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The Danger of Assessing Management Attitudes: An Examination of the Dilution Effect in Auditors' Fraud Risk Assessments

Erin Nickell
Kelsey R. Brasel
*Melanie Millar**

I. Introduction

The Public Company Accounting Oversight Board ("PCAOB" or "the Board") asserts that rigorous risk assessments coupled with responsive audit procedures are critical components of audit quality (PCAOB, 2019). Although the Board stresses the importance of exercising due professional care throughout the risk assessment process and emphasizes areas of significant risk, such as fraud (PCAOB, 2018), deficiencies in this area continue with high frequency (PCAOB, 2019). Extensive research has explored strategies and best practices for improving auditor performance in the risk assessment process while acknowledging that assessing and responding to fraud risk is particularly challenging (e.g., Hammersley, 2011; Allen, Hermanson, and Kozloski, 2006; Norman, Rose, and Rose, 2010; Simon, Smith, and Zimbelman, 2018). We contribute to this stream of research by investigating a potential threat to audit quality, the dilution effect.

The dilution effect is a possible point of failure for fraud risk assessments whereby auditors incorporate irrelevant information in their judgments at the expense of relevant information (e.g., Hackenbrack, 1992). The irrelevant information can weaken auditor reliance on and weighting of the relevant information, eroding judgment quality. For example, if an auditor assesses the risk related to an important fraud risk indicator, such as excessive pressure to meet Wall Street's expectations, inappropriately low because they believe management to be honest, the overall fraud risk assessment would be diluted.

Auditors have been cautioned about the danger of irrelevant information to fraud risk assessments. In particular, they have been warned about management attitudes toward fraud. Audit standards explicitly caution auditors to "set aside any prior beliefs they might have that management is honest and has integrity" (AS 2110.52, PCAOB, 2010), since these low-risk cues may reduce an auditor's sensitivity to other relevant risks and lead to inappropriately low risk assessments and reduced audit quality. That is, auditors should not incorporate low-risk attitude cues in their fraud risk assessments, particularly when other factors (i.e., pressure and/or opportunity) suggest that the risk of fraud is high. In this case, lower overall fraud risk assessments due to low-risk attitude cues are evidence of a dilution effect.

Prior research has largely presumed the dilutive effects of low-risk attitude cues on auditors' risk assessments—focusing instead on the effectiveness of preventive measures (Eilifsen, Kochetova, and Messier Jr., 2019; Favere-Marchesi, 2013; Wilks and Zimbleman, 2004)—without providing empirical evidence of its existence and impact. We extend this literature by empirically establishing the dilutive effects of low-risk management attitudes on auditor fraud risk assessments and audit effort and by examining the mechanism through which dilution operates. Specifically, we investigate auditor sensitivity to the other components of the fraud triangle (i.e., pressure and opportunity) through which overall fraud risk is ultimately diluted, and we consider effects to planned audit procedures.

We test for dilution using a 2×2 between-subjects experiment with experienced auditors as participants. We compare participants' overall fraud risk assessments after reviewing low-risk cues related to management attitudes with those of a control group while holding opportunity and pressure cues constant at high-risk levels. Results are consistent with a dilution effect: auditors' overall fraud risk assessments are lower when management exhibits low-risk attitudes toward fraud compared to those of a control group, where we do not provide information regarding management attitude risk.

*The authors are, respectively, Assistant Professor, Stetson University; Associate Professor, Ball State University; and Assistant Professor, Baylor University.

Examining auditors' component risk assessments of pressure, opportunity, and attitudes separately, we also find that auditors' assessments of pressure risk fully mediate the main effect. That is, the dilutive effects of the low-risk attitude cues function by decreasing auditor sensitivity to high-risk pressure cues. By establishing both the presence of the dilution effect related to management attitudes and the mechanism by which it operates (i.e., weakening auditors' sensitivity to high-risk cues related to pressure but not those related to opportunity), we provide important parameters for understanding the problem of dilution in auditing. Additionally, we find that the effect of dilution does not stop at risk assessment: it carries through to audit effort. Auditors plan lower levels of audit procedures when management attitudes toward fraud are low risk.

We also examine whether trait professional skepticism can mitigate the dilution effect, as prior literature has demonstrated that auditors with higher levels of the trait tend to behave more skeptically in a variety of engagement circumstances (e.g., Hurtt, Brown-Liburd, Earley, and Krishnamoorthy, 2013). Unfortunately, our study does not find evidence to support this possibility; even highly skeptical auditors are susceptible to the dilution effect.

Our findings should be of interest to academics, practitioners, and policymakers alike. This study addresses a call for research that improves "our understanding of how, why, and under what conditions auditors have trouble responding to risk indicators" (Hammersley, 2011, p. 3) by investigating the common audit setting when auditors have favorable impressions of management integrity and consider management attitudes toward fraud low risk. Given concerns about the impact of the auditor-client relationship on audit quality, this concern is a particularly relevant setting to explore and shows another way that a positive relationship with management could be problematic. Our results are particularly concerning because we provide evidence that relying on an auditor's individual trait skepticism is insufficient to counter the threat that low-risk management attitudes pose. Our study has implications for both audit practitioners and policymakers who want to bolster and protect audit quality. Auditors and regulators may need to consider creative or radical approaches to minimize the impact of the dilution effect: for example, despite the fact that attitudes are a key component of the fraud triangle, auditors may want to stop assessing attitude risk in order to eliminate the dilutive effects of low attitude risk and refocus auditor attention on the risks.

II. Background and Hypothesis Development

The Dilution Effect and Auditor Judgment

Auditors receive an enormous amount of information during the course of an engagement, an amount that continues to grow as practitioners incorporate Big Data into the audit process (Eilifsen *et al.*, 2019). Cognitive bias arises when auditors incorporate irrelevant or non-diagnostic information into a probability judgment, reducing the impact of the relevant information and the quality of the resulting judgment (Tetlock and Boettger, 1989; Zukier, 1982; Nisbett, Zukier, and Lumley, 1981). This behavior is known as the dilution effect because the resulting decision is less extreme—"diluted" by the irrelevant information—and, more importantly, less appropriate.

Accounting research has explored the dilution effect in auditors' fraud risk assessments, when auditors are less sensitive to high-risk cues in cases where other, irrelevant information fails to confirm the observed risk (Eilifsen *et al.*, 2019; Hoffman and Patton, 1997; Glover, 1997; Hackenbrack, 1992). Consistent with psychology theory (Tetlock and Boettger, 1989; Zukier, 1982; Nisbett *et al.*, 1981), Hackenbrack (1992) proposes that auditors' susceptibility to the dilution effect results from a similarity-based inference process of assessing the likelihood of an event, such as fraudulent financial reporting. Unfortunately, research suggests that similarity-based inference processing incorporates all available information, regardless of its relevance or diagnosticity (Alba and Hutchinson, 1987). Dilution arises when favorable client-specific information has no predictive ability for the existence of fraud, yet the auditor nevertheless incorporates the knowledge into their likelihood assessment as "dissimilar" to the fraud event (Hackenbrack, 1992). Low management attitude risk toward fraud, then, threatens audit quality as they should be "dissimilar" to and therefore dilutive of fraud risk.

Auditing standards identify the problem of favorable client-specific information that lacks value for predicting fraud: standard setters caution auditors to disregard positive dispositional client characteristics on the grounds that they do not constitute sufficient evidence to conclude that fraud is unlikely. Specifically, AS 2110.52 states that when assessing the risk of fraudulent financial reporting, auditors must "set aside any prior beliefs they may have that management is honest and has integrity" (PCAOB, 2010). While auditors can objectively assess risks related to the pressure and opportunity dimensions of the fraud triangle, observing management's attitude toward fraud is more difficult. This challenge is primarily due to the possibility that management will attempt to conceal a fraudulent scheme by misrepresenting their attitudes to

auditors. Thus, unless attitude cues suggest a high risk of fraud, auditors should regard them as irrelevant to their fraud risk assessments.

High-quality fraud risk assessments are critical components of the audit process (PCAOB, 2010). Appropriately identifying and assessing fraud risks can have important implications for the nature, timing, and extent of procedures, affecting the likelihood that the audit will uncover material misstatements due to error or fraud. Hammersley (2011) summarizes research in this area and encourages further research about the conditions under which auditors have difficulty assessing and responding to fraud risk. One such area relates to auditors' susceptibility to the dilution effect (Eilifsen, Kochetova, and Messier Jr., 2019; Fanning, Agoglia, and Piercey, 2015; Hoffman and Patton, 1997; Glover, 1997; Hackenbrack, 1992).

Prior research has not fully established the dilutive effects of low-risk attitude cues on auditor fraud risk assessments, even though inappropriately favoring the client poses a clear threat to auditor independence and audit quality. Rather, studies presume that the presence of this information results in dilution and have focused on identifying potential approaches for reducing its dilutive effects. Wilks and Zimbelman (2004) propose a decomposition approach to fraud risk assessment, encouraging auditors to separately assess risk related to each dimension of the fraud triangle: pressure, opportunity, and attitudes. When risks related to pressure and opportunity were high, but attitude risks were low (a scenario where fraud risk is presumably diluted), Wilks and Zimbelman (2004) note no effect on auditor fraud risk assessments. One explanation for the absence of an observed effect is that low-risk attitude cues did not dilute fraud risk assessments to begin with, a possibility unexplored in prior research.

In an extension of Wilks and Zimbelman's (2004) work, Favere-Marchesi (2013) further examines the effectiveness of the decomposition approach by comparing it to an alternative referred to as categorization. Keeping attitude cues constant at low risk (again, a scenario that presumes dilution of fraud risk), results suggest that decomposition auditors are sensitive to changes in risk related to pressure and opportunity, while categorization auditors are not. Although both studies demonstrate benefits of decomposition over alternative approaches to assessing fraud risk, neither fully establishes nor resolves the dilutive effects of management attitudes. The absence of a dilution effect, therefore, remains an explanation for their results and further suggests that successful strategies for mitigating the dilution effect will continue to evade researchers until we have a better understanding of the mechanism by which dilution occurs.

To address this gap in the literature, we seek to demonstrate the dilutive effects of low-risk management attitudes toward fraud on overall fraud risk assessments. Based on similarity-based inferencing theory (Hackenbrack, 1992; Tetlock and Boettger, 1989; Zukier, 1982; Nisbett *et al.*, 1981), we expect that low-risk attitudes toward fraud will lead to lower ("diluted") overall fraud risk assessments relative to a control group, stated formally as follows:

H1a: When management attitudes toward fraud are low risk, auditors' overall assessments of fraud risk will be diluted (i.e., lower) relative to a control group.

Dilution occurs when information that is less relevant weakens the influence of other, more relevant information on a judgment. For instance, Fanning *et al*. (2015) find that increased risk disclosures cause investors to dilute focus on the highest risk activities and cause them to systematically underestimate the company's business risk. Prior research on auditor fraud risk assessments, however, has yet to establish whether the dilutive effects of low-risk management attitudes occur by reducing auditors' sensitivity to high-risk cues related to pressure, opportunity, or both. As practitioners consider both to be relevant and diagnostic to the likelihood of fraud, we expect individual assessments of each component to be lower relative to a control group, stated formally as follows:

H1b: When management attitudes toward fraud are low risk, auditors will make lower assessments of the risk related to pressure than a control group.

H1c: When management attitudes toward fraud are low risk, auditors will make lower assessments of the risk related to opportunity than a control group.

Audit Effort

A critical determinant of audit quality is the "likelihood that an auditor discovers existing misstatements" (Knechel, Krishnan, Pevzner, Shefchik, and Velury, 2013, p. 388), and the "primary aim of increasing auditors' sensitivity to fraud risk factors is to ensure that better assessment of fraud risks results in better audit testing" (Trompeter, Carpenter, Desai, Jones, and Riley, 2013, p. 307). Auditor effort and, more specifically, audit-testing procedures affect this likelihood of

misstatement detection (Francis, 2011). Adjusting the standard audit program (e.g., increasing the extent of procedures) reduces the risk that tests will allow an audit client to conceal fraud (Wilks and Zimbelman, 2004). Given the importance of planned procedures and effort to audit quality, we extend our investigation of dilution from fraud risk assessments to its effect on planned audit procedures.

Prior research regarding the link between fraud risk assessments and planned procedures has been mixed. Some evidence has shown that auditors are more likely to increase budgeted hours because of identified fraud risks but are reluctant to change the procedures themselves (Zimbelman, 1997; Glover, Prawitt, Schultz, and Zimbelman, 2003). Other evidence suggests that fraud risk assessments do not affect audit procedure effectiveness (Asare and Wright, 2004) and that an emphasis on how the fraud could occur is necessary for effective changes to the audit program (Bowlin, 2011; Hammersley, 2011; Hammersley, Johnstone, and Kadous, 2011; Simon, 2012). Nelson (2009) explains that auditors may regard standard audit procedures as sufficient to compensate for risk or may be discouraged to change them due to threats to audit efficiency. Appropriately adjusting planned audit procedures, however, is important because those selected procedures impact the audit-testing execution, which may rely more on well-chosen audit procedures to ensure the detection of fraud than on auditors' continued attention to fraud risk (Austin, 2019; PCAOB, 2010).

When planned procedures are based on a diluted fraud risk assessment, we expect greater inappropriate hesitancy to increase the extent of planned audit procedures. We expect that auditors will overweight the irrelevant information that suggests management attitudes toward fraud are low risk. Our hypothesis is stated formally as follows:

> **H2:** When management attitudes toward fraud are low risk, auditors will be less likely to increase audit effort than a control group that does not observe management attitudes toward fraud.

Professional Skepticism and Mitigating the Dilution Effect

Given the threat the dilution effect poses to audit quality, finding ways to mitigate dilution is important. Several studies suggest altering features of the audit task to reduce the dilutive effects of irrelevant or non-diagnostic information. For example, Eilifsen *et al*. (2019) can partially mitigate dilution by presenting auditors with numerical risk information in a frequency format (e.g., five out of twenty) rather than in a base rate format (e.g., 25 percent), but auditors still demonstrate dilutive judgments. Importantly, the frequency format is most effective in the situations when the downside risk is greatest or, in other words, when the auditor receives non-diagnostic information that would cause them to view the client more favorably than they should (Eilifsen *et al.*, 2019). Glover (1997) also finds that restricting the time available to complete the audit task reduces the effect of dilution. The author attributes this result to time pressure forcing auditors to employ "filtration" in their cognitive approach, thereby only attending to the relevant information and disregarding the irrelevant information (Glover, 1997).

These findings are consistent with the theory that the dilution effect is a hard-wired, cognitive bias that comes from the way auditors process information rather than the amount of effort they exert to process the information (Hoffman and Patton, 1997). Corroborating the idea that dilution is a cognitive effect, rather than a motivational effect, is evidence that additional effort does *not* mitigate dilution. Accountability mechanisms, which are useful in prompting additional effort, do not reduce the dilution effect (Glover, 1997; Kennedy, 1993; Simonson and Nye, 1992). Indeed, accountability can worsen the dilution effect by encouraging decision-makers to incorporate all available information rather than discern which information is diagnostic (Tetlock and Boettger, 1989). Since accountability encourages effort (Simonson and Nye, 1992), additional effort, without a change in cognitive approach, could worsen auditor dilution effects. Due to the countervailing effects of cognitive changes to the task and decision-maker effort, we investigate whether auditor trait professional skepticism could mitigate the dilution effect.

Nelson (2009) models auditors' skeptical judgments as a function of 1) evidential input; 2) incentives to increase or reduce skepticism; 3) traits, including problem-solving ability, moral reasoning, and trait skepticism; 4) knowledge; and 5) experience. Nelson (2009, p. 4) defines professional skepticism as follows:

> A skeptic is one whose behavior indicates relatively more doubt about the validity of some assertion. More specifically, I define [skepticism] as indicated by auditor judgments and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor. Under this definition, an auditor who has high [skepticism] needs relatively more convincing (in the form of a more persuasive set of evidence) before concluding that an assertion is correct.

Hurtt (2010, p. 150) further contends that skepticism "can be both a trait (a relatively stable, enduring aspect of an individual) and also a state (a temporary condition aroused by situational variables)." Focusing on trait skepticism, Hurtt (2010) develops a scale (hereafter referred to as the "Hurtt Scale") that measures an individual's inherent skepticism based on six characteristics: suspension of judgment, questioning mind, search for knowledge, interpersonal understanding, autonomy, and self-esteem.

Overall, we expect auditors exhibiting high levels of trait skepticism, as measured by the Hurtt Scale (2010), to be less susceptible to the dilution effect than those scoring low on the skepticism scale. We expect high-skepticism auditors to exhibit an increased emphasis on delaying judgment and demanding corroborating (i.e., relevant) audit evidence, which could protect the auditor against weighting irrelevant information in judgments. Our hypothesis is stated formally as follows:

H3a: When management attitudes toward fraud are low risk, highly skeptical auditors will be less susceptible to the dilution effect than less skeptical auditors.

Furthermore, Nelson (2009) argues that whether skeptical action transpires, such as modification of audit procedures, depends in part on the level of skepticism an auditor exhibits in their judgments. Therefore, we expect auditors exhibiting higher levels of trait skepticism to be more likely to adjust audit procedures, despite the presence of dilutive factors such as low-risk management attitudes, stated formally as follows:

H3b: When management attitudes toward fraud are low risk, highly skeptical auditors will be more likely to modify audit procedures than less skeptical auditors.

III. Methodology

Participants

We recruite a total of 53 experienced auditors—55 percent at the senior-associate level and 45 percent at the manager/partner level—from a series of continuing professional education (CPE) sessions and through professional contacts in the Western and Southeast regions of the United States.[1] We drop data from two participants from the sample due to attention check failures—suggesting inattentiveness to critical case facts[2]—resulting in 51 usable responses. The auditors report an average of eight years of professional auditing experience (median of five years); all are licensed CPAs and indicate experience with performing fraud risk assessments in practice. In total, 47 percent are male, and 54 percent are female.

Table 1 reports demographic data by experimental group. Participants in the low-risk attitudes group report a mean of 8.39 years of experience (median = 5.00) and participants in the high-risk group report a mean of 8.79 (median 4.00). Most participants report being currently employed as auditors with public accounting firms (89 percent in the low-risk group and 91 percent in the control group), but all participants report public accounting experience within the last five years. About a third of participants report employment with a Big Four or a large international firm (25 percent in the low-risk group and 43 percent in the control group), while the other two thirds report employment with other national or regional firms.[3] [See Table 1, pg. 354]

Participant roles in public accounting range from staff to partner across both low-risk and control groups, respectively: staff (25 percent and 35 percent), senior (39 percent and 52 percent), and manager/partner (18 percent and 35 percent). Industry experience also varies widely in both groups—however, only 8 percent of total participants report experience in the telecommunications industry (which is the context for our experimental materials). Overall, there does not appear to be significant variation in demographic variables between experimental groups.

Task and Procedure

First, the study asks auditors to assume the role of senior associate on the recurring audit engagement (five years) of a large public company, RKP Networks, and read a brief history of the company. The history of RKP Networks is based

[1] This study received approval from the institutional review board of the authors' affiliated institution at the time of data collection.

[2] Conclusions based on the experimental results remain unchanged when we include data from the participants not passing the attention checks.

[3] Firm size, coded either as Big Four or as an international firm, is not significant in any of our models, so we exclude it from our analyses.

on the actual fraud case of Nortel Networks,[4] as documented in AAER, Civil Action No. 07-CV-8851 (SEC, 2007). We chose this case because of the prevalence of high-risk factors related to the opportunity and pressure components of the fraud triangle.[5]

Holding the risk of fraud related to opportunity and pressure constant at high risk allows for isolation of a dilution effect related to the manipulated independent variable of management attitudes toward fraud. Risk factors related to opportunities include the presence of complex revenue recognition, asset valuation, and transfer pricing issues that require significant management judgment. Additionally, a significant workforce reduction in the internal audit department results in concerns regarding the company's ability to maintain and monitor adequate internal controls.

Risk factors related to pressures include evidence of rapid growth followed by significant declines in industry-wide demand, overly optimistic press releases, and excessive pressure to meet Wall Street's expectations. The description of the hypothetical RKP Networks include all these opportunity and pressure factors, which we present to the participants of this study and keep consistent across all groups.

Second, we manipulate information about management attitudes at two levels: low risk and control (i.e., no information provided regarding the client's fraud risk). Although auditors should incorporate attitude cues suggesting a high risk of fraud in fraud risk assessments, audit standards instruct auditors not to incorporate low-risk attitudes.

To best represent the low-risk attitude cues that standard setters instruct auditors to disregard, we closely follow the wording of AS 2110, Identifying and Assessing Risks of Material Misstatement. This auditing standard identifies factors related to management attitudes such as the auditor's working relationship with management, timeliness and availability of client-prepared documents, effectiveness of communication with the board and audit committee, and focus of management's attention on fair presentation of the financial statements. Therefore, the instrument informs participants in the low-risk condition that working with RKP's management is "unproblematic," "documents are always received on a "timely basis," "communication with the board and audit committee is effective and candid," and management attaches "significant importance to achieving fair and accurate financial statement presentation." While some of these factors may be relevant to assessing the risk profile of the client and are even included in COSO's internal control framework (COSO, 2013), they should not affect assessments of risk related to pressure and opportunity cues that are held constant across all groups. There is a fundamental asymmetry in the auditing standards pertaining to the consideration of fraud risk: if management is cooperative, auditors are to set aside that low-risk indicator; if management is uncooperative, they should incorporate that high-risk indicator into an overall higher risk assessment. Our manipulation is designed to capture this asymmetry.

Participants in the control condition do not receive any additional information about management attitudes. This action is important to our experimental design because dilution occurs when auditors incorporate irrelevant information into a decision, causing underweighting of relevant decision cues (i.e., high-risk pressure and opportunity). A control group allows for isolation of the impact that low-risk attitude cues might have on assessments of other relevant risks.

After reviewing the experimental materials, auditors are reminded of the three conditions present when fraud occurs—opportunities, pressures, and attitudes—and provide definitions of each, taken directly from the auditing standards. The definition of opportunity risk specifically mentions "the absence of controls, ineffective controls, or the ability of management to override controls (PCAOB, 2010)." This definition is aligned with the high-risk factors present at RKP Networks involving concerns about the company's ability to maintain and monitor adequate internal controls. Pressure risk is defined as "factors which would provide management with a reason or a motive to commit fraud (PCAOB, 2010)." Recall that high-risk pressure cues at RKP Networks include rapid growth but declining demand, overly optimistic press releases, and excessive pressure to meet Wall Street's expectations.

[4] We did not inform participants of the similarities between our fictional company "RKP Networks" and "Nortel Networks" nor do we believe that the similarities are evident in the brief history provided. Those similarities include industry- and decade-specific factors such as rapid growth in the 1990s, followed by dramatic slowdowns leading into the 2008 financial crisis. Following the economic downturn, both companies experienced severe losses, restructuring and workforce reductions, asset write downs, and concerns about internal controls. Just as Nortel did, RKP Networks responded to the events with optimism, reported profits, and substantial bonuses. However, no details about the specific fraud that was later uncovered are included in the case.

[5] We pilot tested the experimental materials used in this study with 14 experienced auditors, and we made minor changes based on their input.

Dependent Variables

We collect three dependent measures on auditors' fraud risk assessments: opportunity risk, pressure risk, and overall risk.[6] We solicit each measure on a fully labeled, seven-point Likert scale of 1 ("Very Low") to 7 ("Very High"), with "Neutral" as the midpoint.

We also collect a fourth dependent measure for audit effort. Due to the high incidence of fraud related to revenue recognition (Beasley, Carcello, Hermanson, and Neal, 2010), participants review a list of standard audit procedures for the sales and receivables cycle and then indicate whether the extent of audit procedures that the audit program covered should increase or decrease using another Likert scale of 1 ("Significantly Decrease") to 7 ("Significantly Increase"), with "No Change" as the midpoint.

Professional Skepticism

We capture a second independent variable, trait professional skepticism, through the Hurtt Professional Skepticism Scale (2010). The scale measures inherent levels of trait skepticism using a scale of thirty items representing the six characteristics of professional skepticism.[7] We classify participants into two levels of professional skepticism: high trait professional skepticism and low trait professional skepticism, according to whether their scores were above or below the median, respectively.

IV. Results

Manipulation Checks

Results indicate that the manipulation of management attitude toward fraud was successful. The study asks participants to assess the risk of fraud attributable to each of the three components of the fraud triangle: opportunity, pressure, and attitudes. We examine differences in the perceived risk of fraud related to management attitudes across conditions. Mean risk assessments of management attitudes in the low-risk and control conditions are 3.89 and 4.91, respectively. These risk assessments are significantly different ($p < 0.01$) and support successful manipulation of management attitudes toward fraud.

Descriptive Statistics

Table 2 presents the descriptive statistics of fraud risk assessments by condition. The means pattern of the overall fraud risk assessment between groups is consistent with a dilution effect. The overall fraud risk assessment in the low management attitude risk condition is 5.04 (out of 7.0) and is significantly lower than overall fraud risk assessments in the control condition (5.61). See Table 2 for means, standard deviations, and cell sizes for each condition. [See Table 2, pg. 355]

Dilution in Overall Fraud Risk Assessment

Our first hypothesis predicts a dilution effect in auditor fraud risk assessments. Specifically, H1a predicts that, despite regulatory instruction to disregard low-risk management attitudes, auditors will incorporate the information, resulting in lower overall fraud risk assessments relative to a control group. We use a multivariate analysis (MANCOVA) to compare overall fraud risk assessments between the low management attitude risk condition and the control condition. We include trait professional skepticism (low vs. high) as an independent variable and audit experience as a covariate,[8] and

[6] Professional auditing standards require auditors to brainstorm fraud risk factors that may exist in a client's organization as part of the risk assessment process. Due to experimental constraints, our study asked participants to complete a fraud risk assessment without interaction with an engagement team. Prior research indicates that fraud risk assessments are generally higher following a brainstorming session than if completed individually prior to brainstorming (Carpenter, 2007). This represents an opportunity for future research. Understanding which fraud risk factors are most susceptible to diluted assessments of risk could further increase the effectiveness of brainstorming sessions.

[7] The six characteristics of professional skepticism include: (1) a questioning mind, (2) suspension of judgment, (3) search for knowledge, (4) interpersonal understanding, (5) self-esteem, and (6) autonomy.

[8] The experience covariant represents the number of years of general audit experience. Prior literature has examined the relationship between skeptical judgments and actions and certain auditor characteristics, including experience (Nelson, 2009; Hurtt *et al.*, 2013). Specifically, prior research finds that auditors with more experience demonstrate relatively less skepticism (Brasel, Hatfield, Parsons,

we find support for H1a. Our results indicate that auditors assess overall fraud risk as lower when management attitudes toward fraud are low risk than when the auditor receives no information about management attitude risk (p=0.04; Table 3). This finding supports the dilutive effects of low-risk attitude cues. [See Table 3, pg. 356]

Opportunity Risk, Pressure Risk, and the Mechanism of the Dilution Effect

Table 3 also presents results for H1b and H1c, which predict the mechanism by which the dilution effect occurs: we expect irrelevant information related to low-risk management attitudes toward fraud to reduce the impact of relevant information related to pressure and opportunity risk on auditor judgment. We find support for H1b: assessments of pressure risk are significantly lower (p=0.01) when management attitude risk is low, even though all participants received the same high-risk cues related to pressure. However, we do not find support for H1c: assessments of opportunity risk are not significantly different (p=0.44) when management attitude risk is low.

Further analysis reveals that pressure risk fully mediates the relationship between attitude risk and overall risk assessment, suggesting that the dilution effect due to low management attitude risk flows through participants' assessment of risk related to pressures: unsubstantiated growth, excessive optimism, and high market expectations. We present results of the mediation analysis in Panel A of Table 4. Panel B presents a visual representation of the full mediation, where low-risk management attitudes and high-risk pressure cues significantly impact auditors' overall fraud risk assessments when examined individually (p<0.05). However, consistent with mediation, when including both variables in the model, the significance of management attitudes disappears (p=0.46), while the impact of pressures becomes more pronounced (p<0.01). [See Table 4, pg. 358]

Our finding that the dilution effect operates through reduced pressure risk but not reduced opportunity risk may occur because pressure risk is more fungible than opportunity risk. Opportunity risk should be a product of the observed internal control environment of the company: if internal controls are weak, opportunity risk should be high, and if internal controls are strong, opportunity risk should be low, regardless of other factors. Pressure risk is more difficult for auditors to observe and measure than the internal control environment and associated opportunity risk. Like motivated reasoning (Kunda,1990), dilution is subject to bounded rationality; observable facts could constrain the dilution effect.

Planned Audit Effort and the Dilution Effect

Assessed fraud risk should affect the effort—in the form of the types of procedures chosen and the level of testing—that auditors plan to exert higher assessed risk should lead to greater audit effort; lower risk should lead to lower audit effort. This relationship prompts our second hypothesis, which predicts that when management attitude risk is low (and, therefore, overall fraud risk is diluted and assessed lower), auditors will plan a lower level of audit effort than control auditors. Results support H2: auditors in the low management attitude risk condition indicate a lower likelihood of performing additional audit procedures than auditors in the control condition ($p < 0.01$). Table 5 presents results of the multivariate analysis (MANOVA). This evidence shows that the dilution effect carries through to audit effort, reducing the likelihood that auditors will adjust planned procedures going forward and threatening audit effectiveness. This finding is concerning and warrants further exploration in future research. [See Table 5, 359]

Professional Skepticism and the Dilution Effect

H3a and H3b predict that trait professional skepticism will mitigate the dilution effect, resulting in higher overall fraud risk assessments and increased audit effort by highly skeptical auditors when management attitudes toward fraud are low risk. We split participants at the skepticism median (4.7 out of 6.0) to create high and low trait professional skepticism conditions. We do not find support for H3a: the evidence does not suggest that high levels of trait skepticism fully mitigate the dilution effect.[9] As Table 4 shows, there is neither a main effect of trait skepticism on component or overall fraud risk assessments, nor an interaction effect between trait skepticism and management attitudes. When management attitudes toward fraud are low risk, highly skeptical auditors make lower overall fraud risk assessments than a control group, just like less skeptical auditors. Table 5 presents similar results for H3b: there is no effect of trait skepticism on audit effort. Since interventions that change an auditor's cognitive approach to the task tend to mitigate the dilution effect, rather than

and Nickell, 2019; Payne and Ramsay, 2005). Therefore, we include a control variable in the model for years of experience. Our results are qualitatively unchanged if we exclude this covariate.

[9] We also did not find an effect of trait professional skepticism when splitting the data into thirds and comparing the lowest third with the highest third (dropping the middle third).

interventions that change their motivation to perform the task (Eilifsen *et al.*, 2019; Glover, 1997; Hoffman and Patton, 1997), this result could suggest that trait professional skepticism relates more to auditors' motivations toward evidence rather than their cognitive approaches to it.

V. Discussion and Conclusion

Our study provides direct, empirical evidence of the dilution effect in auditing, shows the mechanism through which it affects fraud risk assessments, and indicates that trait professional skepticism is not a strong mitigator of dilution. We show that when client management exhibits low-risk attitudes toward fraud, this low-risk attitude cue contaminates an auditor's fraud risk assessments, and overall fraud risk assessments are lower than when auditors do not have any information about management attitudes toward fraud. These lower fraud assessments then flow through to lower audit effort. While auditing standards address the need to disregard low-risk management attitudes toward fraud as irrelevant to fraud-related judgments, results of this study indicate that auditors are unable to do so and that their inability to disregard that information could be detrimental to audit quality and fraud detection.

To discover the mechanism through which the dilution effect operates, we use the fraud risk assessments of individual fraud triangle components: pressure, opportunity, and attitudes. Prior studies combined pressure and opportunity risks in their analysis (Favere-Marchesi, 2013; Wilks and Zimbelman, 2004); by investigating the fraud triangle components separately, we can observe how dilution affects them differentially. Contrary to our expectation that dilution would lower both the opportunity and pressure risk assessments, we find that the dilution effect works through a decreased sensitivity to pressure—but not opportunity—risk when management attitudes toward fraud are low risk. This result suggests that, when management attitude risk is low, auditors need to scrutinize the assessment of pressure risk for an inappropriately low assessment. These results are important because, while prior literature has focused on mitigating the dilution effect, these mitigation efforts have been without empirical evidence that low-risk attitudes can cause dilution and without knowledge of the mechanism through which this effect operates.

Lastly, we investigate a possible mitigator of the dilution effect: high trait professional skepticism. Despite promising aspects of professional skepticism, like a willingness to delay judgment and a demand for corroborating evidence, high trait skepticism does not fully protect auditors from succumbing to the dilution effect. Moreover, our finding that trait skepticism does not protect against dilution could support the call for treating professional skepticism as a mindset or attitude, which implies that interventions could promote it within contexts (Nolder and Kadous, 2018). This finding could provide insight into the nature of professional skepticism that could be useful to regulators, practitioners, and academics: professional skepticism, like other failed mitigators of the dilution effect, could relate more to a difference in auditor motivation to reach a skeptical judgment or action than a difference in auditor cognitive approach to those judgments and actions. This possibility has implications for academics and practitioners as they develop interventions to promote professional skepticism. Also, this possibility has implications for regulators as they consider what they can expect from professional skepticism in auditors: it may not be the silver bullet for audit quality that we would like it to be.

The limitations of our study provide opportunities for future research, particularly for investigating approaches that could reduce the impact of the dilution effect now that we understand how it occurs. Although we do not find evidence to suggest that highly skeptical auditors are less susceptible to dilution, Brasel et al. (2019) find that inward-directed skepticism, which involves revisiting one's own risk assessments, can reduce bias and improve auditor effectiveness when assessing fraud risk. Since our study finds that a reduced sensitivity to risk factors related to pressure drives the dilution effect, an inward-directed approach to skepticism (Peecher, Solomon, and Trotman, 2013) may be more effective at mitigating dilution than trait skepticism. Future research also should consider whether time pressure does in fact mitigate dilution, as Glover (1997) suggests, because auditors often must decide between exercising professional skepticism and going over budget or staying within the budget at the expense of audit quality (Agoglia, Hatfield, and Lambert, 2015).

Another opportunity for future research revolves around dilution's effects on audit effort. Although we investigate whether auditors would change the extent of planned procedures, we cannot speak to whether they would change the nature of such procedures or whether they would change them appropriately. It is possible that management attitude cues toward fraud are "general" rather than "specific" situational cues; if so, those cues might not be as useful for changing the nature, rather than the extent, of planned procedures (Hammersley, 2011, p. 103). Similarly, researchers could investigate how the dilution effect impacts the fieldwork phase since auditors may behave differently during fieldwork than during planning (e.g., Austin, 2019). For instance, auditors could be subject to more deadline or time pressure during fieldwork than during planning, or they may have a greater propensity to work in an implemental rather than deliberative mindset, which could

affect the impact of the dilution effect on audit quality. Future research could examine these possibilities to determine if the dilutive impact of low-risk management attitudes warrants further auditor training or quality control procedures to prevent a snowballing impact on the audit.

Our results also speak to the auditor-client relationship literature by demonstrating another way that such relationships threaten audit quality. Positive affect, impressions of management, and overreliance on management assertions are known challenges to audit quality (e.g., Schafer and Schafer, 2019; Knechel *et al.*, 2013; Robertson, 2010; Wolfe, Mauldin, and Diaz, 2009). Interactions with management, an increasingly important aspect of the audit process (Carlisle, Gimbar, and Jenkins, 2022), can pose a threat to independence and objectivity if positive elements of that relationship impair auditor judgment (e.g., Herda and Lavelle, 2015). We show that one avenue for this impaired judgment is if auditors assess management's attitude risk toward fraud as low, since this low-risk assessment can spill over and detrimentally affect other areas of the audit.

Auditing standards take a broad view of what constitutes management attitudes toward fraud. Although some of the risk factors related to management attitudes are relevant to engagement and attitude risks, when those factors are low risk, auditors should exclude them from their fraud risk assessment, particularly when opportunity and pressure risks are high. For fraud risk assessment, it is important for auditors to acknowledge that even genial, agreeable, accommodating people can commit fraud when they have the incentive and opportunity.

Overall, our findings suggest that assessing the risk related to management attitudes is problematic. This setting could be an instance of well-intended regulation producing the result regulators attempted to reduce, like how the PCAOB's increased risk assessment documentation requirements can cause auditors to be more lenient when assessing risk qualitatively (Piercey, 2011). While it will not mitigate the dilution effect more generally, the PCAOB may consider eliminating formal consideration of management attitudes during fraud risk assessments to reduce the dilution bias and its resulting impact on planned audit testing, thereby improving fraud detection.

Finally, the empirical evidence that the dilution effect impacts auditor judgment, even when audit regulation specifically disallows use of that information, is particularly concerning considering the increasing importance of Big Data in auditing. As the amount of information available to auditors increases by orders of magnitude, the effect of irrelevant information on the audit may go from diluting to drowning.

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Table 1: Participant Demographic Data

	Low-Risk (n = 28)	Control (n = 23)
Gender		
Male	14 (50%)	10 (43%)
Female	14 (50%)	13 (57%)
Audit Experience		
Years of Experience (mean)	8.39	8.79
Years of Experience (median)	5.00	4.00
Employment Experience		
Current Auditor	25 (89%)	21 (91%)
Big 4 or International Firm	7 (25%)	10 (43%)
Staff	7 (25%)	8 (35%)
Senior	11 (39%)	12 (52%)
Manager/Partner	5 (18%)	8 (35%)
Industry Experience		
Financial Services	6 (21%)	6 (26%)
Health Care	4 (14%)	0 (0%)
Hospitality	1 (4%)	4 (17%)
Manufacturing	11 (39%)	12 (52%)
Retail or Wholesale	6 (21%)	4 (17%)
Telecommunications	1 (4%)	3 (13%)
Real Estate	2 (7%)	6 (26%)

Table 2: Fraud Risk Assessment Descriptive Statistics
Mean (Std. Dev.)

		Management Attitudes[c]		
		Low-Risk	Control	*Difference*[a]
Low Trait Skepticism[d]	Opportunity Risk[b]	5.33 (0.78)	5.08 (1.75)	*0.26 (0.55)*
	Pressure Risk	5.83 (0.72)	6.23 (0.73)	*-0.40 (0.29) **
	Attitude Risk	3.83 (1.19)	4.69 (1.25)	*-0.86 (0.49) ***
	Overall Fraud Risk	**5.08 (0.52)**	**5.69 (0.86)**	*-0.61 (0.29) ***
	N	12	13	25
High Trait Skepticism	Opportunity Risk	4.69 (1.45)	5.20 (1.62)	*-0.51 (0.61)*
	Pressure Risk	5.50 (1.10)	6.20 (0.79)	*-0.70 (0.37) ***
	Attitude Risk	3.94 (1.12)	5.20 (1.48)	*-1.26 (0.51) ****
	Overall Fraud Risk	**5.00 (1.21)**	**5.50 (1.27)**	*-0.50 (0.50)*
	N	16	10	26
Total	Opportunity Risk	4.96 (1.23)	5.13 (1.66)	*-0.17 (0.41)*
	Pressure Risk	5.64 (0.95)	6.22 (0.74)	*-0.58 (0.24) ****
	Attitude Risk	3.89 (1.13)	4.91 (1.35)	*-1.02 (0.35) ****
	Overall Fraud Risk	**5.04 (0.96)**	**5.61 (1.03)**	*-0.57 (0.28) ***
	N	28	23	51

*, **, *** *Findings are significant at the p < 0.10, p < 0.05, and p < 0.01 levels, respectively (one-tailed).*

[a] *Independent t-tests compare auditors' fraud risk assessments between groups. Levene's test for homogeneity of variance was not significant for any of the dependent variables, allowing for analysis of unequal sample sizes.*

[b] *Fraud risk assessments of the fraud triangle components (opportunity risk, pressure risk, and attitude risk) and the overall fraud risk assessment are each assessed on a 7-point scale ranging from 1 = "very low" to 7 = "very high," with a "neutral" midpoint.*

[c] *Management attitudes is a two-level, between-subjects variable (low-risk vs. control) representing management's attitude toward fraud.*

[d] *Trait skepticism is a continuous variable representing participants' inherent skepticism and is assessed using the 30-item Hurtt Professional Skepticism Scale (2010) and split at the median of 4.67.*

Table 3: Effect of Management Attitudes and Trait Skepticism on Auditor's Fraud Risk Assessments (n = 51)

Source of Variation	DV[b]	SS	df	MS	F	p-value
Model[a]	Opportunity Risk	4.14	4	1.04	0.49	0.38
	Pressure Risk	5.54	4	1.39	1.82	0.07
	Attitude Risk	16.46	4	4.12	2.66	0.02
	Overall Fraud Risk	5.05	4	1.26	1.22	0.15
Management Attitudes[c]	Opportunity Risk	0.62	1	0.62	0.29	0.30
	Pressure Risk	4.33	1	4.33	5.70	0.01***
	Attitude Risk	15.65	1	25.65	10.11	< 0.01***
	Overall Fraud Risk	4.46	1	4.46	4.32	0.02**
Trait Skepticism[d]	Opportunity Risk	0.99	1	0.99	0.47	0.25
	Pressure Risk	0.50	1	0.50	0.65	0.21
	Attitude Risk	0.92	1	0.92	0.60	0.22
	Overall Fraud Risk	0.30	1	0.30	0.29	0.30
Attitudes x Skepticism	Opportunity Risk	2.21	1	2.21	1.04	0.16
	Pressure Risk	0.43	1	0.43	0.56	0.23
	Attitude Risk	0.85	1	0.85	0.55	0.23
	Overall Fraud Risk	0.00	1	0.00	0.00	0.48
Experience (Covariate)	Opportunity Risk	0.85	1	0.85	0.40	0.27
	Pressure Risk	0.61	1	0.61	0.80	0.19
	Attitude Risk	1.79	1	1.79	1.16	0.15
	Overall Fraud Risk	0.65	1	0.65	0.63	0.22
Error	Opportunity Risk	95.76	46	2.08		
	Pressure Risk	35.14	46	0.76		
	Attitude Risk	71.31	46	1.55		
	Overall Fraud Risk	47.02	46	1.02		

***, *** Findings are significant at the p < 0.05 and p < 0.01 levels, respectively (one-tailed).*

[a] *The analysis performed is a multivariate analysis of covariance (MANCOVA) with two between-subject variables (Management Attitudes and Trait Professional Skepticism), and a control variable for years of*

experience. Levene's test for homogeneity of variance was not significant for any of the dependent variables, allowing for analysis of unequal sample sizes.

[b] *Fraud risk assessments of the fraud triangle components (opportunity risk, pressure risk, and attitude risk) and the overall fraud risk assessment are each assessed on a 7-point scale ranging from 1 = "very low" to 7 = "very high," with a "neutral" midpoint.*

[c] *Management attitudes is a two-level, between-subjects variable (low-risk vs. control) representing management's attitude toward fraud.*

[d] *Trait skepticism is a continuous variable representing participant's inherent skepticism and is assessed using the 30-item Hurtt Professional Skepticism Scale (2010) and split at the median of 4.67.*

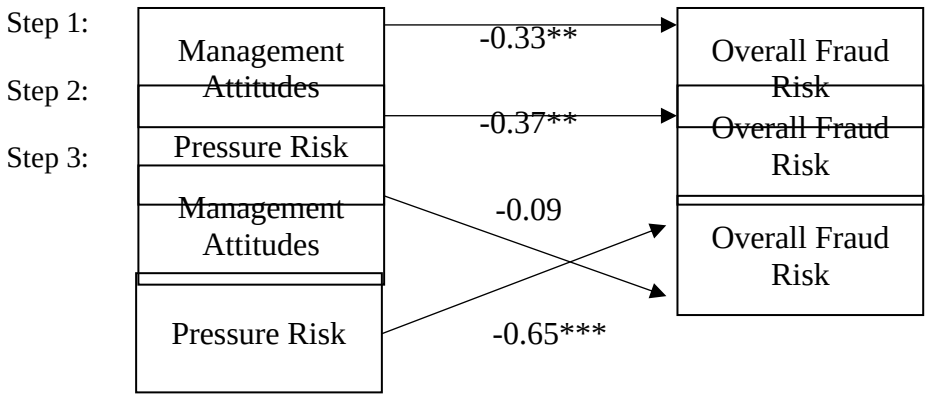
[e] *Experience is a continuous variable representing participants' years of professional auditing experience.*

Table 4: Dilution Through Reduced Sensitivity to Pressure Risk
Mediation Analysis

Panel A: Mediation Analysis

Mediation Step	DV	IV(s)	Standard Error	Beta Coefficient	t	Significance
1	Overall Fraud Risk[a]	Management Attitudes[c]	0.31	-0.33	-2.18	0.03**
2	Pressure Risk[b]	Management Attitudes	0.27	-0.37	-2.43	0.02**
3	Overall Fraud Risk	Management Attitudes	0.26	-0.09	-0.75	0.46
		Pressure Risk	0.13	0.65	5.74	<0.01***

Panel B: Mediation Analysis Figure



***, *** Findings are significant at the p < 0.05 and p < 0.01 levels, respectively.*

[a] *Overall fraud risk assessments are assessed on a 7-point scale ranging from 1 = "very low" to 7 = "very high," with a "neutral" midpoint.*

[b] *Fraud risk assessments of the pressure risk are assessed on a 7-point scale ranging from 1 = "very low" to 7 = "very high," with a "neutral" midpoint.*

[c] *Management attitudes is a two-level, between-subjects variable (low-risk vs. control) representing management's attitude toward fraud.*

Table 5: Effect of Management Attitudes and Trait Skepticism on Audit Effort (n = 51)

Source of Variation	SS	df	MS	F	p-value
Model[a]	9.72	4	2.43	3.78	0.01
Management Attitudes[b]	8.23	1	8.23	12.79	<0.01***
Trait Skepticism[c]	0.20	1	0.20	0.31	0.58
Attitudes x Skepticism	0.00	1	0.00	0.01	0.94
Experience (Covariate)[d]	0.16	1	0.16	0.25	0.62
Error	29.60	46	0.64		

*** *Findings are significant at the p < 0.01 level.*

[a] *The analysis performed is a multivariate analysis of covariance (ANCOVA) with two between-subject variables (Management Attitudes and Trait Professional Skepticism), and a control variable for years of experience. Levene's test for homogeneity of variance was not significant (p=0.34), allowing for analysis of unequal sample sizes.*

[b] *Management attitudes is a two-level, between-subjects variable (low-risk and no information given (control)) representing management's attitude toward fraud.*

[c] *Trait skepticism is a continuous variable representing participant's inherent skepticism and is assessed using the 30-item Hurtt Professional Skepticism Scale (2010) and split at the median of 4.7.*

[d] *Experience is a continuous variable representing participants' years of professional auditing experience.*