



The Effects of Group Brainstorming on the Auditor's Search  
for Potential Misstatements and Assessment of Fraud Risk  
in the Presence of Pressures and Opportunities

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**W.P. No.2015-03-11**

March 2015

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## **The Effects of Group Brainstorming on the Auditor's Search for Potential Misstatements and Assessment of Fraud Risk in the Presence of Pressures and Opportunities**

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### **Abstract**

This paper examines the effect of SAS No. 99 recommended group brainstorming on the auditor's search for potential material misstatements and assessments of fraud risk in the presence of different levels of pressures and opportunities. We argue that there are potential differences in the auditor's evaluation of pressures and opportunities while searching for potential material misstatements and assessing fraud risk, and these differences could be exaggerated when auditors brainstorm in groups. The results of a 2 x 2 x 2 between-subjects experiment (in which pressures and opportunities were manipulated at high and low levels, and brainstorming occurred individually or in three member audit teams) indicate that auditors found a significantly greater number of potential material misstatements when they observed high pressures and low opportunities compared to when they observed low pressures and high opportunities (even though there was an equal number of potential material misstatements across in all the treatments). Furthermore, this difference was significantly increased when auditors performed group brainstorming. Similarly, auditors' assessments of fraud risk were significantly higher when they observed high pressures and low opportunities as compared to when they observed low pressures and high opportunities. Again, this difference was significantly increased when auditors performed group brainstorming.

## **The Effects of Group Brainstorming on the Auditor's Search for Potential Misstatements and Assessment of Fraud Risk in the Presence of Pressures and Opportunities**

### **INTRODUCTION**

This paper examines the effect of group brainstorming on the auditor's search for potential material misstatements and assessments of fraud risk in the presence of different levels of pressures and opportunities. Prior research indicates that the presence of both pressures and opportunities facilitate opportunistic and/or fraudulent accounting tactics (Hogan et al. 2008; Healy and Whalen 1999). We investigate how group brainstorming exaggerates or mitigates differences in the manner in which individual auditors evaluate the pressures on management, as well as opportunities for management to commit fraud (due to weaknesses in corporate governance mechanisms), while they search for potential material misstatements and assess fraud risk.

Statement on Auditing Standards (SAS) No. 99, *Consideration of Fraud in a Financial Statement Audit*, requires auditors and audit teams to conduct brainstorming sessions, during which the auditors will exchange ideas about where an entity's financial statements may be susceptible to fraud (AICPA 2003). SAS No. 99 defines three conditions (fraud risk factors) that need to be considered while assessing fraud risk of a company (also referred to as the "Fraud Triangle"): (1) perceived pressure, (2) perceived opportunity, and (3) rationalization.<sup>1</sup> The results of Desai, Trompeter, and Wright (2010) indicate that in the presence of high pressures, managers will act opportunistically irrespective of either their ability to rationalize, or the level of opportunities available due to the internal control system. On the other hand, in the presence of

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<sup>1</sup> As the auditing standard suggests, it is difficult to observe management's ability to rationalize because it is a psychological factor unique to each individual. Auditors can more directly observe the pressures on management and opportunities to commit fraud (Carpenter and Reimers 2005). Therefore, in this paper we focus our attention on two of the three conditions: pressures and opportunities.

high opportunities, managers possessing a high ability to rationalize will act opportunistically irrespective of the level of pressures on management. Since SAS No. 99 requires brainstorming about fraud risk factors, it is important to examine how group brainstorming affects the relationship between different levels of pressures and opportunities and the auditor's search for potential misstatements (and the related risk assessments).

According to Hogan et al. (2008), the auditor can play a significant role in reducing the opportunities available to commit fraud. Many studies in the accounting literature indicate that auditors possessing more experience and expertise allow companies to report relatively lower discretionary accruals (Becker et al. 1998; Francis et al. 1999; Carcello and Nagy 2002; Knapp and Knapp (2001).<sup>2</sup> Various auditing standards (such as SAS No. 99) have also been introduced to improve the effectiveness and efficiency of the audit process and reduce the opportunities available to commit fraud. However, the auditor has no control over the pressures on management to act aggressively or to commit fraud. Since the auditor cannot control pressures on management, but the auditor's work can exert some control over the opportunities to commit fraud, it is possible that there may be differences in the manner in which pressures and opportunities are evaluated by auditors. Auditors' assessments of pressures and opportunities could be also be different because managers are under pressures to meet financial goals (e.g., to meet or beat earnings targets), could override control and governance mechanisms and create opportunities even in cases where no opportunities are present, or observable to the auditor (Caplan 1999; SAS No. 99). Hence, in this paper we conduct an analysis of to examine the

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<sup>2</sup> While high discretionary accruals are not necessarily indicative of fraud they could be indicative of opportunistic and aggressive accounting which in turn could be an indicator of fraud (Hogan et al. 2008).

manner in which individual auditors treat pressures and opportunities while searching for potential material misstatements and assessing fraud risk.

More importantly, to the extent that auditors' search for potential material misstatements and assessed fraud risk differ based on differences in pressures and opportunities, we investigate how brainstorming influences these differences. Prior research suggests that a situation relevant concept, norm, perspective, or cognitive process that is shared by a majority of the group members, will be exaggerated in a group setting (Hinsz et al. 1997; Hinsz et al. 2008). Such findings hold particularly in scenarios where groups are trying to accomplish a task that does not have a normatively or demonstrably correct answer (Mugny and Perez 1991; Laughlin and Ellis 1986). In an audit setting, typically there are no normatively correct answers related to the weighting of different levels of pressures and opportunities while searching for potential material misstatements or assessing fraud risk. Therefore, we investigate if brainstorming in groups (as opposed to individual auditors) exaggerates the differences observed in individual auditors' efforts while searching for potential material misstatement and assessing fraud risk. Of concern is the issue of whether individuals' potentially different evaluations of pressures and opportunities increase as a result of team brainstorming.

We conducted an experiment using a 2 x 2 x 2 between-subjects design in which pressures and opportunities were manipulated at high and low levels, and brainstorming occurred individually or in three member audit teams. The results of our study indicate that auditors found a significantly greater number of potential material misstatements when they observed high pressures and low opportunities compared to when they observed low pressures and high

opportunities (even though there was an equal number of potential material misstatements across groups). Furthermore, this difference was significantly increased when auditors performed group brainstorming. Similarly, the auditors' assessments of fraud risk were significantly higher when they observed high pressures and low opportunities as compared to when they observed low pressures and high opportunities. Again, this difference was significantly increased when auditors performed group brainstorming. Thus, our findings suggest that brainstorming does not necessarily increase the likelihood of fraud detection in all pressure/opportunity scenarios because the potential misstatements were held constant across all experimental treatments.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### Pressures and Opportunities

Auditing standards and related practitioner literature recommend that auditors gain an overall perspective of a company's business through strategic assessment and analytical procedures to help develop detailed substantive tests. For example, SAS No. 109, *Understanding the Entity and Its Environment and Assessing the Risks of Material Misstatement*, recommends that auditors gain an understanding of the company's environment and internal control system to help design more effective and detailed substantive tests (AICPA 2006). SAS No. 99 recommends that auditors consider the presence of three types of fraud risk factors (pressures, opportunities and rationalizations), and that auditors should brainstorm about the potential instances of material misstatements that could affect the financial statements.

There is ample evidence suggesting that managers make choices to adjust earnings because of the pressures exerted on them by various environmental or situational factors (Hogan et al. 2008;

Healy and Wahlen 1999). For example, pressures like bonus payouts (Healy 1985) debt covenants violations (DeFond and Jiambalvo 1991), getting favorable terms on bank debt contracts (Beatty and Weber 2003), and achieving capital, tax, and earnings goals (Beatty et al. 1995) have been associated with earnings management and fraud. Managers can also make earnings-based accounting choices to obtain low cost financing (Dechow et al. 1996) and to avoid reductions in earnings levels compared to previous years (Burgsthaler and Dichev 1997).

There is also a relationship between internal control weaknesses (providing managers with opportunities) and aggressive accounting (Hogan et al. 2008). For example, aggressive accounting has been linked to concentration of power (Dunn 2004), CEOs serving on boards of directors (Dechow et al. 1996), audit committee independence and composition (Abbott et al. 2000; Abbott et al. 2004), board of director composition, and the existence and characteristics of audit committees (Beasley 1996; Klein 2002). Additionally, for companies in which fraud was discovered, there were significantly more weaknesses in governance structure than for companies where fraud was not discovered (Beasley et al. 2000). Material internal control weaknesses (and related opportunities to commit fraud) go beyond governance weaknesses. Fraud can also occur when there is a breakdown in fundamental aspects of the internal control system. For example, common material internal control weaknesses are in the areas of deficient revenue recognition policies, duties not being properly segregated, and accounts not being reconciled (Ge and McVay 2005). Therefore, the presence of opportunities is also a significant factor that could lead to aggressive accounting and/or fraud.<sup>3</sup>

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<sup>3</sup> Companies can pursue aggressive accounting practices within the rules of GAAP and/or by violating GAAP. However, in cases where companies are aggressively trying to manipulate the financial statements and disclosures, auditors must be aware of this fact as an indicator of potential fraud risk. While there is no universally accepted definition of earnings management, Dechow and Skinner (2000, 238), note that it has been defined as: a purposeful

SAS No. 99 advises auditors to consider all three conditions (pressures on management, opportunities to commit fraud, and rationalization) of fraud risk factors while assessing the risk of fraud. However, the standard also specifically forewarns the auditor that it is not necessary to observe all three fraud risk factors while assessing fraud risk. The presence of any one condition should be sufficient to make the auditor skeptical about the presence of fraud.<sup>4</sup> The results of Desai et al. (2010) indicate that while the presence of high pressure alone can compel managers to act opportunistically, high opportunities in combination with a manager's high ability to rationalize are also likely to induce opportunistic behavior from management. Therefore the auditor should be wary about the presence of both high pressures and high opportunities while searching for potential material misstatements and assessing fraud risk.

However, there are some fundamental differences between pressures and opportunities which, in turn could lead to differences in the auditors' evaluation of pressures and opportunities while assessing fraud risk. While superior audit quality, by reducing opportunities, can act as a significant deterrent to commit fraud (Hogan et al. 2008), the auditors have no control over pressures on management. For example research shows that Big N auditors are more effective in constraining managers' attempts to manage earnings through higher discretionary accruals compared to non-Big N auditors (Becker et al. 1998; Francis et al. 1999). Similarly, Carcello and Nagy (2002) found a negative relationship between financial statement fraud and auditors' industry specific expertise. Knapp and Knapp (2001) found a positive relationship between audit

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intervention in the external financial reporting process, with the intent of obtaining some private gain... (Schipper 1989, 92), and, alternatively as managers use of judgment: in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers (Healy and Whalen 1999).

<sup>4</sup> According to Bazerman et al. (2002), the majority of frauds start as small indiscretions (which the auditor tends to overlook) and then escalate into bigger problems.



experience and performance on analytical procedures aimed at detecting financial statement fraud. Furthermore, various auditing standards (such as SAS No. 99) and legislation (such as the Sarbanes-Oxley Act) have been introduced to improve the effectiveness and efficiency of the audit process, and to reduce the opportunities available to commit fraud. However, the auditor has no control over the pressures on management to act aggressively or commit fraud. Another significant difference between pressures and opportunities is that when managers are under high pressures they can “create” opportunities even in scenarios where they are not present in the internal control system and observable to the auditors. For example, even though internal control over financial reporting may appear to be well-designed and effective, controls that are otherwise effective can be overridden by management in every entity. Many financial statement frauds have been perpetrated by intentional override by senior management of what might otherwise appear to be effective internal controls (Caplan 1999; AICPA 2005; SAS No. 99). Moreover, the pressures on management are generated by a complex set of economic, human, and environmental factors (see SAS No. 99 for a list of pressures). Therefore, there are bound to be differences in the manner in which pressures and opportunities are evaluated by auditors. The important issue is when such differences exist, does brainstorming affect these differences.

### **Brainstorming, Identification of Material Misstatements, and Assessment of Fraud Risk**

SAS No. 99 requires audit teams to brainstorm (both before and during the information-gathering process) about the potential presence of material misstatements in the financial statements due to fraud. The two primary objectives of brainstorming sessions are improved understanding of the financial statements, and setting a skeptical tone for the overall audit engagement (Ramos 2003). For example, auditors are encouraged to identify and discuss ideas about where an entity’s

financial statements might be susceptible to fraud, and how management could perpetrate and conceal it. Brainstorming, when combined with the results of preliminary analytical procedures, should allow auditors to improve their assessments of the likelihood of fraudulent material misstatements being present in the financial statements. Brainstorming should also heighten the auditors' professional skepticism because a significant part of brainstorming is oriented towards reminding auditors of the importance of maintaining the proper state of mind regarding the potential for material misstatement due to fraud (AICPA 2002; 2003; Carpenter 2007).

There has been limited research on the benefits of group brainstorming in the context of an audit. Carpenter (2007) found that brainstorming in groups leads to a significant increase in the number of actual fraud instances identified, and a significant decline in the number of non-fraud instances identified. Carpenter (2007) also concluded that auditors working in groups provided higher fraud risk assessments than auditors working individually (suggesting that auditors became more skeptical while working in groups). Other research found that strategic reasoning and group brainstorming lead to the establishment of more effective audit plans (Hoffman and Zimbelman 2009), and that computer-mediated brainstorming was significantly more effective than traditional face-to-face brainstorming (Lynch et al. 2009).

Psychology research has cited several reasons for improvement in performance due to brainstorming. Compared to individuals, groups have a greater probability of having more unique as well as common, information (Stasser 1992). Moreover, multiple information processors in a group increase the probability that at least one member will have a correct solution to a problem (Davis 1969). Even if a small subset of group members has some unique

information it can help focus the whole group's attention on such information (Laughlin 1980; Stasser et al. 1989; Vollrath et al. 1989). It is possible that group members correct each other's errors, thus increasing the probability of generating an optimal solution (Hill 1982). Interaction among group members can help in resolving implicit difference of opinions, which in turn could improve decision quality (Sniezek 1992). It has also been suggested that group work can help group members motivate each other to perform better, enable group members to learn from observing others, and increase the likelihood that individual group members will remember others' ideas, thus increasing the likelihood of the idea being acted upon (Arnold and Sutton 1997). Thus, brainstorming could improve auditors' search for instances of fraud and assessment of fraud risk.

However, another stream of research indicates that groups display more homogenous cognitive processes than their members. If individual members tend to process information with certain perspectives, cognitive processes, themes, dimensions, or features, then groups often accentuate this tendency (Hinsz et al. 1997; Hinsz et al. 2008). If some information-processing tendency is uncommon among the members, groups typically further attenuate this uncommon tendency during processing. Information weighted heavily by individual members of the group is weighted more heavily by the group as a whole, and information weighted relatively less by individual members of the groups is weighted even lesser by the overall group (Hinsz and Davis 1984). Tindale et al. (1996) indicated that shared representations were accentuated in a group's responses as well. They argued that groups will be attracted to response alternatives that fit the task representation shared by most of the group members.<sup>5</sup>

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<sup>5</sup> A task representation is any task or situation-relevant, concept, norm, perspective, or cognitive process, that is shared by most or all of the group members (Smith et al. 2000).

Hinsz et al. (2008) investigated differences in the ways that groups and individuals apply information-processing strategies and biases in their judgments involving probabilistic inference problems that involved base-rate and case-specific information. Their results showed that when individuals neglected base-rate information in their judgments, groups accentuated this tendency and used the base-rate information even less in their probability judgments. The predicted group accentuation patterns were also found in responses regarding the relevance of the base-rate and case-specific information that reflected the ways in which information was integrated. Karau and Kelly (1992) argued that restrictive time pressures also induced groups to focus on task completion; consequently, initial member preferences had more influence on group discussion and the final decision.

Prior research suggests that a situation relevant concept, norm, perspective, or cognitive process that is shared by a majority of the group members, will not be exaggerated in a group setting only if the task has a normatively correct answer or a demonstrably correct answer (Mugny and Perez 1991; Laughlin and Ellis 1986). This is because a minority portion of the group can normatively argue in favor of the correct solution. However, in cases without a normatively correct solution, minority group members find it very difficult to argue against the views of the majority (Smith et al. 2000; Clark 1990; Smith et al. 1998; Tindale et al. 1990; Tindale et al. 1993). In an audit setting there are no normatively correct answers related to the effects of pressures or opportunities on search for potential material misstatements and assessment of fraud risk.<sup>6</sup> As a result, the task representation shared by the majority group members while assessing

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<sup>6</sup> The auditors' effort and fraud risk assessments could be different under different sets of pressures and opportunities. This paper tries to examine if the differences observed in individual auditors, with respect to a particular set of pressures and opportunities are increased in a group setting.

the effects of pressures and opportunities will get reinforced. Therefore, the differences observed in individual auditors' assessments of pressures and opportunities are expected to be exaggerated in a group setting. Additionally, research has shown that there is a negative correlation between the perceived risk of material misstatements in the financial statements and auditor effort (Margheim 1986; Gaumnitz et al. 1982; Schneider 1985; DeZoort et al. 2001). Therefore, we predict:

- H1:** The observed difference in the number of potential material misstatements identified by individual auditors, in the presence of different levels of pressures and opportunities, will be greater when auditors brainstorm in groups.
- H2:** The observed difference in individual auditors' assessments of the material misstatements being fraudulent, in the presence of different levels of pressures and opportunities, will be greater when auditors brainstorm in groups.

## METHOD

### Participants

A total of 347 auditors from two major Big 4 firms and three regional firms participated in this experiment. The participants were randomly assigned to one of the eight treatments where the pressures and opportunities were manipulated at two levels (high and low) and brainstorming was manipulated at two levels (individual versus group) forming a 2 x 2 x 2 between-subjects design. All the data was collected during training sessions of the firms (the participants received CPE credits for attending these sessions) and feedback on the results was provided to the participating firms after the experiment was completed and results were tabulated. Of the 252 participants assigned to the "group" treatment, 63 were managers while the rest were audit seniors. Of the 89 participants assigned to the "individual" treatment 49 were managers while the rest were audit seniors. The audit managers reported an average experience of 6.08 years

(standard deviation 1.14 years) and the audit seniors reported an average experience of 3.96 years (standard deviation 1.06 years).

## **Materials and Procedures**

In the first phase of the experiment, participants were provided with a case containing a brief company description, the financial statements of the company, and the accompanying explanations and notes provided by the management<sup>7</sup> and, they were asked to familiarize themselves with the case. This is similar to actual audit scenarios in which auditors are asked to familiarize themselves with the details of the case before the brainstorming sessions are conducted (Beasley and Jenkins 2003).

The different levels of pressures and opportunities were embedded in the brief company description. The “high” pressures on management were operationalized by the presence of aggressive bonus targets, and aggressive earnings targets set by board of directors and analysts. The “high” opportunities were operationalized by the wide geographic spread of the company, the presence of complex accounting transactions, presence of weak internal controls, importance of client to external auditor, and the presence of affiliated directors on the board of directors (see Appendix).<sup>8</sup> The high pressure/high opportunity treatment and the low pressure/low opportunity treatment represent control conditions (these are essentially the boundary conditions in the experiment). The other two treatments, high pressure/low opportunity & low pressure/high opportunity, are the treatments of interest. As mentioned above, SAS No. 99 states that the

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<sup>7</sup> These financial statements were adapted from the financial statements of a large publicly held company.

<sup>8</sup> These pressures, opportunities, and the rating scale are similar to those in Moyes et al. (2006), Apostolou et al. (2001), and Wilks and Zimbelman (2004) and this research as shown these pressures and opportunities to be significant fraud risk factors (additionally, these factors are also listed in SAS No. 99 as possible fraud risk factors)

auditor does not need to observe all risk factors (pressures, opportunities, and rationalization); observing pressures or opportunities alone are enough to alert auditors to potential fraud risk. However, as discussed above, there are bound to be instances in which the auditors are more sensitive to either opportunities or pressures, even if the underlying potential misstatements are the same (as they are in the current experiment). Therefore, the differences in the misstatements identified and assessed fraud risk for the high pressure/low opportunity & low pressure/high opportunity treatments will be analyzed to support of our hypotheses.

Nine instances of potential material misstatements were embedded in the financial statements and accompanying explanations from management. These instances were created by choosing more aggressive accounting treatments (e.g., inflating current period revenues by year end transactions, accelerating revenue recognition, capitalizing certain expenditures that should usually be expensed immediately etc.) compared to the ones that were actually used by the company from which this case was adapted.<sup>9</sup> To avoid demand effects, participants were not given any information about the actual number of instances of misstatements embedded in the financial statement. Before the start of the experiment the participants were also given information about SAS No. 99 and the reasons for which the brainstorming sessions were to be conducted. These instructions were adapted from Carpenter (2007). It is important to note that the potential misstatements were held constant across all experimental treatments.

The second phase of the experiment consisted of the brainstorming sessions (participants brainstormed individually or in groups), in which the participants were asked to complete two

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<sup>9</sup> These potential material misstatements were developed after discussions with accounting faculty members and an audit firm partner.

tasks. For the first task, participants were asked to identify the possible fraud risk factors that were observed in the brief company description and classify them as pressures or opportunities. Such classification would help the participants in decomposing the risks associated with pressures and opportunities, which in turn helps in making the participants more sensitive to the presence of pressures or opportunities while making their risk assessments (Wilks and Zimelman 2004; Glover et al. 2003). For the second task the participants were asked to identify possible instances of material misstatements in the financial statements and assess the probability that the material misstatements were caused intentionally by the management (fraud).<sup>10</sup>

## RESULTS

### Preliminary Analysis

The manipulation checks indicated that the participants (in the “individual” brainstorming treatment) on average identified 2.23 out of the 3 high pressures embedded in the case, and 3.98 out of the 5 high opportunities embedded in the case.<sup>11</sup> The results also suggest that the assessed level of pressure was 6.91 (on scale ranging from 1 through 10, with 1 indicating low pressure and 10 indicating high pressure) for the high pressure cases compared to 4.23 for the low pressure cases (this difference was significant;  $t = 3.16$ ,  $p < 0.05$ ). Similarly the assessed level of opportunity was 6.78 for the high opportunity cases compared to 4.05 for the low opportunity cases (this difference was significant;  $t = 2.97$ ,  $p < 0.05$ ). This suggests a successful manipulation of pressures and opportunities and also that the participants’ responses were conditioned by the

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<sup>10</sup> Material misstatements can be caused inadvertently and intentionally. This task measures how auditors’ sensitivity to the presence of fraud is heightened by the presence of pressures and opportunities.

<sup>11</sup> The number of pressures and opportunities embedded in the experiment was derived after pilot testing and consultations with practitioners.



pressures and opportunities. Nine participants failed the manipulation check and their responses were not included in the final analysis.

The same manipulation checks were evaluated for participants that were assigned to the three-person brainstorming treatment group. The data indicated that these participants on average identified 2.39 out of the 3 high pressures embedded in the case, and 4.01 out of the 5 high opportunities embedded in the case. The results also suggest that the assessed level of pressure was 7.02 (on scale ranging from 1 through 10, with 1 indicating low pressure and 10 indicating high pressure) for the high pressure cases compared to 4.21 for the low pressure cases (this difference was significant;  $t = 2.79$ ,  $p < 0.05$ ). Similarly, the assessed level of opportunity was 6.89 for the high opportunity cases compared to 4.02 for the low opportunity cases (this difference was significant;  $t = 2.91$ ,  $p < 0.05$ ). This again suggests a successful manipulation of pressures and opportunities.

Means and standard deviations for all treatment groups are displayed in table 1. As a preliminary analysis of the brainstorming individuals, a two-way ANOVA was calculated with the number of potential material misstatements identified as the dependent variable. The ANOVA revealed a significant Pressure x Opportunity interaction,  $F(1, 76) = 4.55$ ;  $p < .05$  (see table 2, panel A). Subsequent analysis of this interaction showed that there was a simple effect for level of opportunity (high versus low) at the low level of pressure,  $F(1, 76) = 14.21$ ;  $p < .001$ . The low pressure/high opportunity group identified significantly more potential material misstatements (4.95) than the low pressure/low opportunity group (3.95). However, the simple effect for level of opportunity (high versus low) at the high level of pressure was found to be not significant

(respective means are 6.1 and 5.9). The pattern of means also indicated that the presence of high pressure on management (regardless of level of opportunity) results in a greater number of potential material misstatements than the presence of low pressure on management (regardless of level of opportunity).

**Table 1**  
**Mean Scores and Standard Deviations of Individuals and Groups**

Measure	Panel A (Individuals)				Panel B (Groups)			
	HP/HO (SD)	HP/LO (SD)	LP/HO (SD)	LP/LO (SD)	HP/HO (SD)	HP/LO (SD)	LP/HO (SD)	LP/LO (SD)
Potential Material Misstatements identified	6.10 (0.85)	5.90 (0.79)	4.95 (0.83)	3.95 (0.61)	7.00 (0.84)	6.86 (0.73)	5.03 (0.86)	3.90 (0.76)
Average Probability of Misstatements being Fraud	7.75 (1.07)	7.10 (1.12)	5.95 (0.69)	4.95 (0.89)	8.14 (1.21)	7.71 (0.96)	5.14 (0.79)	4.71 (1.02)
Time Spent on Case (in minutes)	74.95 (1.67)	73.05 (2.72)	69.00 (1.45)	66.3 (1.98)	77.38 (1.28)	76.67 (1.32)	64.71 (2.17)	63.90 (3.14)
Other Misstatement identified*	2.75 (0.79)	2.95 (0.89)	1.9 (0.64)	1.35 (0.88)	3.01 (0.81)	1.81 (0.60)	1.33 (0.91)	1.45 (0.83)

\*These misstatements are items that were not intentionally embedded in the case but perceived by participants to be misstatements.

HP/HO = High Pressure and High Opportunity

HP/LO = High Pressure and Low Opportunity

LP/HO = Low Pressure and High Opportunity

LP/LO = Low Pressure and Low Opportunity

**Table 2**  
**Two-Way ANOVA for the Effect of Pressures and Opportunities (Individuals)**

Panel A: ANOVA, Potential Material Misstatements Identified

Source	df	MS	F	p-value
Pressures (P)	1	48.050	68.26	<.01
Opportunities (O)	1	7.200	10.23	<.01
P x O	1	3.200	4.55	.04
Error	76	0.704		

Panel B: ANOVA, Average Probability of Identified Misstatements being Fraudulent

Source	df	MS	F	p-value
Pressures (P)	1	78.013	85.37	<.01
Opportunities (O)	1	13.613	14.90	<.01
P x O	1	0.613	0.67	.42
Error	76	0.914		

Supplementing this analysis, the individual brainstorming treatment group was analyzed to see if there was a difference between the high pressure/low opportunity treatment and the low pressure/high opportunity treatment. The related means and standard deviations are in table 1, panel A. For the control treatments high pressure/high opportunity and low pressure/low opportunity, the mean number of potential misstatements identified was 6.10 and 3.95, respectively. However, for the high pressure/low opportunity and low pressure/high opportunity treatments, the respective means were 5.90 and 4.95. An independent-samples t-test was calculated to compare these two means. This analysis revealed a significant difference between the high pressure/low opportunity and low pressure/high opportunity groups,  $t(38) = -3.72$ ;  $p < 0.001$ .

For each potential misstatement that was identified, participants made a probability assessment that the misstatement was fraudulent. Average probabilities were calculated for each participant's set of misstatements and these average probabilities were analyzed as above. The results of a two-way ANOVA (calculated with the average probability of the potential material misstatements being fraudulent as the dependent variable) did not result in a significant interaction (see table 2, panel B). There was a significant main effect for pressure,  $F(1, 76) = 85.37$ ;  $p < .0001$ , and a significant main effect for opportunity,  $F(1, 76) = 14.90$ ;  $p < .001$ .

While the high pressure/high opportunity and low pressure/low opportunity treatments had average fraud probabilities of 7.75 and 5.95, respectively, the high pressure/low opportunity and low pressure/high opportunity treatment means were 7.10 and 5.95, respectively. Again, an independent-samples t-test was calculated to compare these two means (for the high pressure/low opportunity and low pressure/high opportunity treatment groups). This analysis revealed a significant difference between the high pressure/low opportunity and low pressure/high opportunity groups,  $t(38) = -3.92$ ;  $p < 0.001$ .

An analysis of the time spent on the cases by the participants revealed that the participants spent an average time of 73.05 minutes in the HP/LO treatment while participants in the LP/HO treatment spent an average of only 69 minutes.<sup>12</sup> This difference was significant at the 0.05 level. The hypothesis testing below investigates whether brainstorming increases this difference between these two treatment groups.

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<sup>12</sup> The total time spent on the case was a self reported measure.

## The Effect of Brainstorming in Groups

We conduct this analysis to observe if the differences in the individual auditors' identification of potential material misstatements and assessment of fraud risk would be accentuated in a group setting. The first and second hypotheses suggest that differences observed in individual auditors search for potential material misstatement and assessment of misstatements being fraudulent in the presence of different levels of pressures and opportunities will be significantly increased when they brainstorm in groups. We conduct ANOVA and t-test analysis to examine if H1 and H2 were supported.

Results were analyzed using three-way ANOVA, with three between-group factors (pressure, opportunity, and brainstorming). Panel A of table 3 shows results for the number of potential material misstatements identified. As the data show, the three-way interaction was not significant, ( $F(1, 156) = 0.09$ ;  $p = .77$ ). There is, however, a significant pressure x opportunity interaction, ( $F(1, 156) = 11.59$ ;  $p < .001$ ), and a significant pressure x brainstorming interaction, ( $F(1, 156) = 12.95$ ;  $p < .001$ ). This interaction is of interest because it provides support for H1. Additional analysis discussed below further investigates the nature of this interaction and extends the hypothesis testing.

Panel B of table 3 shows results for the average probability of the identified misstatements being fraudulent as a dependent variable in the three-way ANOVA. Similar to the results discussed above, the three-way interaction was not significant ( $F(1, 156) = 0.38$ ;  $p = .54$ ) while there was a significant pressure x brainstorming interaction ( $F(1, 156) = 13.20$ ;  $p < .001$ ). This provides support for H2; however, the analysis is extended below for direct testing of the high

pressure/low opportunity and low pressure/high opportunity treatments in the experiment (comparing individual brainstorming to group brainstorming).

**Table 3**

Panel A: Potential Material Misstatements Identified

Source	df	MS	F	p-value
Pressures (P)	1	166.056	244.66	<.001
Opportunities (O)	1	15.223	22.43	<.001
Brainstorming (B)	1	8.878	13.08	<.001
P x O	1	7.864	11.59	<.001
P x B	1	8.788	12.95	<.001
O x B	1	0.004	0.01	0.94
P x O x B	1	0.059	0.09	0.77
Error	156	0.679		

Panel B: Average Probability of Identified Misstatements being Fraudulent

Source	df	MS	F	p-value
Pressures (P)	1	253.543	311.04	<.001
Opportunities (O)	1	16.098	19.75	<.001
Brainstorming (B)	1	0.003	0.00	0.95
P x O	1	0.314	0.38	0.54
P x B	1	10.763	13.20	<.001
O x B	1	1.610	1.97	0.16
P x O x B	1	0.314	0.38	0.54
Error	156	0.815		

We examined how the difference in auditors' responses to the most extreme treatments (difference between the HP/HO and LP/LO treatments in the "individual" versus "group" treatments) were affected by the group brainstorming. The means reported in Table 4 (Panel A) indicate that the difference in material misstatements identified between the HP/HO and LP/LO treatments significantly increased from 2.15 to 3.10 (Table 5). A similar pattern was observed in the responses to probability of misstatement being fraud and time spent on the case (Table 4, Panel A and Table 5). We next examine if group brainstorming in combination with high

pressures or high opportunities exaggerates the differences between individual auditors and groups of auditors.

The means reported in Table 4 (Panel B) indicate that the difference in number of potential material misstatements identified between the HP/LO and LP/HO treatments increased from 0.95 (Table 4, Panel B) for the individual auditors to 1.83 for the groups. This difference was significant as indicated by the t-test analysis (Table 6). It is interesting to note that while there was no difference between the LP/HO (I=individuals) and LP/HO (G=groups) participants ( $t = 1.61$ ;  $p = 0.13$ ) (not reported in table)<sup>13</sup>, the number of potential material misstatements identified by the HP/LO (G) participants was significantly more than HP/LO (I) participants ( $t = 9.63$ ;  $p < 0.01$ (not reported in table)).<sup>14</sup> These results which provide evidence in support of H1 are also exhibited in figure 1.

The means reported in Table 4 (Panel B) indicate that the difference in assessed probability of material misstatements being fraudulent, between the HP/LO and LP/HO treatments increased from 1.15 for the individual auditors to 2.57 for the groups. This difference was significant as indicated by the t-test analysis (Table 6). The results also indicate that there was a significant *decrease* in the assessed probability of misstatement being fraudulent between the LP/HO (I) and LP/HO (G) participants ( $t = 10.21$ ;  $p < 0.01$ (not reported in table)). On the other hand there was a significant *increase* in assessed probability of misstatements being fraudulent between the

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<sup>13</sup> It can be inferred that there was no decline in the number of misstatements identified as a result of brainstorming in these treatments. Hence brainstorming did not have an adverse effect on misstatements identified in these treatments.

<sup>14</sup> The fact that there are three participants in the group appears to be helping in preventing a decline in the number of misstatements identified. It is also interesting to note that despite having three members in the group; the number of misstatements identified does not increase significantly compared to when the participants were working individually.

HP/LO (G) and HP/LO (I) participants ( $t = 4.59$ ;  $p < 0.05$  (not reported in table)). Figure 2 provides a visual depiction of these results which provide evidence in support of H2.

Based on the data it can be inferred that the decrease (increase) in the auditors' sensitivity to the presence of high opportunities and low pressures (high pressures and low opportunities) while searching for potential misstatements in a group setting is also having an effect on their audit effort. There is a significant decrease ( $t = 11.04$ ;  $p < 0.01$ ) (increase, ( $t = 10.75$ ;  $p < 0.01$ )) in the time spent between the LP/HO (I) and LP/HO (G) (between the HP/LO (I) and HP/LO (G)) treatments while searching for material misstatements (Table 4, Panel B and Table 6). The means depicted in figure 3 provide further support for these results.

**Table 4**  
**Mean Scores and Standard Deviations (Individuals versus Groups)**

<u>Panel A:</u>						
Measure	Brainstorming Individuals		Row difference	Brainstorming Groups		Row Difference
	HP/HO (SD)	LP/LO (SD)		HP/HO (SD)	LP/LO (SD)	
Potential Material Misstatements Identified	6.10 (0.85)	3.95 (0.61)	<b>2.15</b>	7.00 (0.84)	3.90 (0.76)	<b>3.10</b>
Probability of Misstatement being Fraud	7.75 (1.07)	4.95 (0.89)	<b>2.80</b>	7.71 (0.96)	4.71 (1.02)	<b>3.00</b>
Time Spent on Case (minutes)	74.95 (1.67)	66.30 (1.98)	<b>8.65</b>	76.67 (1.32)	63.90 (3.14)	<b>12.77</b>
<u>Panel B:</u>						
Measure	Brainstorming Individuals		Row difference	Brainstorming Groups		Row difference
	HP/LO (SD)	LP/HO (SD)		HP/LO (SD)	LP/HO (SD)	
Potential Material Misstatements identified	5.90 (0.79)	4.95 (0.83)	<b>0.95</b>	6.86 (0.73)	5.03 (0.86)	<b>1.83</b>
Probability of Misstatement being Fraud	7.10 (1.12)	5.95 (0.69)	<b>1.15</b>	7.71 (0.96)	5.14 (0.79)	<b>2.57</b>
Time Spent on Case (minutes)	73.05 (2.72)	69.00 (1.45)	<b>4.05</b>	76.67 (1.32)	64.71 (2.17)	<b>11.96</b>



**Table 5**  
**T-test Investigating Differences between Individuals and Groups**  
**[HP/HO (I) – LP/LO (I)] – [HP/HO (G) – LP/LO (G)]**

Measure	Mean Difference in Pair	Standard Deviation	t-value	df	p-value
Potential Material Misstatement Identified	0.91	1.440	2.868	20	0.010
Probability of Misstatement Being Fraud	0.67	1.354	2.256	20	0.035
Time Spent on Case	4.67	1.957	10.923	20	< 0.01

**Table 6**  
**T-test Investigating Differences between Individuals and Groups**  
**[HP/LO (I) – LP/HO (I)] – [HP/LO (G) – LP/HO (G)]**

Measure	Mean Difference in Pair	Standard Deviation	t-value	df	p-value
Potential Material Misstatement Identified	0.90	1.640	2.528	20	0.021
Probability of Misstatement Being Fraud	1.42	1.764	3.339	20	0.030
Time Spent on Case	7.89	3.363	3.339	20	< 0.01

Figure 1

Misstatements Identified

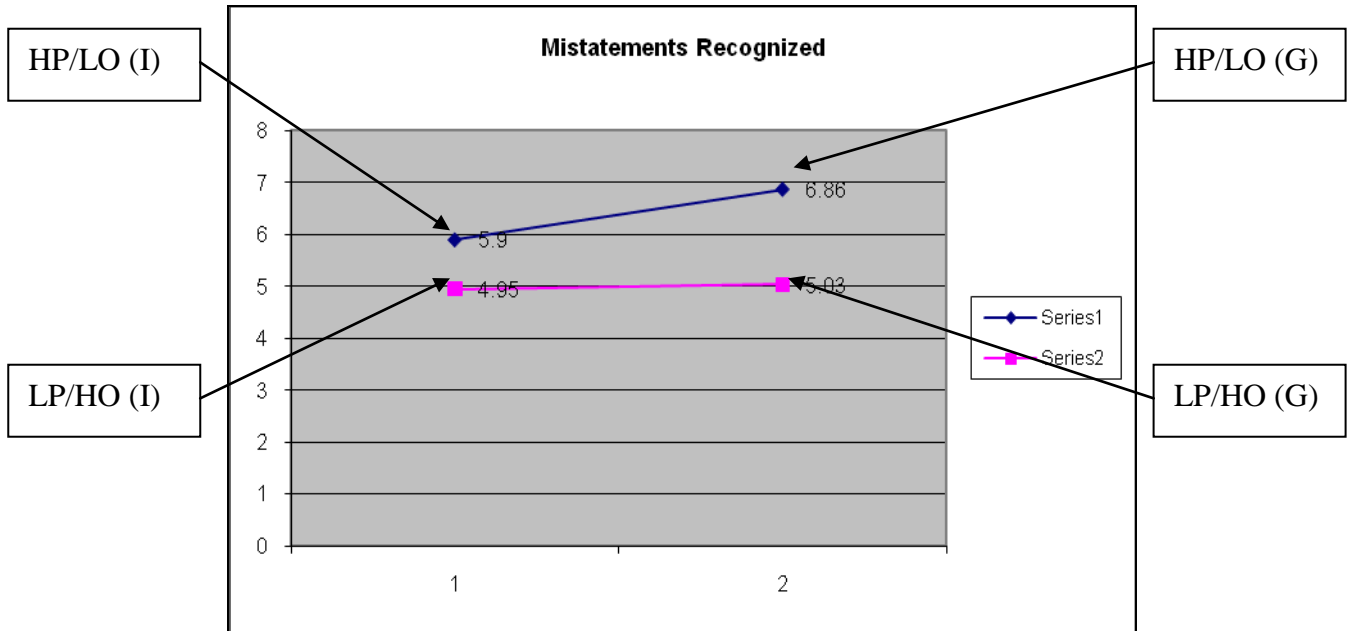


Figure 2

Probability that Misstatement is a Fraud

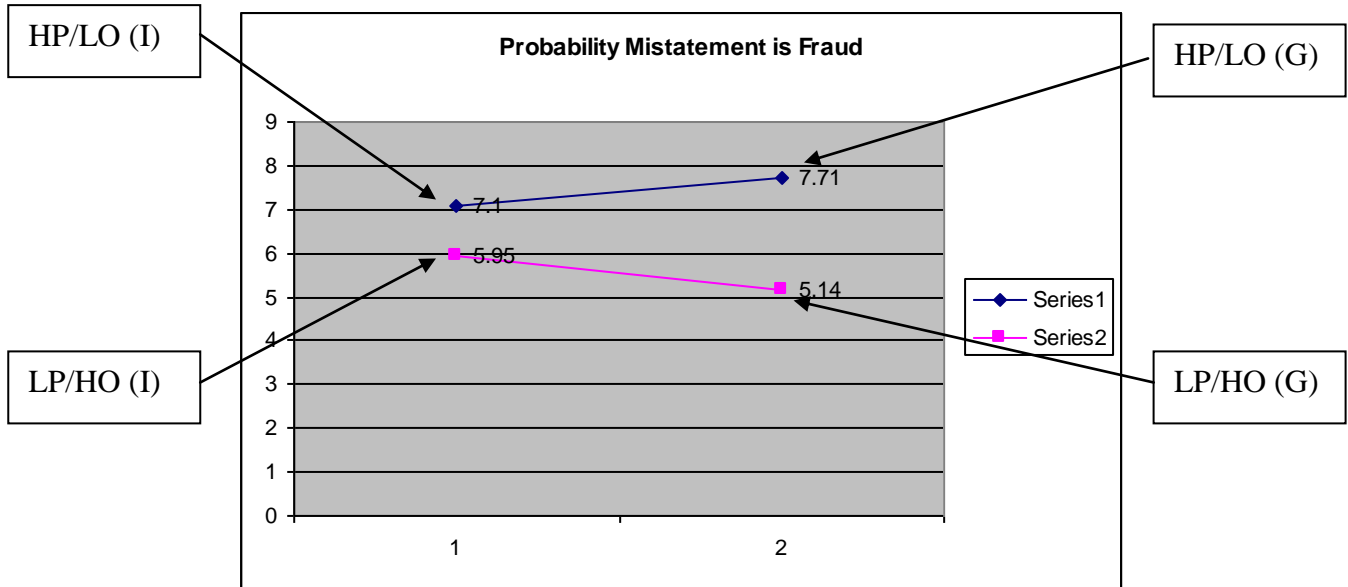
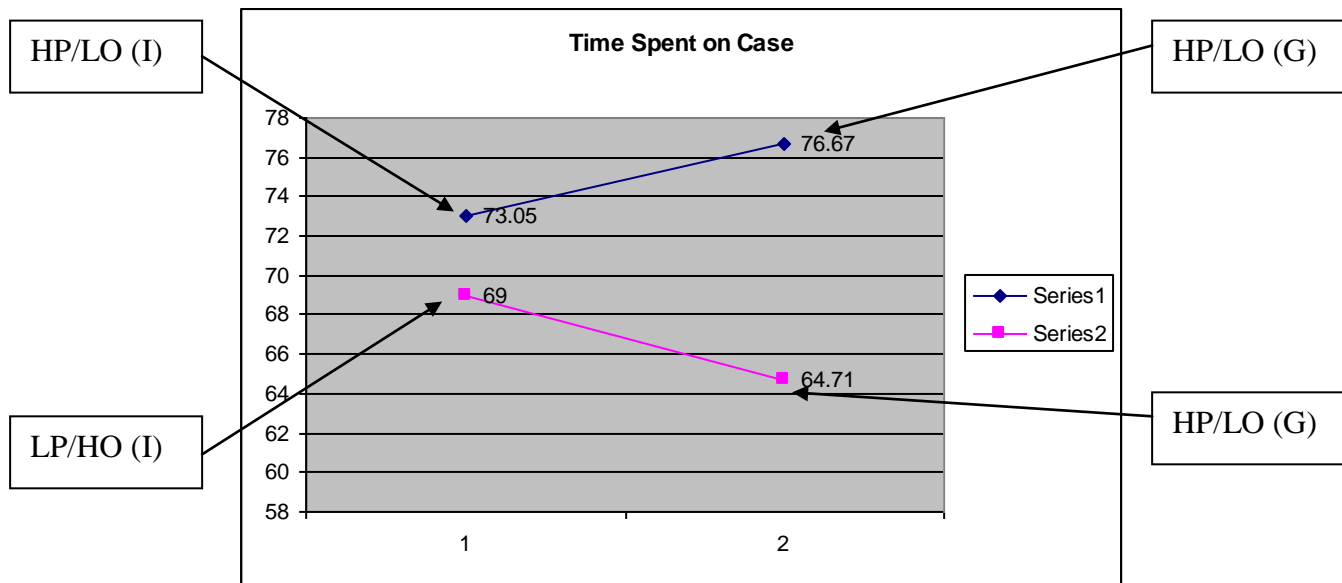


Figure 3

## Time Spent on the Case



The results supporting the first and second hypotheses provide further evidence in support of the psychology theory of accentuation of tendencies of individual group members in a group judgment and decision making context without a normatively correct answer. More importantly, it raises a significant concern about the role of brainstorming as mandated by SAS No. 99.

### CONCLUSION

This study contributes to the understanding of how SAS No. 99 recommended group brainstorming sessions affect auditors' evaluation of pressures and opportunities while searching for potential material misstatements and assessing fraud risk. The results of our study have important implications for practicing auditors, standard setters and academic researchers.

The results indicate that individual auditors are more sensitive to the presence of high pressures compared to the presence of high opportunities when the pressures and opportunities are

interacted at the high and low levels. Prior research suggests that a situation relevant concept, norm, perspective, or cognitive process that is shared by a majority of the group members, will be exaggerated in a group setting if the task does not have a normatively correct answer or a demonstrably correct answer (Mugny and Perez 1991; Laughlin and Ellis 1986). Consistent with these findings, the results of our study indicate that differences observed (in the number of potential misstatements identified, and the assessed probabilities of those statements being fraudulent) under different levels of pressures and opportunities, when auditors brainstormed individually, were significantly exaggerated when they worked in three member groups.

There is an underlying assumption in our study that the auditors' identification of a greater number of potential material misstatements is an ideal achievement. Although this notion is consistent with the brainstorming literature, as well as SAS No. 99, it should also be recognized that a potential effect of this process is the risk of unnecessarily increasing the audit scope. One possible avenue for future research is to have a manipulation of fraud versus no fraud (see e.g., Carpenter 2007 and Knapp and Knapp 2001) scenarios, although adding a fourth factor to our experimental design would certainly be a challenge.

This research reflects the first step of a broader research agenda. Although the specific pressures and opportunities that were chosen for the high pressure and high opportunity treatments were based on prior literature, it must be recognized that the numbers and combination of pressures and opportunities represents a mere sample of the numbers and combinations that could exist in real companies. Future research must determine whether different tasks, numbers of pressures and opportunities, and different combinations of pressures or opportunities, would change the

results reported here. Furthermore, it is unclear if the results of the brainstorming group are contingent on the number of people in the brainstorming group (for comparison Carpenter (2007) and Hoffman and Zimbelman (2009) used 3 person auditor groups and Lynch, Murthy, and Engle (2009) used 4 person student groups).

The results of this study have important implications for practicing auditors and standard setters. Prior research indicates that while the presence of high pressures on its own is sufficient to induce opportunistic behavior from management, high opportunities in combination with a high ability to rationalize is also likely to induce opportunistic managerial behavior (Desai et al. 2010). During the course of an audit, the auditor is able to observe opportunities, and to a lesser extent pressures; however, it is relatively more difficult to observe and assess the management's ability to rationalize their fraudulent or opportunistic actions. Therefore to the extent that the research findings presented here extend to actual audit settings, the auditor's tendency to be relatively less sensitive to the presence of high opportunities could reduce the effectiveness of the audit process. A manager with a high ability to rationalize (which the auditor cannot measure or directly observe) could use these opportunities to manage earnings or commit fraud.

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## Appendix

### Manipulations of Pressures and Opportunities

#### High Pressure

The divisional managers' compensation plans consist of a relatively low fixed salary. A significant part of the compensation consists of generous and large bonuses that are dependent on meeting aggressive earnings and performance targets. Through this compensation scheme, the board of directors hopes to encourage the divisional managers to improve ABC's overall earnings performance. The divisional managers have struggled to meet these earnings targets in the past 3 quarters. The manufacturing industry as a whole has experienced a marginal growth in sales for the last three years amidst increasing competition from local and foreign companies.

#### Low Pressure

The divisional managers' compensation plans consist of a relatively high fixed salary. Only a small part of the compensation consists of bonuses that are dependent on meeting earnings and performance targets. The Board of Directors usually set very reasonable performance and earnings targets for the divisional managers. The divisional managers have managed to meet their earnings targets in the past 3 quarters. The manufacturing industry as a whole has experienced a steady growth in sales for the last three years amidst a very negligible growth in competition.

#### High Opportunity

ABC Inc. is a large publicly held corporation that is involved in manufacturing operations. ABC's manufacturing operations are spread over 4 states and 2 foreign countries. The net worth of the company is approximately 500 million dollars.

The company has reasonably reliable internal controls. It maintains an in-house internal audit function, which is run by an experienced and well trained group of company employees, who are answerable only to an audit committee comprised of independent directors. The divisional managers of the company decide the timing and scope of all internal audit work. The internal auditors also spend a significant amount of time on consulting work in addition to their usual internal audit compliance work. Due to the large geographical coverage and international operations, the divisional managers have to deal with complex revenue recognition, asset valuation and, transfer pricing issues. This makes it necessary for the divisional managers to use their judgment and discretion to come up with various estimates for some of the company's complex transactions. The company's external audit is performed by a Big 4 accounting firm. ABC Inc. is the largest client for the Big 4 accounting firm office, located in the region where the company is incorporated. The company rotates its external auditors at regular intervals.

#### Low Opportunity

ABC Inc. is a large publicly held corporation that is involved in manufacturing operations. All its manufacturing operations take place at a single large manufacturing facility located in a major mid western US city. The net worth of the company is approximately 500 million dollars.

The company has strong internal controls. It has a strong internal audit function, which is run by an independent Big 4 accounting firm and which is answerable only to an audit committee comprised of independent directors. The timing and scope of all internal audit work is decided by the Big 4 firm. The internal audit function is primarily involved in providing internal audit compliance services. The operations of ABC Inc. do not involve any complex transactions at or near year end, nor do they involve any complex asset, liability, revenue or expense recognition issues. As a result the divisional managers rarely use their judgment and discretion to come up with estimates for the company's transactions. The company's external auditor is also a Big 4 accounting firm (different from Big 4 firm which provides internal audit services). The company rotates its external auditors at regular intervals.