Prompting the Benefit of the Doubt: The Joint Effect of Auditor-Client Social Bonds and Measurement Uncertainty on Audit Adjustments

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ABSTRACT

We design an incentivized experiment to test whether measurement uncertainty elevates the risk that social bonds between auditors and reporters compromise audit adjustments. Results indicate that, when audit evidence is characterized by some residual uncertainty, the adjustments our auditor-participants require are sensitive to whether auditors have an opportunity to form a modest but friendly social bond with reporters. In contrast, although auditors do not adjust fully even when misstatements are known with certainty, social bonding has no effect in this scenario. Accordingly, our experiment contributes beyond the main effects of social bonding and measurement uncertainty demonstrated in prior research by showing that these forces interact. A practical implication is that regulators and practitioners should consider both the technical and the social challenges facing audits of complex estimates.

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Keywords:

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1. Introduction

When audit evidence is inconsistent with reported values, auditors have discretion over the amount of adjustment to require. Separate streams of research have found that auditors require smaller adjustments when social ties threaten independence (e.g., Bamber and Iyer [2007], Bauer [2015]) or when the amount of adjustment is characterized by uncertainty (e.g., Wright and Wright [1997], Libby and Kinney [2000], Braun [2001]) or imprecision (e.g., Griffin [2014]). We design an incentivized experiment to link these themes. Our key finding is that friendly, social interactions between reporters and auditors influence the adjustments our auditor-participants require only when the amount of misstatement is estimated, not when it is known with certainty.

The link between auditor-client social bonds and measurement uncertainty is important because the effect of each construct is likely to depend on the other. In particular, our study suggests that social bonds *alone* are insufficient to impair auditor independence. That is, although stronger social bonds between participants in the auditor and reporter roles decrease the extent of misreporting in our experiment, they do not influence audit adjustments when the amount of misstatement is known with certainty. When the amount of misstatement is *estimated*, however, the same social bonds result in smaller audit adjustments, even after controlling for lower levels of misreporting.

From the perspective of measurement uncertainty, our findings add a social dimension to the technical challenges often associated with auditing complex estimates (e.g., Bratten, Gaynor, McDaniel, Montague, and Sierra [2013], PCAOB [2014], Griffith, Hammersley, and Kadous [2015a], Griffith, Hammersley, Kadous, and Young [2015b], Glover, Taylor, and Wu [2017]). Specifically, our study suggests that even seemingly innocuous social interactions between auditors and clients can lead auditors to interpret uncertainty in the client's favor. While prior studies show that measurement uncertainty or subjectivity can lead auditors to be more lenient (e.g., Wright and Wright [1997], Libby and Kinney [2000], Braun [2001]), our results suggest that uncertainty *alone* does not impair auditor judgments. Rather, we observe a significant downward shift in auditor-imposed adjustments only when social bonds and measurement uncertainty are both present.

For theoretical insight, we draw on work from social psychology that links uncertainty to leniency. Specifically, Ganzach and Krantz [1991] develop psychological arguments supporting their finding that uncertainty leads to more lenient social judgments, as is well-captured by the familiar adage of giving someone the "benefit of the doubt." Ganzach and Krantz [1991] do not, however, examine the potential for social bonds to *strengthen* the association between uncertainty and leniency. Accordingly, we also draw on different literatures involving social identity theory (e.g., Tajfel [1978], Tajfel and Turner [1979], Tajfel [1981], Ashforth, Harrison, and Corley [2008]), social comparison theory (e.g., Festinger [1954], Haunschild [1994], Podolny [1994]), and betrayal aversion (e.g., Bohnet and Zeckhauser [2004], Bohnet, Greig, Hermann, and Zeckhauser [2008]) to develop our interactive prediction that stronger social bonds magnify the tendency for uncertainty to promote leniency. In an audit context, this reasoning implies that auditor-client social bonds will influence audit adjustments primarily when misstatements are estimated, not when misstatements are known with certainty.

To capture these notions in a *ceteris paribus* manner, we design an incentivized experiment in the traditions of experimental economics, in which we assign student participants to roles analogous to reporters and auditors. Before participants learn about the reporter-auditor game, they complete an unrelated exercise involving trivia questions. Our first manipulation is whether participants answer the trivia questions individually or in pairs, capturing the presence or absence of an opportunity to form a modest but friendly social bond. After completing the trivia contest, participants convene at individual computer stations for a separate, interactive task in which reporter-participants (hereafter, "reporters") are compensated for aggressive reporting and auditor-participants (hereafter, "auditors") decide how much of the report to adjust, given a signal that is analogous to audit evidence. Reporter-auditor pairs are either the same pairs that completed the trivia contest together or newly formed pairs in the condition in which participants completed the trivia contest individually. Incentives for the reporter-auditor game reflect the usual tensions in such environments: reporters profit from unadjusted aggressive reporting, but face a penalty if adjusted by the auditor. In turn, auditors incur costs to adjust aggressive reporting, but also face the possibility of a monetary penalty, analogous to a legal settlement or fine, that increases in probability as the amount of unadjusted aggressive reporting increases.

Our experiment also manipulates measurement uncertainty. Specifically, the auditor receives evidence that either reveals the extent of the reporter's aggressive reporting with certainty, or it is a noisy signal that is highly *diagnostic* of the extent of aggressive reporting but not definitive. To capture as much data as possible, we use the so-called "strategy method" across conditions to elicit auditors' adjustment decisions for each possible signal they might observe. We then reveal the actual decisions and signals to determine outcomes and payoffs.

Our primary finding is a significant interaction between the two manipulated factors. Auditors willingly underadjust to some extent even when misstatements are known with certainty, so it is not simply the case that certainty leads auditors to adjust fully as a routine matter. This finding is consistent with Libby and Brown [2013], who observe variation in required audit adjustments even for a known error. Nevertheless, when misstatements are known, we find that the extent of underadjustment is not sensitive to whether the auditor completed the trivia task individually or in pairs. Conversely, when audit evidence is highly diagnostic but subject to some uncertainty, we find that auditors who completed the trivia task in pairs require significantly lower adjustments than those who completed the same task individually. Supplemental analyses indicate that this conclusion persists even when we control for the extent to which reporters are in fact less aggressive in the presence of a stronger social bond.

Overall, we find that impaired auditor judgments do not arise from either impaired independence or measurement uncertainty in isolation, but rather from the combination of both forces. Our study contributes to the auditing literature by highlighting that the effects of social bonding and measurement uncertainty on auditor adjustments are not independent, but in fact interact. Prior studies tend to examine auditor-client social bonding and sources of uncertainty as separate issues, examining one while holding the other constant. While these efforts have yielded important insights, the evidence our study provides of a significant interaction between social bonding and measurement uncertainty offers new insights with implications for auditing practice and ongoing policy debates.

For example, considerable attention has been directed to the role of audit-firm specialists (e.g., Boritz, Kochetova-Kozloski, Robinson, and Wong [2015], Griffith [2016]), concurring partners (e.g., Epps and Messier [2007]), and others that auditors draw upon when evaluating complex issues characterized by uncertainty. While the PCAOB [2015] has recently expressed concern about ensuring adequate audit oversight over specialists, our study suggests that a potentially overlooked benefit of in-firm specialists is that they do not interact with client personnel on a day-to-day basis. Thus, in addition to their expertise, specialists, concurring partners, and other non-client-facing audit personnel are likely to confer the benefit of a more distanced assessment of uncertainty that is less prone to social bonding. This reasoning is consistent with field evidence from Boritz et al. [2015] that client-preferred accounting positions tend to be viewed more favorably by members of the audit team than by specialists.

Section 2 develops the theory underlying our hypothesized interaction between auditor-client social bonds and measurement uncertainty. Section 3 describes our research method and design. Section 4 presents results, and Section 5 concludes.

2. Theory and Hypothesis Development

2.1. MEASUREMENT UNCERTAINTY AND AUDITOR LENIENCY

The increasing prominence of estimates in financial reporting has placed greater burdens on auditors tasked with opining on accounts with measurement uncertainty (e.g., Christensen, Glover, and Wood [2012], PCAOB [2014]). Several experiments examine factors that can impair auditor judgments in settings characterized by uncertainty (e.g., Hackenbrack and Nelson [1996], Salterio and Koonce [1997], Kadous, Kennedy, and Peecher [2003]), while others examine the mechanisms and mindsets that auditors can use to deal with uncertainty (e.g., Griffith et al. [2015b]; Rasso [2015]). Still other experiments manipulate the extent of uncertainty, supporting the general conclusion that increased uncertainty makes it more likely that auditors will accept a client-preferred position (e.g., Wright and Wright [1997], Libby and Kinney [2000], Braun [2001], Mayhew, Schatzberg, and Sevcik [2001]). Yet, it is not self-evident that auditors disregard client preferences when uncertainty is removed, as is evidenced, for example, by Libby and Brown's [2013] finding that financial statement disaggregation affects auditors' adjustments even for a known miscalculation error. Thus, the incremental role that uncertainty plays in auditor judgments remains an open question.

Griffin [2014] argues that uncertainty involves both subjectivity and imprecision, roughly capturing the quality and reasonable range of an estimated value, respectively. He finds that greater subjectivity, as operationalized by Level 3 fair market value estimates, can increase the *likelihood* of auditor adjustment because lower-quality inputs increase the risk that a misstatement could exceed a prespecified materiality threshold. Nevertheless, greater imprecision from wider ranges of plausible values decreases the *amount* of adjustment. In our experiment, we hold constant the source of the auditor's evidence, while manipulating the possible outcomes that could be consistent with this evidence. Our more abstract setting is not directly comparable to Griffin's [2014] contextually rich experiment with well-specified materiality benchmarks and real-world referents that Griffin uses to capture the notion of measurement subjectivity. Nevertheless, we build on his finding that measurement imprecision can lead to smaller audit adjustments.

Beyond the technical challenges, the *social* dimensions of uncertainty are also important. Outside accounting, Ganzach and Krantz [1991] find experimental evidence that inconclusive cues can lead to *leniency*, consistent with the expression of giving someone "the benefit of the doubt." More specifically, the authors propose a leniency heuristic, whereby individuals tend to afford more benefit in judgments about others when they have more cause for doubt.[1] However, Ganzach and Krantz [1991] do not manipulate the strength of the social bond between the party making a judgment and the party being judged. Accordingly, their research does not speak to the potential for social bonds to *moderate* the extent to which uncertainty prompts leniency. We turn next to a different literature to develop this reasoning and apply it to an auditing context.

2.2. SOCIAL BONDS AND AUDITOR INDEPENDENCE

To better understand how social bonds formed through auditor-client interactions can influence auditor leniency, we draw on insights from social identity theory on how human interaction is shaped by interpersonal and intergroup associations (Tajfel [1978], Tajfel and Turner [1979], Tajfel [1981]).[2] The social bonds resulting from such associations can lower the propensity to question others' behavior within a self-identified group (Ashforth et al. [2008]). Social identity encompasses both the effects of identifying with a particular group as well as the "*emotional significance* attached to that membership" (Tajfel [1981], p. 255, emphasis added). This point is of particular relevance to our experiment, in which we manipulate the strength of the social bond that can arise from interactions between a reporter and an auditor.

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[1] A related notion is captured by the "leniency bias" addressed in management accounting research on subjective performance evaluations (e.g., Moers [2005], Bol [2011]). For example, Bol [2011] finds that managers give employees lenient subjective performance ratings in order to avoid damage to personal relationships.

[2] Turner, Hogg, Oaks, Richer, and Wetherell [1987] broaden this notion through what they term "self-categorization theory." Efforts of subsequent researchers related to both theories are regarded as part of a social identity approach. Hornsey [2008] reviews the social-identity literature.

Social identify theory supports the prediction that auditors who develop closer social bonds with client personnel would be more likely to reach judgments that favor their clients. Consistent with this premise, Bamber and Iyer [2007] draw on social identity theory to support their finding that auditors who identify with their clients are more likely to accept aggressive reporting positions. More recently, Bauer [2015] finds that auditors who identify with favorable corporate social responsibility activities undertaken by their clients reach more favorable judgments for those clients. Closer to our experiment's manipulation of the strength of the auditor-client social bond, Koch and Salterio [2017] find that auditors with strong affinity for the client propose lower adjustments and are less likely to reject the client's preferred treatment. Thus, prior studies find that both uncertainty and social bonding can influence auditor judgments. However, auditing studies that manipulate uncertainty generally hold the implied auditor-client social bond constant, whereas studies examining the effects of social bonding tend to hold uncertainty constant. A reasonable generalization is that most studies focusing on uncertainty imply at least a moderate social tie between the auditor and client, while most studies focusing on auditor-client social bonds assume at least a moderate degree of underlying uncertainty.[3] That being said, a deeper understanding requires explicit consideration of how each of these constructs affects the other, which is the issue to which we turn next.

2.3. LINKING SOCIAL BONDS TO THE "BENEFIT OF THE DOUBT"

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[3] Notwithstanding this point, it is not the case that all auditor judgment studies assume auditor-client social ties or uncertainty. In Libby and Brown [2013], for example, the assumed misstatement is the omission of a known, unambiguous accrual. The more fundamental point motivating our study is that, while individually important, there is also a need to test how measurement uncertainty and auditor-client social bonding interact.

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Given that prior studies have demonstrated the main effects of uncertainty and social bonds on auditor judgments, our incremental contribution lies in testing how these influences interact. Specifically, we predict that measurement uncertainty is likely to *magnify* the extent to which auditor-client social bonds influence auditor adjustments.

The theoretical basis for a linkage between social cues and uncertainty dates back at least as far as Festinger's [1954] social comparison theory, a core premise of which is that social factors are more prominent in judgments and decisions when evaluations are more ambiguous. Festinger [1954, p. 118] illustrates the point by observing that people are less concerned for others' approval when evaluating running ability than when evaluating the ability to write poetry, as receiving social approval for one's running prowess is of small comfort when a stopwatch indicates otherwise. In archival research, studies have built on this premise in showing that economic uncertainty elevates the extent to which social ties influence how firms structure securities offerings (Podolny [1994]) and value business acquisitions (Haunschild [1994]).

In our setting, friendly social ties between auditors and their clients can be threatened by client actions that jeopardize auditors. Accordingly, the interaction we predict also builds on the "betrayal aversion" literature, which examines the costly actions people take when facing the possibility of being cheated by others (e.g., Bohnet and Zeckhauser [2004]; Bohnet et al. [2008]). In accounting, Birnberg and Zhang [2011] find that betrayal aversion commands a premium in the design of internal control systems, while Kachelmeier, Majors, and Williamson [2014] find that auditor-participants are relatively insensitive to the magnitude of misstatement when human intent is involved. None of these studies, however, examine the sensitivity of betrayal aversion to the joint forces of social bonds and uncertainty. We build on this literature by predicting that audit evidence indicating a misstatement with certainty is more likely to have the effect of betraying a social bond between the auditor and reporter than if measurement uncertainty leaves open the potential to rationalize a more benign interpretation of unfavorable audit evidence.

Importantly, the social bond we consider involves a relatively innocuous aspect of auditor-client relationships, similar to the casual interactions that real-world auditors and their clients experience on a day-to-day basis. That is, social bonds in our experiment do not impose economic pressures such as client retention or other conflicts of interest that would be analogous to violations of regulatory auditor independence rules. Rather, our manipulation is more like what Guénin-Paracini, Malsch, and Tremblay [2015, p. 201] refer to as "operational independence," in which auditors build personal relationships with client personnel that at the same time can "undermine their willingness to take enforcement action when necessary." Our social-bond manipulation should not matter from a wealth-maximization perspective, as it does not change any payoffs from the auditor-reporter game we describe below. Still, we examine whether even subtle and casual interactions between auditors and reporters can lead to social bonding, with measurement uncertainty providing the catalyst by which this bonding influences subsequent auditor judgments. Formally stated, we hypothesize the following interaction:

Hypothesis: Social bonding between auditors and reporters will decrease audit adjustments to a greater extent when audit evidence suggesting a misstatement is characterized by measurement uncertainty than when the extent of misstatement is known with certainty.

3. Method and Design

3.1. SETTING

Theoretical (e.g., Shibano [1990], Bloomfield [1995]) and experimental (e.g., Bloomfield [1997], King [2002], Bowlin [2011], Kachelmeier et al. [2014]) accounting researchers often model decisions made by auditors and reporters as a strategic game. In a similar manner, our study operationalizes a setting in which reporters have the opportunity to take a hidden action that results in an economic benefit, analogous to issuers of financial statements benefiting by inflating reported values. Such an action by the reporter increases the probability of an audit failure that would significantly penalize the auditor. To reduce this risk, auditors have the ability to force (at some cost) an audit adjustment to the extent supported by available audit evidence.

Following the traditions of experimental economics, the audit-like task we present to participants captures incentives relevant to the setting, but uses contextually abstract terminology and labels to minimize the potential for role-playing or demand effects (Haynes and Kachelmeier [1998]). In the primary reporter-auditor experimental task, which occurs *after* manipulating the presence or absence of a social bond, randomly assigned pairs of participants engage in a two-person sequential-move game. Reporters, referred to as “Player A” in the experiment, move first by adding five marbles to a bag. The marbles added can be either red or white. The computer interface for the task does not involve any literal marbles or bag, but this figurative depiction, held constant across conditions, likely helps to enhance task comprehension. In addition to $15 fixed pay, reporters are informed that they will receive $2 for each red marble added and $0 for each white marble. Any red marbles that the reporter adds to the bag also increase the probability that the corresponding auditor, "Player B" in the experiment, will incur a $15 penalty, analogous to an audit failure. Specifically, unless offset by red marbles removed by the auditor, the probability of penalty increases monotonically from 5 percent for zero red marbles added to 95 percent for five red marbles added, following the parameters in Table 1.[4]

In this setting, adding red marbles is analogous to upward distortion of a financial report, which, if left uncorrected by the auditor, increases the likelihood of audit failure and negative consequences for the auditor (e.g., Palmrose [2000], Chaney and Philipich [2002], Glover et al. [2017]). For simplicity, there is no literal value communicated by the reporter to the auditor, as the reporter's only action is to add red marbles. Nevertheless, as explained below, the auditor observes a signal of the amount of *distortion* (i.e., misstatement) in the implicitly reported value. This simplification helps us to focus the experiment on how auditors deal with the *exceptions* they detect, separate from the underlying processes that generate true values.

To reduce the probability of the $15 penalty, auditors may remove red marbles from the bag based on evidence they receive, as discussed in more detail below. Auditors start with a $25 endowment and incur a cost of $2 for each red marble they choose to remove. The $2 cost captures the fact that auditors must undertake effort and overcome resistance when

[4] The probability of penalty is bounded between 5 percent and 95 percent rather than between 0 percent and 100 percent to capture the notion that no audit is completely free from audit risk or guarantees an audit failure.

requiring adjustment of the client's financial statements (Gibbins, Salterio, and Webb [2001]). Thus, as in real-world audits, auditors must trade-off the costs associated with audit adjustments against the risk of penalty associated with unadjusted misstatements. The maximum number of red marbles auditors can remove is limited by the number of red marbles indicated by the evidence auditors receive. As described below, we utilize the strategy method to elicit auditor responses for each possible realization of audit evidence.

With 60% probability, reporters incur a loss of $3 for each red marble removed by auditors. This loss represents the negative consequences reporters face due to reversal of the misstatement from which they would otherwise benefit. The 60% probability reflects the fact that audit procedures do not always detect misstatements. That is, while we abstract away from auditor *effort* choices for simplicity, the reality is that audits are imperfect, such that misstatements are not always detected. As a practical matter, this parameter choice provides reporters with an equilibrium incentive to add red marbles. Otherwise, if reporters inferred that they would be penalized in equilibrium for misreporting, there would be no pure-strategy equilibrium incentive to misreport.[5] Table 1 summarizes the parameters of the game.

[INSERT TABLE 1]

Given these parameters, the equilibrium best strategy for reporters is to add the maximum of five red marbles. In turn, auditors maximize expected payoffs by removing all

[5] In our setting, auditors *always* possess evidence regarding misreporting. The design choice to enforce the effect of auditors' adjustments on reporters with 60% probability allows us to obtain meaningful observations from auditor participants reflecting responses to evidence of misreporting, *given that they possess such evidence*, while maintaining incentives for reporters to misreport.

red marbles supported by the available evidence. While prior studies sometimes operationalize audit-like games with mixed-strategy equilibria (e.g., Bowlin, Hales, and Kachelmeier [2009], Bowlin, Hobson, and Piercey [2015]), the pure-strategy equilibrium in our setting affords the benefit of simplicity, while preserving the key tensions faced by auditors and reporters. DeAngelo [1981] defines audit quality as the joint probability that auditors (1) detect misstatements and (2) respond appropriately. Mixed-strategy audit games tend to focus on audit effort, which is the detection component of DeAngelo's definition. In contrast, our study focuses on how auditors *respond* to evidence of a misstatement in an environment with incentives for aggressive reporting and conservative auditing. While real-world reporters might not always face incentives to act aggressively, the construction of a reporter-auditor game with a pure-strategy equilibrium provides a rigorous test of theory, as an equilibrium incentive for reporters to behave aggressively should bias *against* auditor leniency in required adjustments. See Appendix A for further discussion and a proof of equilibrium behavior.

A significant simplifying assumption is that we treat reporter-auditor interaction as a one-shot game, excluding the complications of repeated interactions between auditors and their clients. Our aim is to isolate the joint impact of social bonds and measurement uncertainty on auditor adjustments. Multiperiod feedback would complicate this objective because it could, over time, reduce the measurement uncertainty we manipulate as a core construct. Such feedback could also introduce an economic element to the auditor-reporter social bond from client retention pressure that goes beyond the psychological effects of social bonding.[6] While future researchers could plausibly add multiperiod considerations to our framework, a one-shot game provides a clean test of theory that limits the potential for alternative interpretations.

3.2. PARTICIPANTS, PROCEDURES, AND EXPERIMENTAL MANIPULATIONS

Experimental participants consist of 140 undergraduate business student volunteers enrolled in introductory financial and managerial accounting classes at a large public university. All experimental sessions are conducted in a dedicated computer research laboratory.[7]

3.2.1. First Experimental Manipulation: Ex Ante Social Bond. Upon arrival at the laboratory, participants are assigned randomly to a seat by drawing a prenumbered card. After brief introductory remarks, participants begin a trivia contest in which they answer ten trivia questions obtained from www.triviachamp.com.[8] Our first experimental manipulation is whether all participants in any particular session complete this exercise individually or in randomly assigned pairs. In the "social-bond" condition in which participants answer the

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[6] For example, Mayhew et al. [2001] find from their laboratory market experiment that auditor-participants are more objective in the presence of certainty because they fear the economic consequences of reputation damage. Our research question, by contrast, examines the more subtle psychological effect of social bonding that is independent of reputational concerns.

[7] Experimental sessions consist of six, eight, or ten participants each, depending on the extent of sign-ups and occasional no-shows. Because the game requires reporter-auditor pairings, research sessions must have an even number of participants. In the event that an odd number arrived, we paid a show-up fee to the last person to arrive and then dismissed that individual, leaving an even number of participants.

[8] Questions from www.triviachamp.com are used with permission. We use questions from the "general knowledge" category, which includes questions involving history, literature, movies, music, sports, and popular culture. To guard against information leakage, we use different questions in each experimental session.

trivia questions in pairs, future reporters and auditors engage in a friendly joint activity, much in the same way that auditors in practice can socialize with client personnel to build a constructive business relationship (Guénin-Paracini et al. [2015]). We are careful, however, to separate the subsequent reporter-auditor game from this preliminary activity. Indeed, participants are not even aware of the reporter-auditor game during the trivia phase. We also hold constant any behavioral effect from merely completing the trivia exercise by asking participants in the condition with no *ex ante* social bond to complete the same exercise on an individual basis.

To encourage attentiveness, the instructions inform participants that they will receive $1 for each correct trivia answer, or $1 each when completed in pairs. The use of joint payments likely reinforces the social-bond condition, much in the same way that auditors and their clients can derive joint benefits from coordinated meals, golf outings, and other interactions. However, we hold constant the presence of an economic benefit from the trivia exercise by paying *all* participants. More importantly, the compensation participants earn from correct trivia answers is independent of their compensation for the reporter-auditor game, described next. We reveal the correct answers and trivia compensation at the end of the experiment to guard against the potential for relative success or failure in the trivia exercise to influence behavior in the reporter-auditor game. Consistent with this intent, supplemental analyses reported in Section 4.3.3 confirm that our primary results are not sensitive to performance in the trivia contest, nor do we detect significant differences in this performance across experimental conditions.

3.2.2. Reporter-Auditor Game. After completing the trivia exercise, participants turn to individually partitioned computer terminals to begin the reporter-auditor game. Participants have no prior knowledge of this game to this point, maintaining the separation from the social-bond manipulation just completed. We operationalize the reporter-auditor game using z-Tree software (Fischbacher [2007]). At their own speed, participants work through several instructional screens. We also distribute a hard copy of the instructions and a reference sheet containing relevant probabilities. Throughout the instructional period, the program prompts participants to answer several comprehension check questions. Incorrect responses lead to a screen with remedial information followed by a repeat of the same question, such that all questions must be answered correctly before continuing. The instructions end with a short quiz that reviews the most important elements of the task, using the same remedial approach for incorrect answers.

After participants complete the instructions for both roles, they learn whether they are assigned to the role analogous to the reporter (Player A) or auditor (Player B). Participants are aware from the instructions that A-B pairs are seated across from each other, such that pairings are not anonymous. However, the partitioned computer stations are arranged with seats facing the wall, such that participants cannot see or communicate with each other during the reporter-auditor game. In the condition in which participants completed the trivia exercise in pairs, the same pairings are used for the audit game.

The program prompts reporters to input how many white and red marbles they wish to add to the bag. Auditors provide several judgments and decisions, as described below, including the number of red marbles to remove from the bag. Because auditors' decisions to remove red marbles are conditional on the information signals they receive, we next describe our manipulation of measurement uncertainty.

3.2.3. Second Experimental Manipulation: Measurement Uncertainty. Reporter decisions generate an information signal to the auditor, which is the experimental analog to audit evidence. In the *certainty* condition, the signal reveals exactly how many of the five marbles added by the reporter are white and how many are red. This condition is analogous to real-world cases of known misstatements, such as the failure to accrue a known expense or recording a known sale in the wrong period. Conversely, in the *uncertainty* condition, the reporter adds five marbles to a bag that already contains five white and five red marbles, thus generating a total population of fifteen marbles. The auditor then observes a computer-generated random sample of five marbles from the bag of fifteen. Only the red marbles *added by the reporter* benefit the reporter and jeopardize the auditor. Red marbles already in the bag before the reporter's decision capture the sense of a "reasonable range" of values that could exist even in the absence of any distortion induced by the reporter, while red marbles added by the reporter increase the likelihood of red marbles in the auditor's sample, suggesting upward distortion. In short, the auditor's information signal is *diagnostic* of the number of red marbles added by the reporter, but not definitive.

The uncertainty condition is analogous to cases in which the auditor's evidence could be highly suggestive of aggressive reporting by the client, such as an unusually favorable client estimate of bad debt expense or a fair market value, but with some possibility that the client's report could be accurate. At the extreme within the parameters of our experiment, a sample of five red marbles indicates that it is highly unlikely that the true population of red marbles in the bag lies within the "reasonable range" one would expect with no incremental red marbles added by the reporter, although it is not impossible. As supplemental analysis, we later use Bayesian reasoning to condition our findings on the posterior probabilities of reporter misstatements in the uncertainty condition, given actual reporter decisions and auditor predictions of those decisions. Our more central objective, however, is to examine whether the *ex ante* social bond from the pre-reporting trivia exercise is more influential when reporter aggressiveness is known than when it can be inferred but is uncertain.

3.2.4. Auditor Judgments and Decisions. Before providing the information signal to the auditor, the computer prompts auditors to predict the percentage likelihood that the reporter will add 0, 1, 2, 3, 4, or 5 red marbles, with a check programmed to ensure that these percentages sum to 100%. While not affecting auditors' compensation, these elicited "priors" aid our ability to interpret findings within the context of auditors' beliefs, thus shedding additional insight in our supplemental analyses. After auditors enter these expectations, the program uses the so-called strategy method (see Brandts and Charness [2011]) to elicit the number of red marbles the auditor chooses to remove for each possible number of red marbles that might be revealed in the information signal. This approach maximizes our available data and also provides results for all auditors of what the auditor would do for the most extreme signal possible of five red marbles, while ensuring that final outcomes are based on the actual realizations of reporters' decisions and the corresponding information signals.[9] Auditors are not allowed to remove more red marbles than the number of red

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[9] Brandts and Charness [2011] survey the experimental economics literature to compare the strategy method of responding conditionally to all possible actions vs. the "direct-response" method of first learning one party's action and then responding to that specific action. They find that the strategy method tends to reduce the extent

marbles revealed in the auditor's information signal. This rule is consistent with the reasoning that auditors cannot realistically demand an adjustment that exceeds the amount of misstatement indicated by the available audit evidence.

3.2.5. Other Questions and Revelation of Outcomes. After providing the judgments and decisions detailed above, participants complete a post-experimental questionnaire along with a risk-preference exercise adapted from Boylan and Sprinkle [2001] that we elicit as a potential covariate.[10] After all materials are completed, the computer reveals to each auditor the number of red marbles added by the reporter in the certainty condition or the number of red marbles in the random sample in the uncertainty condition. We operationalize probabilities by asking participants to draw a card at random from a deck prenumbered from 1 to 100, which we input into the z-Tree program.[11] We also reveal the trivia answers and scores at this time. The computer then determines outcomes and reports each participant's total compensation, which we pay in cash along with a $5.00 show-up fee. Total compensation averages to $30.57 per participant for an approximately 75-minute experimental session.

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of actions that punish others, which could be relevant to our setting. Any such effect would likely be present in both the certainty and uncertainty conditions, however, and hence would be unlikely to affect our hypothesized interaction between measurement uncertainty and the auditor's *ex ante* social bond with the reporter. More importantly, Brandts and Charness [2011] find no evidence that the strategy method induces treatment effects that would not otherwise be present under the direct-response method. Their overall conclusion supports the use of the strategy method as an effective way to maximize data availability in experimental economics.

[10] The risk-preference task elicits the point at which participants would prefer a certain payoff of $2.50 over varying probabilities of winning $5.00 or nothing. As noted later, our results are not sensitive to the inclusion of a covariate from this task.

[11] For example, Player A incurs a loss based on the number of marbles removed by Player B if Player A draws a card numbered 60 or lower, thus operationalizing a 60% probability.

4. Results

4.1. MANIPULATION CHECKS

To determine whether performing the trivia exercise individually or in pairs successfully manipulates the strength of auditors' social bonds with reporters, the post-experimental questionnaire asks participants to respond to statements regarding the degree to which, prior to reaching decisions in the audit game, they had (1) "positive feelings towards," (2) felt as though they were "working together" with, and (3) "felt close to" the person with whom they were paired. As shown in Table 2, responses on a seven-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree" indicate that auditors who completed the previous trivia exercise in pairs agree with each of these statements to a greater extent than do those who answered the trivia questions individually (all p-values < 0.01, one-tailed).[12] We conclude that the trivia exercise successfully manipulates the strength of auditors' social bonds with reporters. Importantly, this manipulation is successful in *both* the certainty and uncertainty conditions.[13] Accordingly, the interaction we report shortly between the social-bond and measurement uncertainty manipulations cannot be attributed to the failure of social bonding to arise in the certainty condition. Rather, this interaction suggests

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[12] We also analyze responses to these questions using a full-factorial ANOVA model across both manipulated factors (untabulated). Results for each of the three measures confirm a statistically significant main effect of social bonding (all $p < 0.01$, one-tailed), an insignificant main effect of measurement uncertainty (all $p \geq 0.11$, two-tailed), and an insignificant interaction between the two factors (all $p \geq 0.42$, two-tailed). This evidence gives us comfort that perceived social bonds were influenced only by the social-bond manipulation.

[13] Tested separately within the certainty and uncertainty conditions, responses to each of the three social-bond manipulation check questions are statistically significant between the two social-bond conditions in the predicted direction (all $p \leq 0.03$, one-tailed).

that auditors' adjustment decisions are less sensitive to social bonding in the certainty condition.

To ensure the effectiveness of our manipulation of measurement uncertainty, the computer program includes comprehension-check questions at multiple stages of the instructions. Incorrect answers lead to remedial instructions and a prompt to retry the question, such that all participants must provide correct answers to these questions before continuing. This process gives us reasonable assurance that all participants are aware of the implications of the measurement (un)certainty specific to their assigned experimental conditions.

[INSERT TABLE 2]

4.2. PRIMARY FINDINGS

4.2.1. Auditor Decisions for Extreme Realizations of Audit Evidence. We test the hypothesized interaction between social bonding and measurement uncertainty with alternative dependent variables. Across analyses, we obtain similar findings with or without a covariate for risk preferences, so we report results without a covariate for simplicity. Our first analysis takes advantage of the fact that the strategy method elicits auditor judgments for all possible realizations of the auditor's signal, including the signal with five red marbles that indicates the greatest degree of aggressive behavior on the part of the reporter. That is, all auditors indicate the number of red marbles they would remove *if* the auditor were to observe a signal with five red marbles, which is the most damaging evidence possible in our setting. This signal is advantageous because it offers the greatest flexibility in auditor adjustments, which could be from zero to five red marbles removed. It also provides the strongest test of theory, indicating the extent to which the auditor-reporter social bond and measurement uncertainty interact when audit evidence indicates the greatest threat. In the certainty condition, observing five red marbles indicates with certainty that the reporter added five red marbles. In the uncertainty condition, observing five red marbles is highly diagnostic but not conclusive of several red marbles added by the reporter, a point to which we return later in supplemental analyses of auditors' elicited "priors" and actual reporter behavior.

Figure 1 depicts and Table 3 reports the number of red marbles removed by the auditor *conditional* on observing five red marbles in the auditor's signal. Figure 1 indicates an interactive pattern consistent with our hypothesis, which the ANOVA in Table 3, Panel B confirms is statistically significant ($F_{1,66} = 2.66$, $p = 0.05$, one-tailed).[14] Follow-up analyses of simple effects, shown in Panel C, confirm that the social-bond manipulation is significant in the uncertainty condition ($F_{1,66} = 6.94$, $p < 0.01$, one-tailed), but not when misstatements are known with certainty ($F_{1,66} = 0.08$; $p > 0.50$, two-tailed). As Figure 1 and Panel A of Table 3 indicate, conditional on observing five red marbles, auditors remove approximately one red marble less in the condition with measurement uncertainty and a social bond than in the other three conditions. Finally, given that our hypothesis predicts a specific form of the social-bond × measurement uncertainty interaction, we apply contrast coding (see Buckless and Ravenscroft [1990]) to test the predicted pattern. Specifically, we apply planned contrasts of +⅓ for all cells except the combination of a social bond and uncertainty, for which the

[14] Given our directional predictions, reported *p*-values are one-tailed unless otherwise noted. One-tailed tests are appropriate for two-way interactions such as ours that can take only two possible directions, as explained by McNeil, Newman, and Kelly [1996, pp. 137-139].

contrast weight is -1. Results (untabulated) confirm a statistically significant pattern that is consistent with lower audit adjustments for the combination of social bonding with measurement uncertainty than in the other three conditions ($F_{1,66} = 5.55$; $p = 0.01$, one-tailed).

[INSERT FIGURE 1 AND TABLE 3]

When interpreting this evidence, it is important to note that auditors do not merely adjust by the maximum amount possible when audit evidence is certain. Rather, auditors remove an average of 3.71 and 3.82 red marbles out of five possible in the certainty condition with and without a social bond, respectively. In the uncertainty condition, auditors remove an average of 4.12 red marbles when the social bond is absent, which is even larger than the number removed in the certainty condition, albeit not significantly larger. The fact that uncertainty alone does not lower audit adjustments may seem surprising in view of the fact that the number of red marbles added cannot possibly be higher in the uncertainty condition than in the certainty condition when the audit signal is five red marbles. The exact probabilities of reporters' actions are ambiguous in the uncertainty condition, however, which appears to be enough to prompt auditors to impose adjustments similar to those in the certainty condition, as long as a social bond is absent.[15] Conversely, when measurement uncertainty and a social bond are *both* present, we observe a statistically significant decline in audit adjustments to an average of 3.12 red marbles removed.

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[15] See Ellsberg [1961] for a general discussion and Zimbelman and Waller [1999] for evidence in an audit context that ambiguous probabilities are more aversive than known probabilities, which could help to explain why uncertainty alone does not result in lower audit adjustments in the absence of social bonding.

Our results do not imply that auditors' decisions become trivial in the presence of certainty, as auditors willingly accept some risk even when reporters' actions are known. This observation is consistent with other evidence that auditors underadjust even when evaluating known misstatements (e.g., Libby and Brown [2013]). Nor can we say that certainty removes social bonding, as our manipulation-check evidence indicates that the social bonding exercise is similarly effective in the certainty and uncertainty conditions. Instead, our results are consistent with the more subtle interaction-based reasoning that social bonding *magnifies* the risks auditors are willing to accept, but only when audit evidence is characterized by some residual uncertainty. We return to the consideration of audit risk in a Bayesian analysis of posterior probabilities of reporter actions that we report in our supplemental analyses.

4.2.2. Auditor Decisions across All Realizations of Audit Evidence. As an alternative measure of auditor adjustments, we repeat the analysis with the dependent variable defined as the sum of red marbles removed under the strategy method across *all* possibilities of red marbles that could be observed in the auditor's signal. This variable has a possible range from zero if the auditor does not remove any red marbles for any signal to 15 if the auditor removes all red marbles for each possible signal of 1, 2, 3, 4, or 5 red marbles observed. Results for this alternative measure, as depicted in Figure 2, show an interactive pattern similar to that depicted in Figure 1. Namely, auditors adjust to a similar extent in the certainty condition with or without a social bond, with averages of 11.18 and 10.94, respectively. These adjustments are similar to the average of 11.32 in the uncertainty condition without a social bond, but when uncertainty and a social bond are both present, adjustments fall to a markedly lower average of 8.88.

Table 4 reports descriptive statistics in Panel A and an ANOVA in Panel B for the total number of red marbles auditors remove across all possible signals. The *p*-value for the interaction in Panel B is more marginal ($F_{1,66} = 2.02$; $p = 0.08$, one-tailed) than is the case when the dependent variable is the number of red marbles removed for five red marbles observed.[16] Given the predicted form of the interaction, contrast coding again provides a more powerful test. Using the same contrast weights as before, contrast-coded results (untabulated) support the functional form we hypothesize ($F_{1,66} = 4.28$; $p = 0.02$, one-tailed). Follow-up simple effect tests reported in Table 4, Panel C confirm that social bonding lowers the amount of adjustment only when audit evidence is characterized by measurement uncertainty ($F_{1,66} = 3.45$; $p = 0.03$, one-tailed), not when the audit signal is certain ($F_{1,66} = 0.03$; $p > 0.50$, two-tailed). Overall, whether for auditor adjustments at the most extreme level of audit evidence or for adjustments in general, our findings support the hypothesized prediction that the effects of auditor-reporter social bonding and measurement uncertainty are interdependent.

[INSERT FIGURE 2 AND TABLE 4]

4.3. SUPPLEMENTAL ANALYSES

4.3.1. Conditioning on Reporter Behavior. In addition to affecting auditors, is it possible that our treatment manipulations could also influence reporters. Table 5 tallies and

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[16] The social bond × uncertainty interaction becomes statistically significant at the 0.05 level ($F_{1,66} = 3.26$, $p = 0.04$, one-tailed) if we exclude one outlier in the condition with no social bond and no measurement uncertainty whose response was 2.5 standard deviations below that cell's mean. No other cell has an outlier this extreme.

analyzes the number of red marbles added by reporters. Unlike auditors, reporters exhibit a simpler *main effect* of the social bond manipulation ($F_{1,66} = 4.25$; $p = 0.04$, two-tailed), with fewer red marbles added in the presence of a social bond across both the certainty and uncertainty conditions. Specifically, reporters add an average of 3.00 red marbles when completing the *ex ante* trivia contest in pairs, which is lower than the average of 3.72 red marbles added when completing the trivia contest individually. Although reporters are aware of the nature of the auditor's information signal, the measurement uncertainty manipulation does not have a main effect on the number of red marbles added by reporters ($F_{1,66} = 0.51$; $p = 0.48$, two-tailed), nor does it interact with the social bond manipulation ($F_{1,66} = 0.10$; $p > 0.50$, two-tailed).

[INSERT TABLE 5]

Thus, irrespective of the presence or absence of measurement uncertainty, the social bonding exercise we manipulate appears to prompt reporters to add fewer red marbles that could potentially harm the auditors with whom they are paired. The influence of auditor-reporter social bonding on *reporters* is generally overlooked in the auditor independence literature, but it is certainly plausible that the same social bonds that make auditors more favorably disposed to their clients could also make clients more favorably disposed to their auditors. Indeed, this finding is consistent with field evidence reported by Guénin-Paracini et al. [2015] that the personal relationships auditors form with their clients can generate beneficial effects along with potential threats to the auditor's "operational independence." If so, however, reporter behavior could suggest a possible alternative explanation for our primary findings on auditor adjustments. Specifically, the possibility arises that auditors might have *anticipated* that reporters would be less opportunistic in the social-bond condition. The point is moot when the auditor's signal is certain, as the auditor would then know exactly how many red marbles the reporter added. In the uncertainty condition with a social bond, however, it is conceivable that auditors might have lowered the number of red marbles removed simply because they inferred that reporters would add fewer red marbles in the presence of a social bond.

To address this possibility, we use Bayes' Rule to compute the audit risk assumed by auditors, *given actual reporter behavior*. Specifically, we compute the posterior probability of each possible number of red marbles added by reporters within the uncertainty condition, given the observation of five red marbles in the auditor's sample. First, we use the actual probability frequencies of reporters adding 0, 1, 2, 3, 4, or 5 red marbles with and without the social bond as prior probabilities for our Bayesian calculations. We then compute posterior probabilities for each possible number of red marbles added, assuming that the auditor observes the most extreme evidence of five red marbles.

The posterior probabilities thus computed allow us to estimate the audit risk each auditor is willing to take in the uncertainty condition, assuming that auditors accurately infer the prior probabilities of red marbles added by reporters with and without a social bond. To compute audit risk, we note the number of red marbles each auditor removes for a signal of five red marbles observed. For example, if an auditor removes three red marbles, there can only be zero, one, or two red marbles remaining that were added by the reporter. We then weight the probability of incurring the $15 penalty for each such possibility by the corresponding Bayesian posterior probabilities. We estimate audit risk by summing the weighted probabilities of penalty for each possible number of red marbles remaining.[17] Appendix B details this calculation for an illustrative example of three red marbles removed when the audit signal indicates five red marbles in the uncertainty condition with a social bond. Audit risk is more straightforward in the certainty condition, as prior or posterior probabilities are no longer relevant if the reporter's actions are known with certainty. Thus, as Appendix B illustrates, audit risk in the certainty condition simply reflects the parameters in Table 1, Panel B.

We estimate audit risk for the most extreme signal possible of five red marbles observed. Results from this supplemental analysis (untabulated) indicate that auditors assume a higher risk of penalty for a signal of five red marbles when the social bond is present than when it is absent in the uncertainty condition ($F_{1,66} = 3.57$; $p = 0.03$, one-tailed),[18] whereas the social bond has no effect on assumed audit risk in the certainty condition ($F_{1,66} = 0.22$; $p > 0.50$, two-tailed). Thus, we find that social bonds in the uncertainty condition increase the risk of penalty that auditors are willing to assume, even after controlling for the tendency of reporters to add fewer red marbles when the social bond is present. Put differently, social

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[17] Specifically, following Bayes' Rule, we compute the posterior probabilities that the reporter added {0, 1, 2, 3, 4, 5} red marbles, given the number of red marbles observed in the sample, as $P(A|B) = \frac{P(B|A)P(A)}{P(B)}$, where A = the number of red marbles added by the reporter and B = the number of red marbles observed in the sample. Thus, P(A) is the prior probability of the reporter adding {0, 1, 2, 3, 4, 5} red marbles, which we estimate from reporters' actual behavior. Having computed P(A|B) for each possible value of A, we weight the probabilities of incurring the $15 penalty (see Table 1) by the corresponding posterior probabilities, given the number of red marbles removed by each individual auditor. As illustrated in Appendix B, the sum of these weighted risks determines the expected risk of incurring the $15 penalty that each auditor assumes, based on expected reporter behavior.

[18] A one-tailed *p*-value is justified for this test because it follows from our prediction that the social bond will have a stronger effect on audit adjustments in the uncertainty condition than in the certainty condition.

bonding leads auditors to “lower their guard” when signals are uncertain to an extent that goes beyond what one would predict if auditors were simply responding to anticipated differences in reporter behavior. We cannot say whether auditors assume these risks intentionally or unintentionally, but we can say that social bonding in the uncertainty condition increases auditors’ expected penalties.

4.3.2. Conditioning on Auditors’ Priors. The Bayesian calculations in the above analysis are based on prior probabilities estimated from actual reporter behavior. Auditors in the uncertainty condition do not observe reporter behavior, however, before they make their decisions. Accordingly, in this subsection we undertake a similar analysis based on prior probabilities of reporter behavior that we elicit from *auditors* before auditors decide how many red marbles to remove. Table 6 tallies and analyzes auditors’ *ex-ante* predictions of the number of red marbles reporters will add in each condition, which we calculate for each auditor by summing the elicited probability frequencies weighted by the associated number of red marbles.

[INSERT TABLE 6]

Consistent with reporters’ actual behavior, auditors expect reporters to add fewer red marbles in the presence of a social bond (average = 2.94) than when the social bond is absent (average = 3.36). Table 6, Panel B indicates that the main effect of the social bond is statistically significant for auditors’ elicited priors of red marbles added by reporters ($F_{1,66}$ = 5.05; p = 0.03, two-tailed), but that neither the uncertainty manipulation nor the social bond × uncertainty interaction are significant (both p > 0.50, two-tailed). Thus, auditors accurately predict that reporters will add somewhat fewer red marbles when a social bond is present for both certain and uncertain audit signals.

We next conduct an audit-risk analysis based on Bayesian calculations of posterior probabilities for an observed sample of five red marbles and the *priors elicited from individual auditors*, similar to the analysis reported earlier in which we infer prior probabilities from actual reporter behavior.[19] We obtain similar results, with the social bond prompting auditors to assume a significantly greater risk of penalty when the audit signal is uncertain ($F_{1,66} = 3.04$; $p = 0.04$, one-tailed), but not when the reporter's action is known with certainty ($F_{1,66} = 0.24$; $p > 0.50$, two-tailed). Thus, even controlling for auditors' own expectations of reporter behavior within each condition, auditors appear willing to bear more risk when they have a social bond and audit evidence is characterized by uncertainty.

In sum, evidence suggests that our primary findings cannot be explained solely as rational responses by auditors to anticipated reporter behavior. If auditors were responding to the general expectation of fewer red marbles added by reporters when the signal is uncertain, this expectation would not explain why auditors remove fewer red marbles for an uncertain signal only when the social bond is present. Further, the expectation that reporters would add fewer red marbles in the social-bond condition would not explain why auditors assume a significantly greater risk of incurring the $15 penalty when the social bond is present in the

[19] For the analysis of audit risk using auditors' priors, the prior probability that the reporter will add any given number of red marbles is defined uniquely for each auditor using the prior probabilities that auditor provides. The sum of the resulting weighted posterior probabilities can be interpreted as each auditor's assumed risk of incurring the penalty based on that auditor's expectations of reporter behavior.

uncertainty condition, even after controlling for differences in actual reporter behavior or auditors' elicited expectations of reporter behavior.

Setting these points aside, it would seem disconcerting from a societal perspective if auditors are more lenient when measurement uncertainty is present simply because social bonds lead auditors to place more trust in their clients, even if some of that trust can be justified from client behavior. Importantly, the social bond in our experiment is not like an internal control that is designed to prevent misstatements. Rather, the social bond we capture rests on the trust that can be justified from a friendly encounter, which is inherently fragile and sensitive to the whims of different personalities (Majors [2016]). Regulators would likely be uncomfortable with an environment in which auditors take fewer reporting precautions because their friendships with client personnel lead them to be more trusting, especially if that trust applies to the most complex parts of the audit with the greatest uncertainty.

4.3.3 Controlling for Performance in the Trivia Exercise. Although participants' compensation from the trivia exercise is independent of the reporter-auditor game that follows, it is important to test for any potential sensitivity of our reported results to the trivia outcomes. First, we confirm in an untabulated ANOVA that there are no significant differences across the four experimental conditions in the number of trivia questions answered correctly (all $p \geq 0.25$, two-tailed).[20] Second, we find no significant correlation overall (all $p \geq 0.30$) or within the social-bond condition (all $p \geq 0.23$) between the number of trivia questions answered correctly and responses to the three post-experimental questions we

[20] For all tests in this section, we analyze auditors' trivia responses to avoid double-counting the paired responses, which are identical by construction between auditors and reporters.

use to assess the extent of the social bond between auditors and reporters. Thus, although participants who completed the trivia exercise in pairs perceive a closer social bond in general, as reported previously in our manipulation checks, this association does not appear to depend on the number of questions answered correctly. Third, we repeat all primary analyses with a covariate for the number of correct trivia answers. This covariate does not reach statistical significance in any analysis (all $p \geq 0.50$, two-tailed), nor does it change the conclusions from any of our reported findings. In sum, these supplemental tests suggest that the trivia exercise influenced auditor behavior from the way this activity was completed rather than from the outcomes achieved.

5. Conclusions

Our primary conclusion is that neither auditor-client social bonding nor measurement uncertainty can be fully appreciated in isolation. Rather, evidence from our experiment indicates that these two factors interact, insofar as a friendly social bond reduces the adjustments that auditor-participants require only when audit evidence is characterized by measurement uncertainty, not when such evidence is perfectly diagnostic. Although auditors in our experiment do not adjust fully even when presented with certain evidence, to the extent that our results generalize, we can at least take some comfort that social bonding is unlikely to magnify the extent of underadjustment in settings with known misstatements such as Libby and Brown [2013]. Similarly, one might take some comfort from the finding that measurement uncertainty alone does not influence auditor adjustments in the absence of social bonding. Thus, our results suggest that one way to ensure more conservative auditor evaluations of accounts with measurement uncertainty is to limit auditors' social-bonding opportunities with their clients.

Our findings are also disconcerting, however, insofar as we find that something as simple as working together on a trivia contest can influence the extent to which auditor-participants subsequently require an adjustment when an audit signal strongly suggests but does not prove aggressive reporting. One implication of this finding is that audit firms and regulators should consider the influence of social bonding when evaluating the role of in-firm specialists, concurring partners, and other relevant firm personnel involved in assessments of accounts with high measurement uncertainty. The PCAOB [2015] has expressed concern about the sufficiency of oversight when auditors seek guidance from specialists when auditing complex estimates. Notwithstanding this concern, in addition to their technical expertise, specialists could confer the advantage of a more dispassionate perspective that is less susceptible to the social bonds that arise from day-to-day client interactions. This reasoning is consistent with evidence from field interviews conducted by Boritz et al. [2015], who find that members of the audit team tend to be more tolerant of client-preferred accounting positions than are the specialists they consult for advice. That being said, our study manipulates social bonding as a dichotomous treatment factor, and hence does not examine the *range* of social bonds that could possibly threaten auditor independence in an uncertain setting, even for specialists. We encourage further research on the extent to which specialists or other audit firm initiatives could help to protect auditors from the risks of social bonding in settings characterized by uncertainty.

We find that even *reporters* in our experiment are sensitive to the social bond we manipulate, as they are less aggressive in their reporting decisions when reporters and auditors have the opportunity to form a modest social bond. Given this finding, one might conjecture that auditors are simply reacting rationally to the reporter behavior they face by lowering required adjustments when the audit signal is uncertain but a social bond suggests that the reporter is more trustworthy. Our supplemental Bayesian analysis of audit risk, however, indicates that auditors bear more risk in the social-bond condition when measurement uncertainty is present, even after controlling for the actual decisions reporters make or the reporter behavior predicted by auditors. Thus, our findings cannot be explained entirely by strategic wealth-maximizing incentives. Rather, the behavior we observe appears to include an important social element.

Our study is subject to the usual limitations of a stylized experiment in the traditions of experimental economics (Kachelmeier and King [2002]). Our student participants are not real-world auditors, nor are they reporters. We also use abstract terminology, such that reporters in our experiment do not literally misrepresent reported values, nor do auditors in our experiment literally require adjustments. Nevertheless, we believe that our experiment sheds useful insights about human behavior in audit-like situations characterized by interpersonal relationships and uncertainty. If students lower protections against opportunistic behavior under uncertainty simply because they have completed a five-minute general-knowledge trivia contest with other students, it seems plausible that real-world auditors could also be led to accept a manager's aggressive estimate of a fair market value if the manager and auditor have friendly associations from lunch outings or an occasional round of golf.

We encourage future research that extends the analysis of complex audit areas beyond the technical difficulties associated with such areas. In particular, our study suggests that measurement uncertainty is characterized not only by technical challenges, but also by social challenges. Effective audits require effective control of both.

References

ASHFORTH, B. E.; S. H. HARRISON; AND K. G. CORLEY. "Identification in Organizations: An Examination of Four Fundamental Questions." *Journal of Management* 34 (2008): 325-74.

BAMBER, E. M., AND V. M. IYER. "Auditors' Identification with Their Clients and Its Effect on Auditors' Objectivity." *Auditing: A Journal of Practice & Theory* 26 (2007): 1-24.

BAUER, T. "The Effects of Client Identity Strength and Professional Identity Salience on Auditor Judgments." *The Accounting Review* 90 (2015): 95-114.

BIRNBERG, J. G., AND Y. ZHANG. "When Betrayal Aversion Meets Loss Aversion: The Effects of Changes in Economic Conditions on Internal Control System Choices." *Journal of Management Accounting Research* 23 (2011): 169-87.

BLOOMFIELD, R. "Strategic Dependence and Inherent Risk Assessments." *The Accounting Review* 70 (1995): 71-90.

BLOOMFIELD, R. J. "Strategic Dependence and the Assessment of Fraud Risk: A Laboratory Study." *The Accounting Review* 72 (1997): 517-38.

BOHNET, I.; F. GREIG; B. HERRMAN; AND R. ZECKHAUSER. "Betrayal Aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States." *The American Economic Review* 98 (2008): 294-310.

BOHNET, I., AND R. ZECKHAUSER. "Trust, Risk and Betrayal." *Journal of Economic Behavior and Organization* 55 (2004): 467-84.

BOL, J. C. "The Determinants and Performance Effects of Managers' Performance Evaluation Biases." *The Accounting Review* 86 (2011): 1549-75.

BORITZ, J. E.; N. KOCHETOVA-KOZLOSKI; L. A. ROBINSON; AND C. WONG. "Auditors' and Specialists' Views about the Use of Specialists during an Audit." Unpublished paper, University of Waterloo, 2015. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2379424.

BOWLIN, K. O. 2011. "Risk-Based Auditing, Strategic Prompts, and Auditor Sensitivity to the Strategic Risk of Fraud." *The Accounting Review* 86 (2011): 1231-53.

BOWLIN, K. O.; J. HALES; AND S. J. KACHELMEIER. "Experimental Evidence of How Prior Experience as an Auditor Influences Managers' Strategic Reporting Decisions." *Review of Accounting Studies* 14 (2009): 63–87.

BOWLIN, K. O.; J. L. HOBSON; AND M. D. PIERCEY. "The Effects of Auditor Rotation, Professional Skepticism, and Interactions with Managers on Audit Quality." *The Accounting Review* 90 (2015): 1363-93.

BOYLAN, S. J., AND G. B. SPRINKLE. "Experimental Evidence on the Relation between Tax Rates and Compliance: The Effect of Earned Vs. Endowed Income." *The Journal of the American Taxation Association* 23 (2001): 75-90.

BRANDTS, J., AND G. CHARNESS. “The Strategy Versus the Direct-Response Method: A First Survey of Experimental Comparisons.” *Experimental Economics* 14 (2011): 375-98.

BRATTEN, B.; L. M. GAYNOR; L. MCDANIEL; N. R. MONTAGUE; AND G. E. SIERRA. “The Audit of Fair values and Other Estimates: The Effects of Underlying Environmental, Task, and Auditor-Specific Factors.” *Auditing: A Journal of Practice & Theory* 32 (2013): 7-44.

BRAUN, K. W. “The Disposition of Audit-Detected Misstatements: An Examination of Risk and Reward Factors and Aggregation Effects.” *Contemporary Accounting Research* 18 (2001): 71-99.

BUCKLESS, F., AND S. RAVENSCROFT. “Contrast Coding: A Refinement of ANOVA in Behavioral Analysis.” *The Accounting Review* 65 (1990): 933-45.

CHANEY, P. K., AND K. L. PHILIPICH. “Shredded Reputation: The Cost of Audit Failure.” *Journal of Accounting Research* 40 (2002): 1221-45.

CHRISTENSEN, B. E.; S. M. GLOVER; AND D. A. WOOD. “Extreme Estimation Uncertainty in Fair Value Estimates: Implications for Audit Assurance.” *Auditing: A Journal of Practice & Theory* 31 (2012): 127-46.

DEANGELO, L. “Auditor Size and Audit Quality.” *Journal of Accounting and Economics* 3 (1981): 183-99.

ELLSBERG, D. “Risk, Ambiguity, and the Savage Axioms.” *The Quarterly Journal of Economics* 75 (1961): 643-69.

EPPS, K. K., AND W. F. MESSIER, JR. "Engagement Quality Reviews: A Comparison of Audit Firm Practices." *Auditing: A Journal of Practice & Theory* 26 (2007): 167-81.

FESTINGER, L. "A Theory of Social Comparison Processes." *Human Relations* 7 (1954): 117-40.

FISCHBACHER, U. "Z-Tree: Zurich Toolbox for Ready-Made Economic Experiments." *Experimental Economics* 10 (2007): 171-8.

GANZACH, Y., AND D. H. KRANTZ. "The Psychology of Moderate Prediction: II. Leniency and Uncertainty." *Organizational Behavior and Human Decision Processes* 48 (1991): 169-92.

GIBBINS, M.; S. SALTERIO; AND A. WEBB. "Evidence about Auditor-Client Management Negotiation Concerning Client's Financial Reporting." *Journal of Accounting Research* 39 (2001): 535–63.

GLOVER, S.; M. TAYLOR, AND Y. WU. "Current Practices and Challenges in Auditing Fair Value Measurements and Complex Estimates: Implications for Auditing Standards and the Academy." *Auditing: A Journal of Practice & Theory* 36 (2017): 63-84.

GRIFFIN, J. B. "The Effects of Uncertainty and Disclosure on Auditors' Fair Value Materiality Decisions." *Journal of Accounting Research* 52 (2014): 1165-93.

GRIFFITH, E. E. "Auditors, Specialists, and Professional Jurisdiction in Audits of Fair Values." Unpublished paper, The University of Wisconsin-Madison, 2016. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2808581.

GRIFFITH, E. E.; J. S. HAMMERSLEY; AND K. KADOUS. “Audits of Complex Estimates as Verification of Management Numbers: How Institutional Pressures Shape Practice.” *Contemporary Accounting Research* 32 (2015a): 833-63.

GRIFFITH, E. E.; J. S. HAMMERSLEY; K. KADOUS; AND D. YOUNG. “Auditor Mindsets and Audits of Complex Estimates.” *Journal of Accounting Research* 53 (2015b): 49-77.

GUÉNIN-PARACINI, H.; B. MALSCH; AND M-S. TREMBLAY. “On the Operational Reality of Auditors’ Independence: Lessons from the Field.” *Auditing: A Journal of Practice & Theory* 34 (2015): 201-36.

HACKENBRACK, K., AND M. W. NELSON. “Auditors’ Incentives and Their Application of Financial Accounting Standards.” *The Accounting Review* 71 (1996): 43-59.

HAUNSCHILD, P. R. “How Much Is That Company Worth? Interorganizational Relationships, Uncertainty, and Acquisition Premiums.” *Administrative Science Quarterly* 39 (1994): 391-411.

HAYNES, C. M., AND S. J. KACHELMEIER. “The Effects of Accounting Contexts on Accounting Decisions: A Synthesis of Cognitive and Economic Perspectives in Accounting Experimentation.” *Journal of Accounting Literature* 17 (1998): 97-136.

HORNSEY, M. J. “Social Identity Theory and Self-Categorization Theory: A Historical Review.’ *Social and Personality Psychology Compass* 2 (2008): 204-22.

KACHELMEIER, S. J., AND R. R. KING. “Using Laboratory Experiments to Evaluate Accounting Policy Issues.” *Accounting Horizons* 16 (2002): 219-32.

Accepted Article

KACHELMEIER, S. J.; T. M. MAJORS; AND M. G. WILLIAMSON. "Does Intent Modify Risk-Based Auditing?" *The Accounting Review* 89 (2014): 2181-201.

KADOUS, K.; S. J. KENNEDY; AND M. E. PEECHER. "The Effect of Quality Assessment and Directional Goal Commitment on Auditors' Acceptance of Client-Preferred Accounting Methods." *The Accounting Review* 78 (2003): 759-78.

KING, R. R. "An Experimental Investigation of Self-Serving Biases in an Auditing Trust Game: The Effect of Group Affiliation." *The Accounting Review* 77 (2002): 265-84.

KOCH, C., AND S. SALTERIO. "The Effects of Auditor Affinity for Client and Perceived Client Pressure on Auditor Proposed Adjustments." *The Accounting Review* (2017): Forthcoming.

LIBBY, R., AND T. BROWN. "Financial Statement Disaggregation Decisions and Auditors' Tolerance for Misstatement." *The Accounting Review* 88 (2013): 641-65.

LIBBY, R., AND W. R. KINNEY, JR. "Does Mandated Audit Communication Reduce Opportunistic Corrections to Manage Earnings to Forecasts?" *The Accounting Review* 75 (2000): 383-404.

MAJORS, T. M. "The Interaction of Communicating Measurement Uncertainty and the Dark Triad on Managers' Reporting Decisions." *The Accounting Review* 91 (2016): 973-92.

MAYHEW, B. W.; J. W. SCHATZBERG; AND G. R. SEVCIK. "The Effect of Accounting Uncertainty and Auditor Reputation on Auditor Objectivity." *Auditing: A Journal of Practice & Theory* 20 (2001): 49-70.

MCNEIL, K. A.; I. NEWMAN; AND F. J. KELLY. *Testing Research Hypotheses with the General Linear Model*. Carbondale, IL: Southern Illinois University Press, 1996.

MOERS, F. "Discretion and Bias in Performance Evaluation: The Impact of Diversity and Subjectivity." *Accounting, Organizations and Society* 30 (2005): 67-80.

PALMROSE, Z. *Empirical Research in Auditor Litigation: Considerations and Data*. Studies in Accounting Research Series, No. 33. Sarasota, FL: American Accounting Association, 2000.

PODOLNY, J. M. "Market Uncertainty and the Social Character of Economic Exchange." *Administrative Science Quarterly* 39 (1994): 458-83.

PUBLIC COMPANY ACCOUNTING OVERSIGHT BOARD (PCAOB). *Auditing Accounting Estimates and Fair Value Measurements*. Staff Consultation Paper. August 19, 2014. Available at https://pcaobus.org/Standards/Documents/SCP_Auditing_Accounting_Estimates_Fair_Value_Measurements.pdf.

PUBLIC COMPANY ACCOUNTING OVERSIGHT BOARD (PCAOB). *The Auditor's Use of the Work of Specialists.* Staff Consultation Paper. May 28, 2015. Available at https://pcaobus.org/Standards/Documents/SCP-2015-01_The_Auditor's_Use_of_the_Work_of_Specialists.pdf.

RASSO, J. T. "Construal Instructions and Professional Skepticism in Evaluating Complex Estimates." *Accounting, Organizations and Society* 46 (2015): 44-55.

SALTERIO, S. AND L. KOONCE. "The Persuasiveness of Audit Evidence: The Case of Accounting and Policy Decisions." *Accounting, Organizations and Society* 22 (1997): 573-87.

SHIBANO, T. "Assessing Audit Risk from Errors and Irregularities." *Journal of Accounting Research* 28 (1990): 110-40.

TAJFEL, H. "Interindividual Behaviour and Intergroup Behaviour." In H. Tajfel (Ed.), *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations*. London: Academic Press: 27-60, 1978.

TAJFEL, H., AND J. C. TURNER. "An Integrative Theory of Intergroup Conflict." In W. G. Austin and S. Worchel (Eds.), *The Social Psychology of Intergroup Relations*. Monterey, CA: Brooks/Cole: 33-47, 1979.

TAJFEL, H. *Human Groups and Social Categories: Studies in Social Psychology*. Cambridge: Cambridge University Press, 1981.

TURNER, J. C.; M. A. HOGG; P. J. OAKES; S. D. REICHER; AND M. S. WETHERELL. *Rediscovering the Social Group: A Self-categorization Theory*. New York: Blackwell, 1987.

WRIGHT, A., AND S. WRIGHT. "An Examination of Factors Affecting the Decision to Waive Audit Adjustments." *Journal of Accounting, Auditing, and Finance* 12 (1997): 15-36.

ZIMBELMAN, M. F., AND W. S. WALLER. "An Experimental Investigation of Auditor-Auditee Interaction under Ambiguity." *Journal of Accounting Research* 37 (Supplement 1999): 135-155.

APPENDIX A

Proof of Equilibrium Strategies for Reporters and Auditors

r = number of red marbles added by reporter = {0, 1, 2, 3, 4, 5}

x = number of red marbles removed by auditor = {0, 1, 2, 3, 4, 5}

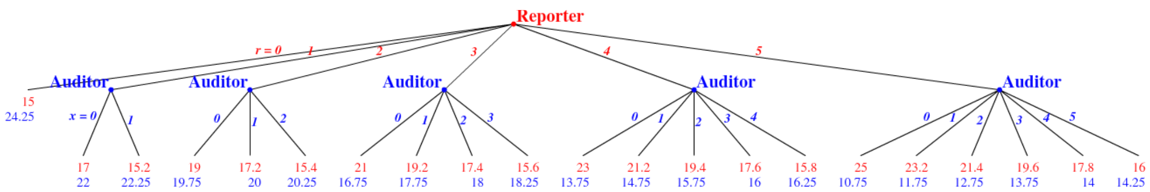
p = probability of auditor's penalty = f(r – x):

$$
\begin{cases}
f(\leq 0) = 0.05 \\
f(1) = 0.20 \\
f(2) = 0.35 \\
f(3) = 0.55 \\
f(4) = 0.75 \\
f(5) = 0.95
\end{cases}
$$

Reporter's Expected Payoff = 0.4(15 + 2r) + 0.6(15 + 2r – 3x) = 15 + 2r – 1.8x

Auditor's Expected Payoff = 25 – 2x – 15p

In the certainty condition, the reporter can perfectly anticipate the auditor's response, x, to any level of r (note that x is constrained to be less than or equal to r). The game tree below, based on expected payoffs for risk neutral reporters and auditors, demonstrates that equilibrium occurs with the reporter selecting r = 5 and the auditor selecting x = 5. That is, for any r, the auditor maximizes his/her payoff by selecting x = r. Anticipating this, the reporter maximizes his/her payoff by selecting r = 5.



In the uncertainty condition, the reporter cannot perfectly anticipate the auditor's response because r is unobservable to the auditor and x is constrained by the realization of the randomly drawn sample (which, regardless of r, can take a value of 0, 1, 2, 3, 4, or 5). However, for all possible values of x, it is optimal for the reporter to choose r = 5. That is, treating the number of marbles removed by the auditor (0, 1, 2, 3, 4, or 5) as exogenous, the reporter choosing r = 5 strictly dominates any possible outcome resulting from the reporter choosing r < 5. Thus, the auditor rationally anticipates r = 5 and (as illustrated by the far right branch in the tree above) maximizes his/her expected payoff by choosing the largest value of x allowed by the realization of the sample.

APPENDIX B

Illustration of Risk Assumed by Auditors

Assume as an illustrative example that an auditor-participant in the uncertainty condition chooses to remove three red marbles if the observed sample contains five red marbles. This combination implies that the auditor would be at risk for two red marbles if the corresponding reporter added five red marbles. However, because the auditor faces the risk of penalty only for red marbles added by the reporter, the auditor would be at risk for only one red marble if the reporter added four red marbles, and would face the lowest possible risk of zero red marbles if the reporter added three or fewer red marbles. The corresponding probabilities and calculations are as follows, based on reporter behavior in the social-bond condition:

Red Marbles Added by Reporter	"At Risk" Red Marbles Remaining[a]	Prior Probability Based on Actual Reporter Behavior[b]	Posterior Probability Given Five Red Marbles in the Auditor's Sample[c]	Risk of Penalty[d]	Weighted Risk of Penalty (Risk of Penalty × Posterior Probability)
0	0	0.059	0.001	0.05	0.000
1	0	0.059	0.004	0.05	0.000
2	0	0.059	0.013	0.05	0.001
3	0	0.471	0.279	0.05	0.014
4	1	0.176	0.235	0.20	0.047
5	2	0.176	0.469	0.35	0.167
Expected risk of penalty (sum of weighted risks)					0.229

In this example, the auditor assumes a 22.9% risk of incurring the $15 penalty, which is our proxy for audit risk in the supplemental analysis reported in subsection 4.3.1. Within the certainty condition for comparison, the calculation is easier, as audit evidence containing five red marbles indicates with certainty that the reporter added five red marbles. Accordingly, prior or posterior probabilities are irrelevant to the risk calculation in this condition. Retaining the same assumption of three red marbles removed by the auditor when the audit evidence indicates five red marbles, the risk assumed in the certainty condition would be 35%, based on the parameters in Table 1, Panel B for two red marbles remaining after the auditor's adjustment.

Notes:

[a] Numbers in this column are based on the assumption that the auditor removes three red marbles. Different auditor actions would generate different risks of incurring the penalty.

[b] Prior probabilities are computed from the actual frequencies of reporter choices, computed separately in the conditions with and without a social bond. The numbers shown are with a social bond. As a separate analysis, subsection 4.3.2 determines prior probabilities from each auditor's individual predictions of reporter behavior rather than actual reporter behavior.

[c] See footnote 17 for details of the Bayesian calculation of posterior probabilities.

[d] See the parameters in Table 1, Panel B.

FIGURE 1

Red Marbles Removed by Auditors for a Signal of Five Red Marbles Observed

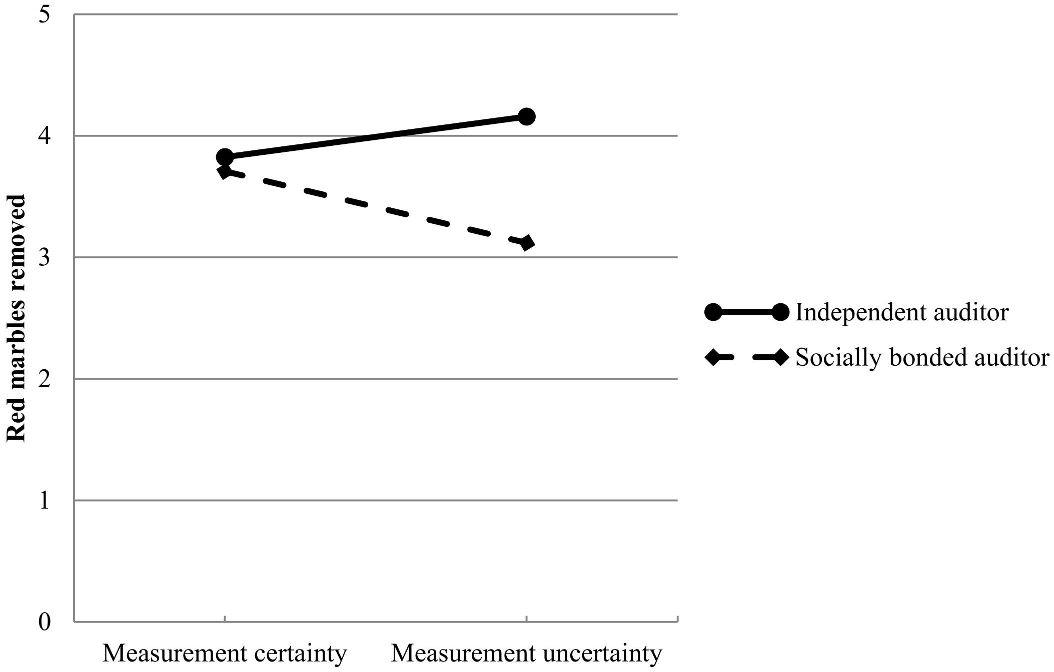


FIGURE 2

Total Red Marbles Removed by Auditors across All Possible Signals

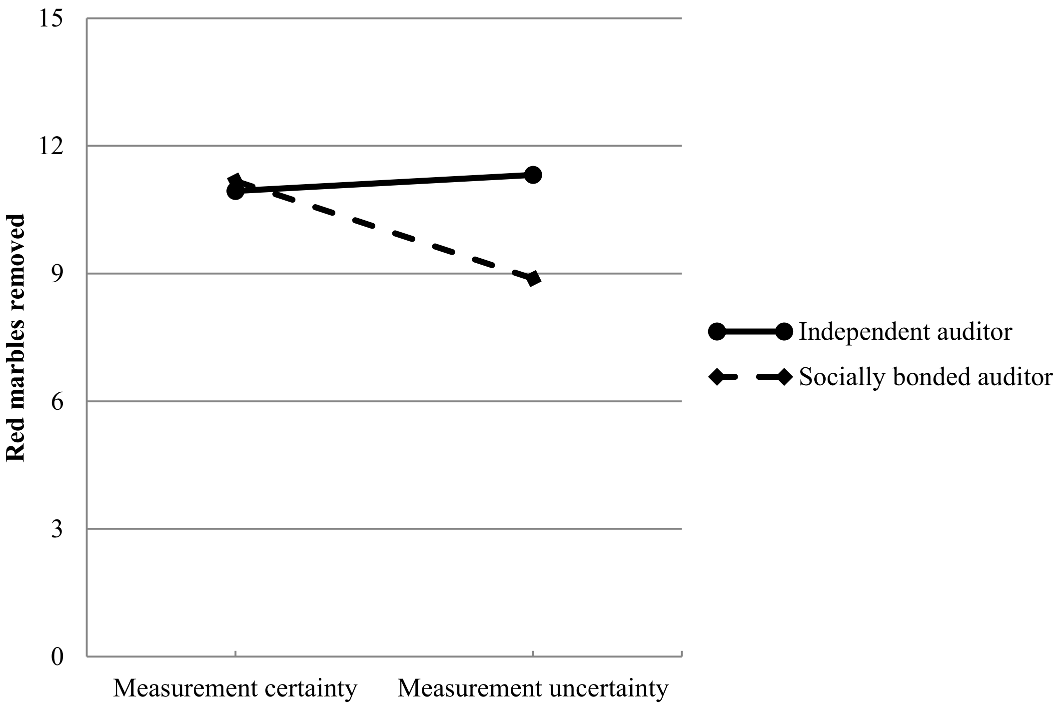


TABLE 1

Parameters of the Reporter-Auditor Game

Panel A: Parameters

Reporter's fixed pay:	$15
Reporter's benefit for distorting the report:	$2 per red marble added to the bag (between 0 and 5 red marbles)
Reporter's possible loss from auditor's adjustment:	$3 per red marble removed by the auditor (loss occurs with 60% probability; between 0 and 5 red marbles)
Auditor's fixed pay:	$25
Auditor's cost of imposing audit adjustment:	$2 per red marble removed from the bag (constrained by available audit evidence; max 5 red marbles)
Auditor's possible penalty from audit failure:	$15 (occurs with probability as described in Panel B)

Panel B: Probability of Audit Failure

The probability that auditors incur the $15 penalty (analogous to loss from audit failure) is determined by the number of red marbles added by the reporter that remain in the bag after the reporter decides how many marbles to add and the auditor decides how many marbles to remove:

Marbles added by the reporter that remain in the bag after the auditor's adjustment:	Probability of the auditor losing $15:
0	0.05
1	0.20
2	0.35
3	0.55
4	0.75
5	0.95

TABLE 2

Manipulation of Auditors' Social Identification with Reporters

Panel A: Mean (Std. Dev.) response to "Before making any decisions about adding or removing marbles in Part 2 of the experiment, I had positive feelings toward the person I was paired with."

	Answered trivia questions in pairs	Answered trivia questions individually	df	*t*-statistic	*p*-value
Response	5.41 (1.21)	3.97 (1.11)	66[a]	5.09	< 0.01

Panel B: Mean (Std. Dev.) response to "Before making any decisions about adding or removing marbles in Part 2 of the experiment, I felt like the person I was paired with and I were working together/on the same team."

	Answered trivia questions in pairs	Answered trivia questions individually	df	*t*-statistic	*p*-value
Response	5.69 (1.20)	3.22 (1.69)	66[a]	6.84	< 0.01

Panel C: Mean (Std. Dev.) response to "Before making any decisions about adding or removing marbles in Part 2 of the experiment, I felt close to the person I was paired with."

	Answered trivia questions in pairs	Answered trivia questions individually	df	*t*-statistic	*p*-value
Response	4.06 (1.54)	2.69 (1.49)	66[a]	3.72	< 0.01

Participants provided responses to the above statements using a 7-point scale with the following labels: 1 = "Strongly disagree," 2 = "Mostly disagree," 3 = "Somewhat disagree," 4 = "Neither agree nor disagree," 5 = "Somewhat agree," 6 = "Mostly agree," 7 = "Strongly agree."

This table presents responses from auditor-participants only.

All *p*-values in this table are two-tailed.

[a] Two participants did not complete the post experimental survey questions.

TABLE 3

Red Marbles Removed by Auditors for a Signal of Five Red Marbles Observed

Panel A: Descriptive statistics

	Measurement certainty	Measurement uncertainty	Row means
Independent auditor	3.82	4.16	4.00
	(0.88)	(1.12)	(1.01)
	n=17	n=19	n=36
Socially bonded auditor	3.71	3.12	3.41
	(0.92)	(1.65)	(1.35)
	n=17	n=17	n=34
Column means	3.76	3.67	
	(0.89)	(1.47)	
	n=34	n=36	

Panel B: Analysis of variance

Source	df	M.S.	*F*-statistic	*p*-value
Social bond	1	5.85	4.19	0.05
Measurement uncertainty	1	0.28	0.20	> 0.50
Social bond × Measurement uncertainty	1	3.72	2.66	**0.05**
Error	66	1.40		

Panel C: Simple effect of social bonding given measurement (un)certainty

Effect of social bond given:	*F*-statistic	p-value
Measurement certainty	0.08	> 0.50
Measurement uncertainty	6.94	**< 0.01**

Under the strategy method, auditor-participants indicated the total number of red marbles they would remove for each possible realization of the audit evidence: 0, 1, 2, 3, 4, and 5. For each potential realization, auditors could only remove up to number of red marbles observed. This table presents auditors responses when the realization of audit evidence was 5.

Reported *p*-values for directional predictions are one-tailed, as indicated by **boldface**.

TABLE 4

Total Red Marbles Removed by Auditors across All Possible Signals

Panel A: Descriptive statistics

	Measurement certainty	Measurement uncertainty	Row means
Independent auditor	10.94	11.32	11.14
	(3.53)	(4.08)	(3.78)
	n=17	n=19	n=36
Socially bonded auditor	11.18	8.88	10.03
	(2.27)	(5.21)	(4.12)
	n=17	n=17	n=34
Column means	11.06	10.17	
	(2.92)	(4.74)	
	n=34	n=36	

Panel B: Analysis of variance

Source	df	M.S.	*F*-statistic	*p*-value
Social bond	1	21.09	1.37	0.25
Measurement uncertainty	1	16.08	1.05	0.31
Social bond × Measurement uncertainty	1	31.09	2.02	**0.08**
Error	66	15.38		

Panel C: Simple effect of social bonding given measurement (un)certainty

Effect of social bond given:	*F*-statistic	*p*-value
Measurement certainty	0.03	> 0.50
Measurement uncertainty	3.45	**0.03**

Under the strategy method, auditor-participants indicated the total number of red marbles they would remove for each possible realization of the audit evidence: 0, 1, 2, 3, 4, and 5. For each potential realization, auditors could only remove up to number of red marbles observed. This table presents results related to the aggregation of those responses into a total number of red marbles removed (out of a possible 15).

Reported *p*-values for directional predictions are one-tailed, as indicated by **boldface**.

TABLE 5

Red Marbles Added by Reporters

Panel A: Descriptive statistics

	Measurement certainty	Measurement uncertainty	Row means
Independent auditor	3.65	3.79	3.72
	(1.41)	(1.03)	(1.21)
	n=17	n=19	n=36
Socially bonded auditor	2.82	3.18	3.00
	(1.94)	(1.33)	(1.21)
	n=17	n=17	n=34
Column means	3.24	3.50	
	(1.72)	(1.21)	
	n=34	n=36	

Panel B: Analysis of variance

Source	df	M.S.	*F*-statistic	*p*-value
Social bond	1	9.01	4.25	0.04
Measurement uncertainty	1	1.07	0.51	0.48
Social bond × Measurement uncertainty	1	0.19	0.09	> 0.50
Error	66	2.12		

Reporter-participants chose the number of red marbles (up to 5) to add to the bag.

All *p*-values in this table are two-tailed.

TABLE 6

Auditors' Expectations of Red Marbles Added by Reporters

Panel A: Descriptive statistics

	Measurement certainty	Measurement uncertainty	Row means
Independent auditor	3.36	3.36	3.36
	(0.75)	(0.89)	(0.82)
	n=17	n=19	n=36
Socially bonded auditor	2.97	2.91	2.94
	(0.62)	(0.82)	(0.72)
	n=17	n=17	n=34
Column means	3.17	3.15	
	(0.70)	(0.88)	
	n=34	n=36	

Panel B: Analysis of variance

Source	df	M.S.	*F*-statistic	*p*-value
Social bond	1	3.08	5.05	0.03
Measurement uncertainty	1	0.01	0.02	> 0.50
Social bond × Measurement uncertainty	1	0.02	0.02	> 0.50
Error	66	0.61		

This table reports the expected number of red marbles auditors believed that reporters would add, computed by summing each possible number of red marbles added, weighted by the corresponding probabilities elicited from auditors.

All *p*-values in this table are two-tailed.