Does Information about Material Weaknesses Facilitate Auditors' Fraud Detection?

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Abstract

We investigate whether information about deficiencies in controls over financial reporting made available under the Sarbanes-Oxley Act facilitates auditors' fraud detection. Using an actual fraud case, we experimentally examine auditors' planning judgments and decisions under three levels of information about material weaknesses: (1) no information available, (2) a material weakness exists in the transaction cycle being audited, and (3) a material weakness exists in a different cycle. Auditors receiving information about a material weakness in the transaction cycle they are auditing assessed higher fraud risk and indicated a higher need to consult with a risk management partner, but did not generate more risk factors related to the seeded fraud or produce higher quality audit programs, compared to auditors in the other experimental conditions. Further, auditors receiving information about a material weakness in the cycle they are auditing produced audit programs that are no more effective, and are *less* efficient, than those produced by auditors in the other experimental conditions. Additional analysis reveals that auditors modified the standard program by increasing sample size in light of material weakness information, even though increasing sample size is ineffective in detecting the fraud. We conclude that auditors attend to the material weakness information when assessing risk and making audit planning decisions, but they do not appear to know how to use such information effectively.

Keywords: Audit planning, Fraud detection, Internal controls, Sarbanes-Oxley Act.

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I. INTRODUCTION

A primary purpose of the Sarbanes-Oxley Act of 2002 (SOX) was to reduce the incidence of fraudulent financial reporting (Oppel 2002; Nicolaisen 2004). Though SOX took a multi-pronged approach to the problem, the internal control provisions, which require management and auditors to examine and report on the operating effectiveness of management's internal controls over financial reporting, stand out as particularly ambitious. Based on the idea that weak internal controls facilitate fraud (Turner 2006), SOX was designed to reduce fraud by improving internal controls over financial reporting. To encourage such improvement, auditors are required to examine a more comprehensive set of internal controls than they typically examined in pre-SOX financial statement audits and are required to identify important deficiencies in controls and publicly report the most severe deficiencies. A result of this legislation is that all parties to financial reporting, including auditors, have more information about the quality of the client's internal control system than they did before the implementation of SOX, including, in particular, knowledge of important deficiencies in controls over financial reporting.

In this study, we examine whether this additional information can enhance audit quality. Implementation of the SOX internal control provisions has proven very costly (McDonough 2005; Charles River Associates 2005); however, it is important to weigh the costs against the appropriate set of benefits. We identify a potential benefit of SOX that is difficult to measure archivally, but that can be examined in an experimental setting. In particular, we examine whether the information about a company's deficiencies in internal controls that is available under SOX facilitates auditors' ability to detect fraud.

We anticipate that information about a material weakness (the most severe classification of deficiency) in a client's controls will make the possibility that the financial statements are materially

misstated more salient to auditors, and that this effect will be stronger when the material weakness is in the transaction cycle being audited. We expect the increased salience of potential material misstatement among auditors receiving this information will prompt them to think in more careful and complex ways about how misstatements could occur for this client, resulting in better use of available client information in fraud detection. The nature of these posited effects implies that enhanced fraud detection should occur even when the material weakness turns out to be unassociated with the fraud. Based on this reasoning, we expect that auditors will be better able to (1) identify high fraud risk when it exists, (2) respond to the fraud risk via identification of specific fraud risk factors, (3) design effective audit procedures for detecting the fraud, and (4) assess the need to consult with a risk management specialist when they have information that a material weakness exists, especially when the material weakness is in the same transaction cycle that they are auditing.

We report results of an experiment in which senior-level Big Four auditors made audit planning judgments and decisions related to the revenue cycle of a (disguised) company that had perpetrated a material fraud in the revenue cycle. We manipulated the information auditors received about material weaknesses at three levels. Auditors in the "no information" condition were told that internal controls testing was currently being performed and results were not yet available. Participants in the "different cycle" ("same cycle") conditions were told that internal controls testing was currently being performed and that so far, one material weakness had been identified related to recording debt (revenue). The material weaknesses were unrelated to the seeded fraud. We provided auditors with company information including background information, financial statements, selected ratios, and a description of the company's new marketing plan that was the means by which they perpetrated the fraud. After reading the materials, auditors assessed fraud risk, listed risk factors, modified a standard revenue cycle audit program, and assessed the need to consult with a risk management partner.

Results are consistent with information about a same-cycle material weakness increasing the salience of misstatement risk. That is, auditors who received information about a material weakness in the transaction cycle they were auditing assessed fraud risk significantly higher than did auditors who received no information about a material weakness. While information about a same-cycle material weakness apparently increased the salience of potential misstatement, it did not increase auditors' ability to detect fraud. Contrary to expectations, auditors receiving material weakness information did not identify more risk factors related to the actual fraud and did not design higher quality audit programs (i.e., better matching those of an expert panel) than auditors without such information. Finally, auditors receiving information about a material weakness in the same cycle assessed a higher need to consult with a risk management partner before finalizing the audit program.

We perform additional analyses to assess why auditors who received information about a material weakness did not design higher quality audit programs despite assessing higher fraud risk. We find that auditors who received information about a same-cycle material weakness designed programs that were *no more effective* and were *less efficient* than those of auditors in the no information condition. A closer examination of the audit programs shows that auditors receiving information about a same-cycle material weakness modified the audit program more than did auditors without material weakness information, but their modifications generally were ineffective—they tended to indiscriminately increase sample size even though these changes would not detect the seeded fraud. Overall, our evidence indicates that auditors use information about material weaknesses in the transaction cycle they are auditing to assess higher fraud risk. However, on average, senior-level auditors are apparently unable to appropriately respond to the risk.

Finally, we find that auditors whose list of risk factors focused more on the seeded fraud designed higher quality audit programs. This indicates that fraud risk factor identification is a critical

link in the fraud detection process. Provision of material weakness information does not facilitate fraud detection apparently because it does not enhance auditors' ability to identify relevant risk factors.

This paper contributes to the literature by identifying a potential benefit of information available under SOX in helping auditors to identify high fraud risk when it exists. While the COSO report documents that auditors' most commonly ignored fraud red flags are those related to weak internal controls (COSO 1987), we provide the first evidence that information about deficiencies in controls over financial reporting increases the salience of misstatement due to fraud in the post-SOX environment.

While the results show that auditors attend to material weakness information in making auditing judgments, our study contributes further by demonstrating that auditors are not able to use that information to design better audits. While our study is not the first to identify a disconnect between risk assessments and audit planning performance, it is meaningful that we document this issue in the context of the internal control reporting requirements imposed by SOX because it implies that an important intended benefit of SOX is not being realized.

Finally, our study contributes to the literature by providing evidence about how auditors deal with heightened perceptions of fraud risk and why their attempts to address the risk are unsuccessful. We do this, in part, by separately analyzing the effectiveness and efficiency of the audit programs auditors develop and by examining their modifications to a standard program in detail. We show that auditors receiving information about a material weakness in the cycle they are auditing tend to respond by indiscriminately increasing sample size for standard procedures, even when doing so does not effectively address the specific risks present in the fraud scheme. In addition, in comparing prior judgments of preparers of higher and lower quality audit programs we show that identifying relevant fraud risk factors is critical to designing high-quality programs. These results should prove useful to researchers and auditors who seek to improve audit quality.

The remainder of this paper is organized as follows. Section II lays out our theory and predictions. Section III describes our experimental method, and Section IV provides results of our tests of hypotheses and additional analyses. Section V includes a discussion of limitations and conclusions.

II. PRIOR LITERATURE AND HYPOTHESES

The internal control reporting provisions of SOX result in auditors having far more information about the effectiveness of their clients' internal controls than they were likely to have had before SOX. In particular, auditors must identify important deficiencies in controls over financial reporting, and so when planning audit procedures for a transaction cycle, auditors may have information about material weaknesses in that cycle or in a different cycle. A material weakness is the most severe type of deficiency. It is defined as a weakness in internal control over financial reporting that causes at least a reasonable possibility that a material misstatement in the financial statements will not be prevented or detected on a timely basis (PCAOB 2007). We examine whether information about material weaknesses facilitates auditors' ability to detect fraud when fraud is present.

Assessing the Risk of Fraud

An important first step in fraud detection is identifying high fraud risk conditions. Several prior studies illustrate that auditors experience difficulty in appropriately assessing fraud risk (see Nieschwietz et al. 2000 and Allen et al. 2006 for comprehensive reviews). For example, Hackenbrack (1992) and Hoffman and Patton (1997) show that auditors' fraud risk assessments are diluted by non-diagnostic cues. Hackenbrack (1993) shows that there is considerable disagreement among auditors about the effect of the presence of various red flags on the risk of fraudulent financial reporting. Pincus (1989) reports that auditors' fraud risk assessments are not sensitive to the presence of fraud when they use a questionnaire to aid fraud red flag identification. More recently, Graham and Bedard (2003) document that auditors' fraud risk assessments are not associated with fraud risk factors related to

management integrity, industry, controls quality or performance pressure, despite the fact that auditors identified the most relevant fraud risk factors themselves. These studies illustrate that the fraud risk factors are not always appropriately reflected in fraud risk assessments. However, Zimbelman (1997) shows that auditors pay more attention to fraud risk factors when they make explicit, separate fraud risk assessments for intentional and unintentional misstatements than when they make holistic assessments not specifically focused on fraud, so increasing the salience of the possibility of fraud may improve fraud risk assessments.

We expect that having information about a material weakness such as that provided by SOX will improve auditors' ability to appropriately assess fraud risk when that risk is high. Our reasoning is that because material weaknesses are associated with the possibility of material misstatement, information that a material weakness exists will highlight the possibility of material misstatement in the client's financial statements, whether specifically related to the material weakness or not. Because the possibility of a material misstatement should be more salient to auditors with material weakness information than to auditors who have no such information, auditors with the material weakness information should attend more to fraud risk cues and other indications of misstatement encountered during the audit. Thus, we expect that the possibility of material misstatement anywhere in the audit (i.e., same or different transaction cycle) will heighten auditors' awareness of relevant fraud risk indicators and improve assessment of high-risk situations. Information about a material weakness in the cycle under audit is a particularly strong indicator of the possibility of material misstatement in that cycle, and so the impact of information about a material weakness in the same cycle should be particularly large.

> ***Hypothesis 1:*** Given the presence of fraud risk cues, ***auditors' fraud risk assessments*** will be higher when they have information that a material weakness exists, especially when that material weakness is in the transaction cycle they are auditing, compared to a different cycle.

Responding to the Risk of Fraud

Identifying Fraud Risk Factors and Designing Procedures

Upon assessing the risk associated with fraudulent financial reporting, professional standards require auditors to act on their assessments in planning the nature of tests on the audit engagement (AICPA 2002). However, auditors often have difficulty translating their risk assessments into meaningful audit procedures (Allen et al. 2006), and some early studies show that they are reluctant to alter evidence collection in response to changes in client risks (Bedard 1989; Mock and Wright 1993, 1999). Considering fraud risk specifically, Zimbelman (1997) finds that auditors do not change the nature of their audit plans in response to heightened fraud risk, attributing this result to the possibilities that auditors do not know how to adjust their procedures to detect fraud, they do not consider it effective to adjust their procedures, or they do not believe that procedures other than those that are "standard" are necessary to detect fraud. Using data collected as recently as 2000, Asare and Wright (2004) also report that auditors do not design audit programs that reflect heightened fraud risk.

While some prior studies show that auditors do not perform well in planning tests appropriate for responding to risk, other studies report results more consistent with professional standards, largely when standards can be met by increasing the extent of testing. For example, Cohen and Hanno (2000) show that when management has a weak control philosophy and weak corporate governance, auditors increase the number of locations to be tested and the extent of testing to be conducted prior to year-end. Glover et al. (2000) report that auditors increase the number of planned site visits for inventory testing and budgeted hours for inventory observation and price testing when management has a higher incentive to misstate the financial statements, although there was no effect on planned sample sizes. However, over 40 percent of auditors failed to alter their preliminary plans despite learning of a significant unexpected fluctuation.

A few studies are more promising regarding auditors' ability to relate risk assessments and risk factors to subsequent audit judgments. Graham and Bedard (2003) asked auditors to design procedures to address the fraud risks at a given client. Under these conditions, they show that fraud risks related to the client's industry and financial status are associated with substantive testing plans tailored to fraud detection. Further, auditors' assessments of management integrity and internal controls are associated with plans for review and inquiry tests tailored to fraud detection. Kizirian et al. (2005) show that auditors' assessments of the risk of material misstatement, low management integrity, and the existence of a prior period error are positively associated with the persuasiveness of audit evidence gathered during audit testing in the revenue cycle.

While the literature that we review above provides mixed results concerning the responsiveness of auditors to the presence of fraud, it is important to note that this research primarily reflects auditor decisions prior to the financial crisis of the early 2000's, the enactment of SOX, the creation of the PCAOB, and the application of SOX Section 404 on internal control reporting. These events highlighted auditors' downside risk for failing to detect fraud. The new regulations make it mandatory that auditors consider and report on internal controls in audits of financial statements. PCAOB inspection teams review firms' audit engagements to ensure standards are followed. Thus, one might reasonably expect that auditors' responses to the potential presence of fraud would be more consistent with professional standards in the post-SOX era that is the subject of this study.

We expect that as the risk of material misstatement becomes more salient (due to the provision of material weakness information), auditors' decision processes will be influenced in ways that will facilitate fraud detection. In particular, heightened risk of material misstatement increases the importance to auditors of performing a high quality audit by increasing the salience of potential future losses associated with audit failure. Drawing on research on accountability, when risk of material

misstatement is high and such losses are salient, we expect professionals to engage in "pre-emptive self-criticism" (Tetlock 1983; Tetlock et al. 1989). For example, auditors may consider what responses the regulator or the legal system would expect them to undertake given the misstatement risk. This, in turn, should spur auditors to engage in more careful and complex reasoning in order to identify the specific fraud risk factors that are present and the procedures that would most effectively identify the fraud. We expect this will aid fraud identification if auditors are able to develop specific hypotheses about the source and nature of the possible fraud (i.e., they can generate the correct fraud hypothesis) and if they can identify procedures that would be effective for fraud detection.

Prior research provides evidence of similar effects in other accounting contexts. For example, Johnstone et al. (2002) show that auditors in a high-risk client-auditor negotiation context process case information more deeply and develop more complete mental representations of that information compared to auditors in a low risk context. Kadous et al. (2008) show that tax professionals undertake a more effortful and more appropriate information search strategy for a high-risk client than for a low-risk client.

To summarize, in Hypothesis 1 we predict that information about a material weakness increases the salience of the possibility of material misstatement, thereby heightening auditors' awareness of relevant fraud risk indicators and improving the assessment of high fraud risk situations, especially when the material weakness is in the cycle being audited. Increased fraud risk assessments should highlight the potential costs of poor auditor decision making, thereby increasing auditor care and effort applied to responses to fraud. This line of reasoning supports the following predictions:

> ***Hypothesis 2:*** Given the presence of fraud risk cues, ***auditors' lists of risk factors*** will focus more on the fraud area when they have information that a material weakness exists, especially when that material weakness is in the transaction cycle they are auditing, compared to an unrelated transaction cycle.

> ***Hypothesis 3:*** Given the presence of fraud risk cues, auditors' ***audit program modifications*** will be of higher quality when auditors have information that a material weakness exists, especially when that material weakness is in the transaction cycle they are auditing, compared to a different cycle.

Using Specialists

Consulting personnel that specialize in high-risk clients is a potentially effective auditor response to fraud risk. Johnstone and Bedard (2001) report that auditors plan increased use of personnel specializing in high-risk clients when a prospective audit client has heightened risks of either fraud or error. Asare and Wright (2004) find that auditors are more likely to consult with the firm's fraud experts when they perceive heightened risk of fraud on the engagement. Thus, this narrowly focused area of the academic research provides support for appropriate auditor responses to fraud risk. Given these results and given our expectation that material weakness information increases perceptions of fraud risk and the importance to auditors of responding to that risk, we make the following prediction:

> ***Hypothesis 4:*** Given the presence of fraud risk cues, ***auditors' assessments of the need to consult*** with a risk management partner will be higher when they have information that a material weakness exists, especially when that material weakness is in the transaction cycle they are auditing, compared to a different cycle.

III. RESEARCH METHOD

We tested our hypotheses in an experiment in which practicing auditors made audit planning judgments and decisions for the revenue cycle of a hypothetical client under conditions that varied in terms of the information provided about the existence of material weaknesses in controls over financial reporting.

Participants

Ninety-nine senior-level auditors with an average of 41.2 months of audit experience participated in our study during a firm training session for experienced seniors.[1] Fifty percent of

[1] Two participants did not complete the task and we excluded their data from all analyses.

participants identified themselves as CPAs. Experienced audit seniors are appropriate participants for this task because they are responsible for preparing audit programs.

Materials and Procedures

Participating auditors read case information about a hypothetical client and were instructed to design a revenue cycle audit program for the client. We adapted the materials from Asare and Wright (2004). Our case included background information on the company, industry analysis, assessments of management, materiality, and the control environment, an overview of the revenue cycle, and information about a new marketing strategy the company was employing. The case also contained current and prior year ratio analyses and summary financial statements. After reading the materials, the auditors identified five audit risk factors, judged revenue cycle risks, modified a standard revenue cycle audit program to respond to the risks, assessed the need to consult with a risk management partner before finalizing the audit program, and completed a post-experimental questionnaire containing demographic questions and manipulation checks.

The case contained an embedded revenue cycle fraud reported by the Securities and Exchange Commission in an Accounting and Auditing Enforcement Release, thereby providing a valid outcome measure of fraud. The company had committed revenue fraud via channel stuffing and bill-and-hold schemes with a small subset of its distributors. The case contained a description of the "new marketing strategy" by which the fraud was committed—the strategy described questionable sales, credit, shipping, and other incentives being offered to that small set of distributors. Financial statements and financial ratios also indicated potential misstatements consistent with the scheme.

Independent variables

We manipulated information about a material weakness between participants at three levels: (1) no information provided about the presence of a material weakness, (2) information provided about a material weakness in a different transaction cycle than the cycle being audited, and (3) information provided about a material weakness in the same cycle as the cycle being audited. In all conditions, we told participants that the audit firm was currently testing the client's controls company-wide (i.e., testing was incomplete). In the no information condition, we also told them that no results were available yet. In the other two conditions, we told them that so far, one material weakness has been identified. In the different cycle material weakness information condition the instrument described a weakness in recording debt contracts; in the same cycle material weakness information condition the instrument described a weakness in recording revenue contracts. We present details of the manipulations in Appendix 1.

Dependent variables

We have four primary dependent variables. First, we elicited auditors' assessments of fraud risk associated with the revenue cycle on an 11-point Likert scale anchored by 0 (low risk), 5 (moderate risk), and 10 (high risk). We defined fraud risk as the risk that the client and its management would intentionally cause the financial statements to be materially misstated. This risk assessment is the dependent variable for Hypothesis 1.

Second, auditors listed up to five important risk factors that came to their attention while reading the case. We use this measure to test Hypothesis 2, which concerns the extent to which the risk factors are related to the fraud. To facilitate that determination, we had two research assistants (each with at least three years of audit experience) code the risk factors into one of six categories: related to the seeded fraud, re-iterating a material weakness, related to other revenue

cycle issues, related to other risks, related to other control system issues, and errors.[2] They coded while blind to the research hypotheses and experimental conditions. Inter-rater agreement was 88.4 percent. Cohen's Kappa, a measure of inter-rater agreement over and above that expected by random agreement, is 0.834, and this is significantly different from zero ($p < 0.001$). All differences were mutually resolved by the coders. Our dependent variable for Hypothesis 2 is the number of risk factors that were coded as related to the seeded fraud.

Third, participants modified a standard revenue cycle audit program and wrote additional procedures that would be necessary to respond to the risks present at the client. The standard audit program contained 15 audit procedures related to sales and receivables. Auditors chose one or more of five options for each procedure: (1) omit, not applicable; (2) perform standard procedure (random sample, low to medium risk); (3) increase sample size for high risk; (4) modify to focus (target) sample; and (5) modify in some other way. The standard audit program is contained in Appendix 2. When the auditors chose options 4 and 5 they also specified how they would modify the procedure. We read the modifications they specified to determine whether they were focused on the fraud area.

We had an expert panel determine a high quality audit program that would effectively and efficiently respond to the fraud risk factors contained in the experimental materials, and we measured the degree to which the individual auditors' programs coincided with this high quality program. The expert panel was composed of three auditors (two partners and one senior

[2] We coded risks as related to the seeded fraud if the items discussed characteristics of the marketing plan or made conclusions about its character (e.g., "bill and hold" or "channel stuffing"). We coded risks as reiterating a provided material weakness if the items noted the presence of the weakness or described the weakness. Other revenue cycle risks include items focused on revenue trends or changes in sales mix, but not related to the seeded fraud. Other risks include risk factors focused on the changing competitive environment, pressure on management, and the organization of the business. Control system risks include conclusions about the internal control system or concerns about the internal control system that are a consequence of a material weakness in a different cycle (e.g., "Is the control system effective at recording non-routine transactions?", "The material weakness is probably indicative of problems in revenue, too"). Errors are conceptual mistakes.

manager) with an average of 14.4 years of audit experience. The expert panel recommended that the standard audit program procedures be performed for three of the fifteen standard audit program steps and recommended modifications that target the sample or change the standard procedure in other ways to focus the procedure on the fraud for eight program steps. The expert panel also recommended that the remaining four program steps be omitted because they were not relevant to the client's situation.

We computed a measure of audit program quality by summing the number of each auditor's procedure choices that agreed with the recommendations of the expert panel and the number of additional audit procedures the auditor wrote that were coded as able to diagnose the fraud. Higher scores reflect higher quality audit programs. The audit program quality score is the dependent variable for Hypothesis 3.

To compute the first component of the audit program quality score, we assigned one point for each program step for which the auditors chose only the same action as the expert panel. For example, because the fraud was isolated to the new marketing strategy, the expert panel suggested targeting several procedures to focus the sample on the distributors included in the program. When the expert panel recommended this targeting, an auditor who indicated that the procedure should be performed by increasing the sample size received no credit for this modification under our audit program quality measure as it is neither effective nor efficient (note that we later separately examine efficiency and effectiveness).[3]

For the additional procedures written, an author who was blind to experimental condition and a research assistant who was blind to the hypotheses and experimental condition coded the

[3] Note that a general sample size increase would be appropriate if general conditions were risky but the source of the risk could not be targeted. Given the availability of a hypothesis focusing on a specific group of customers (i.e., distributors), recommending that option is inefficient and would be ineffective unless the distributors appear in the enlarged sample by chance.

additional procedures written as to whether they would discriminate the presence of the seeded fraud. Inter-rater agreement is 89.3 percent. Cohen's Kappa is 0.732, and this is significantly different from zero ($p < 0.001$). All coding differences were mutually resolved.

Finally, we elicited auditors' judgments about the need to consult with a risk management partner before finalizing the proposed audit program for the revenue cycle on an 11-point Likert scale anchored by 0 (no necessity to consult), 5 (moderate need to consult), and 10 (high necessity to consult). This is the dependent variable for Hypothesis 4.

IV. RESULTS

Manipulation Check

In the post-experimental questionnaire, we assessed the effectiveness of our material weakness information manipulation by asking the auditors to identify the results of controls tests in the case they had read. They could answer that the case did not state whether any material weaknesses had been identified, that a material weakness had been discovered in a cycle other than the revenue cycle, or that a material weakness had been discovered in the revenue cycle. Fifteen participants failed this manipulation check. We drop data from participants who failed the manipulation check in our analyses; however, inferences are unchanged if we include these data.[4]

Fraud Risk Assessments

Our first hypothesis predicts that given a seeded fraud, auditors' fraud risk assessments will be higher when they have information that a material weakness exists, especially when it is in the transaction cycle they are auditing. To test this hypothesis, we estimate an ANOVA with

[4] Seven participants correctly identified that they had been given information about a material weakness, but identified it as relating to the wrong cycle. Seven additional participants who received information about a material weakness incorrectly said that the case did not state whether a material weakness had been identified. Finally, one participant answered that there was a revenue cycle material weakness even though that participant received no material weakness information.

revenue cycle fraud risk assessment as the dependent variable and material weakness information condition as the independent variable. Table 1, Panel A contains the ANOVA and Panel B contains descriptive statistics.

Auditors with information that a material weakness exists in the cycle they are auditing assessed fraud risk higher (8.286) than auditors with no material weakness information (7.148), and this difference is significant ($F_{1, 76} = 4.63$, $p = 0.018$); however, they did not assess fraud risk significantly higher than auditors with information that a material weakness exists in a different cycle (mean 7.708, $F_{1, 76} = 1.12$, $p = 0.147$).[5] Auditors with different-cycle material weakness information did not assess fraud risk significantly higher than auditors with no material weakness information ($F_{1, 76} = 1.04$, $p = 0.156$). Thus, information about a same-cycle material weakness increased fraud risk assessments compared to no information about material weaknesses, but information about a different-cycle material weakness did not. This evidence partially supports Hypothesis 1.

Fraud Risk Factors

Our second hypothesis predicts that given a seeded fraud, auditors' lists of risk factors will focus more on the fraud area when they have information that a material weakness exists, especially when it is in the cycle they are auditing. To test this hypothesis, we estimate an ANCOVA with number of fraud-specific risks as the dependent variable, material weakness information condition as the independent variable, and revenue recognition experience as a covariate.[6] Table 2, Panel A contains the ANCOVA and Panel B contains descriptive statistics for our dependent variable as well as for the other categories we coded. The tests of planned

[5] Because we have directional predictions, we report one-tailed p-values unless otherwise noted.
[6] Despite our use of random assignment to experimental condition, we have significant differences across material weakness information condition on two demographic measures: number of audits on which material fraud has been discovered and self-rated revenue recognition experience. We include these variables in our models as control variables when they are significantly correlated with our dependent variables.

comparisons among the cell means reveal no significant differences in fraud risk factors identified across conditions (all p-values > 0.60). This evidence does not support Hypothesis 2.[7] Recall that we instructed our participants to write up to five risk factors. Because we limited their responses, we were concerned that participants who were in same or different cycle material weakness information conditions may have used one of their five risk factors to list the presence of the material weakness. To investigate whether this affects our conclusions, we compute the proportion of fraud risk factors written to total risk factors written without regard to material weakness risk factors. Our inferences are unaffected by using this dependent variable; there are no significant differences among the three levels of our independent variable (all p-values > 0.50). Information about a material weakness, whether in the same cycle or a different cycle, did not increase the number of risk factors listed that focus on the seeded fraud.

Audit Program Quality

Our third hypothesis predicts that given a seeded fraud, auditors' audit program modifications will be of higher quality when auditors have information that a material weakness exists, especially when that material weakness is in the cycle they are auditing. To test this hypothesis, we estimate an ANCOVA with audit program quality as the dependent variable, material weakness information condition as the independent variable, and experience with fraud as a covariate. Table 3, Panel A contains the ANCOVA and Panel B contains descriptive statistics for each element of the audit program quality score (i.e., effective additional procedures written and the disaggregated elements of the audit program quality score). We find that same-cycle material weakness information auditors did not create higher quality audit programs (5.067) than either no material weakness information auditors (mean 7.353, $F_{1, 73} = 12.85$, p =

[7] We also test whether an indicator variable that is set to one if a participant included at least one risk factor related to the seeded fraud and to zero otherwise is associated with our manipulation. There are no significant differences across conditions using this dependent variable (all p-values > 0.50).

0.999), or different-cycle material weakness information auditors (mean 5.834, $F_{1, 73} = 1.34$, $p = 0.874$). Additionally, different-cycle auditors did not create higher quality audit programs than no information auditors ($F_{1, 73} = 5.06$, $p = 0.986$).

Additional inspection of Panel B yields three observations. First, same-cycle material weakness information auditors wrote only a small number of additional effective audit procedures (0.624), and this number is not significantly different than that written by either no material weakness information auditors (mean 1.067, $F_{1, 73} = 1.46$, $p = 0.116$) or different-cycle material weakness information auditors (mean 0.393, $F_{1, 73} = 0.37$, $p = 0.273$). Second, for the eight procedures on which the expert panel recommended modifying the sample to focus on the fraud area, participants' programs matched the expert panel recommendation only 1.070 times, on average, and information about material weaknesses did not affect their relative success.

Third, for the three procedures for which the expert panel recommended performing the standard procedure, same-cycle material weakness information auditors chose the standard procedure 0.819 times. This is lower than the mean in both the no material weakness information condition (mean 1.815, $F_{1, 73} = 20.12$, $p < 0.001$) and the different-cycle material weakness information condition (mean 1.612, $F_{1, 73} = 11.76$, $p = 0.001$). For the four procedures that the expert panel recommended omitting because the area is not relevant to the client situation, same-cycle material weakness information auditors omitted 2.716 of these procedures, on average, and this is significantly less than the mean in the no information condition (mean 3.341, $F_{1, 73} = 3.84$, $p = 0.027$), but not significantly different from the mean in the different cycle information condition (mean 2.659, $F_{1, 73} = 0.03$, $p = 0.432$).[8] Thus, when the best course of action according to the expert panel is performing standard audit procedures or omitting audit procedures, same-

[8] For the procedures for which the expert panel recommend omitting the procedure because it was unrelated to the client's situation, we accept either omit or perform the standard procedure as high-quality answers.

cycle material weakness information auditors performed significantly worse than no material weakness information auditors and sometimes performed worse than different-cycle material weakness information auditors.

This evidence does not support Hypothesis 3. Information about a material weakness in the same or a different cycle did not increase the quality of auditors' programs. Instead, it appears that the opposite is true—auditors who received material weakness information created *lower quality* audit programs than auditors who received no material weakness information. In the Additional Analysis section, we investigate why this occurred by separately examining how material weakness information affects audit effectiveness and efficiency and by examining their program choices in more detail.

Need to Consult

Our fourth hypothesis predicts that given a seeded fraud, auditors' assessments of the need to consult with a risk management partner before finalizing the proposed audit program will be higher when they have information that a material weakness exists, especially when it is in the cycle they are auditing. To test this hypothesis, we estimate an ANOVA with need to consult as the dependent variable and material weakness information as the independent variable. Table 4, Panel A contains the ANOVA and Panel B contains descriptive statistics. As expected, auditors with same-cycle material weakness information assessed the need to consult significantly higher (7.393) than both auditors with no material weakness information (mean 5.538, $F_{1, 75} = 8.36$, $p = 0.002$) and auditors with different-cycle material weakness information (mean 6.125, $F_{1, 75} = 3.75$, $p = 0.028$). However, auditors with different-cycle material weakness information did not assess need to consult significantly higher than auditors with no material weakness information ($F_{1, 75} = 0.77$, $p = 0.191$). This evidence partially supports Hypothesis 4.

Our analysis thus far shows that auditors are better able to identify a high fraud risk situation when they receive same-cycle material weakness information than when they receive no information about material weaknesses. In our study, auditors assess higher fraud risk and a higher need to consult when they have such information. However, auditors do not use this information to identify specific risk factors that are indicative of the fraud or to produce higher quality audit programs. Below we present additional analyses to explore why this is the case.

Additional Analysis: Audit Effectiveness and Efficiency

Our analysis of overall audit program quality shows that auditors created lower quality audit programs when they received same-cycle material weakness information. This could have happened because auditors chose effective, but inefficient procedures in response to the material weakness information. Alternatively, they may have chosen more procedures to be performed without regard to their effectiveness (i.e., procedures that are both inefficient and ineffective). To investigate this issue, we compute audit effectiveness and efficiency scores and perform additional analysis. We compute a measure of audit effectiveness by adding one point for each program step for which the auditors chose the same action as the expert panel, even if they also included additional choices that would not be effective for that program step and one point for each effective additional audit procedure written.[9] Table 5 contains the descriptive statistics for audit effectiveness.

Table 5 reveals that same-cycle material weakness information auditors did not create significantly more effective audit programs (4.789) than no material weakness information auditors (mean 5.376, $F_{1, 73} = 1.06$, $p = 0.848$); however, different-cycle material weakness information auditors created significantly less effective audit programs (4.164) than no material

[9] We exclude from this computation the procedures that the expert panel recommended omitting because there are no effectiveness implications for such procedures (i.e., effectiveness will not improve or decline with options chosen for these procedures).

weakness information auditors ($F_{1, 73} = 4.05$, p= 0.021).[10] There are no differences across conditions for procedures for which the expert panel recommended either performing the standard program or modifying the procedures. However, performance is poor in all conditions on procedures for which the expert panel recommended modifications to target the fraud. Experienced audit seniors specified an average of only 1.411 effective modifications to these eight procedures.

Next, we consider audit efficiency. We compute audit *in*efficiency by summing the number of procedures that auditors selected that do not match the procedures recommended by the expert panel and the number of additional procedures written that would not provide diagnostic evidence about the seeded fraud. Higher scores indicate less efficient (more inefficient) audit programs. We present descriptive statistics in Table 6. We find that same-cycle material weakness information auditors produced less efficient audit programs (11.163) than no material weakness information auditors (mean 9.353, $F_{1, 73} = 6.48$, p = 0.006) and different-cycle material weakness information auditors (mean 9.642, $F_{1, 73} = 4.23$, p = 0.021). This effect is driven by procedures the expert panel recommended performing as the standard program procedure or omitting. There are no differences across material weakness information conditions for the procedures the expert panel recommended modifying or in additional ineffective procedures listed.[11]

Additional Analysis: Audit Program Modifications

In this section, we examine the nature and extent of auditors' modifications to the standard audit program in response to the material weakness information. We know from the

[10] Reported test statistics for audit effectiveness and efficiency are based on separate (untabulated) ANCOVA models in which material weakness information is the independent variable and experience with fraud is a covariate.
[11] We also compute audit efficiency as the ratio of effective procedures to the total number of procedures specified. Using this measure we find no differences across material weakness information conditions (all p-values > 0.14).

previous analysis that auditors did not modify the program in an effective or efficient manner, but this leaves open the question of whether and how they attempted to respond to material weakness information. We start by examining the total number of modifications auditors made to the audit program.[12] Total modifications is the sum of all changes to the audit program that the auditors made (i.e., sample size increases, targeting the sample, other modifications, and additional audit procedures written) without regard to the effectiveness of these modifications.

We compute an ANCOVA (not tabulated) with total modifications as the dependent variable, material weakness information condition as the independent variable, and experience with fraud as a covariate. Table 7 contains descriptive statistics. We find that same-cycle material weakness information auditors made significantly more total modifications (9.570) than both no material weakness information auditors (mean 7.960, $F_{1, 73} = 3.03$, $p = 0.043$) and different-cycle material weakness information auditors (mean 7.068, $F_{1, 73} = 6.76$, $p = 0.006$). Different-cycle material weakness information auditors did not make more standard program modifications than no material weakness information auditors ($F_{1, 73} = 0.83$, $p = 0.818$). Consistent with increased salience of fraud risk among auditors receiving information about a material weakness in the cycle they are auditing, these auditors made more modifications to the standard program than auditors in other conditions.

Next, we examine the nature of these modifications. To investigate whether the auditors chose sample size increases in response to the material weakness information, we sum the number of procedures for which the auditors chose to increase sample size. Despite the fact that indiscriminately increasing sample size would not be effective for any of the audit procedures, we find that same-cycle material weakness information auditors chose such sample size increases

[12] In this section we exclude program items that the expert panel suggested omitting as they were not relevant to the client's situation.

significantly more often (6.544) than both no material weakness information auditors (mean 4.342, $F_{1, 73} = 14.39$, $p < 0.001$) and different-cycle material weakness information auditors (mean 4.226, $F_{1, 73} = 14.74$, $p < 0.001$). There is no significant difference in the number of sample size increases between no information and different-cycle material weakness information auditors ($F_{1, 73} = 0.04$, $p = 0.575$). Thus, auditors chose sample size increases in response to receiving same-cycle material weakness information, even though an unfocused increase in sample size does not address the risks and is unlikely to be helpful in detecting the fraud.

We also examine whether auditors attempted to tailor procedures (i.e., modify the sample or the procedure in some way) or write additional audit procedures in response to material weakness information, regardless of whether these tailoring attempts or audit procedures are effective. We find that neither the number of attempts to tailor audit procedures nor the number of additional audit procedures differed across material weakness information condition (all p-values > 0.400).

Overall, our evidence is consistent with auditors attempting to respond to increased fraud risk due to the presence of a material weakness in the audited cycle (and not in a different cycle), but not knowing how to respond effectively to this risk, and, as a result, producing lower quality audit plans. Since auditors receiving information about a same-cycle material weakness also assessed a higher need to consult a risk management partner before finalizing the audit program than auditors in other conditions, it is possible that final audit plans (i.e., those developed after consultation with a risk management partner) may not be of lower quality than those prepared without access to material weakness information.[13]

[13] Further analysis reveals that auditors with audit program quality scores below the median did not assess significantly higher need to consult a risk-management partner than better performing auditors (6.764 versus 6.061, p = 0.227 two-tailed), and so increased consultation likely will not be applied where it is most needed.

Additional Analysis: Antecedents of Audit Program Quality

Finally, we perform a median split on audit program quality scores to identify whether the auditors who created higher quality audit programs were also those who assessed higher fraud risk and identified more fraud risk factors. Fraud risk assessment and risk factor identification precede audit program development both in our experiment and in the real world, and so they are potential antecedents of program quality. We find that auditors who created above-median quality programs did not assess higher fraud risk than other auditors (7.351 versus 8.176, $F_{1, 72} = 3.05$, $p = 0.085$ two-tailed); however, these higher performing auditors did identify more fraud-specific red flags than lower performing auditors (2.008 versus 1.285, $F_{1, 72} = 4.50$, $p = 0.013$ two-tailed). This suggests that identifying red flags focused on the fraud area is critical to the development of high quality audit plans and thus to fraud detection. Provision of material weakness information apparently fails to facilitate fraud detection because it fails to facilitate identification of fraud-specific red flags. The lower audit program quality of same-cycle material weakness information auditors that we observe may result from material weakness information distracting these auditors from fraud-specific red flags.

V. CONCLUSIONS

We report results of an experiment designed to test whether one type of additional information that is available to auditors under SOX—information about important deficiencies in controls over financial reporting—helps auditors to detect frauds that are not directly related to those deficiencies. Our tests employed experienced auditors who typically plan audit work. Consistent with expectations, we find that auditors with information that a material weakness has been identified in the transaction cycle for which the auditor is planning tests assessed fraud risk higher when a seeded fraud is present, as compared with auditors with no information about

material weaknesses. Thus, the information about a material weakness in the same cycle increases the salience of material misstatement due to fraud, indicating a potential benefit of the SOX-provided information about internal controls. We do not find a statistically significant comparable effect for information about a material weakness in a different transaction cycle.

Although same-cycle material weakness information prompts auditors to make higher fraud risk assessments, it does not facilitate fraud detection, because senior-level auditors apparently do not know how to appropriately respond to high fraud risk. In particular, when asked to list specific risk factors, auditors receiving same-cycle material weakness information did not generate more risk factors related to the seeded fraud and did not generate higher quality audit programs. In fact, audit programs were of highest quality when auditors did not receive material weakness information. Further analysis of audit programs provides insight into why material weakness information is not helpful in constructing better programs. We find that auditors receiving same-cycle material weakness information chose procedures that are *no more effective* at identifying fraud, but that are *less efficient* than those chosen by auditors without this information. In particular, same-cycle material weakness information condition auditors were far more likely to increase sample sizes when such increases are unnecessary and ineffective. We interpret these results as evidence that auditors receiving information about a same-cycle material weakness are more likely to recognize high fraud risk and attempt to respond to it, but they are unable to do so in an appropriate, effective way. We thus find that auditors are unable to realize the potential fraud-detection benefits of having information about deficiencies in internal controls over financial reporting.

While previous studies have identified that auditors experience difficulties in linking higher fraud risk assessments to appropriate audit actions, we expected that the nature of the

additional information provided by SOX (i.e., the presence of material weaknesses), along with the seeded fraud, would facilitate this task. Instead, it appears that information about material weaknesses may have the unintended effect of creating less efficient, but no more effective, audits. Our study provides specific information about how auditors attempt to respond to heightened perceptions of fraud risk and how and why they are unable to do so effectively. Our analyses should be helpful to researchers and auditors interested in improving fraud detection and audit quality, more generally.

A limitation of our study is that audits are designed and executed by teams, rather than individual auditors. Thus, auditors have opportunities to consult with others and to have their work reviewed before the audit is completed, and we did not allow those opportunities in our study. Although the senior-level auditors in our study were unable to design audit programs that would allow them to detect fraud, they did recognize a higher need to consult with a risk management specialist when they received same-cycle material weakness information. Thus, material weakness information may indirectly assist auditors in identifying fraud by increasing the likelihood that risky client situations are reviewed more carefully. Nonetheless, the fact that auditors tried, but failed, to effectively respond to increased fraud risk is concerning, as is the low overall level of effectiveness of audit programs.

While the availability of material weakness information does not appear useful in helping auditors detect fraud, we acknowledge that SOX has likely been beneficial in preventing financial reporting fraud in other ways. For example, audit firm inspections by the PCAOB result in improvements to audit training and practice, and audits of internal controls have increased the focus of both auditors and management on internal controls, which has resulted in improved controls at many companies.

Appendix 1
Material Weakness Information Condition Manipulation

No Material Weakness Information Condition:

"Your firm is currently testing Precision's controls company-wide, and no results are available at this time."

Different Cycle Material Weakness Information Condition:

"Your firm is currently testing Precision's controls company-wide, and so far testing has revealed one material weakness. This material weakness relates to the control processes related to debt transactions. Your firm identified several instances where there was a lack of timely communication between purchasing and the accounting department about debt contracts. Specifically, Precision lacked controls to insure that agreements, contracts, and other documents relating to debt transactions, including new debt issuances, were provided to and reviewed by accounting and financial reporting personnel on a timely basis. This resulted in new debt not being recorded on a timely basis or disclosed adequately. Your firm is still determining how frequently this happened and the degree of the problem. However, because of the potential to cause current or future material misstatements of liabilities, this internal control weakness will be classified as a material weakness."

Same Cycle Material Weakness Information Condition:

"Your firm is currently testing Precision's controls company-wide, and so far testing has revealed one material weakness. The material weakness relates to the control processes related to revenue recognition. Your firm identified several instances where there was a lack of timely communication between the sales and accounting departments about certain contract terms. Specifically, Precision did not account for certain oral and written modifications to written agreements in determining the proper recognition of revenue, which resulted in revenues being recognized during the wrong periods. Your firm is still determining how frequently this happened and the degree of the problem. However, because of the potential to cause current or future material misstatements of revenue, this internal control weakness will be classified as a material weakness."

Appendix 2
Standard Audit Program

Standard audit procedures – Sales and Receivables
01. TEST PROPRIETY OF REVENUE RECOGNITION POLICIES AND PROCEDURES - SALES AND RECEIVABLES [Validity, Completeness, Recording, Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
02. TEST PRESENTATION OF SALES AND RECEIVABLES [Presentation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
03. TEST SALES AND RECEIVABLES JOURNAL ENTRIES RECORDED IN THE GENERAL LEDGER [Validity, Recording] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
04. EVALUATE BUSINESS RATIONALE FOR SIGNIFICANT UNUSUAL SALES OR RECEIVABLES TRANSACTIONS [Validity, Recording, Valuation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
05. TEST PRESENTATION OF RELATED-PARTY SALES AND RECEIVABLES [Presentation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____

Standard audit procedures – Sales
01. TEST SALES BALANCES [Validity, Completeness, Recording, Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
02. TEST SALES RETURNS [Completeness, Recording, Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
03. TEST CUT-OFF OF SALES [Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
04. TEST CUT-OFF OF CREDIT MEMOS [Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
05. TEST FOREIGN CURRENCY SALES [Recording] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____

Standard audit procedures – Receivables
01. CONFIRM RECEIVABLES [Validity, Recording, Cutoff] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
02. TEST THE ALLOWANCE FOR DOUBTFUL ACCOUNTS AND BAD DEBT EXPENSE [Valuation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
03. TEST ALLOWANCES FOR SALES RETURNS AND DISCOUNTS [Valuation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
04. TEST VALUATION OF FOREIGN CURRENCY RECEIVABLES [Valuation] _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____
05. TEST FOR PROHIBITED LOANS TO EXECUTIVES _____ omit, not applicable _____ perform standard procedure (random sample, low to medium risk) _____ increase sample size for high risk _____ modify to focus (target) sample, describe the targeting here _____ _____ modify in some other way, describe modification here _____

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Table 1
Fraud Risk Assessment

Panel A: ANOVA Table

Source of Variation	df	MS	F	p-value
Material Weakness Information Condition	2	8.90	2.32	0.106
Error	76	3.84		

Panel B: Descriptive Statistics

	Material Weakness Information Condition		
	No Material Weakness Information	**Different Cycle Material Weakness**	**Same Cycle Material Weakness**
LS Mean	7.148[a]	7.708	8.286[a]
Standard Error	(0.38)	(0.40)	(0.37)
n	[27]	[24]	[28]

Superscripts of the same letter indicate that means are different at $p < 0.05$ (one-tailed).

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
The *Fraud Risk Assessment* for the revenue cycle was elicited on an 11-point scale anchored by 0 (low risk) and 10 (high risk).

Table 2
Fraud Risk Factor Identification

Panel A: ANCOVA Table – Number of Fraud Risk Factors

Source of Variation	df	MS	F	p-value
Material Weakness Information Condition	2	1.15	0.78	0.462
Revenue Recognition Experience	1	12.74	8.67	0.004
Error	75	1.47		

Panel B: Descriptive Statistics: Adjusted Least Squares Mean (Standard Error)

	Material Weakness Information Condition		
Dependent Variables	**No Material Weakness Information** (n=27)	**Different Cycle Material Weakness** (n=24)	**Same Cycle Material Weakness** (n=28)
Fraud Risk Factors	**1.951**	**1.830**	**1.550**
	(0.24)	**(0.25)**	**(0.23)**
Material Weakness Risks	0.024[a, b]	0.392[a]	0.498[b]
	(0.08)	(0.09)	(0.08)
Other Revenue Cycle Risks	0.806	0.801	1.001
	(0.17)	(0.18)	(0.16)
Other Risks	1.948	1.861	1.598
	(0.23)	(0.24)	(0.22)
Other Control System Risks	0.250[c]	0.055[c]	0.140
	(0.08)	(0.08)	(0.07)
Errors	-0.004	0.045	0.036
	(0.03)	(0.03)	(0.03)
Total Risk Factors	4.975	4.984	4.824
	(0.11)	(0.12)	(0.11)
Proportion Fraud Risk Factors without regard to MW Risk Factors	**0.397**	**0.393**	**0.355**
	(0.05)	**(0.05)**	**(0.05)**

Superscripts of the same letter indicate that means are different at $p < 0.05$ (one-tailed).

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different

(Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
Revenue Recognition Experience is the amount of experience participants have with revenue recognition issues elicited on a 7-point scale anchored by 1 (no prior experience) and 7 (dealt with this very often).
Fraud Risk Factors is the number of risk factors participants wrote that were coded as focused on the fraud area.
Material Weakness Risks is the number of risk factors written that reiterated the seeded material weakness.
Other Revenue Cycle Risks is the number of risk factors written that focus on revenue cycle risks that are unrelated to the seeded fraud.
Other Risks is the number of risk factors written that focus on the competitive climate, pressures on management, and the organization of the business.
Other Control System Risks is the number of risk factors written that make conclusions about the internal control system.
Errors is the number of items written that are obvious errors including conceptual errors.
Total Risk Factors is the total number of risk factors written; participants were asked to write five risk factors.
The *Proportion of Fraud Risk Factors* is the proportion of risk factors written that were coded as focused on the fraud area, without regard to the risk factors written that focused on the material weaknesses used in our manipulations. We computed this variable as Number of Fraud Risk Factors / (Total Risk Factors – Material Weakness Risk Factors).

Table 3
Audit Program Quality

Panel A: ANCOVA Table – Audit Program Quality Score

Source of Variation	df	MS	F	p-value
Material Weakness Information Condition	2	35.44	6.59	0.002
Experience with Fraud	1	34.90	6.49	0.013
Error	73	5.38		

Panel B: Descriptive Statistics - Adjusted Least Squares Mean (Standard Error)

		Material Weakness Information Condition		
Component	**Number Possible**	**No Material Weakness Information** (n=26)	**Different Cycle Material Weakness** (n=24)	**Same Cycle Material Weakness** (n=27)
Effective Additional Procedures Written	N/A	1.067[a] (0.26)	0.393[a] (0.28)	0.624 (0.26)
Quality Audit Program Choices when Expert Panel Recommended:				
Standard Procedure	3	1.815[b] (0.16)	1.612[c] (0.17)	0.819[b, c] (0.16)
Modify Procedure	8	1.131 (0.24)	1.171 (0.26)	0.907 (0.24)
Omit Procedure	4	3.341[d, e] (0.23)	2.659[d] (0.24)	2.716[e] (0.22)
Audit Program Quality Score	> 15	**7.353[f, g] (0.46)**	**5.834[f] (0.48)**	**5.067[g] (0.45)**

Superscripts of the same letter indicate that means are different at $p < 0.05$ (one-tailed).

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
Experience with Fraud is the number of the participants' audits in the previous five years on which material fraud was discovered.
Effective Additional Procedures Written is the number of additional audit procedures participants wrote that would provide evidence that would discriminate the presence of the seeded fraud.

Standard Procedure is the number of times participants opted only to perform the standard audit program procedure for the three procedures the expert panel recommended performing the standard audit program procedure.
Modify Procedure is the number of times participants' only modification was to modify the standard audit program procedure to be correctly focused on the fraud area for the eight procedures that the expert panel recommended modifying in this way.
Omit Procedure is the number of times participants opted to omit or perform the standard audit program procedure for the four procedures that the expert panel recommended omitting as the procedures did not relate to the fraud.
Audit Program Quality Score is the number of standard audit procedures for which participants chose only the same option (e.g., perform standard, modify, or omit) as the expert panel, plus the number of effective additional procedures participants wrote.

Table 4
Need to Consult Assessment

Panel A: ANOVA Table

Source of Variation	df	MS	F	p-value
Material Weakness Information Condition	2	24.35	4.39	0.016
Error	75	5.54		

Panel B: Descriptive Statistics

	Material Weakness Information Condition		
	No Material Weakness Information	**Different Cycle Material Weakness**	**Same Cycle Material Weakness**
Least Squares Mean	5.538[a]	6.125[b]	7.393[a, b]
Standard Error	(0.46)	(0.48)	(0.44)
n	[26]	[24]	[28]

Superscripts of the same letter indicate that means are different at $p < 0.05$ (one-tailed).

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
The *dependent variable* is the need to consult with a risk management partner before finalizing the proposed revenue audit program, which we elicited on an 11-point scale anchored by 0 (no necessity to consult) and 10 (high necessity to consult).

Table 5
Audit Effectiveness

Descriptive Statistics - Adjusted Least Squares Mean (Standard Error)

		Material Weakness Information Condition		
Dependent Variable	**Number Possible**	**No Material Weakness Information** (n=26)	**Different Cycle Material Weakness** (n=24)	**Same Cycle Material Weakness** (n=27)
Effective Additional Procedures Written	N/A	1.067[a] (0.26)	0.393[a] (0.28)	0.624 (0.26)
Effective Standard Audit Program Choices when Expert Panel Recommended:				
Standard Procedure	3	2.706 (0.11)	2.536 (0.12)	2.770 (0.11)
Modify Procedure	8	1.604 (0.29)	1.235 (0.31)	1.395 (0.28)
Audit Effectiveness Score	**>11**	**5.376[b] (0.41)**	**4.164[b] (0.43)**	**4.789 (0.40)**

Superscripts of the same letter indicate differences in cell means at $p < 0.05$.

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
Experience with Fraud is the number of the participants' audits in the previous five years on which material fraud was discovered.
Effective Additional Procedures Written is the number of additional audit procedures participants wrote that would provide evidence that would discriminate the presence of the seeded fraud.
Standard Procedure is the number of times participants included performing the standard audit program procedure or increasing sample size as a procedures choice for the three procedures the expert panel recommended performing the standard audit program procedure.
Modify Procedure is the number of times participants included modifying a standard audit program procedure to be focused on the fraud area as a procedure choice for the eight procedures that the expert panel recommended modifying in this way.
Audit Effectiveness Score is the number of audit procedures for which participants included the same option (e.g., perform standard or modify) as the expert panel, plus the number of effective additional procedures participants wrote.

Table 6
Audit Efficiency

Descriptive Statistics – Adjusted Least Squares Mean (Standard Error)

	Material Weakness Information Condition		
Dependent Variable	**No Material Weakness Information** (n=26)	**Different Cycle Material Weakness** (n=24)	**Same Cycle Material Weakness** (n=27)
Ineffective Additional Procedures Written	0.302 (0.13)	0.385 (0.14)	0.219 (0.13)
Inefficient Standard Audit Program Choices when Expert Panel Recommended:			
Standard Procedure	1.301[a] (0.20)	1.304[b] (0.21)	2.329[a, b] (0.19)
Modify Procedure	7.049 (0.28)	6.660 (0.30)	7.292 (0.28)
Omit Procedure	0.701[c] (0.25)	1.294 (0.26)	1.323[c] (0.24)
Audit Inefficiency Score	**9.353[d] (0.51)**	**9.642[e] (0.54)**	**11.163[d, e] (0.50)**
Audit Efficiency Ratio	**0.319 (0.02)**	**0.274 (0.02)**	**0.289 (0.02)**

Superscripts of the same letter indicate differences in cell means at $p < 0.05$.

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
Ineffective Additional Procedures Written is the number of additional audit procedures participants wrote that would provide evidence that would not discriminate the presence of the seeded fraud.
Standard Procedure is the number of times participants included inefficient procedure choices (i.e., other than performing the standard audit program procedure) for the three procedures the expert panel recommended performing the standard audit program procedure.
Modify Procedure is the number of times participants included inefficient procedure choices (i.e., other than modifying a standard audit program procedure to be focused on the fraud area) for the eight procedures that the expert panel recommended modifying in this way.

Omit Procedure is the number of times participants included inefficient procedure choices (i.e., other than omitting or performing the standard audit program procedure) for the four procedures that the expert panel recommended omitting because the procedures did not relate to the fraud.
Audit Inefficiency Score is the number of inefficient audit procedure choices participants included (i.e., those that did not match the expert panel's panel prescription, plus the number of ineffective additional procedures participants wrote).
Audit Efficiency Ratio is the proportion of effective procedure choices and additional procedures written (i.e., effective procedures) to total procedure choices and additional procedures written.

Table 7
Audit Program Modifications

Descriptive Statistics: Adjusted Least Squares Mean (Standard Error)

	Material Weakness Information Condition		
	No Material Weakness Information (n=26)	**Different Cycle Material Weakness** (n=24)	**Same Cycle Material Weakness** (n=27)
Sample Size Increases	4.342[a]	4.226[b]	6.544[a, b]
	(0.42)	(0.44)	(0.41)
Tailoring	2.249	2.064	2.184
	(0.36)	(0.38)	(0.35)
Total Standard Audit Program Modifications	6.592[c]	6.290[d]	8.728[c, d]
	(0.57)	(0.60)	(0.56)
Additional Audit Procedures	1.368	0.778	0.843
	(0.29)	(0.31)	(0.29)
Total Audit Program Modifications	7.960[e]	7.068[f]	9.570[e, f]
	(0.66)	(0.70)	(0.65)

Superscripts of the same letter indicate differences in cell means at $p < 0.05$.

Material weakness information condition is manipulated between participants at three levels. No Material Weakness Information condition participants were told internal control testing was underway. Different (Same) Cycle Material Weakness Information condition participants were told that so far, a material weakness in recognizing debt (revenue) had been identified.
Sample Size Increases measures the number of times the auditors chose to increase sample size on procedures in the standard audit program.
Tailoring Attempts measures the number of times the auditors attempted to modify the standard audit program to target the sample or modify in some other way, without regard to the effectiveness of the attempt.
Total Standard Audit Program Modifications is the total of all attempts to modify the standard audit program, without regard to the effectiveness of the attempt.
Additional Audit Procedures measures the number of additional audit procedures the auditors wrote, regardless of whether the procedure focused on the fraud or would provide diagnostic evidence about the fraud.
Total Audit Program Modifications is the number of attempts to respond to perceived risk by modifying the standard audit program and adding additional procedures to the program, regardless of the effectiveness of the procedures.