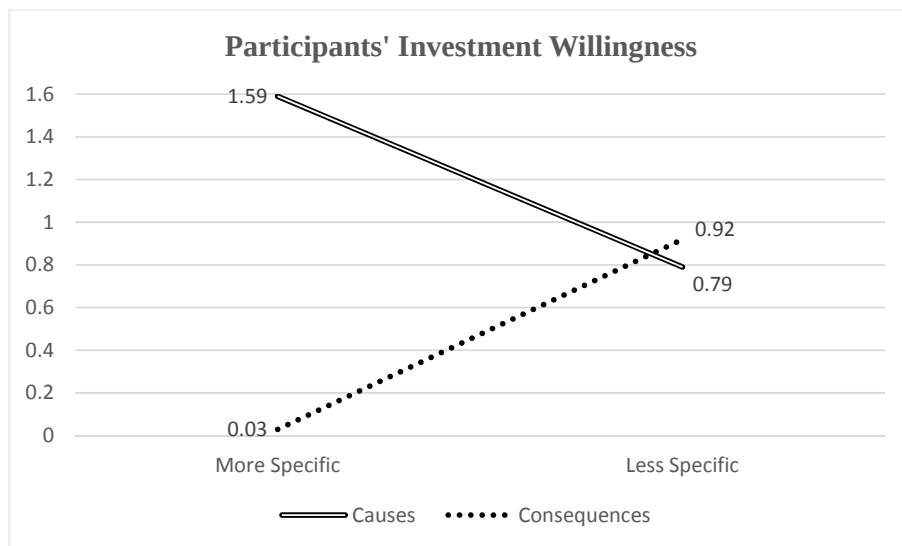
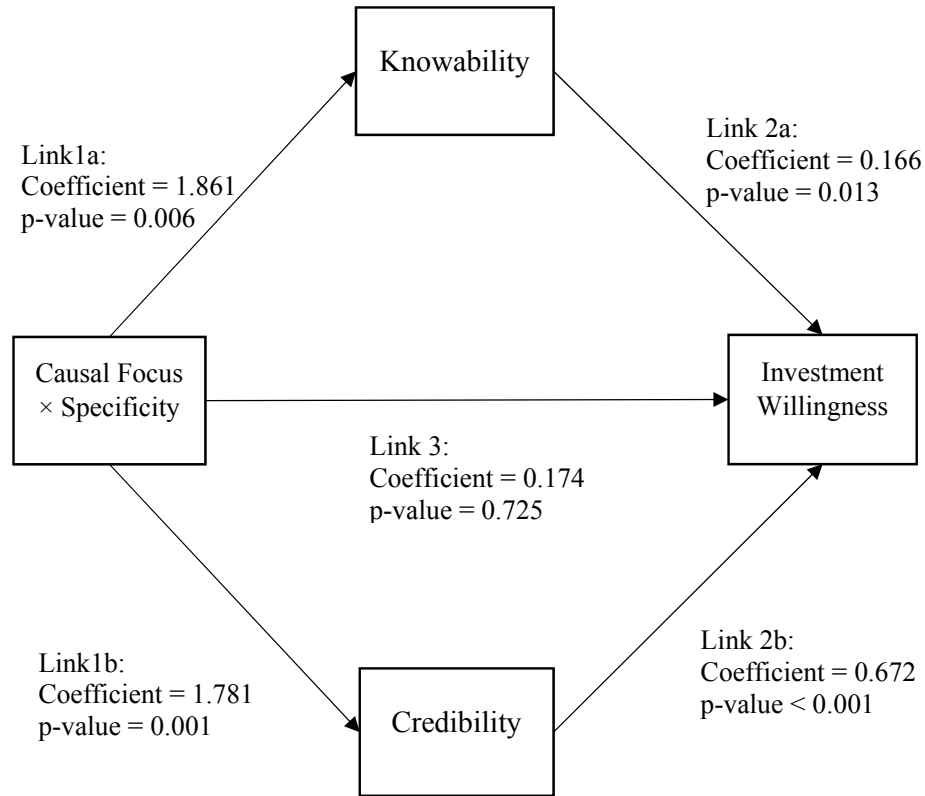


FIGURE2
The Moderated-Mediation model



Indirect Effect of Specificity on Investment Willingness through Knowability:
 a. Focusing on Causes: 0.120 (90% confidence interval: 0.006, 0.327)
 b. Focusing on Consequence: -0.190 (90% confidence interval: -0.417, -0.051)

Indirect Effect of Specificity on Investment Willingness through Credibility:
 a. Focusing on Causes: 0.728 (90% confidence interval: 0.324, 1.185)
 b. Focusing on Consequence: -0.469 (90% confidence interval: -0.932, -0.075)

TABLE 1

Participants' Assessments of Knowability across Treatment Conditions

Panel A: Descriptive Statistics – Mean (Standard Deviation) [Sample Size]

Causal Focus	Specificity			
	<i>More</i>	<i>Less</i>	Overall	<i>Less-plus-Footnotes</i>
<i>Causes</i>	0.71	-0.25	0.24	-0.19
	(2.54)	(2.26)	(2.45)	(2.43)
	[50]	[49]	[99]	[49]
<i>Consequences</i>	-0.01	0.89	0.44	0.40
	(2.18)	(2.35)	(2.30)	(2.19)
	[49]	[48]	[97]	[50]
Overall	0.36	0.31	0.34	
	(2.39)	(2.37)	(2.37)	
	[99]	[97]	[196]	

Panel B: Two-Way ANOVA of Between-Subjects Effects – *More* versus *Less Specific*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	2.17	1	2.17	0.40	0.530
Specificity	0.06	1	0.06	0.01	0.918
Causal Focus *					
Specificity	42.40	1	42.40	7.74	0.006
Error	1052.08	192	5.48		

Panel C: Simple Effects – *More* versus *Less Specific*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	23.05	1	23.05	4.97	0.025*
Effect of Specificity when the focus is on Consequences	19.45	1	19.45	3.78	0.027*
Effect of Causal Focus when the disclosure is More specific	12.83	1	12.83	2.28	0.067*

Effect of Causal Focus when the disclosure is Less specific	31.54	1	31.54	5.93	0.008*
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Panel D: Two-Way ANOVA of Between-Subjects Effects – *More Specific* versus *Less-plus-Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	0.21	1	0.21	0.04	0.846
Specificity	3.06	1	3.06	0.56	0.456
Causal Focus * Specificity	21.25	1	21.25	3.87	0.050
Error	1064.11	194	5.49		

Panel E: Simple Effects – *More Specific* versus *Less-plus-Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	20.22	1	20.22	3.26	0.037*
Effect of Specificity when the focus is on Consequences	4.10	1	4.10	0.86	0.357
Effect of Causal Focus when the disclosure is More specific	12.83	1	12.83	2.28	0.067*
Effect of Causal Focus when the disclosure is Less specific	8.63	1	8.63	1.62	0.207

Panel A reports the descriptive statistics of participants' perceptions of knowable versus random uncertainty inherent in a risk (hereafter, knowability). Panel B presents results of an ANOVA with causal focus and specificity as the independent variables, and knowability as the dependent variable. Panel C shows results of simple effects tests. I measure knowability by asking participants to indicate: (1) ABC's cybersecurity risk events are in principle knowable in advance on an 11-point scale, with endpoints from "-5" = not at all knowable in advance to "5" = completely knowable in advance; (2) ABC's cybersecurity risk events are something that has been determined in advance on an 11-point scale, with endpoints from "-5" = strongly agree to "5" = strongly disagree; and (3) ABC's cybersecurity risk events are predictable in advance, given enough information on an 11-point scale, with endpoints from "-5" = strongly agree to "5" = strongly disagree. Cronbach's alpha of 0.86 indicates that the three items capture a single construct. In addition, a factor analysis confirms that all the three questions load as a single factor. Hence, I average all three items to form a single measure to capture knowability, with a higher value indicating that participants perceive the company's cybersecurity risk as entailing relatively more knowable (or less random) uncertainty and a lower value indicating they perceive the risk as entailing relatively more random (less knowable) uncertainty. All p-values are two-tailed unless indicated with *, given the directional predictions.

TABLE 2

Participants' Assessments of Credibility across Treatment Conditions

Panel A: Descriptive Statistics – Mean (Standard Deviation) [Sample Size]

Causal Focus	Specificity			
	<u>More</u>	<u>Less</u>	Overall	<u>Less-plus-Footnotes</u>
<u>Causes</u>	6.91	5.98	6.45	6.17
	(1.86)	(1.95)	(1.95)	(1.58)
	[50]	[49]	[99]	[49]
<u>Consequences</u>	5.83	6.68	6.25	6.46
	(1.86)	(1.81)	(1.88)	(2.12)
	[49]	[48]	[97]	[50]
Overall	6.37	6.32	6.35	
	(1.93)	(1.90)	(1.91)	
	[99]	[97]	[196]	

Panel B: Two-Way ANOVA Test of Between-Subjects Effects - *More* vs. *Less*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	1.82	1	1.82	0.52	0.471
Specificity	0.08	1	0.08	0.02	0.882
Causal Focus * Specificity	38.85	1	38.85	11.09	0.001
Error	672.84	192	3.50		

Panel C: Simple Effects - *More* vs. *Less*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	21.42	1	21.42	6.90	0.009*
Effect of Specificity when the focus is on Consequences	17.54	1	17.54	5.20	0.012*
Effect of Causal Focus when the disclosure is More specific	29.05	1	29.05	8.37	0.002*
Effect of Causal Focus when the disclosure is Less specific	11.80	1	11.80	3.33	0.036*

Panel D: Two-Way ANOVA Test of Between-Subjects Effects - *More* vs. *Less-plus- Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	7.86	1	7.86	2.25	0.135
Specificity	0.13	1	0.13	0.04	0.846
Causal Focus * Specificity	23.22	1	23.22	6.66	0.011
Error	676.32	194	3.49		

Panel E: Simple Effects - *More* vs. *Less-plus-Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	13.42	1	13.42	4.50	0.018*
Effect of Specificity when the focus is on Consequences	9.93	1	9.93	2.49	0.059*
Effect of Causal Focus when the disclosure is <i>More</i> specific	29.05	1	29.05	8.37	0.002*
Effect of Causal Focus when the disclosure is <i>Less</i> specific	2.03	1	2.03	0.58	0.448

Panel A reports the descriptive statistics of participants' assessments of management credibility (hereafter credibility). Panel B presents results of an ANOVA with causal focus and specificity as the independent variables, and credibility as the dependent variable. Panel C shows results of simple effect analysis. I measure credibility by asking them to rate the extent to which they think that (1) ABC's management is competent, on an 11-point scale ranging from "0" = not at all competent and "10" = "absolutely competent; and (2) ABC's management is trustworthy, on an 11-point scale ranging from "0" = not at all trustworthy and "10" = absolutely trustworthy. Given the two items are highly correlated (Pearson correlation= 0.76, $p < 0.001$; A Cronbach's alpha = 0.87), I use the average of these two measures as credibility. All p-values are two-tailed unless indicated with *, given the directional predictions.

TABLE 3

Participants' Investment Willingness across Treatment Conditions

Panel A: Descriptive Statistics – Mean (Standard Deviation) [Sample Size]

Causal Focus	Specificity			
	<u>More</u>	<u>Less</u>	Overall	<u>Less-plus</u> <u>Footnotes</u>
<u>Causes</u>	1.59	0.79	1.19	1.04
	(1.99)	(2.31)	(2.18)	(1.75)
	[50]	[49]	[99]	[49]
<u>Consequences</u>	0.03	0.92	0.47	0.81
	(2.09)	(2.07)	(2.11)	(1.93)
	[49]	[48]	[97]	[50]
Overall	0.82	0.85	0.84	
	(2.17)	(2.18)	(2.17)	
	[99]	[97]	[196]	

Panel B: Two-Way ANOVA of Between-Subjects Effects – *More* versus *Less Specific*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	24.87	1	24.87	5.55	0.020
Specificity	0.09	1	0.09	0.02	0.889
Causal Focus * Specificity	34.58	1	34.58	7.71	0.006
Error	861.11	192	4.48		

Panel C: Simple Effects – *More* versus *Less Specific*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	15.74	1	15.74	3.39	0.034*
Effect of Specificity when the focus is on Consequences	18.89	1	18.89	4.36	0.020*
Effect of Causal Focus when the disclosure is More specific	59.66	1	59.66	14.35	<0.001
Effect of Causal Focus when the disclosure is Less specific	0.39	1	0.39	0.08	0.775

Panel D: Two-Way ANOVA of Between-Subjects Effects – *More Specific* versus *Less-plus- Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Causal Focus	39.21	1	39.21	10.36	0.002
Specificity	0.67	1	0.67	0.18	0.673
Causal Focus * Specificity	21.73	1	21.73	5.74	0.018
Error	734.36	194	3.79		

Panel E: Simple Effects – *More Specific* versus *Less-plus-Footnotes*

Source	Sum of Squares	df	Mean Square	F	p-value
Effect of Specificity when the focus is on Causes	7.37	1	7.37	2.10	0.076*
Effect of Specificity when the focus is on Consequences	15.03	1	15.03	3.71	0.029*
Effect of Causal Focus when the disclosure is More specific	59.66	1	59.66	14.35	<0.001
Effect of Causal Focus when the disclosure is Less specific	1.28	1	1.28	0.38	0.542

Panel A reports the descriptive statistics of participants' investment willingness. Panel B presents results of an ANOVA with causal focus and specificity as the independent variables, and investment willingness as the dependent variable. Panel C shows results of simple effect analysis. I measure participants' investment willingness by asking them following questions: (1) "How willing are you invest in ABC's stock?" on an 11-point scale with endpoints from "-5" = absolutely not willing to invest" to "5" = "absolutely willing to invest; (2) "Please assess the attractiveness of ABC's stock" on an 11-point scale with the endpoints from "-5" = not at all attractive to "5" = absolutely attractive; and (3) "Suppose you hold ABC's stock. How will you change your holdings of ABC's stock?" on an 11-point scale, with "-5" = significantly decrease, "0" = no change, and "5" = significantly increase. Given that these three questions capture the same underlying construct (Cronbach's alpha of 0.90) and load onto one factor, I use the average of them as a single measure, which I label it investment willingness, with a higher value indicating that greater investment willingness and a lower value indicating lower investment willingness. All p-values are two-tailed unless indicated with *, given the directional predictions.

TABLE 4
Results for the Moderated-Mediation Model

Panel A: Path Estimates and Coefficients for Moderated-Mediation Model					
	Coefficient	t-statistic	p-value	LLCI	ULCI
Knowability regressed on					
Constant	0.713	2.155	0.032	0.166	1.261
Causal Focus	0.720	1.530	0.128	-0.058	1.498
Specificity	0.965	2.051	0.042	0.187	1.743
Causal Focus *					
Specificity (Link 1a)	1.861	2.782	0.006	0.755	2.966
Credibility regressed on					
Constant	6.910	26.101	<0.001	6.472	7.348
Causal Focus	1.084	2.879	0.004	0.462	1.701
Specificity	0.930	2.473	0.014	0.308	1.552
Causal Focus *					
Specificity (Link 1b)	1.781	3.329	0.001	0.897	2.665
Investment Willingness regressed on					
Constant	-3.175	-6.363	<0.001	-4.000	-2.350
Knowability (Link 2a)	0.166	3.256	0.013	0.082	0.251
Credibility (Link 2b)	0.672	10.529	<0.001	0.567	0.777
Causal Focus	0.705	2.066	0.040	0.141	1.269
Specificity	0.012	0.035	0.972	-0.551	0.575
Causal Focus *					
Specificity (Link 3)	0.174	0.353	0.725	-0.991	0.643
Panel B: Conditional Indirect Effects of Specificity on Investment Willingness through Knowability					
	Effect		LLCI	ULCI	
Conditions					
Focusing on Causes	0.120		0.006	0.327	
Focusing on Consequences	-0.190		-0.417	-0.051	

**Panel C: Conditional Indirect Effects of Specificity on Investment
Willingness through Credibility**

	Effect	LLCI	ULCI
Conditions			
Focusing on Causes	0.728	0.324	1.185
Focusing on Consequences	-0.469	-0.932	-0.075

Panel A shows results for the moderated-mediation model using the biased-corrected bootstrapping method (Preacher and Hayes 2008; Hayes 2013). Panel B (Panel C) presents conditional indirect effects of specificity on investment willingness through knowability (credibility) with respect to causal focus. Following the procedures described by Hayes (2013), I use the SPSS process macro (Model 8) to estimate the path coefficients through 10,000 bootstrapped sample with a 90% confidence level.