

## **A Field Investigation of Auditors' Use of Brainstorming in the Consideration of Fraud**

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### **ABSTRACT**

Audit standards require auditors to conduct a brainstorming session on each audit so that engagement team members can discuss the potential for fraud and how the team might respond to the risk of fraud. Little is known about how this brainstorming session takes place or how it affects auditors' consideration of fraud. This paper reports the results of a field investigation of auditors' actual brainstorming sessions and fraud-related judgments. Our results suggest that fraud risk factors were correlated with fraud risk assessments, and that the overall quality of the brainstorming session positively moderated the links between fraud risk assessments and related audit testing. We also find that auditors do not consistently alter the nature of their procedures in response to fraud risk, a finding consistent with recent PCAOB inspections. These results should be informative to standard setters as they suggest that there is variation in the way that auditors are conducting SAS No. 99 brainstorming sessions in practice and that the quality of these sessions are important in order for the benefits to be realized.

**Keywords:** *brainstorming; fraud; fraud risk assessments; fraud risk response*

**Data availability:** *Contact the authors*

## I. INTRODUCTION

Fraud detection is among the highest priorities for the profession and standard setters for a variety of reasons (PCAOB 2007; PCAOB 2003; Elliott 2002), not the least of which are the staggering economic costs. Glass Lewis & Co. (2005) estimated that a number of high profile frauds led to the loss of almost \$900 billion in market capitalization from 1997 to 2004. Consequently, efforts to improve the detection of fraud have been met with great interest. The current guidance on auditors' consideration of fraud was issued by the Auditing Standards Board largely due to the perception that new guidance could aid the fraud detection process. Statement on Auditing Standards (SAS) No. 99 (AIPCA 2002), *Consideration of Fraud in a Financial Statement Audit*, introduced several new requirements including a brainstorming session to discuss the risk of fraud and how the engagement team might respond to that risk.

With the adoption of SAS No. 99, brainstorming sessions have become an important part of the financial statement audit. A recent report issued by the Public Company Accounting Oversight Board (PCAOB) indicates that inspectors have found substantial variation in the quality of brainstorming sessions to the extent that some fail to meet the requirements of SAS No. 99 (PCAOB 2007). Because these required sessions are a relatively recent change for auditors, little is known about *how* they are conducted in practice and *how* judgments made in the sessions influence the overall audit. Accordingly, the objectives of this study are to provide descriptive data on the conduct of brainstorming sessions in practice and to determine how the quality of these sessions influences auditors' consideration of fraud. Specifically, we examine how fraud risk factors identified by auditors for actual clients influence their fraud risk assessments, how auditors respond to these fraud risk assessments (i.e., the scope of their testing), and if the quality of brainstorming sessions moderate these relationships.

To accomplish these objectives, we conducted a field investigation of 179 recently completed audits. Audit professionals, including partners and managers from each of the Big Four firms and one national firm, completed a field survey which provided us with data related to the consideration of fraud on one audit engagement. We used the SAS No. 99 framework for developing our field survey. This

framework suggests that auditors complying with SAS No. 99 identify fraud risk factors (e.g., incentives) by evaluating the risks of their clients' environment and financial statement information. They subsequently brainstorm about these risk factors with engagement team members to arrive at fraud risk assessments which are then used as a basis to plan and perform audit procedures which are responsive to the identified risks. Using this framework, we asked these professionals to answer questions related to their consideration of fraud, including brainstorming sessions, for one client engagement that they had worked on within the last year. From a review of the fraud and brainstorming literatures, we developed a twenty-one item measure for *brainstorming session quality* that contains both objective and subjective data concerning each engagement team's fraud brainstorming session(s). The data collected were used to 1) examine how fraud risk factors identified by auditors for actual clients influence related fraud risk assessments, 2) how auditors responded to these fraud risk assessments (i.e., modifying the nature, staffing, timing and extent of audit procedures), and 3) how the quality of brainstorming sessions moderated these relationships.

Our descriptive data on brainstorming sessions provide some interesting findings. For example, we find that a partner or forensic specialist only led the brainstorming session on 60% of the engagements and, on 27% of the engagements, not all members of the engagement team attended the session. Key engagement team members are required to attend these sessions per SAS No. 99. We also find, consistent with recent PCAOB inspection team reports (PCAOB 2007), that specialists (e.g., fraud, tax, and information technology) are *not* included in a high percentage of sessions. Further, for 35% of the engagements in our sample, sessions were held *after* the early stages of planning. Such rich and descriptive data complement the lack of detail supplied to the public by PCAOB inspections of brainstorming sessions (e.g., PCAOB 2007).<sup>1</sup>

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<sup>1</sup> For example, while the PCAOB (2007) reports that inspection teams have identified audits in which brainstorming sessions occurred after planning, they provide no additional details (e.g., frequency, percentage) regarding the issue. Therefore, it is difficult for outsiders to discern if issues identified by the PCAOB are widespread or perhaps isolated to only a few audit engagements. Also, our study captures brainstorming data that may not be documented by auditors (e.g., participation levels of engagement team members) and thus not available for PCAOB inspection teams to review.

Our results from hypotheses testing suggest that fraud risk factors for our respondents' clients were positively correlated with their fraud risk assessments, but these relationships were not uniformly improved by the overall quality of engagement teams' brainstorming sessions. Interestingly, however, the audit responses to these fraud risk assessments were contingent on the quality of the brainstorming session. As the quality of the brainstorming sessions increased, the expected positive relationship between fraud risk assessments and responses became stronger, with increased fraud risks being more positively related to the degree to which engagement teams modified the staffing, timing, and extent of subsequent audit procedures. We fail to find a link between risk assessments and the nature of audit procedures, regardless of the quality of brainstorming on the engagement. However, this is consistent with recent inspection results reported by the PCAOB (2007) and prior experimental research (Zimbelman 1997, Glover et al. 2003, Asare and Wright 2004).

This study is important for several reasons. First, our study contributes to the existing fraud literature by documenting how auditors are implementing SAS No. 99 in practice. Prior fraud audit standards, SAS No. 53 (AICPA 1988) and SAS No. 82 (AICPA 1997), focused on a typical list of fraud risk factors that, in practice, were usually compiled in a checklist that individual auditors completed (Shelton et al. 2001; AICPA 2003). SAS No. 99, however, introduces a new audit procedure, a brainstorming session, that must be performed on every engagement and cannot be readily reduced to a checklist or form. Past research has examined auditors' fraud judgments under previous audit standards (e.g., Pincus 1989; Hackenbrack 1992; Zimbelman 1997; Asare and Wright 2004), but only three experimental studies investigate auditors' judgments under SAS No. 99 (Wilks and Zimbelman 2004; Hoffman and Zimbelman 2006; Carpenter 2007). Hoffman and Zimbelman (2006) and Carpenter (2007), in particular, experimentally investigate whether brainstorming (vs. not brainstorming) improves auditor judgments. In practice, however, brainstorming is required on every engagement and its conduct/quality may vary substantially between audits. The PCAOB (2007) suggests that brainstorming quality may improve auditors' consideration of fraud. Our study complements these prior experimental studies and empirically assesses the PCAOB's conjecture by documenting how auditors are implementing SAS No.

99 in practice and investigating the role of brainstorming quality plays in its successful implementation. Second, our study extends our understanding of fraud by collecting a unique and rich data set which describes how brainstorming sessions are currently conducted in the field and identifies potential brainstorming deficiencies. Third, recent PCAOB inspection reports (e.g., PCAOB 2007) suggest that some audit teams' brainstorming sessions and their subsequent audit testing have failed to meet the standard set by SAS No. 99. Thus, this study's findings may inform standard-setters as they reconsider the professional guidance on auditors' consideration of fraud (PCAOB 2004, 2007; Hogan et al. 2006).

The remainder of the paper is organized as follows. Section II describes the background and hypotheses development. Sections III and IV provide the methods and results of the study, respectively. Section V concludes the paper.

## **II. BACKGROUND AND HYPOTHESES DEVELOPMENT**

### **Overview of SAS No. 99**

SAS No. 99, *Consideration of Fraud in a Financial Statement Audit*, was issued in 2002 by the Auditing Standards Board because standard setters believed that new guidance was needed to improve the likelihood that auditors would detect fraudulent financial reporting (AICPA 2003). SAS No. 99 provides more structure around auditors' consideration of fraud than did either of the previous fraud standards, SAS No. 53 and SAS No. 82. In essence, SAS No. 99 consists of three important phases. First, auditors obtain information to identify risks of material misstatement due to fraud. This information gathering entails a number of activities including inquiries of management and other employees, considering unusual or unexpected relationships identified by preliminary analytical procedures, and considering which fraud risk factors may be present. Next, auditors synthesize this information to develop fraud risk assessments. This assessment is based on the auditor's expectations of the types of intentional misstatements that may occur and whether the client has programs and controls in place that mitigate the risk of misstatement. Finally, auditors develop a response to these fraud risk assessments. The risk-based response may involve assigning personnel with more experience or specialized skills to the audit or modifying the nature, timing, and extent of audit procedures.

## **Linking Fraud Risk Factors and Fraud Risk Assessments**

Because frauds are difficult to find and are hidden by individuals who perpetrate them, auditors attempt to identify risk factors that are associated with the occurrence of fraud. These fraud risk factors are commonly categorized along three dimensions of the fraud triangle: incentives, opportunities, and rationalization (AICPA 2002). *Incentives* are present when employees feel pressure to commit fraud. Pressures from personal financial obligations or expectations regarding the entity's profitability may all create incentives for employees to commit fraud. *Opportunities* arise when circumstances within an entity are such that an employee can commit fraud. Employees may have opportunities to commit fraud when there are deficient internal controls or weak corporate governance. Some employees *rationalize* engaging in fraudulent behavior because they have attitudes or character traits which allow them to commit a dishonest act. Auditors synthesize their understanding of the fraud risk factors with other information to prepare their fraud risk assessments (AICPA 2002).

A number of studies examine the link between risk factors and related risk assessments. For example, in their review of the fraud literature, Nieschwietz et al. (2000) found that auditors' risk assessments are generally higher when fraud is present. Graham and Bedard (2003) analyzed audit planning decisions on a sample of audit engagements and concluded that auditors' fraud risk assessments were appropriately related to the number of risk factors present in the audit environment. Wilks and Zimbelman (2004) provide mixed evidence about fraud risk assessments. They found that auditors who made decomposed (i.e., based upon the fraud triangle) fraud risk assessments were more sensitive to incentive and opportunity risks than auditors who made holistic fraud risk assessments, but only when the incentive and opportunity factors suggested low fraud risk. Further, Asare and Wright (2004) found that, given a case study where fraud was perpetrated, auditors who used a standard fraud risk checklist made lower fraud risk assessments than those who used no checklist.

A more recent experimental study by Carpenter (2007), found that auditors who participated in brainstorming sessions were better able to synthesize fraud risks and generate lists with more quality fraud ideas than individual auditors. Further, brainstorming audit teams provided more effective fraud risk

assessments (i.e., higher when fraud is present than when fraud is not present) than auditors working alone. This suggests that the mere implementation of required brainstorming sessions on all current engagements, regardless of their quality, may improve the linkage between fraud risk factors and auditor assessments of fraud risk. Based on guidance provided in SAS No. 99, findings reported in the literature, and the recent attention on fraud, we expect that auditors' fraud risk assessments will be positively related to fraud risk factors identified in the client environment. Stated formally:

**H1a:** Fraud risk factors are positively related to fraud risk assessments.

### **PCAOB Inspection Reports on Brainstorming Sessions**

The PCAOB suggests that conducting higher quality brainstorming sessions increases the likelihood that the benefits of these sessions are realized. The PCAOB suggests that auditor's planning should include a brainstorming session where the audit team explicitly considers how a client's financial statements might be susceptible to material misstatement due to fraud. They suggest that this discussion allows the audit team to be alerted to how fraud could be perpetrated and concealed and to reinforce the concept that detection of fraud is an essential element of the audit. They also prescribe that the brainstorming session should occur during the early stages of audit planning and should involve key members of the audit team including specialists (PCAOB 2007).

Even though SAS No. 99 brainstorming sessions are required on all audit engagements, the PCAOB, in their inspections, has noted instances of failures. They have identified audits in which 1) audit teams were unable to demonstrate that brainstorming sessions were held, 2) auditors failed to conduct brainstorming sessions until after planning was completed and substantive work had begun, and 3) key engagement team members did not attend sessions (PCAOB 2007). Prior experimental research supports the PCAOB's recommendation that participation of key engagement team members would likely improve the link between fraud risk factors and risk assessments. Carpenter (2007), and Knapp and Knapp (2001) find that more experienced auditors provide more effective fraud risk assessments (i.e., higher when fraud is present than when fraud is not present). Further, Braun (2000) suggests that time spent preparing for the session as well as time spent during the session will also likely improve the auditor's attention to fraud

factors. Given that one of the objectives of the brainstorming session is to analyze fraud risk factors and to develop a fraud risk assessment, a higher quality brainstorming session should improve this process.

Thus, our hypothesis stated formally is:

**H1b:** Fraud risk factors become more positively related to fraud risk assessments as the quality of fraud brainstorming sessions increase.

### **Linking Fraud Risk Assessments and Fraud Risk Responses**

SAS No. 99 requires auditors to respond to fraud risk assessments by designing audit procedures to obtain more reliable evidence regarding management's assertions. Research conducted prior to the issuance of SAS No. 99 failed to find a consistent positive link between risk assessments and planned audit procedures. For example, Zimbelman (1997) found limited evidence of an increase in the extent of audit procedures and no evidence of a change in nature of those procedures in response to fraud risk assessments under the guidance of SAS No. 82. A replication of Zimbelman's study by Glover et al. (2003) found similar results with auditors increasing the extent of their procedures in response to fraud risk, but not effectively varying the nature of their planned audit procedures. Graham and Bedard (2003) determined that auditors increased the extent of testing in response to fraud risk, but that the increase mostly took the form of review and inquiry procedures. Using an experimental approach based on an actual fraud, Asare and Wright (2004) found no association between fraud risk assessments and planned audit procedures, consistent with recent PCAOB inspection findings that some audit teams do not respond to fraud risk assessments with appropriate testing (PCAOB 2007). Contrary to the results of these studies, using pre-SAS No. 99 data, Mock and Turner (2005) found archival evidence that audit procedures were modified to be responsive to fraud risk assessments. They found that auditors modified the nature, timing and extent of procedures, and assigned more experienced personnel to the engagement as risk assessments increased. Given the inconsistent results reported in prior studies, we offer no hypothesis regarding the direct effects of fraud risk assessments and fraud risk responses.

It is important to note that the aforementioned studies occurred, or examined data, prior to SAS No. 99 and therefore exclude the possibility that brainstorming sessions could improve the sensitivity of

fraud risk responses to fraud risk assessments. However, Hoffman and Zimbelman (2006) conducted a post-SAS No. 99 study where they experimentally examined the role that brainstorming plays with regard to auditors' planned audit procedures. According to Hoffman and Zimbelman (2006), prior research findings suggest that developing effective fraud detection procedures may be a more cognitively demanding task than assessing fraud risk. They suggest that brainstorming provides benefits to audit teams such as the strategic thinking required to design audit procedures which can detect fraud. While they do not examine the link between fraud risk assessments and responses or manipulate the quality of brainstorming, Hoffman and Zimbelman (2006) find (in a fraud setting) that brainstorming (vs. no-brainstorming) leads to more effective modification of standard audit procedures.

According to SAS No. 99, one objective of these sessions is to provide an opportunity for audit teams to consider how they might *respond* to their fraud risk assessments for their clients (AICPA 2002). Standard setters suggest that the brainstorming session reinforces the concept that the detection of material misstatement in the financial statements caused by fraud is an essential element of the audit (AICPA 2002). The PCAOB has found auditors' responses to fraud risk assessments to be, at times, ineffective (PCAOB 2007). We empirically examine whether higher quality brainstorming sessions can improve this link. When the quality of the brainstorming sessions increases, it becomes more probable that engagement teams will, as prescribed by SAS No. 99, expand the scope of testing in response to higher fraud risk assessments. We therefore propose the following hypothesis:

**H2:** Fraud risk assessments become more positively related to fraud risk responses as the quality of fraud brainstorming sessions increase.

### III. METHOD

#### Participants

One-hundred and seventy-nine practicing auditors completed a field instrument related to the fraud audit process for this study. Participants were auditors from four international (i.e., the Big 4 firms)

and one national public accounting firm and held positions of partner (56), director (2), senior manager (60), and manager (61).<sup>2</sup>

### **Research Instrument**

Similar to the methodology used in Gibbins et al.'s (2001) study of the auditor-management negotiation process, participants completed a field survey which required them to select one recently completed audit for which a fraud brainstorming session was held (i.e., a brainstorming session required by SAS No. 99).<sup>3</sup> They then responded to questions related to the fraud audit process based upon their experiences related to that one year's audit engagement.<sup>4</sup> Participants could refer to audit documentation related to the audit they selected at any time during the survey. Among the data collected from the participants were measures of fraud risk factors for the audit, the overall fraud risk assessment for the audit engagement, measures of audit responses to the fraud risk assessment, and objective and subjective data regarding the quality of the audit's fraud brainstorming session(s). Thus, our sample consists of fraud audit process data from one-hundred and seventy-nine recently completed audit engagements.<sup>5</sup>

### **Fraud Risk Factors**

Fraud risk factors elicited from participants for their audit clients were measured according to SAS No. 99 and prior research (e.g., Wilks and Zimbelman 2004) which defines fraud risk factors as

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<sup>2</sup> Discussions with practitioners revealed that auditors at all four of these position levels would be familiar with all phases related to the consideration of fraud on a financial statement audit (i.e., SAS No. 99). Also, for example, approximately 40 percent of fraud brainstorming sessions in our sample were led by a member of the engagement team below the partner level and the review of fraud audit documentation began at the manager level for over 50% of the engagements we analyzed.

<sup>3</sup> The survey was pre-tested with five partners and two senior managers from two international accounting firms to ensure that the survey fully covered the constructs/relationships we wished to examine and that the survey questions and responses were clear.

<sup>4</sup> We did not want to receive multiple responses based on the same audit, so each firm appointed one person who maintained a control list of the client engagements selected by respondents. Each firm required respondents to notify the person maintaining the control list of the selected engagement prior to completing the survey to ensure that no duplicate responses occurred.

<sup>5</sup> We obtained data for a diverse group of audit engagements. Approximately 18% of the audit clients had revenues < \$100M, 23% had revenues between \$100-\$500M, 13% had \$500M-\$1B, 25% had \$1B-\$5B, and 21% had >\$5B. We classified these audit clients into 8 distinct industries: manufacturing (n=36), retail (n=19), government/not-for-profit (n=34), energy (n=15), high tech/communications (n=25), healthcare/pharmaceuticals (n=13), financial services (n=12), and miscellaneous (n=25). Sixty-seven percent of our observations were audits of publicly traded companies. As noted in the Method section, we control for size and industry in our analyses and use whether or not the client is publicly traded as an item to measure the fraud risk factor of incentive.

events or conditions that indicate *incentives* to perpetrate fraud, *opportunities* to carry out fraud, or *rationalizations* to justify a fraudulent action. Previous studies have examined and documented evidence about fraud risk factors on these dimensions. For example, Erickson et al. (2006) posit (but do not find) that one form of incentives for managers to perpetrate fraud is equity-related compensation and the results of Dechow et al. (1996) suggest that debt-related incentives are higher for fraud firms. With respect to opportunities, corporate governance quality, internal control strength, and the level of accruals have been found to be correlated with fraudulent activity (e.g., Beasley 1996; Beneish 1997; Bell and Carcello 2000). Thus, we measured incentive with seven questions related to market and debt incentives and opportunity with four measures of corporate governance quality, internal control strength, and accrual levels. We also collected direct measures of these two constructs. We found no research to indicate that rationalization to commit fraud could be measured with multiple items, and thus measured this factor with one direct measure with wording consistent with SAS No. 99: the extent to which management is enabled to rationalize fraud. In order to compare responses across participants, we measured all but one of these items on a scale where 1 = “extremely low” and 10 = “extremely high.”<sup>6</sup> Table 1 provides descriptive statistics on the 12 items used to measure the fraud risk factors of incentive, opportunity, and rationalization.

[Insert Table 1]

Factor analysis performed on the seven items used to measure incentive indicated that the items satisfactorily loaded in excess of .50 (Nunnally 1978) on two factors. Items associated with market-related incentives and debt-related incentives loaded on separate factors. Because participants were allowed to provide data on audits of both publicly traded and privately-held companies, we decomposed the incentive construct into “market incentive” and “debt incentive.” Four of the five items related to “opportunity” satisfactorily loaded on one factor and rationalization was measured with only one item.

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<sup>6</sup> The item that was not measured on the scale was related to market incentives. The item was coded based on whether the client chosen was publicly traded (coded 1) or private (coded 0). Results are qualitatively similar when this item is removed from our analyses. Also, due to the positive wording of two opportunity items (e.g., strength of corporate governance), responses were reverse coded for the analyses performed in this study.

The factor loading for a measure of total accruals (.283) was unacceptable and therefore the total accruals measure was excluded from our opportunities measure in all subsequent analyses. Tests of measurement reliability for the items composing market incentive, debt incentive, and opportunity provided Cronbach's alpha levels approaching or exceeding the generally accepted threshold of .70 (Nunnally 1978).<sup>7</sup> As the construct of "rationalization" was measured with one item, no factor or reliability analyses were performed. Thus, for the purposes of this study, fraud risk factors will be decomposed into: 1) market incentive (five items), 2) debt incentive (two items), 3) opportunity (four items), and 4) rationalization (1 item). For each engagement in our sample, the four risk factors are measured as the mean of participants' responses to the items classified under each factor.

### **Fraud Risk Assessment and Fraud Risk Responses**

Similar to Carpenter (2007), participants provided an overall fraud risk assessment for the engagement via a scale ranging from 1 ("extremely low") to 10 ("extremely high"). The non-tabulated mean fraud risk assessment (standard deviation) for the sample was 4.92 (2.23). After completing their risk assessments, participants were asked to provide data on how the engagement team responded to the fraud risk assessment. As described by SAS No. 107 (AICPA 2006a) and Bedard et al. (1999), the survey allowed participants to describe their response to the fraud risk assessment by the degree to which they modified the nature, staffing, timing, and extent of subsequent audit procedures. Similar to Low (2004), Bedard et al. (2005), and Brazel and Agoglia (2006), the "nature" of participants' responses was measured with two items: 1) the extent to which the number of testing procedures was increased and 2) the degree to which the types of procedures were changed. "Staffing" was determined by both the extent to which more experienced staff or forensic specialists were used on the engagement as suggested by O'Keefe et al. (1994) and Low (2004). Consistent with SAS No. 107 (AICPA 2006a), the "timing" of audit responses was measured with the extent to which the timing of audit procedures was changed on the

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<sup>7</sup> While items composing market incentive and debt incentive provided Cronbach's alphas exceeding .70, the four measures of opportunity provide a Cronbach's alpha = .62. Such a level has been deemed by prior research to denote moderate reliabilities and are acceptable for testing relations (e.g., Bamber et al. 1989; Rudolph and Welker 1998; Viator 2001). Omitting one or more of the four items does not increase the Cronbach's alpha for opportunity.

engagement. The “extent” of auditors’ responses was measured with three items: the extent to which 1) budgeted audit hours, 2) sample sizes, and 3) audit documentation review were increased (e.g., Bedard et al. 1999; Mock and Wright 1999; PCAOB 2007). All eight items were measured on a scale where 1 = “none” and 10 = “extensively.” Table 2 provides descriptive statistics on the eight items used to measure the fraud risk responses of nature, staffing, timing, and extent.

[Insert Table 2]

Factor analysis performed on the seven response items provided satisfactory loadings in excess of .50 on their respective fraud risk response factors (Nunnally 1978). Tests of measurement reliability for the items composing nature, timing, and extent provided Cronbach’s alpha levels exceeding the generally accepted threshold of .70 (Nunnally 1978).<sup>8</sup> For the purposes of this study, fraud risk responses will be decomposed into: 1) nature (two items), 2) staffing (two items), 3) timing (one item), and 4) extent (3 items). The four fraud risk responses were measured as the mean of participants’ responses to the items classified under each factor.

### **Quality of the Fraud Brainstorming Session**

From a review of the fraud and brainstorming literatures, we developed a twenty-one item measure to determine the quality of brainstorming on each engagement. Participants provided both objective and subjective data concerning their engagement’s fraud brainstorming session(s). Responses for each of the twenty-one items were coded either 1 (high quality) or 0 (low quality) based upon the participant’s response (see below for specific coding criteria for each item). Similar to Defond et al.’s (2005) and Carcello et al.’s (2006) multiple measure of corporate governance quality, each item was equally weighted to avoid adding additional subjectivity to the measure. Thus, the quality of the engagement’s brainstorming was rated on a scale from 0 - 21. The non-tabulated mean quality score for all of the engagements in our sample was 10.56 (SD = 3.85), with a minimum score of 3 and a maximum score of 18. Figure 1 provides a frequency distribution of the brainstorming session quality scores. It

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<sup>8</sup> The Cronbach’s alpha level for staffing was .423. Given this low level of measurement reliability, results for staffing will be provided with the two staffing items combined and separated.

appears that, for our measure of brainstorming quality, our sample is relatively normally distributed and contains substantial variation.

[Insert Figure 1]

### ***Attendance and Communication***

Table 3 provides descriptive statistics in relation to the twenty-one items used to measure brainstorming quality. Included in our measure were ten items related to which professionals led/attended the brainstorming sessions and the extent of their contribution. Standard setters suggest that proper tone at the top is important to the success of the brainstorming process (AICPA 2003). Further, having members at all levels of the engagement team actively participate in the brainstorming session should encourage those who are less experienced, but have recent firsthand knowledge of client processes, to provide their insights to senior members of the audit team. Also, whole engagement team participation allows more experienced auditors to share their fraud insights/experiences with less experienced team members and enhances the dissemination of ideas produced by the brainstorming session to the entire engagement team (AICPA 2003; Beasley and Jenkins 2003; PCAOB 2007). Beasley and Jenkins (2003) also state that the level of openness to ideas during a brainstorming session should be maximized to promote the free exchange of ideas and opinions amongst the entire engagement team. SAS No. 99 (AICPA 2002) and a recent PCAOB release (PCAOB 2007) encourage the inclusion of specialists in the brainstorming session, and prior research (e.g., Brazel and Agoglia 2006) suggests that audit judgment performance is enhanced when appropriate specialists are utilized on audit engagements.

[Insert Table 3]

Therefore, with respect to our field survey, if the brainstorming session was led by either the engagement partner or a fraud specialist, for this item, the engagement received a coding of one (i.e., high quality). If all levels of the engagement team (e.g., staff, seniors, managers, and partners) attended the brainstorming session, the session was deemed high quality (coded one). We also rated brainstorming quality to be high when fraud specialists, IT audit specialists, or tax specialists participated in the brainstorming session. Lastly, we measured the level of contribution to the brainstorming session from

staff, seniors, managers, partners, and fraud specialists, as well the level of the engagement management's openness to all ideas submitted during the brainstorming session. These items were measured on a scale from 1 ("extremely low") to 10 ("extremely high") and responses related to these items were coded high if they exceeded the sample mean for the item.

### ***Brainstorming Format***

Data was collected on the format of the brainstorming session. SAS No. 99 and practitioner guidance (e.g., Beasley and Jenkins 2003) suggest that the use of agendas should increase the effectiveness and efficiency of brainstorming sessions. Conversely, Asare and Wright (2004) find that the use of fraud checklists may impair auditor performance. Therefore, sessions were coded as high quality if participants indicated that an agenda (*checklist*) was (*was not*) used. While the appropriate timing for the session is not addressed in the literature, a recent PCAOB report indicates that sessions held earlier in the planning process are likely to have a more pervasive effect on the fraud audit process (PCAOB 2007). In addition, SAS No. 99 and Hogan et al. (2006) suggest holding a brainstorming session at the end of each audit, when the completed fraud audit process can be formally assessed by the engagement team, to enhance the effectiveness of the next year's brainstorming session. Thus, if the initial current year brainstorming session was held pre- or early in planning (vs. later in the audit process) or the engagement team held a brainstorming session at the end of the *prior year's* audit, it was deemed high quality.

### ***Engagement Team Effort***

In general, the audit literature has shown that when auditors are induced to exert more cognitive effort, the quality of their performance increases (e.g., Kennedy 1993, Brazel et al. 2004). Thus, our survey captured measures with respect to the extent of brainstorming conducted (i.e., the effort provided) by the engagement team. Brainstorming quality was deemed high if the time spent by the engagement team preparing for the brainstorming session exceeded the mean for our sample, if the engagement had more than one brainstorming session, or if the total length of time for the brainstorming sessions exceeded the mean for the sample. SAS No. 99 (AICPA 2002) and Beasley and Jenkins (2003) point toward specific efforts, such as requiring auditors to individually identify risks prior to the session and explicit

discussion of fraud risk responses, which should improve the quality of the brainstorming session.

Therefore, if participants indicated that the engagement team was asked to identify potential fraud risks prior to the session, the session was classified as high quality. Participants, on a scale from 1 (“extremely low”) to 10 (“extremely high”), provided data on the extent of discussion during the brainstorming sessions about how management might perpetrate fraud and possible audit responses to fraud risks at the client. Responses related to these two items were coded high if they exceeded the mean for the sample.<sup>9</sup>

### **Control Variables**

Prior research has found that client size and industry may impact auditor risk assessment and testing decisions (e.g., O’Keefe et al. 1994; Johnstone and Bedard 2003). We control for size by including a measure of the client’s revenues in our analyses. We asked respondents to provide the client’s industry (see footnote 3) and, similar to Johnstone and Bedard (2003), created dichotomous industry control variables in order to control for industry effects in our analyses. We also control for the effects of numerous auditor or engagement team-related variables which prior research has shown to influence audit judgments (e.g., Bonner 1990; Bonner and Lewis 1990). Specifically, we control for the specific audit firm which performed the audit and the survey respondent’s general audit experience, position in the firm, experience with the client, extent of fraud training, and their experience level with actual financial statement fraud.<sup>10</sup>

While we do believe that some of the aforementioned factors should be indicative of the experience and expertise levels of the entire engagement team (e.g., extent of fraud training), we recognize that these control variables are related to the respondent and not the entire engagement team.

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<sup>9</sup> In order to validate our measure of brainstorming quality we collected several measures related to the outcomes of the session. For example, we measured the number of high quality fraud ideas/fraud procedures submitted during the session, participant satisfaction with the session, level of engagement team consensus with fraud risk assessments and responses, extent to which staff members learned about fraud risk, and the extent to which the brainstorming session led to a higher level of professional skepticism among engagement team members / more critical evaluation of evidence. Without exception, our brainstorming quality measure was significantly (all  $p$ -values < .05) and positively correlated with these measures.

<sup>10</sup> For the audit firm control variable, responses were coded from 1 to 5 based upon the respondent’s firm (four international and one national firm participated in our study). In order to examine whether our coding could be improved by identifying audit firms engaged with riskier clients, we performed ANOVA analyses for the audit firm control variable on fraud risk assessments. Non-tabulated ANOVA results were insignificant ( $p$ -value = .710). Thus, the aforementioned non-subjective coding for audit firm will be used for the testing of our hypotheses.

Pilot testing of our instrument indicated that it was infeasible for respondents to supply such objective data regarding the background of the entire engagement team (e.g., fraud training levels for all engagement team members). Still, we obtained and controlled for the respondent's perception of the entire engagement team's expertise level.<sup>11</sup>

#### **IV. RESULTS**

##### **Descriptive Statistics of Brainstorming Practices**

Given our sample of 179 recently completed audit engagements across five public accounting firms, Table 3 provides rich descriptive evidence regarding how the average fraud brainstorming session is being performed in practice. First, a partner or forensic specialist only led the session 60% of the time, pointing towards the important role audit managers and seniors probably play in determining the quality of the session. Surprisingly, on 27% of the engagements, not all members of the engagement team attended the session. In such cases, it is possible that important information regarding fraud risk factors, assessments, and reactions were not conveyed (or conveyed secondhand) to audit staff and were thus lost. Second, consistent with recent PCAOB inspection team reports (PCAOB 2007), we find evidence that specialists' (fraud, tax, IT) participation in sessions varies. For example, fraud specialists participated on just 31% of engagements, while tax and IT specialists participated on 63% and 69% of engagements, respectively. It is also interesting to note that, when a fraud specialist was included in the session, their level of contribution was fairly high (7.01), but less than engagement partners (8.41) or managers (7.93). Third, our results are consistent with the hierarchical structure of engagement teams. Specifically, the level of contribution to the session increases with seniority with staff (4.32), seniors (6.03), managers (7.93) and partners (8.41) contributing according to their level of experience in the firm. Fourth, on a scale from 1 to 10, on average, auditors were fairly open to ideas during the sessions (8.54). Agendas were used in 84% of the brainstorming sessions, however only 28% of engagements did not use a

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<sup>11</sup> Similar to Johnstone and Bedard (2003), whose hypotheses posited interactive effects, we control for the direct effects of these control variables in all of our analyses. Given that the independent variables of interest in our tests of Hypotheses 1b and 2 are interaction terms, an alternative treatment would be to control for the interactions between these variables and fraud risk factors (H1b)/fraud risk assessments (H2). Such analyses were performed (non-tabulated) and results are qualitatively similar to those reported in the text.

checklist during the session. Asare and Wright (2004) posit and find that the use of standardized fraud checklists reduces the effectiveness of auditors' fraud risk assessments. Fifth, consistent with PCAOB inspection team findings (PCAOB 2007), for 35% of engagements, sessions were held *after* the early stages of planning. Further, 84% of engagements did not perform a final wrap-up session in the prior year. Not holding the session early in the engagement process and not holding a "review" of the fraud process at the end of the audit may lead to a failure to incorporate fraud risk assessments into substantive testing and an impairment of engagement team learning in relation to their client vis-à-vis fraud, respectively. Lastly, engagement team preparation for the sessions tended to be substantial, fraud risk sessions lasted, on average, 1 ½ hours and 50% percent of engagements had more than one session. In sum, several of our findings are consistent with recent PCAOB inspection reports, there appears to be substantial variation in the way brainstorming sessions are conducted in practice, and there appears to be a number of areas where the quality of brainstorming could be improved.

### **Hypotheses Testing**

We test our hypotheses via linear regression, controlling for the variables described above. See Appendix A for the specific models used to test our hypotheses. Significance levels are one-tailed when expectations are directional (hypothesized relationships) and two-tailed when no directional expectations were formed *a priori* (control variables).

### ***Fraud Risk Factors, Fraud Risk Assessments, and the Quality of the Brainstorming Session***

Hypothesis 1a predicts that audit fraud risk factors such as market incentive, debt incentive, opportunity, and rationalization are positively related to fraud risk assessments. Table 4 provides the results of Hypothesis 1a testing. We include in the analysis and Table 4 the direct effects of our control variables. All dichotomous industry control variables were insignificant (*p-values* > .16) and are excluded from Table 4 for purposes of parsimony. In general, the fraud risk factors of market incentive, opportunity, and rationalization for the clients in our sample are significantly (*p-values* < .05) and positively correlated with the level of fraud risk assessed by the engagement team. The effect of debt

incentive is positive and marginally significant ( $p\text{-value} = .076$ ). Thus, H1a is supported. These results are consistent with auditors utilizing the framework suggested by SAS No. 99 for fraud risk factors and fraud risk assessments on their actual audit engagements. Further, our post-SAS 99 results obtained via a field survey, are consistent with pre-SAS 99 experimental research which has found auditors to be fairly adept at fraud risk assessment (e.g., Zimbelman 1997; Knapp and Knapp 2001).

[Insert Table 4]

With respect to the direct effect of control variables on fraud risk assessment, we find a negative relationship between client size and fraud risk assessments in Table 4. This suggests that auditors tend to assess fraud risk lower for larger clients. This result may be troubling given that the costs to audit firms of not detecting fraud (i.e., litigation and reputation) tend to be higher for larger, more visible clients. On the other hand, the negative relationship between size and fraud risk assessments may be appropriate, given that Beasley et al. (1999) find that fraudulent activity may be more prevalent at smaller (vs. larger) public companies. We also find that as the extent of fraud training and expertise of the engagement team increases, fraud risk assessments tend to increase. This perhaps signifies that higher quality engagement teams, in general, may be more likely to assess fraud risk as higher or are assigned to higher risk engagements.

Table 5 provides the results of Hypothesis 1b testing. Hypothesis 1b posits that the relationship between fraud risk factors and fraud risk assessments is positively moderated by the quality of the brainstorming session. Thus, Hypothesis 1b is supported by regression results that provide positive and significant interactions between fraud risk factors and the quality of the brainstorming session on fraud risk assessments. For presentation purposes, only effects related to our control variables with  $p\text{-values} < .10$  are tabulated. As posited by Hypothesis 1b, we find a positive interaction between debt incentive and session quality ( $p\text{-value} = .03$ ) on fraud risk assessments. The interactions between market incentive/opportunity/rationalization and the quality of the brainstorming session are insignificant in Table 5. Thus, our results are mixed with respect to Hypothesis 1b. Higher quality brainstorming sessions may improve the positive link between debt incentives and fraud risk assessments, however higher quality

sessions appear to not improve the positive links between the other three risk factors and risk assessments found in Table 4. In Table 5, we find similar effects of client size, engagement team expertise, and fraud training that we observe in Table 4. Interestingly, in Table 5, we find a positive effect for the high tech/communications industry on fraud risk assessments. This suggests that, in general, fraud risk assessments for this industry appear to be higher than other industries contained in our sample.

[Insert Table 5]

### ***Fraud Risk Assessments, Fraud Risk Responses, and the Quality of the Brainstorming Session***

Hypothesis 2 predicts a positive and significant interaction between fraud risk assessment and the quality of the brainstorming session on fraud risk responses. We analyze the nature, staffing, timing, and extent of fraud risk responses (i.e., scope of testing). Table 6 presents the results of our Hypothesis 2 testing. Again, for presentation purposes, only effects related to our control variables with *p-values* < .10 are tabulated. For the measures of staffing, timing, and extent (see Panels B, C, and D), we find the interaction term for the fraud risk assessment and the quality of the brainstorming session to be in the anticipated direction and significant (*p-values* < .02). As the quality of the brainstorming session increases, audit teams are more likely to employ more senior staffing/fraud specialists, change the timing of tests, and increase the extent of testing (e.g., provide higher budgets) as the fraud risk assessment increases.<sup>12</sup> Interestingly, for these three measures of fraud risk response, the direct effect of fraud risk assessments is not significant. Consistent with prior studies (e.g., Asare and Wright 2004), we fail to find a direct, positive link between fraud risk assessments and subsequent testing. As posited by Hypothesis 2,

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<sup>12</sup> As noted in footnote 8, while the factor loadings for the construct of staffing were at satisfactory levels, the reliability statistic for the construct was below a satisfactory level. Therefore, we examine the interaction posited by Hypothesis 2 in relation to our two individual measures of staffing: use of more experienced auditors to perform procedures and increase use/consultation of fraud specialists. Non-tabulated results indicate that the interaction term for fraud risk assessment and the quality of the brainstorming session is positive but only marginally significant (*p-value* = .08) for the use of more experienced auditors and is positive and significant (*p-value* < .03) for the use/consultation of fraud specialists. The finding that, as the quality of the brainstorming session increases, the positive link between fraud risk assessments and the use/consultation of fraud specialists increases is probably more consequential given that the use/consultation of fraud specialists should improve the likelihood of fraud detection on risky engagements. This result may also be indicative of firm policy as some firms require the consultation of fraud specialists under certain circumstances such as high fraud risks.

a higher quality brainstorming session appears to improve the risk-based strategy prescribed by SAS No. 99 to detect fraud (i.e., a positive relationship between risk assessments and responses).<sup>13</sup>

[Insert Table 6]

In Panel A, the direct effect of the fraud risk assessment and the interaction term of fraud risk assessment and quality of brainstorming session are not significant for the nature of the fraud risk response (e.g., adding/changing testing procedures). This result, obtained from a survey of actual audit engagements in our study, compliments prior experimental studies which find that auditors fail to modify the nature of their tests in response to their fraud, inherent, and control risk assessments (Zimbelman 1997; Knapp and Knapp 2001; Wilks and Zimbelman 2004). The use of some, but not all, mechanisms to respond to fraud risk assessments is also consistent with results found in prior studies of inherent and control risk assessments and subsequent testing decisions (Bedard and Wright 1994; Brazel and Agoglia 2006). Our finding is also congruent with discussions with practicing auditors that suggest that they often view these items as substitutes (e.g., assigning a more experienced staff member to a procedure instead of increasing the number of procedures).

Even though the lack of support for Hypothesis 2 with respect to the nature of the response/testing is consistent with recent PCAOB inspection team findings (PCAOB 2007) and prior research indicating that auditors are apt to follow a “same as last year” (SALY) approach (e.g., Wright 1988; Brazel et al. 2004), this result is disconcerting. This finding suggests that, even in the case of high quality brainstorming sessions, higher fraud risk assessments do not tend to elicit a change in current procedures and/or the addition of specific procedures designed to detect fraud. Rather, as the quality of the brainstorming session increases, auditors appear to react to higher fraud risk assessments by simply spending more time performing the prior year’s tests, at different times, and with more qualified

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<sup>13</sup> Additional analysis of this interaction provides evidence that as the quality of the brainstorming session *decreases*, a *negative* relationship between fraud risk assessments and responses becomes stronger. In addition, we analyzed the relationship between fraud risk assessments and responses for engagements where the quality of the brainstorming session was lower than the sample mean of 10.56. For these engagements, the relationships between risk assessment and all four response factors was *negative* and significant ( $p$ 's < .10). As stated previously, the SAS No. 99 framework prescribes a positive relationship between these factors.

professionals. This is especially important given the fact that the six biggest accounting firms are currently suggesting that investors and stock exchanges consider whether companies should be subject to forensic audits specifically designed to detect fraud (Reilly 2006). It appears that auditors' hesitancy to employ additional tests and/or their lack of knowledge about additional, fraud specific tests could impair these fraud audits. Perhaps these audits should be staffed with forensic experts equipped with the knowledgebase to use alternative/customized fraud procedures (AICPA 2006b).

With respect to our control variables for which *p-values* were  $< .10$ , we observe positive effects for client size and fraud training on staffing (Panel B). Perhaps as client sizes (and related audit fees) and/or engagement teams' knowledge of fraud increase, engagement teams are more apt to expend the resources for more experienced auditors/fraud specialists. As noted in panels B and C, audits of manufacturing industry clients were more likely to adjust the staffing and timing of their fraud risk responses. Why such responses were found only in this industry is an empirical question for future research. Lastly, audit experience was found to negatively affect the extent of fraud risk responses. Perhaps more experienced auditors (to the extent that they affected engagement team decisions) perceive extent as a less than effective means of responding to fraud risks.

### **Supplemental Analysis – Brainstorming Session Quality and Effectiveness**

While our study examines the influence of brainstorming quality on the links among fraud judgments, our hypotheses do not examine the extent to which brainstorming quality affects the effectiveness of the audit and/or fraud detection.<sup>14</sup> Still, we did collect data related to the overall effectiveness of the fraud audit process for our sample. In 43 of the 179 audit engagements in our sample,

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<sup>14</sup> We do not believe that a field survey is an effective way to evaluate this relationship for a number of reasons. First, given the sensitivity of our subject matter, participants may be hesitant to admit when fraud occurred but was not detected by the audit team. In fact, only 2 respondents out of 179 indicated that fraud was detected *after* the engagement was completed. Second, with each survey respondent being related to a unique audit client, it is difficult to determine what exactly constitutes an effective risk assessment or response for each unique setting. Third, provided that frauds may occur yet never be detected or come to the audit team's attention, participant responses related to fraud detection performance may be inaccurate. For such reasons as these, it may be more appropriate to investigate the role brainstorming plays in audit effectiveness via experimental or other methods. Indeed, both Carpenter (2007) and Hoffman and Zimbelman (2006) leverage the advantages that the experimental method offers (e.g., the use of one case across brainstorming teams where the existence and nature of fraudulent reporting is known) and examine the link between brainstorming and audit effectiveness.

fraud was detected.<sup>15</sup> For these 43 engagements, we asked whether the brainstorming session aided in the detection of fraud. Thirty participants (13) responded “no” (“yes”) to this question. Such a result indicates that the process of brainstorming appears to have helped to detect 30% (13/43) of the frauds in our sample. Still, brainstorming appears to be an area in need of improvement. We also tested to see whether our brainstorming quality measure was significantly higher for participants who responded “yes” to the aforementioned question. While the means were in the expected direction (mean brainstorming quality when *brainstorming did aid* in the detection of fraud = 11.46; mean brainstorming quality where *brainstorming did not aid* in the detection of fraud = 10.17), the difference was not significant ( $p = .144$ ). Perhaps with a larger sample size and more statistical power such a relationship could be found to be significant at conventional levels.

Additional effectiveness measures that were collected for all 179 respondents were the respondent’s perception of the effectiveness of the audit process related to fraud detection, confidence in the audit process related to fraud detection, and perception of the audit committee’s satisfaction with the audit process related to fraud detection. For all three effectiveness measures, their relationship with brainstorming session quality was positive and significant ( $p$ ’s < .03). Thus, in addition to providing evidence that the quality of brainstorming can improve the fraud audit process, we provide limited evidence that higher quality brainstorming can improve fraud detection.

## V. CONCLUSION

The purpose of this study was to describe how auditors conduct fraud brainstorming sessions in response to SAS No. 99 and to investigate whether the quality of these sessions affected their consideration of fraud. To do this, we conducted a field investigation to examine how fraud risk factors identified by auditors on actual clients influence their fraud risk assessments, how their fraud risk

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<sup>15</sup> Given the sensitivity of our study’s subject matter, our survey instrument was reviewed and approved by representatives of all of the firms that participated in our study. We asked for detailed information on the types and sizes of the frauds that were detected in our sample. In general, participants chose not to provide this data. One respondent did indicate that the fraud related to management manipulation of payroll reports. Another indicated that the fraud related to the payment of expenses to a fictitious vendor. Thus, the possibility exists that a number of the frauds that were detected were more related to misappropriations of assets (vs. fraudulent financial reporting) and were immaterial from the auditor’s perspective.

assessments affect their fraud risk responses, and if the overall quality of their brainstorming sessions improves these relationships.

Results from our hypotheses testing suggest that client fraud risk factors were positively correlated with client fraud risk assessments, but the quality of the brainstorming session did not uniformly improve these relationships. However, the testing chosen in response to these fraud risk assessments was contingent on the overall quality of the brainstorming session. Specifically, as the quality of the brainstorming session increases, audit teams are more likely to employ more senior staffing/fraud specialists, change the timing of tests, and increase the extent of testing when the fraud risk assessment increases.

It is interesting to note the difference in results observed for the risk assessment and risk response judgments (i.e., the moderating effect of brainstorming quality was significant for H2, but we received mixed results for H1b). One possible explanation is that task complexity plays a role, as planning responses is typically a more difficult and involved task than risk assessment (Arens et al. 2006; Brazel and Agoglia 2006; Hoffman and Zimbelman 2006). Indeed, the auditing literature suggests that changes in risk assessments are often not reflected in the scope of audit testing (e.g., Hackenbrack and Knechel 1997; Mock and Wright 1999; POB 2000). Therefore, the more cognitively demanding task of designing fraud risk responses to fraud risk assessments may require a high quality brainstorming session to ensure it is effectively accomplished, whereas the less demanding task of linking risk factors to risk assessments may not require the benefits of a high quality session.

We believe that the contributions of our study to practice and research are threefold. First, because SAS No. 99 has been implemented recently, there is limited evidence in the accounting literature on the implications of the standard (e.g., Wilks and Zimbelman 2004; Carpenter 2007). Our study contributes to this experimental literature by documenting how auditors are implementing SAS No. 99, including brainstorming sessions, in practice. Second, we test a framework of auditors' fraud judgments that is guided by SAS No. 99, prior accounting research, and input from experienced audit practitioners. Therefore, this study contributes to the fraud literature by providing initial descriptive evidence and a

basis for further modeling and empirical research on auditors' fraud judgments under this new standard. Third, the PCAOB has formed a focus group to re-examine the professional guidance on auditors' fraud judgment processes as it is unclear that SAS No. 99 provides sufficient guidance to auditors of public companies. The results of this study should facilitate this focus group in their discussions as it provides information from current practice related to SAS No. 99 adoption and, in particular, highlights the positive effects of high quality brainstorming.

Although our study makes important contributions, it is subject to limitations as well. While we wanted to obtain a broad understanding of the use of brainstorming in practice, asking managers and partners to select their own examples may have biased their responses toward engagements in which only the highest quality of brainstorming occurred. However, the variability we observe in the quality of the brainstorming sessions suggests this is not likely to have occurred. In addition, asking auditors to respond to the survey based on their past experiences could suffer from limited recall or even hindsight bias. Because problems such as hindsight bias generally result from biased reconstruction processes (Erdfelder and Buchner 1998), we attempted to mitigate these potential problems by using multiple measures for our constructs and allowing respondents to review audit documentation for the selected engagement. Also, more recent research suggests that hindsight bias may actually lead to more accurate information recall (Hoffrage et al. 2000). Finally, while we attempted to ask relevant and clearly stated questions it is possible that our respondents may have not understood the survey questions or we may have failed to include sufficient questions to obtain all the important data. We did pilot test our instrument in an effort to avoid this limitation.

**APPENDIX A**  
**Regression Models Used to Test Hypotheses**

Hypothesis 1a:

$$\text{FR} = \beta_0 + \beta_1\text{MI} + \beta_2\text{DI} + \beta_3\text{OPP} + \beta_4\text{RAT} + \beta_5\text{CLIENT SIZE} + \beta_6\text{AUDIT FIRM} + \beta_7\text{AUDIT EXPERIENCE} + \beta_8\text{POSITION} + \beta_9\text{CLIENT EXPERIENCE} + \beta_{10}\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{11}\text{FRAUD TRAINING} + \beta_{12}\text{FRAUD EXPERIENCE} + \beta_{13-19}\text{INDUSTRY VARIABLES} + \varepsilon$$

Hypothesis 1b:

$$\text{FR} = \beta_0 + \beta_1\text{MI} + \beta_2\text{DI} + \beta_3\text{OPP} + \beta_4\text{RAT} + \beta_5\text{SESSION QUALITY} + \beta_6\text{MIxSESSION QUALITY} + \beta_7\text{DIxSESSION QUALITY} + \beta_8\text{OPPxSESSION QUALITY} + \beta_9\text{RATxSESSION QUALITY} + \beta_{10}\text{CLIENT SIZE} + \beta_{11}\text{AUDIT FIRM} + \beta_{12}\text{AUDIT EXPERIENCE} + \beta_{13}\text{POSITION} + \beta_{14}\text{CLIENT EXPERIENCE} + \beta_{15}\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{16}\text{FRAUD TRAINING} + \beta_{17-23}\text{INDUSTRY VARIABLES} + \varepsilon$$

Hypothesis 2:

$$\text{Nature} = \beta_0 + \beta_1\text{FR} + \beta_2\text{SESSION QUALITY} + \beta_3\text{FRxSESSION QUALITY} + \beta_4\text{CLIENT SIZE} + \beta_5\text{AUDIT FIRM} + \beta_6\text{AUDIT EXPERIENCE} + \beta_7\text{POSITION} + \beta_8\text{CLIENT EXPERIENCE} + \beta_9\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{10}\text{FRAUD TRAINING} + \beta_{11}\text{FRAUD EXPERIENCE} + \beta_{12-18}\text{INDUSTRY VARIABLES} + \varepsilon$$

$$\text{Staffing} = \beta_0 + \beta_1\text{FR} + \beta_2\text{SESSION QUALITY} + \beta_3\text{FRxSESSION QUALITY} + \beta_4\text{CLIENT SIZE} + \beta_5\text{AUDIT FIRM} + \beta_6\text{AUDIT EXPERIENCE} + \beta_7\text{POSITION} + \beta_8\text{CLIENT EXPERIENCE} + \beta_9\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{10}\text{FRAUD TRAINING} + \beta_{11}\text{FRAUD EXPERIENCE} + \beta_{12-18}\text{INDUSTRY VARIABLES} + \varepsilon$$

$$\text{Timing} = \beta_0 + \beta_1\text{FR} + \beta_2\text{SESSION QUALITY} + \beta_3\text{FRxSESSION QUALITY} + \beta_4\text{CLIENT SIZE} + \beta_5\text{AUDIT FIRM} + \beta_6\text{AUDIT EXPERIENCE} + \beta_7\text{POSITION} + \beta_8\text{CLIENT EXPERIENCE} + \beta_9\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{10}\text{FRAUD TRAINING} + \beta_{11}\text{FRAUD EXPERIENCE} + \beta_{12-18}\text{INDUSTRY VARIABLES} + \varepsilon$$

$$\text{Extent} = \beta_0 + \beta_1\text{FR} + \beta_2\text{SESSION QUALITY} + \beta_3\text{FRxSESSION QUALITY} + \beta_4\text{CLIENT SIZE} + \beta_5\text{AUDIT FIRM} + \beta_6\text{AUDIT EXPERIENCE} + \beta_7\text{POSITION} + \beta_8\text{CLIENT EXPERIENCE} + \beta_9\text{ENGAGEMENT TEAM EXPERTISE} + \beta_{10}\text{FRAUD TRAINING} + \beta_{11}\text{FRAUD EXPERIENCE} + \beta_{12-18}\text{INDUSTRY VARIABLES} + \varepsilon$$

where,

FR = Fraud Risk Assessment; measured on a scale where 1 = “extremely low” and 10 = “extremely high.”  
MI, DI, OPP, RAT = Market Incentive, Debt Incentive, Opportunity, and Rationalization; see the Method section for information on measurement.

CLIENT SIZE = based on client revenues and coded as follows: 1 = < \$100 million, 2 = \$100 million - \$500 million, 3 = \$500 million - \$1 billion, 4 = \$1 billion - \$5 billion, 5 = > \$5 billion.

AUDIT FIRM = coded from 1 to 5 based upon the respondent's firm (four international and one national firm participated in our study).

AUDIT EXPERIENCE = coded as follows: 1 = 5 - 10 years, 2 = 11 - 15 years, 3 = > 15 years.

POSITION = coded as follows: 1 = manager, 2 = senior manager, 3 = principal, 4 = partner.

CLIENT EXPERIENCE = measured as the number of years the respondent had served the client.

ENGAGEMENT TEAM EXPERTISE = measured on a scale where 1 = "extremely low" and 10 = "extremely high."

FRAUD TRAINING = measured by the number of hours of fraud training the respondent had received in the last year and coded as follows: 1 = 0 - 8 hours, 2 = 9 - 16 hours, 3 = > 16 hours.

FRAUD EXPERIENCE = determined by the number of engagements the respondent served on which frauds were identified and coded as follows: 1 = 0, 2 = 1-2, 3 = >2.

INDUSTRY VARIABLES = dichotomous (1,0) industry variables for the following industries: manufacturing, retail, government/not-for-profit, energy, high tech/communications, healthcare/pharmaceuticals, and financial services.

SESSION QUALITY = see the Method section for information on measurement.

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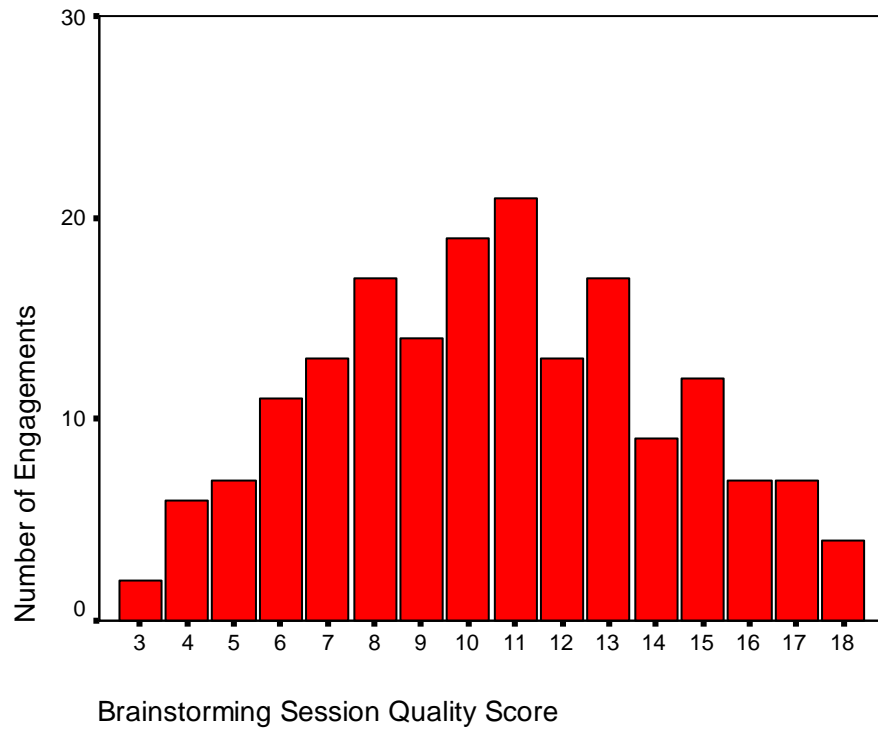
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**FIGURE 1**  
**Frequency Distribution of Brainstorming Session Quality Scores**



This figure illustrates brainstorming session quality scores across the sample of actual audit engagements. These quality scores were formed using a 21-item measure with each item being equally weighted in determining a session's quality. Consequently, session quality scores could range from 0 to 21 points.

**TABLE 1**  
**Descriptive Statistics: Fraud Risk Factors**

Item <sup>a</sup>	Response [n = 179] Mean (Std. Dev.)
<u>Market Incentive</u>	
Percentage of publicly traded clients	67.03 (47.00)
Incentives or pressures for client to commit fraud	4.48 (2.14)
Pressure for client to meet earnings estimates	4.89 (2.57)
Extent of equity-based management compensation	4.28 (2.52)
Extent of budget-based management compensation	4.68 (2.40)
<u>Debt Incentive</u>	
Pressure for client to meet debt covenants	3.72 (2.68)
Amount of debt	4.93 (2.75)
<u>Opportunity</u>	
Opportunity for fraud to be perpetrated at client	4.90 (1.92)
Strength of corporate governance	6.85 (2.26)
Likelihood of management override of controls	4.32 (2.12)
Overall internal control effectiveness	6.74 (2.05)
Difference between net income and cash flow from operations	4.58 (2.34)
<u>Rationalization</u>	
Extent to which management is enabled to rationalize fraud	3.57 (2.07)

<sup>a</sup> With the exception of whether the client chosen was *publicly traded* (coded 1) or private (coded 0), all items were measured on a scale where 1 = “extremely low” and 10 = “extremely high.” Also, due to the positive wording of two opportunity items (*strength of corporate governance* and *overall internal control effectiveness*), responses for these two items were reverse coded for data analysis.

**TABLE 2**  
**Descriptive Statistics: Fraud Risk Responses**

Item <sup>a</sup>	Response [ <i>n</i> = 179] Mean (Std. Dev.)
<u>Nature</u>	
Increase the number of audit procedures	5.26 (2.43)
Change the types of audit procedures	5.56 (2.41)
<u>Staffing</u>	
Use more experienced auditors to perform audit procedures	4.36 (2.78)
Increase the use/consultation of forensic specialists	2.79 (2.73)
<u>Timing</u>	
Change the timing of audit procedures	3.83 (2.70)
<u>Extent</u>	
Increase budgeted hours	3.35 (2.43)
Increase sample sizes	3.73 (2.56)
Increase the extent of audit documentation review	4.71 (2.80)

<sup>a</sup> All items were measured on a scale where 1 = “none” and 10 = “extensively.”

**TABLE 3**  
**Descriptive Statistics: Quality of Fraud Brainstorming Session (21 Items)**

Item	Response [ <i>n</i> = 179] Mean (Std. Dev.)
1. % of engagements where the session was led by the partner or forensic specialist	59.78 (49.22)
2. % of engagements where all levels of engagement team attended sessions	72.63 (44.50)
3. % of engagements where a fraud specialist attended the primary session	31.29 (46.34)
4. % of engagements where an IT audit specialist attended the primary session	69.27 (46.34)
5. % of engagements where a tax professional attended the primary session	62.56 (48.59)
6. Level of staff contribution to the session [ <i>n</i> = 131] <sup>a b</sup>	4.32 (2.13)
7. Level of senior contribution to the session [ <i>n</i> = 170] <sup>a b</sup>	6.03 (1.91)
8. Level of manager contribution to the session <sup>a</sup>	7.93 (1.48)
9. Level of partner contribution to the session <sup>a</sup>	8.41 (1.48)
10. Level of fraud specialist contribution to the session [ <i>n</i> = 56] <sup>a b</sup>	7.01 (2.31)
11. Level of openness to ideas submitted during the session <sup>a</sup>	8.54 (1.42)
12. % of engagements where an agenda was used during the session	83.80 (36.60)
13. % of engagements where a checklist was not used during the session	28.49 (45.34)
14. % of engagements where the primary session was held pre-planning or early in planning	64.81 (47.95)
15. % of engagements where a session was held at the end of the prior year's audit	16.20 (36.03)
16. Time spent by the engagement team preparing for the session (in hours)	9.10 (15.51)
17. % of engagements that had more than one session	49.16 (50.13)

<sup>a</sup> Items were measured on a scale where 1 = “extremely low” and 10 = “extremely high.”

<sup>b</sup> Mean represents the average response in sessions where the professional(s) (e.g., staff, fraud specialist) was present (vs. not present). A Manager(s) and partner(s) were present for all observations.

**TABLE 3 (cont.)**  
**Descriptive Statistics: Quality of Fraud Brainstorming Session**

Item	Response [n = 179] Mean (Std. Dev.)
18. Total length of time for the sessions (in minutes)	93.68 (99.16)
19. % of engagements where team members were asked to identify risk prior to the session	67.60 (47.00)
20. Extent of discussion about how management might perpetrate fraud <sup>a</sup>	7.25 (1.69)
21. Extent of discussion about audit responses to fraud risk <sup>a</sup>	7.38 (1.60)

<sup>a</sup> Items were measured on a scale where 1 = “extremely low” and 10 = “extremely high.”

**TABLE 4**  
**Hypothesis 1a Testing: Regression Results for Fraud Risk Assessment <sup>a</sup>**

Independent Variable <sup>b</sup>	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
<i>Market incentive</i>	.150	1.70	.046
<i>Debt incentive</i>	.109	1.44	.076
<i>Opportunity</i>	.218	2.55	.006
<i>Rationalization</i>	.152	1.88	.031
Client size	-.153	1.88	.062
Audit firm	-.113	1.42	.158
Audit experience	-.051	0.34	.733
Position	.118	0.77	.441
Client experience	-.034	0.46	.643
Engagement team expertise	.164	2.01	.046
Fraud training	.138	1.90	.060
Fraud experience	.005	0.06	.954
Model <i>F</i> -statistic = 3.06			
(p-value < .001)			
R <sup>2</sup> = .270			

<sup>a</sup> *Fraud risk assessment* was measured on a scale where 1 = “extremely low” and 10 = “extremely high.”

<sup>b</sup> The Method section provides information on the measurement of *market incentive*, *debt incentive*, *opportunity*, and *rationalization*. *Client size* was based on client revenues and coded as follows: 1 = < \$100 million, 2 = \$100 million - \$500 million, 3 = \$500 million - \$1 billion, 4 = \$1 billion - \$5 billion, 5 = > \$5 billion. *Audit experience* was coded as follows: 1 = 5 - 10 years, 2 = 11 - 15 years, 3 = > 15 years. *Position* was coded as follows: 1 = manager, 2 = senior manager, 3 = principal, 4 = partner. *Client experience* was measured as the number of years the respondent had served the client. *Engagement team expertise* was measured on a scale where 1 = “extremely low” and 10 = “extremely high.” *Fraud training* was measured by the number of hours of fraud training the respondent had received in the last year and coded as follows: 1 = 0 - 8 hours, 2 = 9 - 16 hours, 3 = > 16 hours. *Fraud experience* was determined by the number of engagements the respondent served on which frauds were identified and coded as follows: 1 = 0, 2 = 1-2, 3 = >2. All dichotomous industry control variables were insignificant (*p*-values > .16) and are excluded from Table 4 for parsimonious purposes.

**TABLE 5**  
**Hypothesis 1b Testing: Regression Results for Fraud Risk Assessment <sup>a</sup>**

Independent Variable <sup>b</sup>	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
Market incentive (MI)	0.208	0.87	.194
Debt incentive (DI)	-0.338	1.39	.166
Opportunity (Opp)	0.348	1.43	.078
Rationalization (Rat)	0.420	1.71	.045
Session quality	0.168	0.57	.567
<i>MI X Session quality</i>	-0.064	0.20	.844
<i>DI X Session quality</i>	0.511	1.88	.031
<i>Opp X Session quality</i>	-0.111	0.35	.725
<i>Rat X Session quality</i>	-0.349	1.22	.226
Client size	-0.204	2.45	.015
Engagement team expertise	0.157	1.93	.055
Fraud training	0.132	1.77	.079
High tech/communications industry	0.155	1.67	.097
Model <i>F</i> -statistic = 2.90 ( <i>p</i> -value < .001) $R^2 = .314$			

<sup>a</sup> *Fraud risk assessment* was measured on a scale where 1 = “extremely low” and 10 = “extremely high.”

<sup>b</sup> The Method section provides information on the measurement of *market incentive*, *debt incentive*, *opportunity*, *rationalization*, and *session quality*. *Client size* was based on client revenues and coded as follows: 1 = < \$100 million, 2 = \$100 million - \$500 million, 3 = \$500 million - \$1 billion, 4 = \$1 billion - \$5 billion, 5 = > \$5 billion. *Engagement team expertise* was measured on a scale where 1 = “extremely low” and 10 = “extremely high.” *Fraud training* was measured by the number of hours of fraud training the respondent had received in the last year and coded as follows: 1 = 0 - 8 hours, 2 = 9 - 16 hours, 3 = > 16 hours. *Fraud experience* was determined by the number of engagements the respondent served on which frauds were identified and coded as follows: 1 = 0, 2 = 1-2, 3 = >2. *High tech/communications industry* is a dichotomous industry variable coded 1 if High tech/communications industry client, 0 otherwise.

**TABLE 6**  
**Hypothesis 2 Testing: Regression Results for Fraud Risk Responses <sup>a</sup>**

<b>Panel A: Nature</b>			
Independent Variable <sup>b</sup>	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
Fraud Risk Assessment (FR)	0.214	0.99	.326
Session quality <sup>c</sup>	0.116	0.71	.482
<i>FR X Session quality</i>	0.161	0.58	.283
Model <i>F</i> -statistic = 3.78 ( <i>p</i> -value < .001) R <sup>2</sup> = .301			
<b>Panel B: Staffing</b>			
Independent Variable	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
Fraud Risk Assessment (FR)	-0.120	0.60	.553
Session quality	-0.014	0.09	.929
<i>FR X Session quality</i>	0.597	2.30	.012
Client size	0.193	2.54	.012
Fraud training	0.144	2.15	.033
Manufacturing industry	0.157	1.72	.088
Model <i>F</i> -statistic = 5.83 ( <i>p</i> -value < .001) R <sup>2</sup> = .399			
<b>Panel C: Timing</b>			
Independent Variable	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
Fraud Risk Assessment (FR)	-0.219	0.99	.324
Session quality	-0.146	0.87	.384
<i>FR X Session quality</i>	0.669	2.35	.010
Manufacturing industry	0.212	2.11	.037
Model <i>F</i> -statistic = 3.37 ( <i>p</i> -value < .001) R <sup>2</sup> = .277			
<b>Panel D: Extent</b>			
Independent Variable	Standardized Coefficient	<i>t</i> -statistic	<i>p</i> -value
Fraud Risk Assessment (FR)	0.001	<0.01	.997
Session quality	-0.057	0.35	.724
<i>FR X Session quality</i>	0.578	2.12	.018
Audit experience	-0.280	1.98	.049
Model <i>F</i> -statistic = 4.45 ( <i>p</i> -value < .001) R <sup>2</sup> = .336			

<sup>a</sup> The Method section provides information on the measurement of the fraud risk responses of *nature*, *staffing*, *timing*, and *extent*.

<sup>b</sup> *Fraud risk assessment* was measured on a scale where 1 = “extremely low” and 10 = “extremely high.” *Client size* was based on client revenues and coded as follows: 1 = < \$100 million, 2 = \$100 million - \$500 million, 3 = \$500 million - \$1 billion, 4 = \$1 billion - \$5 billion, 5 = > \$5 billion. *Audit experience* was coded as follows: 1 = 5 - 10 years, 2 = 11 - 15 years, 3 = > 15 years. *Position* was coded as follows: 1 = manager, 2 = senior manager, 3 = principal, 4 = partner. *Fraud training* was measured by the number of hours of fraud training the respondent had received in the last year and coded as follows: 1 = 0 - 8 hours, 2 = 9 - 16 hours, 3 = > 16 hours. *Manufacturing industry* is a dichotomous industry variable coded 1 if manufacturing industry client, 0 otherwise.

<sup>c</sup> The Method section provides information on the measurement of *Session quality*.