Risk-Based Auditing, Strategic Prompts, and Auditor Sensitivity to the Strategic Risk of Fraud

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ABSTRACT: Under risk-based auditing, more (fewer) audit resources are allocated to accounts that are more (less) likely to be misstated. However, if auditors do not anticipate the strategic risk that arises when client managers anticipate auditors’ risk-based resource allocations, undetected misstatements among ostensibly low-risk accounts could be more common than traditional risk assessment procedures suggest. Using a laboratory experiment, I find that participants assuming the auditor role in a stylized audit game do not naturally attune to strategic risks, but instead focus resources toward accounts with high non-strategic risk and away from ostensibly low-risk accounts. Manager-participants exploit these allocations by overriding the low-risk accounts more often than accounts with high non-strategic risk. However, auditor-participants who are asked to predict managers’ expectations of, and responses to, audit resource allocations, devote additional resources to the low-risk accounts. These results are robust to the level of available audit resources.

Keywords: audit resource allocation; strategic reasoning; fraud risk; risk-based auditing; experimental economics.

Data Availability: Data used in this study are available upon request.

I. INTRODUCTION

The basic premise of risk-based auditing is that auditors should devote more resources to accounts that are likely to be misstated and fewer resources to those that are less likely to be misstated (Bell et al. 2005; Rittenberg and Schwieger 2005; Knechel 2007). This approach is expected to lead to more effective and efficient audits (e.g., Bell et al. 2005; Public Company...
Accounting Oversight Board (PCAOB) 2007). However, if auditors do not accurately assess misstatement risk at the account level, audit resources will be misallocated, resulting in undetected misstatements (e.g., Kinney 2005; O’Donnell and Schultz 2005).

Auditors could wrongly assess misstatement risk by focusing on observable non-strategic risk factors that indicate certain accounts are more likely than others to be misstated and by failing to appreciate the attendant implications for unobservable strategic risks that arise when financial reporting managers anticipate that auditors will allocate resources based on those non-strategic risk factors (Fellingham and Newman 1985). By fixating on non-strategic risk factors and by allocating resources accordingly, auditors could actually create opportunities for fraud among the ostensibly low-risk accounts.

The HealthSouth audit failure provides an example of such an outcome. Having apparently assessed fixed assets as a low-risk account, HealthSouth’s auditors reportedly devoted relatively few resources to testing fixed assets, particularly to vouching smaller fixed asset additions. HealthSouth’s management anticipated this strategy and exploited it by capitalizing certain expenses into the fixed asset accounts (Weil 2004).

The purpose of this study is to demonstrate this potential threat to the efficacy of risk-based auditing by examining the way in which auditors allocate resources among accounts that differ in non-strategic risk and by examining the strategic implications of these allocations for account-specific misstatement risk. I further examine whether prompting strategic reasoning reduces this threat. Although audit standards and extant research acknowledge that auditees might anticipate and exploit auditors’ risk-based strategies (e.g., American Institute of Certified Public Accountants [AICPA] 2003; Peecher et al. 2007; Hoffman and Zimbelman 2009), few prior studies have proposed or tested interventions designed to enhance auditors’ sensitivity to that possibility. An important exception is Hoffman and Zimbelman (2009), who find that prompting auditors to consider likely client responses to audit strategies leads to more effective modifications of a standard audit program in a single-account setting, where the risk of fraud specific to that account is known to be high.

My study builds on Hoffman and Zimbelman (2009) in two important ways. First, I explore the way in which auditors allocate limited pools of resources among client accounts that differ in non-strategic risk and whether client managers exploit those allocations. I also examine whether a strategic reasoning prompt enhances auditor sensitivity to the managers’ potential exploitation of auditors’ risk-based resource allocations and whether such prompts could thereby improve the effectiveness and efficiency of audit resource allocations. By comparison, Hoffman and Zimbelman (2009) focus on the use of prompts in improving auditor anticipation of and responses to specific modes of fraud when an account is already known to be high in fraud risk.

I address these questions with a laboratory experiment in which student participants assume the role of auditor or financial reporting manager and interact in a two-account audit setting, where the accounts differ greatly in non-strategic risk, the auditor’s Nash equilibrium resource allocations are much less

1 For example, the quality of the accounting system and internal controls, frequency and complexity of transactions and prevalence of management judgments are observable factors that could suggest that misstatements are more likely to occur within some accounts than in others.

2 Experimental materials do not use terms such as auditor, manager, audit, fraud, etc., but instead use neutral terminology so that participants’ choices were not influenced by their beliefs about how auditors and managers ought to behave (Haynes and Kachelmeier 1998). However, for clarity, I generally use the more meaningful terminology in this manuscript. For further expository convenience, I generally refer to participants simply as “auditors” and “managers,” although all participants are students who assume those roles for the purposes of this study.
extreme than the differential non-strategic risks would imply. That is, because of the low-risk account’s lower non-strategic risk, the strategic manager expects that account to draw relatively little auditor attention. Therefore, the manager views it as a ripe opportunity for intentional misstatement, creating differential strategic risks that an auditor should consider along with the exogenous non-strategic risks. This between-account difference in non-strategic risk provides a within-subjects variable as part of the experimental design.\footnote{Phillips (1999) similarly examines auditor sensitivity to the presence of fraud in a multi-account setting, where misstatement risk differs between accounts. However, Phillips (1999) focuses on the eventual evaluation of audit evidence, whereas the current study is concerned with sensitivity to the strategic implications of differences in non-strategic risk during the risk assessment and planning phases of the audit.}

I also manipulate, between-subjects, whether auditors receive a strategic prompt. Auditors in the no-prompt condition are provided with the non-strategic risk probabilities. Auditors in the prompt condition are likewise informed of the non-strategic risk probabilities and are also prompted to consider the strategic implications of that information.\footnote{In practice, auditors likely learn of non-strategic risk probabilities through experience, professional or firm guidance, and analysis of client accounting systems.} Specifically, each auditor in the prompt condition is asked to report his/her beliefs about how the manager expects the auditor to allocate resources and how the manager will likely respond to his/her expectations.

Prior research has demonstrated that resource constraints can affect the way in which auditors perceive and respond to risk (Houston 1999; Asare et al. 2000), which suggests that the constraints on audit resources could also affect the usefulness of strategic prompts. Therefore, I additionally manipulate the amount of resources available to the auditor in order to determine whether the effectiveness of the strategic prompt is robust to the degree of resource constraint. In the adequate resources condition, resources are limited to an amount that slightly exceeds that required by the Nash equilibrium, whereas in the excess resources condition, the level of available resources is well above the equilibrium level.

I find that participants in the auditor role tend to allocate fewer resources to the low-risk account than the high-risk account and participants in the manager role respond by overriding the low-risk account more often than the high-risk account. This results in more undetected misstatements in the ostensibly low-risk account than in the high-risk account, despite the high-risk account’s higher level of non-strategic risk. However, compared to auditors in the no-prompt condition, prompted auditors tend to utilize more of their available resources, allocating significantly more resources to the ostensibly low-risk account but no more resources to the high-risk account. Thus, the strategic prompt does not simply result in a general increase in resource use, which could be inefficient, but instead enhances strategic reasoning, with the result that resources are deployed more effectively while maintaining efficiency. I further find that these results are robust to the level of resources available to the auditor, though auditors do utilize more resources overall within the excess resources condition.

These results demonstrate a potential threat to the effectiveness of risk-based auditing that has been largely overlooked in the accounting literature; that is, by failing to appreciate the strategic nature of fraud, auditors are unlikely to appropriately deploy their resources, resulting in failure to detect the intentional misstatements among ostensibly low-risk accounts that occur when managers anticipate that auditors will not focus resources on those accounts. However, the results further suggest that prompting auditors to form beliefs about managers’ expectations of and responses to auditors’ strategies enhances auditor sensitivity to strategic fraud risk, resulting in more effective deployment of resources. Therefore, standard-setters and audit firms could potentially improve audit effectiveness by incorporating such strategic prompts into auditing standards and other professional guidance. These results could be particularly important to the Public Company
Accounting Oversight Board (the “PCAOB”), which encourages a risk-based approach to integrated audits of internal controls and financial statements (PCAOB 2007).

In Section II, I describe the setting for this study as well as the game-theoretic predictions. I develop hypotheses and describe the experimental design and method in Sections III and IV, respectively. Section V presents analysis of the results, followed by concluding comments in Section VI.

II. SETTING

Game theoretic models of auditing (e.g., Shibano 1990; Bloomfield 1995; Newman et al. 2005) demonstrate that the risk of fraud is endogenous, in that the financial reporting manager’s optimal reporting strategy depends on his/her expectations of the auditor’s strategy. This study examines a multi-account audit setting constructed following the game-theoretic reasoning described in that prior analytic literature and adapted in prior behavioral research (e.g., Bloomfield 1997; King 2002; Fischbacher and Stefani 2007; Bowlin et al. 2009).

In this setting, the auditor is responsible for detecting misstatements within two financial statement accounts, \( i \) \((low-risk, high-risk)\), either of which could be misstated due to a non-strategic accounting system error or due to the financial reporting manager’s strategic override of the accounting system. To that end, the auditor allocates a fixed pool of audit resources among the two accounts and his/her personal consumption.

Following Bloomfield (1997), the accounting system materially misstates each account with probability \( r_i \), which represents each account’s non-strategic risk. Although the value of \( r_i \) is common knowledge by assumption, neither the manager nor the auditor knows whether the accounting system will actually generate a misstatement prior to making their respective choices. Thus, simultaneous with the accounting system’s outcome, the manager chooses whether to accept that outcome or to override the accounting system. If the manager chooses to override an account, that account will be misstated with certainty, but will not also be unintentionally misstated. Although multiple misstatements could occur within a single account in practice, my assumption here does not alter the strategic tension between the auditor and the manager but does allow a more straightforward analysis of the game and implementation in the laboratory.

Without knowledge of the manager’s decisions, the auditor chooses the number of audit resources units, \( e_i \), to devote to each account. The probability that the auditor will detect any existing misstatement in account \( i \), \( p_i \) (the detection probability), is the product of \( e_i \) and an audit effectiveness multiplier, \( T \), which represents the marginal increase in the auditor’s probability of detecting a misstatement for each additional unit of resources devoted to a given account. Although this factor likely varies across accounts in practice, for the purposes of this study, \( T \) is set to 1 percent for all accounts. This means that, for each additional resource unit devoted to an account, the probability of detecting an existing misstatement increases by one percentage point. Accordingly, if the auditor allocates 100 units to account \( i \) (i.e., \( e_i = 100 \)), the detection probability, \( p_i \), is 100 percent. At the other extreme, if no resources are devoted to account \( i \) (i.e., \( e_i = 0 \)), there is zero probability of detecting a misstatement in that account.

After the manager has chosen whether to override the two accounts and the auditor has allocated his/her resources, outcomes are determined randomly based on those choices and the non-strategic risk, \( r_i \). Each player’s payoff depends on these outcomes as described below.

**Payoffs and the Nash Equilibrium**

The auditor’s total cost of resources is \( \sum_i e_i K \), where \( K \) is the auditor’s marginal utility of unused resources (i.e., cost per unit of resource). Consistent with King (2002), the total resources devoted to the two accounts is exogenously limited by an audit fee, \( F \). Any resources that are not
allocated to one of the accounts are consumed by the auditor. In addition to the utility garnered from unused resources, the auditor receives utility of \( Y \) for each account for completing the audit.\(^5\) When undetected misstatements occur, the auditor also incurs a penalty, \( Z \), which does not depend on whether the undetected misstatement was intentional or unintentional.

For each account, if the manager accepts the balance generated by the accounting system, his/her payoff is \( M_L \) when a misstatement does not occur or when a misstatement does occur but is not detected. When a misstatement is detected, the manager’s payoff is \( M_L - V_L \). On the other hand, when the manager overrides the accounting system, he or she receives \( M_H \) when the auditor does not detect the resulting intentional misstatement and \( M_H - V_H \) when that misstatement is detected. I assume that the financial reporting manager prefers to override the accounting system when misstatements will not be detected, but prefers to accept the system’s output when misstatements will be detected. That is, \( M_H > M_L \), but \( M_H - V_H < M_L - V_L \).

Solving for the equilibrium gives \( q_i^\ast = \frac{K - Z r_i}{T (Z - Z r_i)} \) and \( e_i^\ast = \frac{M_H - M_L}{T (V_H - V_L r_i)} \), as derived in Appendix A. Consistent with the logic of a mixed-strategy equilibrium (Fudenberg and Tirole 1991), the auditor’s (manager’s) optimal strategy is a function of the manager’s (auditor’s) payoff structure and the account-specific non-strategic risk, \( r_i \), but does not depend on his/her own payoffs. Additionally, the equilibrium is unaffected by the amount of available resources. However, I assume that the amount of resources available to the auditor is sufficient to provide an equilibrium level of resources to both accounts. If resources were constrained to lower levels, the auditor would always allocate below-equilibrium resources to at least one account, thereby resulting in corner solutions, where the manager always overrides at least one of the accounts. Assuming a sufficient level of available resources allows me to focus on the more interesting circumstances with interior solutions.

Table 1 summarizes the game parameters, which are intended to capture the relative preferences of real-world auditors and managers. Note that the two accounts in this game differ only in the non-strategic risk parameter, \( r_i \), which is set at 20 percent and 80 percent for the low-risk account and the high-risk account, respectively. Accordingly, the equilibrium is approximately \((e_1^\ast, e_2^\ast, q_1^\ast, q_2^\ast) = (48, 52, 0.75, 0)\) for both resource conditions.

Under these parameters, the combination of the non-strategic risk of error and the strategic risk of fraud results in an equilibrium misstatement risk of 80 percent for each account, regardless of the non-strategic risk.\(^6\) Therefore, the auditor will allocate similar amounts of resources to the two accounts, even though an unintentional misstatement is substantially more likely to occur in the high-risk account than the low-risk account.

Although the equilibrium misstatement risk is the same for both accounts, the auditor does allocate slightly more resources to the high-risk account in equilibrium. This occurs because the manager is penalized when an unintentional misstatement is detected. Since the manager cannot control the quality of the accounting system in this setting, this penalty for unintentional misstatements actually reduces the disincentive effect of the penalty for detected override. Therefore, as the quality of the accounting system decreases (i.e., as the non-strategic risk increases), the manager’s incentive to override would increase were it not for the auditor’s response of allocating more resources to the high-risk account. Although allocations of auditor effort could be more sharply skewed towards the high-risk account in practice, the equilibrium in this setting strengthens the ability of an experiment to test the theoretical premise that endogenous management reporting can offset differences in non-strategic risk.

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\(^5\) Although the value of \( Y \) does not affect the equilibrium solution to the audit game (as derived in Appendix A), a sufficiently high value of \( Y \) serves the practical purpose of ensuring non-negative payoffs to experimental participants. Therefore, for consistency, I include it in the auditor’s utility function here.

\(^6\) In other words, the auditor is made indifferent among all possible resource allocations when the manager chooses an override strategy that results in misstatement risk of 80 percent for each account.
This model incorporates a number of assumptions that simplify its implementation in the laboratory. First, although this game is meant to represent a fraud setting, the manager does not issue an accounting report on which the auditor opines, but instead chooses a hidden action (whether to override the accounting system), which is more often associated with misappropriation of firm assets than with misreporting in the analytic literature (Newman et al. 1996). Second, consistent with Anderson and Young (1988), I assume that detection of a misstatement in one account does not make a misstatement in the other account more likely to be detected. Third, I assume that the auditor’s penalty for undetected misstatements does not differ depending on whether or not the misstatement is intentional. While, in practice, those penalties could differ, that difference would not affect the equilibrium predictions of auditor behavior. Game theory predicts that increasing the auditor’s penalty for undetected fraud, while holding constant the penalty for undetected errors, results in a lower likelihood of fraud. However, the manager would continue to override accounts with lower non-strategic risk more often than those with higher non-strategic risk except as auditor penalties approach infinity. Finally, this model treats the audit as a one-shot game, though the same auditor and manager often interact repeatedly in practice, allowing each party to learn about the other’s behavior. A multiperiod Bayesian analysis of the game could provide further analytic insights and predictions about auditor and manager behavior. Although each of these assumptions has important implications for predicted behavior, the purpose of this model is not to form precise predictions about auditor and manager behavior per se, but rather is to capture the strategic nature of the auditor-manager relationship in a multi-account setting and to allow a clear examination of auditor resource allocation strategies, manager responses, and the potential benefits of a strategic prompt.

### TABLE 1
**Game Parameters**

#### Panel A: Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Adequate Resources</th>
<th>Excess Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$</td>
<td>101</td>
<td>181</td>
</tr>
<tr>
<td>$K$</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>$Y$</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>$Z$</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>$T$</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>$r_{\text{low-risk}}$</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>$r_{\text{high-risk}}$</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>$M_H$</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>$M_L$</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>$V_H$</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>$V_L$</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Panel B: Equilibrium Choice Probabilities

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Adequate Resources</th>
<th>Excess Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>$e_{\text{low-risk}}$</td>
<td>47.95</td>
<td>47.95</td>
</tr>
<tr>
<td>$e_{\text{high-risk}}$</td>
<td>52.24</td>
<td>52.24</td>
</tr>
<tr>
<td>$q_{\text{low-risk}}$</td>
<td>75.00%</td>
<td>75.00%</td>
</tr>
<tr>
<td>$q_{\text{high-risk}}$</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

This model incorporates a number of assumptions that simplify its implementation in the laboratory. First, although this game is meant to represent a fraud setting, the manager does not issue an accounting report on which the auditor opines, but instead chooses a hidden action (whether to override the accounting system), which is more often associated with misappropriation of firm assets than with misreporting in the analytic literature (Newman et al. 1996). Second, consistent with Anderson and Young (1988), I assume that detection of a misstatement in one account does not make a misstatement in the other account more likely to be detected. Third, I assume that the auditor’s penalty for undetected misstatements does not differ depending on whether or not the misstatement is intentional. While, in practice, those penalties could differ, that difference would not affect the equilibrium predictions of auditor behavior. Game theory predicts that increasing the auditor’s penalty for undetected fraud, while holding constant the penalty for undetected errors, results in a lower likelihood of fraud. However, the manager would continue to override accounts with lower non-strategic risk more often than those with higher non-strategic risk except as auditor penalties approach infinity. Finally, this model treats the audit as a one-shot game, though the same auditor and manager often interact repeatedly in practice, allowing each party to learn about the other’s behavior. A multiperiod Bayesian analysis of the game could provide further analytic insights and predictions about auditor and manager behavior. Although each of these assumptions has important implications for predicted behavior, the purpose of this model is not to form precise predictions about auditor and manager behavior per se, but rather is to capture the strategic nature of the auditor-manager relationship in a multi-account setting and to allow a clear examination of auditor resource allocation strategies, manager responses, and the potential benefits of a strategic prompt.
III. HYPOTHESES

Effect of Non-Strategic Risk

The equilibrium solution to the multi-account audit game described in Section II is derived under the assumption that both the auditor and the manager are each able to anticipate the other’s strategy and respond optimally to it. However, people often exhibit low levels of such strategic reasoning (e.g., Ochs 1995; Bloomfield 1997; Zimbelman and Waller 1999; Wilks and Zimbelman 2004; Fischbacher and Stefani 2007; Bowlin et al. 2009), and instead adopt intuitive decision rules when faced with cognitively challenging problems (Tversky and Kahneman 1986). Adoption of intuitive decision rules is likely in the multi-account audit game due to the cognitive complexity of calculating the game’s mixed-strategy equilibrium. Further, since the only observable difference between the two accounts in this setting is the non-strategic risk of misstatement, that risk will likely provide a salient focal point (Sugden 1995) upon which the auditor will construct an intuitive allocation strategy, directing substantially fewer resources to the low-risk account than the high-risk account in a manner contrary to the game theoretic prediction.

H1: Auditors will allocate a smaller percentage of resources to the low-risk account than to the high-risk account.

Manager Behavior

Allocating significantly more resources to the high-risk account, as predicted by H1, would be reasonable if managers do not anticipate or respond to that strategy, but such an allocation is ineffective if managers behave strategically. The game theoretic model in Section II predicts that the manager will anticipate the audit strategy predicted in H1 and will respond by overriding the low-risk account with a greater probability (75 percent) than the high-risk account (0 percent). While managers probably initially exercise limited strategic reasoning, they are likely to adopt a testing strategy (Bowlin et al. 2009) where they experiment by overriding each account. Therefore, their feedback will likely be informative about auditor behavior and indicate that overriding the high-risk account is detected by the auditor more often than overriding the low-risk account, leading managers to behavior that is consistent with the formal game theoretic predictions.

H2: Managers will override the low-risk account more often than the high-risk account.

Strategic Reasoning and the Effect of Strategic Prompts

Prior economics and accounting research has modeled strategic reasoning as a hierarchy of beliefs (e.g., Stahl and Wilson 1995; Zimbelman and Waller 1999; Camerer et al. 2004; Hoffman and Zimbelman 2009) in which strategic reasoning is categorized in levels according to the players’ conjectures about their opponents’ beliefs and likely behavior. Following Stahl and Wilson’s (1995) model, Level-0 players make no assumptions about other players and haphazardly choose from available strategies. Players with Level-1 beliefs assume that all other players are Level-0 types. Since these Level-1 players assume their opponents make choices haphazardly, Level-1 players in mixed strategy games, such as my audit game, are likely to be responsive to components of their own utility functions. The behavior predicted in H1 is consistent with Level-1 beliefs. Level-2 players believe that all other players are a mixture of Level-0 and Level-1 players (Stahl

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7 Wilks and Zimbelman (2004) define the auditor’s strategic reasoning as the ability to anticipate the financial reporting manager’s response to the auditor’s strategy.
and Wilson 1995; Camerer et al. 2004). Therefore, these players are more likely to be responsive to their opponents’ utility functions, making them more strategically sophisticated.

While prior research demonstrates that people typically attain low levels of strategic reasoning (Ochs 1995; Zimbelman and Waller 1999; Camerer et al. 2004; Fischbacher and Stefani 2007; Bowlin et al. 2009), few studies have tested interventions intended to raise the level of strategic reasoning. Hoffman and Zimbelman (2009) provide an important exception by examining the use of strategic prompts within an auditing context. In their study, professional auditors are asked to suggest modifications to a standard audit program after reviewing case information based on an actual fraud event. Before making these recommendations, participants in the strategic condition are required to explain how management might commit fraud in accounts receivable and how that fraud might be concealed if management anticipates the standard program. The authors find that auditors receiving this prompt recommend procedures that are more consistent with those suggested by a panel of expert auditors.

My study builds on Hoffman and Zimbelman (2009) in two important ways regarding the use of strategic prompts. First, their study is not interactive, meaning that the managers, who could anticipate audit strategies, are hypothetical. Therefore, their study cannot explore whether managers do anticipate and respond to the auditors’ basic audit programs or whether they might further anticipate and respond to the auditors’ modifications. An interactive setting allows one to demonstrate the need for enhanced strategic reasoning via examination of the strategic outcomes of the audit game. Second, Hoffman and Zimbelman (2009) consider a single-account setting where the risk of fraud is already known to be high. My study, on the other hand, takes a step back and examines the efficacy of a strategic prompt in improving the assessments of and responses to misstatement risk, which Hoffman and Zimbelman (2009) take as given.

A few prior studies in economics do examine the effects of strategic prompts in interactive settings with mixed results. For example, Croson (2000) finds that players are more likely to choose the dominant equilibrium strategies of free-riding in a public goods game and defection in a prisoners’ dilemma game when players are required to make guesses about their opponents’ strategies. However, Costa-Gomes and Weizsäcker (2008) find that participant choices in a series of one-shot 3 × 3 normal-form games are not affected by requiring participants to state beliefs about their opponents’ choices before choosing their own strategies. Similarly, Ortmann et al. (2000) find that sender investments in a standard trust game do not differ when senders are asked to predict how much of firm product will be returned to them by the receivers.8

Differences in strategic complexity potentially explain these mixed results. Specifically, in public goods and prisoner dilemma games, where each player’s optimal strategy is to defect regardless of the opponent’s choice, a strategic prompt will likely highlight that dominant strategy, making its play more likely. However, the prompt is likely to be less effective in more strategically complex games like the trust game in Ortmann et al. (2000) and the normal-form games in Costa-Gomes and Weizsäcker (2008), where each player’s optimal strategy depends on the opponent’s choice, because predicting the opponent’s choice will likely be difficult even in the presence of a strategic prompt.

Though an audit is strategically complex (Bloomfield 1995), a strategic prompt is likely to be more effective in my multi-account setting because judgments about risk can be made by

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8 In a trust game, a sender receives an endowment and chooses the portion of the endowment to invest with a receiver. The amount invested is multiplied and the receiver then chooses a portion of the product to return to the sender. Game theory predicts that the receiver would choose to maximize his/her profit by keeping the entire product and that the sender will, therefore, not invest any of his/her endowment. However, contrary to these economic predictions, prior experimental studies find that senders often invest at least part of the endowment and that receivers often return some of the product to the senders (e.g., Berg et al. 1995).
contrasting the two accounts rather than by evaluating each one independently (Bhattacharjee et al. 2007). Even if an auditor receives a strategic prompt, it is still difficult to assess the absolute probability that the manager will override any particular account. However, the auditor could more easily predict that the manager is more likely to override the low-risk account than the high-risk account. That is, the same comparison of non-strategic risks that provides a focal point for the intuitive allocation strategy predicted in H1 will also help prompted auditors recognize that client managers are likely to believe auditors will focus fewer resources on low-risk accounts and are more likely to misreport those accounts. Therefore, auditors in the prompt condition are likely to devote more resources to low-risk accounts than unprompted auditors.

**H3a:** Auditors receiving the strategic prompt will allocate more resources to the low-risk account than auditors not receiving such a prompt.

If the prompt does indeed enhance auditors’ sensitivity to the strategic risk of fraud, auditors will recognize that managers are more likely to override the low-risk account than the high-risk account. Therefore, while the prompt is expected to result in additional resources being devoted to the low-risk account, the prompt will not likely result in the allocation of more resources to the high-risk account.

**H3b:** Auditors receiving the strategic prompt will not allocate more resources to the high-risk account than auditors not receiving such a prompt.

**Effect of Resource Availability**

Prior research suggests that the way in which auditors perceive and respond to risk could depend on the degree to which audit resources are constrained (Glover 1997; Houston 1999). Tight resource constraints are likely to induce constraint stress, which occurs when one feels externally prevented from doing what is desired or necessary (Schuler 1980). Prior auditing research indicates that when auditors face constraint stress, they often respond by mentally filtering away information that seems less relevant to the judgment at hand (e.g., Glover 1997; Asare et al. 2000). 9

When auditors in strategic settings face tight resource constraints, they could similarly respond by filtering away information that seems less relevant to the required judgments. However, in the setting described in Section II, the information that seems less relevant would likely be the information about the managers’ incentives and potential strategic behavior, the use of which is likely to seem more ambiguous and less obvious than the information about non-strategic risk, which clearly differs between accounts. Contrary to auditors in the no-prompt condition, who are less likely to comprehend the strategic implications of the game, auditors in the prompt condition are likely to recognize the strategic nature of the game, but could be tempted to filter that information when making the allocation decision if resources are more tightly constrained. Auditors with excess resources are less likely to suffer from constraint stress and, therefore, would be less likely to filter strategic information. Consequently, the strategic prompt could be more effective under the excess resources condition than in the adequate resources condition.

On the other hand, the opposite prediction is not unreasonable. For example, economics research has shown that introducing excess cash into a market can result in large price bubbles even

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when fundamental value is well-known (Caginalp et al. 2001). Similarly, when auditors have access to excess resources, they could avoid cognitively challenging allocation problems by devoting large amounts of resources to both accounts (relative to the equilibrium) and still retain some resources as profit. Under these circumstances, auditors are not likely to attune as closely to the differences in risk between the two accounts. If this is true, then having greater resources could make a prompt less effective.

These two lines of reasoning support predictions of opposite ordinal interactions between the prompt and resource variables, suggesting that the effect of the strategic prompt would not be robust across differing levels of available audit resources. Given that it is unclear which of these two possible effects will dominate or whether both effects may operate simultaneously within a population, I state the fourth hypothesis in the null form:

**H4:** The effect of the strategic prompt on the amount of resources allocated to the low-risk account will not differ between the adequate and excess resources conditions.

**IV. EXPERIMENTAL METHOD**

**Environment and Procedures**

The experiment was conducted in a controlled laboratory environment with 132 volunteer upper-division accounting students as participants. Prior to beginning the experiment, participants were provided with written instructions that the experimenter read aloud. The instructions explained that each player would be anonymously assigned to one of two player types, a “Chooser” (analog to a financial reporting manager) or a “Guesser” (analog to an auditor), with each Chooser paired with one Guesser for 20 rounds of the audit game described in Section II. The instructions familiarized participants with the setting of the game, the choices to be made by each player type, and their respective payoffs for each of the possible game outcomes.

To enhance comprehension, the instructions characterized the game as a production process with two machines (analog to the accounting system) that each deposit 100 marbles into its output bin. Of the 100 marbles placed in each bin, one will be an odd color (analog to a misstatement) if the Chooser overrides the machine or if the machine places an odd-colored marble in its bin by chance. The instructions explained that the Guesser may search for odd-colored marbles by specifying the number of marbles to be drawn from each bin up to a maximum total of 101 and 181 marbles in the adequate and excess resource conditions, respectively.

The game was implemented using z-Tree software (Fischbacher 2007) on networked laboratory computers. After the experimenter finished reading the instructions, participants received supplemental instructions via z-Tree, which summarized the paper-based instructions and also described the strategic prompt to auditors in the prompt condition. After reading these supplemental instructions, participants took a true-false quiz to help ensure their understanding of the instructions.

After all participants completed the quiz, the computer began the first round of the game described above. In all conditions, the managers chose whether to override each of the two

---

10 Although the player labels were intended to reduce potential demand effects, the “Guesser” label could potentially suggest that participants in that role should allocate resources at random. However, results reported in Section V suggest that this is not the case. Additionally, in their responses to open-ended post-experimental questions about their decision-making, nearly all participants describe allocation strategies that are more sophisticated than a simple guessing strategy.

11 To help ensure that the instructions were understood, z-Tree provided an explanation of the relevant portion of the instructions when a participant answered a question incorrectly. The participant then answered that question again before moving on to the next question.
accounts, and the auditors chose how much of their resources would be allocated to each account and how much would remain unallocated. However, before making their allocation decisions, auditors in the prompt condition responded to two belief-elicitation questions that made up the strategic prompt described in more detail below. When all decisions had been entered, the computer randomly generated outcomes conditional on participant choices and the account-specific non-strategic risk. The computer then awarded points according to the parameters in Table 1. After receiving feedback reports, the game was repeated as described above for another 19 rounds.

Feedback and Compensation

After the computer determined the outcomes at the end of each round, each participant received feedback for each account. The auditor’s feedback only reported his/her own allocation choice and whether the audit had detected a misstatement. If no misstatement was detected, the auditor was not informed about whether a misstatement had occurred but had been undetected. Similarly, the manager’s feedback reported his/her own choices and whether a misstatement had been detected but did not report the amount of audit resources devoted to each account. The incomplete nature of this feedback reflects an institutional reality that auditors cannot know with certainty that an account balance is correctly stated unless that account is fully audited (Anderson and Young 1988), and that managers cannot know with certainty the auditor’s overall level of effort or how the auditor allocates his/her resources (Bowlin et al. 2009).

Note that the auditor only learned whether s/he detected a misstatement and not whether a detected misstatement occurred by chance or due to manager override. This is consistent with Statement on Auditing Standards No. 99 (SAS 99), which suggests that auditors sometimes have difficulty determining whether a detected misstatement is intentional or unintentional (AICPA 2002, footnote 4).

Consistent with the tenets of experimental economics, participants were privately compensated at the end of each session. Participants received a show-up fee of $5.00 plus 6 cents per point earned. The average participant earned approximately $28 for sessions lasting no more than 90 minutes.

Manipulation

In order for an auditor to choose an effective and efficient allocation strategy, his/her understanding of the audit should include the possibility that the manager will anticipate and attempt to exploit the resource allocation predicted in H1. However, a prompt that simply asks the auditor to predict the manager’s strategy may not sufficiently enhance the auditor’s understanding of managerial incentives. That is, to the extent that auditors naturally engage in Level-1 reasoning, a prompt that merely elicits the auditor’s beliefs about the manager’s likely choice might only elicit Level-1 priors (that the manager will behave randomly).

Therefore, I test a stronger strategic prompt that begins by asking an auditor to predict the manager’s beliefs about the auditor’s allocation strategy and then further asks the auditor to predict the manager’s response to those beliefs. Eliciting both types of beliefs is more likely to help auditors develop a strategically sophisticated understanding of the audit environment.

Accordingly, at the beginning of each round, auditors in the prompt condition were required to state their beliefs about the managers’ expectations of and likely responses to auditors’ resource allocations prior to specifying the amount of resources to be allocated to each account. Specifically, and continuing the marble and bin analogy, each auditor in the prompt condition entered his/her beliefs about the number of marbles the manager expected the auditor to draw from each bin. Then, using a Likert scale, the auditor entered his/her beliefs about the likelihood that the manager would
override each machine. To maintain ceteris paribus conditions, the managers were not made aware of this prompt and auditor compensation was not dependent on their responses to it.12

The level of available resources was also manipulated between subjects. Continuing the marble and bin analogy, auditors in the adequate resources condition could draw up to 101 of the 200 total marbles in the two bins, which is sufficient to play the equilibrium strategy described in Section II. However, auditors in the excess resources condition could draw as many as 181 total marbles from the two bins. The level of resources available to the auditor was common information to both auditors and managers.

V. RESULTS

To construct independent observations, each participant’s choices are averaged across all 20 rounds, such that each participant provides a single observation of auditor or manager behavior. For each account, each auditor observation represents the average number of resource units, \( e_i \), allocated to that account. Each manager observation for each of the two accounts represents the percentage frequency with which the manager chose to override that account. Panels A, B, and C of Table 2 summarize the mean number of resource units that auditors utilize in total and specifically devote to the low-risk and high-risk accounts, while Panels A and B of Table 4 summarize manager behavior under each experimental condition.13

Preliminary Analysis of Auditor Behavior

Pooling across resource conditions, auditors utilize a mean of 110.0 resource units when they receive the prompt, compared to an average of 98.6 units when they are not prompted. In addition, auditors utilize 122.5 resource units in the excess resources condition, but only utilize an average of 84.7 units in the adequate resources condition. The significant main effects of PROMPT (\( t_{62} = 1.87, \text{one-sided } p = 0.033 \)) and RESOURCES (\( p < 0.001 \)) in the three-factor, repeated-measures ANOVA on audit resource allocations in Panel A of Table 3 confirm that both prompting auditors to consider the strategic nature of the audit and making more resources available to the auditor result in the utilization of significantly more audit resources overall.

Effect of Non-Strategic Risk (H1)

Recall that H1 predicts that auditors will allocate more resources to the high-risk account relative to the low-risk account. Consistent with H1, results tabulated in Panels B and C of Table 2 show that more resources are allocated to the high-risk account than the low-risk account under all treatments. Pooling across prompt conditions, in the excess resources condition, auditors allocate an average of 68.8 and 53.7 resource units to the high- and low-risk accounts, respectively. Similarly, auditors allocate 55.4 units to the high-risk account and 29.2 to the low-risk account in the adequate resources condition. A significant main effect of ACCOUNT (\( p < 0.001, \text{Table 3, Panel A} \))

12 Not compensating auditors based on their responses to the prompt has the added benefit of maintaining the incentive dominance of the auditors’ resource allocation decisions. However, since participants were not compensated based on the quality or accuracy of their responses to the strategic prompt, those responses may not reliably report their true beliefs while nevertheless enhancing strategic understanding of the audit setting. In fact, analyses of those responses discern few relationships among them aside from a positive correlation between auditors’ beliefs about the number of resource units managers expect auditors to allocate to each and the amount of resources auditors actually allocate to each account.

13 Levene tests for equality of variance (Levene 1957) suggest that there is significant heterogeneity among the cell variances reported in Panels A and B of Table 2. This heterogeneity can be reduced by converting the data to ranks (Kachelmeier and Messier 1990). However, inferences based on the analysis of rank-transformed data do not qualitatively differ from inferences based on the analysis of raw data. Therefore, for consistency across analyses, the results discussed in the following sections are based on the raw data.
supports H1, confirming that the overall difference in resources devoted to the high-risk and low-risk accounts is significant.

Manager Behavior (H2)

Consistent with H2 and as presented in Table 4, managers override the low-risk account more often than the high-risk account under both prompt conditions. Managers in the adequate

<table>
<thead>
<tr>
<th>Panel A: Mean Total Audit Resources Utilized</th>
<th>No-Prompt</th>
<th>Prompt</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess Resources</td>
<td>114.8</td>
<td>130.8</td>
<td>122.5</td>
</tr>
<tr>
<td></td>
<td>(42.6)</td>
<td>(32.6)</td>
<td>(38.4)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 17</td>
<td>n = 35</td>
</tr>
<tr>
<td>Adequate Resources</td>
<td>78.0</td>
<td>90.1</td>
<td>84.7</td>
</tr>
<tr>
<td></td>
<td>(24.9)</td>
<td>(8.9)</td>
<td>(18.7)</td>
</tr>
<tr>
<td></td>
<td>n = 14</td>
<td>n = 17</td>
<td>n = 31</td>
</tr>
<tr>
<td>Combined</td>
<td>98.6</td>
<td>110.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(39.9)</td>
<td>(31.3)</td>
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<td>n = 32</td>
<td>n = 34</td>
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<table>
<thead>
<tr>
<th>Panel B: Mean Resources Allocated under the Adequate Resources Condition</th>
<th>No-Prompt</th>
<th>Prompt</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Risk Account</td>
<td>53.7</td>
<td>56.9</td>
<td>55.4</td>
</tr>
<tr>
<td></td>
<td>(23.8)</td>
<td>(14.0)</td>
<td>(18.8)</td>
</tr>
<tr>
<td></td>
<td>n = 14</td>
<td>n = 17</td>
<td>n = 31</td>
</tr>
<tr>
<td>Low-Risk Account</td>
<td>24.3</td>
<td>33.3</td>
<td>29.2</td>
</tr>
<tr>
<td></td>
<td>(20.0)</td>
<td>(14.1)</td>
<td>(17.1)</td>
</tr>
<tr>
<td></td>
<td>n = 14</td>
<td>n = 17</td>
<td>n = 31</td>
</tr>
<tr>
<td>Combined</td>
<td>39.0</td>
<td>45.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(26.1)</td>
<td>(18.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 28</td>
<td>n = 34</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Mean Resources Allocated under the Excess Resources Condition</th>
<th>No-Prompt</th>
<th>Prompt</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Risk Account</td>
<td>68.1</td>
<td>69.5</td>
<td>68.8</td>
</tr>
<tr>
<td></td>
<td>(25.2)</td>
<td>(16.6)</td>
<td>(21.1)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 17</td>
<td>n = 35</td>
</tr>
<tr>
<td>Low-Risk Account</td>
<td>46.7</td>
<td>61.3</td>
<td>53.7</td>
</tr>
<tr>
<td></td>
<td>(26.2)</td>
<td>(24.6)</td>
<td>(26.2)</td>
</tr>
<tr>
<td></td>
<td>n = 18</td>
<td>n = 17</td>
<td>n = 35</td>
</tr>
<tr>
<td>Combined</td>
<td>57.4</td>
<td>65.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(27.8)</td>
<td>(21.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 36</td>
<td>n = 34</td>
<td></td>
</tr>
</tbody>
</table>

Standard deviation in parentheses.
resources condition override the low-risk account 67.4 percent of the time, while overriding the high-risk account 47.6 percent of the time. Similarly, in the excess resources condition, managers override the low-risk and high-risk accounts 49.9 percent and 35.1 percent of the time, respectively. A significant main effect of ACCOUNT (t_{62} = 4.62, one-tailed p < 0.001) in the three-factor, repeated-measures ANOVA reported in Table 5 indicates that managers override the low-risk account more often than the high-risk account, suggesting that managers are responsive to the auditors’ strategies of allocating larger amounts of resources to the high-risk account than the low-risk account.
Untabulated results of a follow-up logistic regression of manager override decisions on \textit{ACCOUNT}, \textit{PROMPT}, \textit{RESOURCES}, and an experience variable (\textit{ROUND}), along with all possible interactions, indicates that the manager sensitivity to \textit{ACCOUNT} is initially limited and develops with experience. Specifically, as participants in the manager role gain experience, they become increasingly more likely to override the low-risk account than the high-risk account (Wald $\chi^2 = 12.34$, $p < 0.001$).

\textbf{Effect of Strategic Prompt (H3a and H3b)}

Theory suggests that when auditors receive the strategic prompt, they will be more likely to recognize that managers will anticipate that fewer resources will be allocated to the low-risk account than to the high-risk account and that managers will likely view the low-risk account as a particularly attractive opportunity for fraud. Finding, as predicted in H3a and H3b, that the prompt increases audit resources devoted to the low-risk account without a similar increase in the allocation to the high-risk account would support the underlying argument that a strategic prompt enhances auditors’ strategic understanding of the audit and of misstatement risk rather than simply prompting a general deployment of additional resources.

Observed resource allocations, presented in Table 2, are consistent with these predictions. Specifically, within the adequate (excess) resources condition, auditors allocate a mean of 33.3 and
24.3 (61.3 and 46.7) resource units to the low-risk account in the prompt and no-prompt conditions, respectively, while auditors allocate 56.9 and 53.7 (69.5 and 68.1) units to the high-risk account in the prompt and no-prompt conditions, respectively. While this pattern of means is consistent with H3a and H3b and suggests an ordinal interaction, the \textit{ACCOUNT \times PROMPT} effect in Table 3, Panel A, is only marginally significant (t_{62} = 1.32, one-tailed p = 0.096).\footnote{McNeil et al. (1996, 137–139) discuss the rationale for one-tailed tests of directionally predicted interactions.} However, since ANOVA is not always powerful enough to detect significant ordinal interactions (Buckless and Ravenscroft 1990), I separately analyze the allocations of resources to the low-risk and high-risk accounts to provide further evidence that the additional resources used under the \textit{PROMPT} condition are allocated in a manner consistent with an enhanced understanding of the strategic nature of misstatement risk. Panel B of Table 3 indicates that the increase in resources allocated to the low-risk account under the prompt condition is significant (t_{62} = 2.18, one-sided p = 0.016), which supports H3a. However, consistent with H3b, \textit{PROMPT}’s effect on the amount of resources allocated to the high-risk account is not significant (p = 0.658, Table 3, Panel C). These results suggest that the prompt enhances auditor sensitivity to the strategic risk of fraud and consequently improves the effectiveness of auditor resource allocations without diminishing efficiency.\footnote{An untabulated regression of the amount of resources allocated to the low-risk account during the last ten rounds of the game on \textit{PROMPT} and \textit{RESOURCES}, and the detection of manager override during the first ten rounds indicates a positive relationship between allocations to the low-risk account and previously detected override behavior. However, this learning does not appear to moderate the effects of \textit{PROMPT} or \textit{RESOURCES} on resources allocated to the low-risk account.}

### Supplemental Analysis of Undetected Misstatements

The untabulated results of logistic regression of manager override behavior, described above, also indicates that the three-way interaction among \textit{ACCOUNT}, \textit{PROMPT}, and \textit{ROUND} is negative
and marginally significant (Wald $\chi^2 = 2.75$, $p = 0.098$), implying that the strategic prompt is associated with a growing downward pressure on managers’ tendencies to override the low-risk account versus the high-risk account. Now, recall that auditors in the prompt condition allocate more resources to the low-risk account than unprompted auditors but no more resources to the high-risk account. Taken together, these findings suggest that, especially in later rounds, the prompt will lead to a larger decrease in the number of undetected misstatements in the low-risk account than in the high-risk account. The results reported in Tables 6 and 7 suggest this pattern of outcomes.

Table 6 summarizes, by treatment, the mean cumulative undetected misstatements that occur during the last ten rounds of the audit game. In both resource conditions, there are fewer undetected misstatements in the low-risk account in the prompt condition than in the no-prompt condition. Under adequate (excess) resources, there are a mean of 6.50 and 5.00 (3.78 and 2.12) cumulative undetected misstatements in the no-prompt and prompt conditions, respectively. However, there is little difference in the number of undetected misstatements in the high-risk account between the prompt and no-prompt conditions. Specifically, under the adequate (excess) resources condition, the cumulative undetected misstatements in the high-risk account average 4.07 and 3.94 (2.61 and 2.71) in the no-prompt and prompt conditions, respectively. A significant $ACCOUNT \times PROMPT$ interaction ($p = 0.048$, Table 7) confirms that the prompt has a larger effect on the number of undetected misstatements in the low-risk account than in the high-risk account.

<table>
<thead>
<tr>
<th>TABLE 6</th>
</tr>
</thead>
</table>

Cumulative Late-Round Undetected Misstatements by Treatment

Panel A: Mean Cumulative Late-Round Undetected Misstatements under Adequate Resources

<table>
<thead>
<tr>
<th></th>
<th>No-Prompt</th>
<th>Prompt</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Risk Account</td>
<td>4.07</td>
<td>3.94</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>(2.79)</td>
<td>(2.11)</td>
<td>(2.39)</td>
</tr>
<tr>
<td>$n = 14$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Risk Account</td>
<td>6.50</td>
<td>5.00</td>
<td>5.68</td>
</tr>
<tr>
<td></td>
<td>(3.16)</td>
<td>(2.09)</td>
<td>(2.69)</td>
</tr>
<tr>
<td>$n = 14$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>5.29</td>
<td>4.47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.17)</td>
<td>(2.14)</td>
<td></td>
</tr>
<tr>
<td>$n = 28$</td>
<td></td>
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<td></td>
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</tbody>
</table>

Panel B: Mean Cumulative Late-Round Undetected Misstatements under Excess Resources

<table>
<thead>
<tr>
<th></th>
<th>No-Prompt</th>
<th>Prompt</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Risk Account</td>
<td>2.61</td>
<td>2.71</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>(2.83)</td>
<td>(1.99)</td>
<td>(2.42)</td>
</tr>
<tr>
<td>$n = 18$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Risk Account</td>
<td>3.78</td>
<td>2.12</td>
<td>2.98</td>
</tr>
<tr>
<td></td>
<td>(2.82)</td>
<td>(2.39)</td>
<td>(2.72)</td>
</tr>
<tr>
<td>$n = 18$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>3.19</td>
<td>2.41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.85)</td>
<td>(2.19)</td>
<td></td>
</tr>
<tr>
<td>$n = 36$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard deviation in parentheses.
While these results provide less direct evidence of the prompt’s effect on auditor strategic reasoning than analysis of auditor resource allocations, examining the strategic prompt’s effects on the level of undetected misstatements is nevertheless important, in that doing so provides broader insights into the prompt’s direct and indirect effects on strategic behavior and audit outcomes.

That is, the prompt’s downward pressure on the managers’ tendencies to override the low-risk account is likely due to the managers experiencing the auditors’ prompt-induced attention to that account.

Also note in Panels A and B of Table 6 that there are more undetected misstatements in the low-risk account than the high-risk account in all treatments, except the prompt-excess resources treatment. The significant main effect of ACCOUNT (p = 0.011, Table 7) confirms that, in general, more undetected misstatements occur in the low-risk account than the high-risk account. This is an important observation for two reasons. First, it further demonstrates that an auditor’s failure to understand the strategic nature of an audit could result in a misallocation of resources and more audit failures. Second, because managers do not fully exploit the auditors’ below equilibrium allocations to the low-risk account by always overriding that account, as game theory would predict, it is important to show that the high-risk account is not, in fact, a riskier account, in which case allocating significantly more resources to that account than the low-risk account would be reasonable. Instead, these results indicate that allocating additional resources to the low-risk account is economically preferable in this setting.

### Effect of Resource Availability (H4)

As discussed in Section III, prior research suggests that the level of resources available to an auditor could potentially moderate the strategic prompt’s effect on resource allocations, though it is unclear whether increasing available resources would increase or decrease the effectiveness of the strategic prompt. However, an insignificant ANOVA interaction term (p = 0.596, Table 3, Panel B) indicates that the effect of PROMPT on the amount of resources allocated to the low-
risk account is robust to the level of resources available to the auditor, providing no basis for rejecting H4.\(^{16}\)

Although resource availability does not interact with the strategic prompt to affect the amount of resources allocated to the low-risk account, the main effect of \textit{RESOURCES} (p < 0.001, Table 3, Panel A) indicates that the availability of resources does affect the overall use of them, which is inconsistent with the game theoretic predictions in Section II that the level of available audit resources will not affect auditor strategy. Pooling across prompt conditions, auditors allocate 53.7 resource units to the low-risk account in the excess resources condition, but in the adequate resources condition, auditors devote only 29.2 units to that account. Similarly, the amount of resources allocated to the high-risk account decreases from 68.8 units in the excess resources condition to 55.4 units in the adequate resources condition.

In total, a mean of 122.5 resource units are deployed in the excess resource condition, as compared to 84.7 units in the adequate resources condition. There are two potential explanations for this overall difference. First, the distribution of total deployed resources may have been drawn from equivalent distributions under both resource conditions, with the exception that the distribution is more truncated under the adequate resource condition where observations group at the adequate resources constraint of 101 resource units. Under this explanation, the amount of resources auditors desire to deploy would not be affected by resource availability and the frequency with which auditors deploy at least, say, 100 resource units would not differ between resource conditions. Alternatively, making more resources available to the auditor could result in a distributional shift, as auditors are able to experiment along a broader range of resources. In this case, one would find that auditors deploy at least 100 resource units more often when more resources are available.

Untabulated analysis supports the second explanation. The frequency with which auditors deploy at least 100 total resource units is greater in the excess resources condition than in the adequate resources condition (75.6 percent and 52.3 percent, respectively). An ANOVA of the frequency with which auditors use at least 100 resource units on \textit{PROMPT} and \textit{RESOURCES} indicates that this difference is significant (\(F_{1,62} = 10.15, p = 0.002\)), suggesting that constraining audit resources not only limits the amount of resources available for use but perhaps also constrains the amount of resources the auditors desire to use.

VI. CONCLUSION

Risk-based auditing is an intuitive approach that focuses more resources on accounts deemed to be riskier and fewer resources on accounts that seem less risky. However, if auditors focus on non-strategic risks and overlook the strategic risks that arise when managers anticipate risk-based allocations of audit resources, opportunities for fraud can arise among ostensibly low-risk accounts. The purpose of this study is to demonstrate this potential threat to the efficacy of risk-based auditing and to investigate whether prompting auditors to consider financial reporting managers’ likely expectations of and responses to auditor strategies can enhance auditors’ sensitivity to the strategic risk of fraud.

I conduct a laboratory experiment in which student participants assume the roles of auditors and financial reporting managers and interact in a multi-account audit setting, which reflects the essential strategic tension that exists between real-world auditors and managers. Results indicate that participants in the auditor role fail to appreciate the strategic nature of the multi-account audit game and, therefore, allocate fewer of their available resources to accounts with relatively low

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\(^{16}\) Likewise, Table 4, Panel B indicates that the amount of resources allocated to the high-risk account is not significantly affected by the interaction of the strategic prompt and resource availability.
non-strategic risk. Participants in the manager role exploit this behavior by overriding this low-risk account more often than the high-risk account. These behaviors jointly result in more undetected misstatements within the low-risk account than the high-risk account. However, I also find that prompting auditor-participants to consider their opponents’ expectations of and responses to audit resource allocations results in auditor-participants allocating more resources to the low-risk account without a similar change in resources allocated to the high-risk account. In later rounds of the game, these increased resources lead to fewer undetected misstatements in the low-risk account but no significant change in the number of undetected misstatements in the high-risk account. These results suggest that a strategic prompt can enhance auditor sensitivity to the strategic risk of fraud and thereby improve audit effectiveness without reducing efficiency. Finally, I also find that the relative effect of the strategic prompt is robust across levels of available resources, although increasing the amount of resources available to the auditor-participants results in more resources being used.

These results suggest implications for both audit firms and audit standard-setters, including the AICPA’s Auditing Standards Board and the PCAOB. While current auditing standards generally promote risk assessment procedures that are intended to focus auditor attention toward observable factors indicating that certain financial statement accounts are more likely to be misstated than others (e.g., AICPA 2002, 2006), the results of this study suggest that audit procedures that prompt auditors to consider the possibility that financial reporting managers will anticipate and exploit auditor’s risk assessments could result in fewer undetected misstatements. As an example of such a strategic prompt, audit standards or professional guidance could require that audit teams specifically discuss whether there are any client accounts that management would expect auditors to treat as low-risk. If the auditor determines that there are such accounts, standards could require the auditor to take the additional step of considering whether management is likely to attempt to exploit the expected lack of auditor attention. If auditors identify such accounts and determine that fraud attempts are sufficiently likely within them, they could then follow Hoffman and Zimbelman (2009) by considering the specific ways in which fraud could be perpetrated and concealed within those accounts and then designing procedures to overcome such concealment.

A limitation of this study is that the experimental design does not disentangle the marginal effects of eliciting auditors’ beliefs about managers’ expectations of auditor strategies and eliciting auditors’ beliefs about managers’ likely reporting choices. Though a broader purpose of this study is to examine whether strategic prompts, in general, can enhance auditors’ strategic reasoning and sensitivity to fraud risk, disentangling these effects could be important to audit firms and standard-setters as they structure audit standards and guidance.

Consistent with the traditions of experimental economics (Kachelmeier and King 2002), this study attempts to capture the strategic essence of auditing using a relatively stark but tractable setting. As such, I abstract away several institutional features of real-world auditing that may affect auditor and manager choices, leaving them as potential avenues for future research. For example, the amount of resources available to a real-world auditor is likely to be endogenously determined through negotiation between the auditor and client. Additionally, in my setting, the manager is equally capable of intentionally misstating each financial statement account, though, in practice, certain low-risk accounts may not be as easily manipulated. Finally, I assume that auditor penalties do not differ between undetected fraud and errors, and while this does not impact the economic predictions of auditor behavior, such differences could behaviorally affect auditor sensitivity to the strategic nature of the audit setting.

Regardless of these potential limitations, the broader point remains. That is, as auditors focus resources away from accounts they view as low-risk, opportunities for fraud grow among those accounts. Without a strategic prompt similar to that tested here, many auditors could fail to...
appreciate this strategic risk, resulting in a misallocation of audit resources and more undetected misstatements.

REFERENCES


APPENDIX A

Following is the auditor’s expected utility and the solution for the manager’s equilibrium strategy, \( q^*_i \):

\[
EU_{\text{auditor}} = FK - \sum_{i} e_i K + \sum_{i} \left[ Y q_i e_i T + (Y - Z) q_i (1 - e_i T) + Y r_i e_i T (1 - q_i) + (Y - Z) r_i (1 - q_i) (1 - e_i T) \right]
\]

where:
- \( F \) = the total number of resource units available to the auditor;
- \( K \) = the auditor’s marginal utility per unit of unused resources;
- \( Y \) = the auditor’s payoff for a completed audit of account \( i \);
- \( Z \) = the auditor’s penalty for a failed audit of account \( i \);
- \( T \) = the marginal effect per unit of resources on probability of detecting a misstatement in account \( i \);
- \( M_H \) = the manager’s payoff for undetected override in account \( i \);
- \( M_L \) = the manager’s payoff for no fraud or undetected error in account \( i \);
- \( V_H \) = the manager’s penalty for a detected override in account \( i \);
- \( V_L \) = the manager’s penalty for a detected error in account \( i \);
- \( e_i \) = the number of resource units allocated to the audit of account \( i \);
- \( q_i \) = the probability that the manager will override the account \( i \); and
- \( r_i \) = the (exogenous) probability of error in account \( i \) conditional on no override.

\[
\frac{\partial EU_{\text{auditor}}}{\partial e_i} = -K + Z q_i T + Z r_i T - Z r_i q_i T = 0
\]

\[
q^*_i = \frac{K - Z r_i T}{T(Z - Z r_i)}.
\]

Following is the manager’s expected utility and the solution for the auditor’s equilibrium strategy, \( e^*_i \):

\[
EU_{\text{manager}} = \sum_{i} \left[ M_H q_i (1 - e_i T) + (M_H - V_H) q_i e_i T + M_L (1 - r_i) (1 - q_i) + M_L r_i (1 - q_i) (1 - e_i T) \right] + (M_L - V_L) r_i e_i T (1 - q_i)
\]

where:
- \( M_H \) = the manager’s payoff for undetected override in account \( i \);
- \( M_L \) = the manager’s payoff for no fraud or undetected error in account \( i \);
- \( V_H \) = the manager’s penalty for a detected override in account \( i \);
- \( V_L \) = the manager’s penalty for a detected error in account \( i \);
- \( e_i \) = the number of resource units allocated to the audit of account \( i \);
- \( q_i \) = the probability that the manager will override the account \( i \); and
- \( r_i \) = the (exogenous) probability of error in account \( i \) conditional on no override.

\[
\frac{\partial EU_{\text{manager}}}{\partial q_i} = M_H - V_H e_i T - M_L + V_L r_i e_i T = 0
\]

\[
e^*_i = \frac{M_H - M_L}{T(V_H - V_L r_i)}.
\]