The Effects of the Internal Control Opinion and Use of Audit Data Analytics on Perceptions of Audit Quality, Assurance, and Auditor Negligence

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ABSTRACT:
Using advanced audit data analytics tools, public accounting firms propose that they can analyze the entire population of accessible client transactions. While firms emphasize the potential benefits to audit efficiency and effectiveness, they caution that this approach provides no greater than the current level of “reasonable” assurance than does traditional auditing techniques. In the context of a subsequent audit failure where an investor has initiated a law suit, we examine whether the audit methodology (audit data analytics versus traditional auditing techniques) and the type of internal control opinion (unqualified versus adverse) affect perceptions of audit quality and assurance and perceptions of auditor negligence. In the wake of auditors issuing more adverse ICFR opinions, there may be differences in how users perceive assurance levels and attribute blame in circumstances of an audit failure. We develop our expectations using the theory of blame attribution. Using a 2x2 full factorial experimental design, we predict and find that when auditors issue an unqualified ICFR opinion, jurors assess auditors as more negligent when auditors employ traditional auditing techniques (compared to audit data analytic techniques). In subsequent analyses, we find that use of audit data analytic tools increases perceptions of audit quality, such that jurors assess more blame to the plaintiff for their loss, assigning less negligence to the auditor. We view this finding as indicative of the jurors believing that when the auditor uses audit data analytics the auditor has exceeded the minimally expected audit testing techniques. Overall, our study informs regulators, practitioners, and academics about the perceived assurance effects of using advanced technological tools on the audit as well as the corresponding litigation effects.

KEYWORDS: auditor liability, audit data analytics, audit quality, statistical sampling
1. Introduction

This study examines whether an auditor’s testing methodology and the internal controls over financial reporting (ICFR) opinion affect jurors’ perceptions in a litigation setting. Specifically, we examine whether indicators of audit quality such as the use of audit data analytics (ADAs) and issuing an adverse ICFR opinion impact the perceived level of audit quality provided by, and the amount of blame attributed to auditors when there is a subsequent audit failure. Two important drivers of audit quality motivate our study. First, audit practitioners and standards setters believe that leveraging technology to enable ADA techniques, such as testing a full population of transactions versus a sample, can enhance the quality of financial statement audits. These ADAs can be used in any phase of the audit, can manifest in various forms, and can revolutionize the nature, timing, and extent of audit testing (Brown-Liburd, Issa, and Lombardi 2015; Cao, Chychyla, and Stewart 2015). However, while audit practitioners tout the benefits of ADAs for audit quality, they caution that these benefits increase neither the actual nor the perceived level of assurance provided by these audits (EY 2014; KPMG 2014; Deloitte 2016; PwC 2016). While current auditing standards only require auditors to collect audit evidence using traditional sampling techniques (PCAOB 2016a), focus on the use of ADAs by auditors is increasing. As a result, it is important to examine whether financial statement users perceive the use of ADAs as steps taken to enhance audit quality and whether this enhancement results in fewer auditor negligence verdicts.

A second factor motivating our study is that auditors provide integrated audits attesting to both the operating effectiveness of ICFR as well as the fairness of presentation of the financial statements and related disclosures (PCAOB 2007). Audit quality is enhanced when the auditor’s assessment of the ICFR operating effectiveness informs the level of substantive testing and perceptions of the likelihood of a material misstatement in the financial statements. The ICFR
opinion also provides an immediate and public signal to financial statement users about auditors’ assessment of the quality of financial reporting and signals the quality of the auditor’s work (Jennings, Pany, and Reckers 2008; Ashbaugh-Skaife, Collins, Kinney and LaFond 2009). For example, when auditors issue an adverse ICFR opinion they signal financial statement users that they identified one or more material weaknesses in the company’s system of internal controls and that there is an increased potential for a material misstatement in the accompanying financial statements.

Absent an audit failure or additional information such as a critical audit matter paragraph (PCAOB 2017), the auditor’s report is silent about additional efforts auditors take to improve audit quality such as the auditor’s testing methodology. In a jury trial, part of an auditor’s defense is a description of the testing methodology in relation to requirements of auditing standards (PCAOB 2016a). We examine whether jurors’ awareness of the use of ADAs moderates the effect that the ICFR opinion has on perceptions of audit quality and, ultimately, negligence.

We form our predictions based on blame attribution which is a subset of attribution theory and describes how individuals determine who to hold responsible for an event such as an audit failure. During a trial, jurors are aware that a misstatement occurred; they hear arguments from both parties, learn more about the auditor’s approach, and must then determine who is to blame for the plaintiff’s loss (Lowe and Reckers 1994; Kadous 2000, 2001; Clarkson, Emby, and Watt 2002; Peecher and Piercey 2008; Becker, Lawrence, and Sennetti 2009; Backof 2015). While use of ADAs and an adverse ICFR opinion likely signal higher audit quality, we predict an interactive effect of these signals on jurors’ auditor negligence verdicts. Specifically, absent a public and more salient signal provided by an adverse ICFR opinion, jurors will assess auditor negligence as higher after an audit failure when the auditor uses traditional sampling techniques relative to when they
use ADAs to execute audit testing and when auditors also issue an unqualified ICFR opinion. Alternatively, we predict no difference in assessed auditor negligence, regardless of the auditor’s testing approach, when the auditor issues an adverse ICFR opinion.

We conducted a 2x2 between-subjects full factorial experiment and manipulated the auditor’s substantive testing methodology (ADAs versus traditional sampling) and the ICFR opinion (unqualified versus adverse) and measured jurors’ assessments of auditor negligence. We also measured jurors’ perceptions of audit quality and attribution of blame for the loss suffered by investors. ADAs change both the nature of an audit and the extent of audit evidence gathered. Our study narrows the focus to a type of ADA which utilizes advanced technology to test the population of a client’s transactions for auditor-specified characteristics related to revenue recognition such as controls that examine whether all sales transactions in the sales journal are supported by a customer order, shipping document, and invoice to validate the transaction information. Results of this dual-purpose test allow auditors to identify both higher risk transactions and inefficiencies in established internal control procedures; results also serve as a substantive test in the audit of the financial statements. Each test could improve two key elements of audit quality: audit efficiency and effectiveness.

Participants were 800 jury-eligible individuals recruited through an online platform. We find that the ICFR opinion has a direct effect on jurors’ negligence verdicts, such that an adverse opinion results in lower perceptions of auditor negligence. We find no direct effect of the audit testing methodology on perceptions of auditor negligence; however, consistent with our expectations, we find an interactive effect which suggests that when an auditor issues an unqualified ICFR opinion jurors assess negligence as higher when the auditor uses traditional sampling techniques versus ADAs. In contrast, when auditors issues an adverse ICFR opinion,
jurors assess negligence no differently whether the auditor uses traditional sampling techniques or ADAs.

To further explore these findings, we examine the mediating role of blame attribution on jurors’ evaluations of auditor negligence. We measure the extent to which participants blame auditors relative to the extent to which they attribute blame to management and to the investor (i.e., the plaintiff in our setting). Results demonstrate that when auditors issue an adverse ICFR opinion, jurors are less likely to hold the auditor responsible and perceive that both management and the plaintiff are more responsible for the loss suffered by the plaintiff. When the auditor uses ADAs, the plaintiff is viewed as relatively more responsible for the loss suffered. We view the mediation results as suggesting that both the adverse ICFR opinion and the use of ADAs represent strong signals of audit quality that collectively lower the likelihood that jurors perceive auditors as negligent for a subsequent misstatement in the financial statements. Our supplemental analyses also provide evidence consistent with the notion that the use of ADAs enhances audit quality and evidence consistent with practitioners’ caution that such use provides no more than reasonable assurance that the financial statements are fairly presented.

Our study informs regulators, practitioners, and academics about the perceived assurance effects of using one form of ADA in the audit and the impact of the ICFR opinion on litigation outcomes after a misstatement in the financial statements. For regulators, our study suggests that financial statement users view the use of ADAs, as measured in our study, as employing a higher standard of due professional care and view ADAs as steps taken to ensure higher audit quality. This finding is particularly useful to the PCAOB as it strives to better understand the effects of ADAs on the audit process and to develop auditing standards that more widely promote such innovation in audit engagements (e.g., Zhang, Pawlicki, McQuilken, and Titera 2012). In addition,
our study is consistent with prior research which suggests an adverse ICFR opinion provides a salient and useful signal of audit and financial reporting quality (e.g., Wu and Tuttle 2014), but is one of the first to demonstrate the subsequent effect of this signal on litigation outcomes. For audit practitioners, our results lend credence to the notion that utilizing ADAs enhances audit quality; our results also provide some support for the supposition that the increase in audit quality is not associated with an increase in the perceived level of assurance beyond the standard of reasonable assurance about whether the financial statements are free of material misstatement (PCAOB 2007). For researchers, our study highlights how knowledge of auditors’ use of advanced technology to enable testing that exceeds current auditing standards affects others’ perceptions of audit quality; additionally, our study provides many avenues for future research.

In the remainder of the paper, we review prior auditor litigation literature and develop hypotheses. After this, we provide a summary of the experimental methodology and discuss results. Finally, we offer concluding remarks and implications for future research.

2. **Background and Hypothesis Development**

In auditor negligence cases, jurors evaluate whether auditors exercised due professional care in conducting the audit (Causey and Causey 1991). Due professional care (also referred to as “standard of reasonable care”) suggests that the auditors applied a level of reasoning and judgment like any other careful and competent auditor would in a similar circumstance (Kadous 2000). Evaluating due professional care requires jurors to evaluate the steps auditors took to detect a material misstatement and to consider any salient signals auditors provide about the likelihood of such a misstatement to financial statement users.

To investigate juror decision making and the assessment of auditor negligence, we model blame attribution by drawing on attribution theory. Attribution theory describes how individuals
assess and attribute responsibility and culpability (i.e., blame attribution) to individuals when there is a failure (Jennings, Kneer, and Reckers 1993). Kelley and Michela (1980) illustrate both the antecedents and consequences of attribution behavior. Antecedents refer to certain information about the behavior of the individual and how the circumstances surrounding this behavior are used by the decision maker to infer cause. Consequences are the expectations that the decision maker forms related to the information and perceived cause. Specific to our study, jurors’ knowledge and interpretation of auditors’ efforts to conduct a quality audit through issuance of an appropriate ICFR opinion and higher quality audit testing by using ADAs can influence jurors’ outcome expectation and therefore, jurors’ attributions of responsibility for the subsequent audit failure. In litigation, jurors evaluate each party’s role in the failure before attributing blame or causation to one, some, or all parties. As such, we argue that under certain conditions, despite a subsequently discovered material misstatement, jurors could still attribute less blame to the auditor. We develop our expectations below.

**Audit testing: ADAs versus traditional sampling techniques**

The American Institute of Certified Public Accountants (AICPA) defines ADAs as “the science and art of discovering and analyzing patterns, identifying anomalies, and extracting other useful information in data underlying or related to the subject matter of an audit through analysis, modeling, and visualization for planning or performing the audit” (AICPA 2015). ADAs can be used at any stage of the audit. The use of advanced testing methods such as ADAs could significantly transform the process of auditing financial statements, resulting in enhanced audit effectiveness and audit efficiency—both elements and signals of audit quality (Brown-Liburd et al. 2015; Cao et al. 2015). Public Company Accounting Oversight Board (PCAOB) board member Steven Harris recently echoed this sentiment suggesting that “these technological tools could allow
auditors to make better decisions and assessments throughout the audit…thereby improving audit quality.” (PCAOB 2016c). However, the Big 4 firms are careful to acknowledge the positive and negative implications for audit quality in the era of Big Data (e.g., Earley 2015; Liddy 2015; EY 2015; KPMG 2012).

One means of operationalizing the concept of ADAs is using technology to allow inspection of the entire population of data underlying a company’s financial statements rather than examining a limited number of transactions using the traditional sampling approach (Brown-Liburd et al.; Cao et al. 2015; Murphy and Tysiac 2015; PwC 2015; PCAOB 201b). This approach potentially results in a more effective and efficient audit and mitigates the efficiency-effectiveness tradeoff often encountered with traditional sampling methods.

Overall, utilization of ADA tools and techniques provide audit firms the opportunity to increase the sufficiency of audit evidenced gathered at a similar cost (Byrnes, Criste, Stewart, and Vasarhelyi 2014); this results in higher audit quality and reduced audit risk. This technology produces a number of potential exceptions from which auditors may further examine all or a sample based on available audit resources. Alternatively, using traditional sampling requires auditors to extrapolate the magnitude of any exceptions to the population. The former approach allows auditors to focus on higher risk transactions that have the most potential to increase the risk of material misstatement.

**Perceptions of ADAs as a signal of audit quality**

Little empirical evidence exists regarding the impact of ADAs on audit quality. However, findings from recent studies suggest that some forms of ADAs such as Big Data visualizations (Rose, Rose Sanderson, and Thibodeau. 2017) and continuous auditing (Barr-Pulliam 2017a, 2017b) affect perceptions of and actual audit quality. Given that ADAs allow auditors to develop
greater insights into a client’s business and financial statements, jurors could perceive auditors’ examining the entire population of a client’s transactions as more indicative of a higher quality audit than when auditors employ traditional sampling techniques. Accordingly, jurors will likely perceive auditors’ application of ADAs as going beyond the expected standard of performance from auditors in an analogous situation (“due professional care”) and as taking steps to perform a higher quality audit (Maksymov and Nelson 2017).¹ In an audit failure setting, jurors could be less likely to assess auditors as negligent when auditors employ ADA techniques and could attribute this failure to factors outside the auditors’ control such as management collusion. Conversely, employing ADAs could engender juror perceptions that a competent auditor should be able to identify an existing misstatement when the auditors examine the entire population of a client’s transactions.

Failure to identify an existing misstatement can be perceived as incompetence which could then lead jurors to assess auditors as more negligent for the subsequent misstatement. Prior auditor liability research suggest that jurors’ perceptions of auditor competence is both nuanced and context-dependent when the quality of the audit varies. Awareness of the tactics auditors use to improve detection of misstatements moderates how jurors assess auditor negligence. For example, standards of care to which jurors hold auditors varies with the severity of negligence outcomes (e.g., Kadous 2000; Arel, Jennings, Pany, and Reckers 2012). This prior research also suggests that the timing of the assessment of auditors’ standard of care (i.e., before or after jurors learn about steps the auditor took to improve audit quality) also affects jurors’ negligence verdicts (Maksymov and Nelson 2017). Prior research is mixed, however, on the effect of audit quality on negligence judgments (Kadous 2000; Reffett 2010; Arel et al. 2012; Maksymov and Nelson 2017).

¹We use the terms “due professional care” and “standard of care” interchangeably.
Our study specifically extends auditor negligence studies by Reffett (2010) and Maksymov and Nelson (2017). Reffett (2010) manipulates audit quality as 1) whether auditors attend to a fraud cue and 2) whether auditors perform limited or extensive investigation when they identify the fraud cue. The results of his study suggest no effect of the extent of investigation when auditors identify the fraud risk, but his results further suggest that jurors assess auditors as more negligent when auditors identify a fraud risk than when they do not identify the risk and, therefore, performed no testing. In a series of experiments, Maksymov and Nelson (2017) investigate findings presented in Kadous (2000) related to jurors’ assessment of due professional care and findings in Reffett (2010) related to the extent of investigation on juror assessments. The experiment that most closely relates to our study manipulates audit quality as low or high and operationalizes quality by looking at both a relatively small and large sample size to investigate an identified fraud risk. The experiment also examines the timing of jurors’ assessment of due professional care as either before or after jurors make negligence verdicts. Their findings suggest that, beyond the situational context that characterizes the aforementioned studies, jurors’ perceptions of the extent to which auditors actually met the expectation of a reasonable standard of care and jurors’ perceptions of auditors’ specific efforts to improve audit quality facilitate how jurors’ ex post knowledge of a misstatement affects their negligence assessments.

We specifically extend their study by examining the effect of audit quality in a context where auditors use more advanced technology to examine the entire population of revenue transactions. While Maksymov and Nelson (2017) operationalize high audit quality as a large sample size versus lower audit quality as a small sample size, they essentially create a traditional sampling context as compared to our context using ADAs versus traditional sampling.²

² Our “high” condition is more extensive and more descriptive.
Taken together, these studies suggest that in certain contexts, taking steps to improve audit quality can be perceived as positive by jurors. We expect that jurors, given their perception of what is required by current auditing standards, will evaluate auditors’ application of ADAs as going beyond the expected standard of performance and as taking steps to perform a higher quality audit. Therefore, in a setting where there is a subsequent audit failure, we expect that jurors will assess auditors as less negligent when auditors employ ADA techniques versus when auditors use traditional sampling techniques to perform audit testing. We formally state this expectation in our first hypothesis:

**HYPOTHESIS 1.** Jurors’ assessment of auditor negligence will be lower when auditors use audit data analytic (ADA) techniques to conduct audit testing than it will when auditors use traditional sampling techniques.

*Internal controls over financial reporting (ICFR) opinion as a signal of audit quality*

Accounting and auditing standards suggest that auditors should evaluate their clients’ internal controls over financial reporting (ICFR) to gain an understanding of the financial reporting environment and to plan the nature, extent, and timing of substantive tests of transactions (e.g., SEC 1941; SAS No. 55, AICPA 1990; SAS No. 78, AICPA 1997; SAS No. 94, AICPA 2001). These standards suggest that the auditor’s ICFR opinion should inform substantive testing and perceptions of the likelihood of a material misstatement in the financial statements. The auditor’s assessment of the operating effectiveness of ICFR is important both to financial statement auditors and to stakeholders in the financial reporting process. The same expectation of reasonable assurance applies to both the ICFR opinion and the opinion on the financial statements. An unqualified ICFR opinion suggests that established controls may be effective in detecting an existing material misstatement in the financial statements while an adverse ICFR opinion suggests

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3 AS No. 5 (PCAOB 2007) classifies ICFR exceptions as either a control deficiency (least severe), a significant deficiency, or a material weakness—which is severe enough to result in an adverse ICFR opinion.
that such controls may be ineffective. As such, factors that could support an adverse ICFR opinion should alert the auditor to enhance substantive audit testing to determine if an actual misstatement exists. The ICFR opinion also serves as a signal to investors about the quality of the financial statements such that an adverse opinion signals that a misstatement may exist in the financial statements investors rely on to make investment decisions (Jennings et al. 2008; Ashbaugh-Skaife et al. 2009; Wu and Tuttle 2014).

Regulators and audit practitioners recognize, and auditing research corroborates, that the ICFR opinion is an integral signal and component of the quality of a company’s financial reporting (Jennings et al. 2008; Asare, Fitzgerald, Graham, Joe, Negangard and Wolfe 2013). Prior research finds that adverse ICFR reports issued by management are associated with reduced share prices (Hammersley, Myers, and Shakespeare 2008) and higher costs of capital (Ashbaugh-Skaife et al. 2009). Research examining auditor ICFR audit opinions finds an adverse opinion is associated with increased management turnover (Johnstone, Li, and Rupley 2011). Further, investors assess higher risks of misstatement in the current financial statements and restatements, higher information asymmetry and less transparency, higher risk premium and cost of capital, and lower sustainability and predictability of earnings (Lopez, Vandervelde and Wu 2009).

Research on auditor negligence specifically demonstrates that ex ante and ex post disclosures about auditor judgments and decisions during the ICFR and financial statement audits, such as additional procedures used to increase the likelihood of detection of errors or fraud, affect juror decision making. Focusing on the ex-ante disclosure, Brasel, Doxey, Grenier, and Reffett (2016) find that jurors assess lower auditor negligence when the auditor signals financial reporting quality concerns through disclosures made in a critical audit matter paragraph—an ex ante and publicly available signal like the ICFR opinion in our study.
By issuing an adverse ICFR opinion, auditors inform financial statement users that they identified one or more material weaknesses in the company’s system of internal controls and that the material weakness was considered in determining the nature, timing, and extent of audit tests applied in the audit of the financial statements. As such, we expect that jurors will perceive the adverse ICFR opinion as a salient signal to investors that there is an increased potential for a financial statement misstatement. Because of this signal, we expect that jurors will perceive auditors’ judgments as acceptable and assign less blame to the auditor when a material misstatement is subsequently discovered. Further, because management is ultimately responsible for establishing an effective system of internal controls, the ICFR opinion will serve as a salient signal to investors about management’s role in creating an effective financial reporting environment capable of detecting misstatements. Ceteris paribus, an adverse ICFR opinion signals that management’s ineffective controls over financial reporting processes makes management at least partially to blame (contributorily negligent) for material misstatements identified after issuance of the financial statements. Therefore, we posit that in the instance of an adverse ICFR opinion, jurors will assign less blame to the auditors. We formally state this expectation in the following hypothesis:

HYPOTHESIS 2. Jurors’ assessment of auditor negligence will be lower when auditors previously issued an adverse versus an unqualified ICFR opinion.

The interaction of signals provided by audit methodology used and the ICFR opinion

Along with the ICFR opinion, the use of ADAs as an audit testing methodology is likely to influence jurors’ perceptions of culpability and liability attributed to the auditor. Because ADAs allow auditors to gain a greater understanding of a client’s operations and the financial reporting process (Alles 2015; Yoon, Hoogduin, and Zhang 2015), jurors will likely regard auditors’ use of ADAs as demonstrative of a higher quality audit compared to when auditors utilize traditional
auditing techniques. Consideration of both the ex ante (ICFR opinion) and ex post (auditor testing methodology) disclosures about auditors’ judgments and decisions could have intended and unintended effects on jurors’ negligence assessments. For example, Backof (2015) finds that disclosure of the content of audit work paper documentation related to consideration of alternative accounting treatments—like knowledge of the use of ADAs in our study—increases jurors’ perceptions of the foreseeability of a material misstatement in the financial statements. Particularly germane to our study, Backof additionally finds that when also considering how auditors link their risk-based approach to specific audit tests, jurors award lower damage awards because they perceive that the auditor used due professional care compliant with auditing standards prior to the negligent act.

While the ICFR opinion is an ex ante signal, from a juror’s perspective, as posited in H2, we also expect that in an adverse ICFR context there are likely several contributory factors that constrain the effectiveness of audit testing regardless of the methodology auditors employ to detect misstatements. Therefore, when there is an adverse ICFR opinion, we do not expect a difference in jurors’ assessment of auditor negligence based on the auditor’s testing methodology (i.e., whether auditors perform a higher quality audit as perceived by using an ADA versus a statistical sampling approach). However, absent a salient signal of ineffective ICFR, jurors may differentially perceive the adequacy of auditors’ testing techniques. When auditors issue an unqualified ICFR opinion there is no obvious signal of a potential material misstatement that alerts financial statement users. In this context, jurors may perceive that auditors are less or more to blame for the misstatement when auditors do or do not employ ADA techniques that jurors believe extend beyond a reasonable standard of care compared to a traditional audit testing approach (Kadous 2000; Maksymov and Nelson 2017). We state this expectation in the following hypothesis:
HYPOTESIS 3. Jurors will assess auditors as more negligent after an audit failure when the auditors employ traditional sampling versus ADAs and when auditors also issue an unqualified ICFR opinion; however, there will be no difference in assessed auditor negligence regardless of the auditors’ testing approach when auditors issue an adverse ICFR opinion.

3. Research Design

Participants

We used a between-subjects experiment to examine jurors’ assessment of auditor negligence in an audit malpractice suit. We identified jury-eligible participants using Amazon Mechanical Turk (MTurk). Prior accounting studies also use MTurk participants (called workers) as a proxy for jurors (Brasel et al. 2016; Grenier, Pomeroy, and Stern 2015; Grenier, Lowe, Reffett, and Warne 2015; Peecher, Reffett, and Zimbelman 2016; Maksymov and Nelson 2017). A total of 800 workers successfully completed the task and provided an accurate randomly-generated survey code. These participants received $1 ($800 total). Of 800 workers meeting the inclusion criteria, 222 (27.75%) failed to correctly answer both manipulation checks. The 578 participants who answered both manipulation check questions correctly received a $0.50 bonus (total of $289). Total earnings were $1,089 or $1.36. Participants completed the task in an average of 27 minutes, as a result, our hourly rate of $3.03 [calculated as ($1.36/27 minutes) x 60 minutes] exceeds the average hourly MTurk wage of $1.38 (Horton and Chilton 2010).

Of our 800 participants, the mean age was 37.1 years old; 58.0% were female, and 14.8% had a graduate degree. Approximately 11.6% had prior experience serving on a jury, and 23.3% had prior investment experience. Participants in our sample are comparable with those in recent studies eliciting juror negligence judgments in auditor litigation cases (e.g., Lowe, Reckers, and Whitecotton 2002; Backof 2015; Gimbar, Hansen, and Ozlanski 2016). Our participants were

Brandon, Long, Loraas, Mueller-Phillips, and Vansant (2014) and Farrell, Grenier, Leiby (2016) discuss online survey design and provide recruitment tools.
appropriate given our research goals (Libby, Bloomfield, and Nelson 2002; Elliott, Hodge, Kennedy, and Pronk 2007). Demographic data is presented in Table 1.

Insert Table 1 about here

**Experimental materials**

In Stage One of the experiment (see Appendix 1), we screened potential participants to assess jury eligibility. Participants moved to Stage Two if they self-reported that: 1) they were U.S. citizens, 2) they were at least 18 years of age, and 3) they had taken no more than 2 accounting or finance courses. After reading and accepting the informed consent agreement and reading background information provided in Stage Two, participants were presented with information about the financial statement auditing process. The instrument explains the internal controls over financial reporting audit, the relationship between internal controls and the substantive testing procedures in the financial statement audit, as well as key terms such as “reasonable assurance” and “due professional care.” The instrument also explains the meaning of an unqualified (“clean”) audit versus an adverse audit opinion for the internal controls over financial reporting as well as the financial statement audits. We used comprehension check questions for each of these concepts to ensure participants understood the overall steps auditors perform in the integrated financial statement audit process and the related auditing terms. Participants were required to answer these comprehension check questions correctly before they could advance to the next stage of the study. Participants who answered incorrectly or failed to respond to these questions were not allowed to continue with the study. This approach ensured that participants understood key auditing concepts that we described in the case prior to examining the transcript of the legal proceedings.

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5 Randomization among the treatment groups was successful. Untabulated analysis of demographic variables indicate no statistically significant differences between treatment groups for gender, prior jury service, occupation (whether a lawyer or an investor), age, or level of education.
In Stage Three, participants were randomly assigned to one of four experimental conditions (described below). Each participant assumed the role of a juror and read the transcript of a hypothetical jury trial related to an audit failure. This hypothetical case is summarized as follows: The hypothetical company, Rapid Shipping, is a publicly traded shipping company for which the audit firm issued an unqualified opinion on the financial statements as well as an ICFR opinion (either clean or adverse). After the issuance of the audit report, a Securities and Exchange Commission investigation suggested that there was a material misstatement of revenue not identified by the auditors. A large pension fund investor (the plaintiff) sues the auditor for negligence alleging that the audit failure was a result of failure to exercise due professional care. The audit firm contends it used an audit testing methodology that conforms to auditing standards and exercised sufficient professional judgment. After reading the trial transcript, participants were given jury instructions and responded to our primary dependent measures and supplemental and demographic questions.

Independent variables

Appendix 2 describes the between-subjects manipulations of ICFR opinion (unqualified vs. adverse) and audit methodology (statistical sampling vs. ADA testing). In the ICFR opinion (OPINION) condition participants were told that the audit firm issued either an unqualified opinion or an adverse opinion for the audit of internal controls over financial reporting, meaning that the auditors either did not or did identify weaknesses in internal controls specifically related to internal controls over the revenue recognition processes. We coded OPINION as “1” when the auditors issued an adverse ICFR opinion and “0” otherwise. For audit methodology (METHOD) one population of participants learned that the audit firm used audit statistical sampling techniques to examine a portion of the shipping transactions. Other participants learned that the audit form used
data analytics software to examine the entire population of shipping transactions. We coded \textit{METHOD} as “1” when auditors used ADAs and “0” otherwise. In the ADA testing condition, it was made clear to participants that auditors were using software to execute audit testing. Participants were told that the audit approach allowed the auditors to draw conclusions about both the effectiveness of internal controls over shipping transactions and the validity (e.g., occurrence) of recorded sales transactions.\footnote{The audit procedure used in the experiment served as a dual-purpose test (i.e., a test of sales transactions designed to evaluate the effectiveness of controls and detect monetary misstatements).}

\textbf{Dependent variables}

Our primary dependent variable was a continuous measure of participants’ assessment of auditor negligence (\textit{GUILT}). Participants first indicated whether they believed the auditor was guilty or not guilty (\textit{VERDICT}; coded as “1” for guilty, and “0” for not guilty). Participants who selected “guilty” were then asked to indicate the extent of guilt on an anchored scale where 50\% = somewhat completely guilty and 100\% = completely guilty. Participants who selected “not guilty” were asked to respond to a corresponding scale where 50\% = somewhat completely not guilty and 100\% = completely not guilty. We recoded and combined the two measures to create the continuous measure of guilt on a scale ranging from 0\% (completely not guilty) to 100\% (completely guilty).\footnote{Following Hoffman, Joe, and Moser (2003) and Joe (2003), our two scales exclude 0 - 50\% as assessments below 50\% guilty effectively signal not guilty verdicts while assessments less than 50\% not guilty signal guilty verdicts.}

4. Results

\textit{Manipulation check}

First, we asked participants to recall the auditor’s testing methodology. We asked, “What approach did the auditor use to test sales revenue?” Of 800 participants meeting the inclusion criteria, 666 (83.25\%) answered correctly. Second, we asked participants to recall the auditor’s
ICFR opinion. We asked, “What opinion did Smith CPAs (the auditor) assess regarding the effectiveness of Rapid Shipping’s Internal Controls over Financial Reporting?” Of 800 participants, 679 (84.88%) answered correctly. These percentages indicate successful manipulations for both audit methodology ($\chi^2 = 330.3, p < 0.001$) and ICFR opinion ($\chi^2 = 376.3, p < 0.001$). A total of 761 (95.13%) participants passed at least one, and as previously indicated 578 (72.25%) passed both manipulation checks. Our inferences are qualitatively similar excluding those that passed one or both manipulation checks and we find no significant or systematic differences along the demographic dimensions or across any of the experimental conditions. Our analyses include all 800 participants.

**Descriptive statistics**

Table 2 provides descriptive statistics related to participants’ assessments of blame attribution and auditor negligence. Overall, 35.1% of jurors found the auditor guilty and 64.9% found the auditor not guilty of negligence. Jurors were more likely to find the auditor guilty of negligence when the auditor used traditional sampling techniques and issued an unqualified ICFR audit opinion (mean = 42.2%). In contrast, jurors found auditors less negligent when the auditor issued an adverse ICFR audit opinion, regardless of the audit methodology used (mean = 31.8% across METHOD). Figure 1 graphically depicts negligence assessments by experimental condition.

*Insert Figure 1 about here*

*Insert Table 2 about here*

**Tests of hypotheses**

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8 The failure rate for each manipulation check is comparable to prior research using electronic survey methods (e.g., Andrews, Nonnecke, and Preece 2003; Oppenheimer, Meyvis, and Davidenko 2009) and to paper-and-pencil surveys (e.g., Kongsved, Basnov, Holm-Christensen, and Hjollund 2007).
We tested our hypotheses with an ANOVA model that uses a continuous measure of auditor negligence (GUILT) as the dependent variable and audit testing methodology (METHOD) and ICFR opinion (OPINION) as independent variables. Table 3 presents the results of the ANOVA. Recall that HYPOTHESIS 1 examines whether jurors’ assessments of GUILT will vary based on the methodology (METHOD) auditors used to test revenue transactions. As noted in panel A of Table 3, we do not find a significant main effect for METHOD (F1, 796 = 0.08, p = 0.388). Thus, HYPOTHESIS 1 is not supported. This result suggests that ex post knowledge of the testing approach employed by auditors, in isolation, does not significantly influence jurors’ evaluation of auditor negligence. While the audit testing approach may be an important factor that informs negligence evaluations, jurors likely include additional contextual cues to interpret the associated implications.

*Insert Table 3 about here*

HYPOTHESIS 2 examines whether jurors assess auditors as less negligent when auditors issue an adverse ICFR opinion or more negligent when auditors issue an unqualified ICFR opinion. This suggests a main effect for OPINION in our ANOVA model. Descriptive statistics in Table 2 and Figure 1 show a mean for GUILT of 36.04% in the adverse opinion condition and 41.15% in the unqualified opinion condition. As noted in panel A of Table 3, we find support for HYPOTHESIS 2 as ANOVA model results show a main effect of OPINION on GUILT (F1, 796 = 4.67, p = 0.016). This result indicates significantly lower negligence assessments when auditors issue an adverse ICFR opinion and suggests that jurors interpret the ICFR opinion as a signal of financial reporting quality and as an indication of the potential for a misstatement.

---

9 We also use binary logistic regression to examine the main effects of METHOD and OPINION on the dichotomous dependent variable VERDICT and find qualitatively similar results.
Finally, HYPOTHESIS 3 predicts jurors will assess auditors as more negligent when they employ traditional sampling versus ADA techniques and issue an unqualified ICFR opinion; however, there will be no differences in negligence assessments when auditors issue an adverse ICFR opinion. HYPOTHESIS 3 predicts a disordinal interaction; consequently, we use contrast analysis to investigate these results. As such, we expected a significant planned contrast comparing METHOD when OPINION would be unqualified; and we expected an insignificant planned contrast when OPINION would be adverse.\textsuperscript{10} Consistent with our prediction, panel B of Table 3 shows that jurors assess auditors as significantly more negligent when auditors use traditional sampling versus ADAs and also issue an unqualified ICFR opinion (mean difference = 6.28; \( p = 0.030 \)).\textsuperscript{11} We also find, as predicted, no difference in METHOD when auditors issue an adverse ICFR opinion (mean difference = -4.94; \( p = 0.069 \)). Consistent with our theory, we find differences in jurors’ perceptions of audit testing quality across ICFR opinion contexts. When auditors issue an unqualified ICFR opinion, jurors perceive ADA testing techniques as higher audit quality relative to traditional sampling techniques (means = 7.93 vs. 7.38, respectively; \( p = 0.014 \), two-tailed; untabulated). However, when auditors issue an adverse ICFR opinion, jurors perceive no difference in the quality of the audit based on the audit testing methodology (means = 7.73 [ADA] vs. 7.58 [Sampling]; \( p = 0.487 \), two-tailed; untabulated). These findings suggest that jurors perceive the ICFR opinion as a signal and that they use the ICFR context and their interpretation of audit testing quality to inform their assessments of auditor negligence.

\textsuperscript{10} Experimental groups tested included: Unqualified-Traditional Sampling (Cell 1); Unqualified-Audit Data Analytics (Cell 2); Adverse-Traditional Sampling (Cell 3); and Adverse-Audit Data Analytics (Cell 4). For H3, we use the following contrasts: Cell 1 > Cell 2: 1, -1, 0, 0 and Cell 3 = Cell 4: 0, 0, 1, -1.

\textsuperscript{11} Following Guggenmos, Piercey, and Agoglia (2016) contrast analysis guidance, we analyze residual between-cells variance and report \( p \)-values adjusted for unequal variances.
While prior studies have investigated the effects of audit documentation on jurors’ judgments (e.g., Backof 2015), we examine how the ICFR opinion and audit testing methodology affect negligence assessments. Our results are consistent with the literature and provide further evidence that the ICFR opinion is an important signal of potential problems and of the overall quality of the financial reporting (e.g., Ashbaugh-Skaife et al. 2009). However, we demonstrate that this perception of quality is more pronounced when the auditor fails to signal a potential misstatement. Further, we find that the internal controls context differentially affects jurors’ focus on the quality of the audit testing techniques auditors employ and jurors’ assessments of auditor negligence. When there is no salient internal controls signal suggesting poor financial reporting quality, we find that jurors evaluate the use of ADAs as a higher quality testing technique that demonstrates auditors’ intentions to conduct a quality audit (e.g., Reffett 2010; Maksymov and Nelson 2017).

Additional analyses

Blame attribution

To further investigate our results, we examine the extent of blame jurors attribute to auditors, management, and the plaintiff after an audit failure. We use the Preacher and Hayes (2008) multiple mediator model to determine the effect of OPINION on GUILT through three measures of BlameAttribution (auditor, management, and plaintiff; see Figure 2). To derive BlameAttribution, we asked jurors to indicate each party’s responsibility for the plaintiff’s loss on a 10-point scale anchored on 1 (Not at all responsible) and 10 (Completely responsible).\textsuperscript{12} Using all three measures in our mediation analysis allows us to determine the effect of each measure while controlling for the other two measures in the model.

\textsuperscript{12} The Blame Auditor scale differs in that it is anchored on 1 (Not at all caused) and 10 (Completely caused).
As noted in Figure 2, results of the mediation analysis indicate that the effect of \textit{OPINION} on \textit{GUILT} is mediated by two of our measures of \textit{BlameAttribution}.\textsuperscript{13} The effect of \textit{OPINION} on \textit{Blame Auditor} ($p = 0.001; \text{95 CI [-0.928, -0.226]})$, and \textit{Blame Plaintiff} ($p < 0.001; \text{95 CI [0.282, 0.987]})$ is significant. The effects of \textit{Blame Auditor} ($p < 0.001; \text{95 CI [8.055, 9.419]})$, and \textit{Blame Plaintiff} ($p = 0.003, \text{95 CI [-1.911, -0.576]})$ on \textit{GUILT} are also significant. We find that the \textit{BlameAttribution} measures fully mediate the relationship between \textit{OPINION} and \textit{GUILT} (total effect of \textit{OPINION} on \textit{GUILT} $p = 0.031$; direct effect $p = 0.481$).\textsuperscript{14} These findings provide evidence that jurors’ ascription of blame to different constituents in the audit process influences their negligence assessments. Essentially, jurors perceive an adverse ICFR opinion as a warning from auditors to financial statement users about the quality of the financial reports which investors should consider when making investment decisions. As such, jurors believe that the plaintiff shares some responsibility for the loss incurred and abates jurors’ assessment of auditor negligence.\textsuperscript{15}

\textit{Insert Figure 2 about here}

In untabulated results, we also parse our overall mediation analyses by audit testing methodology to determine whether, like our ANOVA results for the interaction (HYPOTHESIS 3), the results are driven by auditors’ use of traditional statistical sampling relative to ADAs. For traditional statistical sampling, we find similar and, in some instances, stronger results than our overall mediation analysis. We find that the effect of \textit{OPINION} on \textit{GUILT} is mediated by each of our measures of \textit{BlameAttribution} at a 95 percent confidence level. The effect of \textit{OPINION} on

\textsuperscript{13}Statistical inferences are unchanged when we use our binary measure of guilt (\textit{VERDICT}).

\textsuperscript{14}Sobel’s tests are significant for judgments of the probability of negligence for \textit{Blame Auditor} ($z = -3.20, p = 0.001$) and \textit{Blame Plaintiff} ($z = -2.49, p = 0.013$).

\textsuperscript{15}We also find that jurors blame auditors more in the unqualified versus adverse ICFR opinion conditions (means = 4.86 vs. 4.29, respectively; $p < 0.001$, one-tailed). Additionally, jurors assess management as being more responsible when the ICFR opinion is adverse versus unqualified (means = 7.16 and 6.87, respectively; $p = 0.033$, one-tailed); which suggests that jurors believe that management is responsible for implementing effective controls over financial reporting and, therefore, at a minimum contributiorily negligent when these controls are deemed ineffective.
Blame Auditor ($p = 0.002$), Blame Management ($p = 0.027$), and Blame Plaintiff ($p < 0.005$) is significant. The effects of Blame Auditor ($p < 0.001$), Blame Management ($p = 0.002$), and Blame Plaintiff ($p = 0.007$) on GUILT are all also significant. The total (main) effect of OPINION on GUILT is significant ($p = 0.001$) as we noted in the ANOVA in Table 3 panel A. Indicating full mediation, we find that this effect is insignificant conditional on measures of Blame Attribution ($p = .314$). Conversely, when the auditor uses ADAs, the main effect of OPINION on GUILT is insignificant ($p = .871$); thus mediation analysis is not appropriate. Taken together, these results suggest that when the auditor uses ADAs as a testing methodology, the type of ICFR opinion does not have a differential effect on auditor guilt. In other words, under conditions where the auditor employs techniques that are perceived to increase the likelihood of detecting misstatements, jurors perceive audit quality to be enhanced.

**Omnibus perceptions of audit data analytics on audit quality and assurance**

To further investigate our results, we analyze jurors’ overall perceptions of audit quality and assurance that the financial statements are free from material misstatement. We contend that use of ADAs as a testing methodology signals a higher quality audit. In untabulated results, we find that jurors perceive audit quality as being higher when the auditor uses ADAs versus traditional statistical sampling audit testing procedures (means = 7.83 vs. 7.48; $p = 0.026$, two-tailed).

Lastly, to examine whether jurors perceive that auditors provide relatively more assurance when they employ ADAs versus traditional sampling, we examine jurors’ perceptions of assurance

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16 Participants responded to the question “Did Smith CPAs intend to conduct a quality audit by using the audit testing approach they used to perform sales revenue testing?” on a scale ranging from 1 (Not at all intended to conduct a high-quality audit) to 10 (Completely intended to conduct a high-quality audit).
that: 1) internal controls are operating effectively\textsuperscript{17} and 2) the financial statements are free from material misstatement.\textsuperscript{18} Related to internal controls, we find no difference in juror perceptions of assurance when the auditor uses ADAs versus traditional statistical sampling audit testing procedures (means = 6.05 vs. 5.79, respectively; $p = 0.136$, two-tailed; untabulated). Related to misstatements in the financial statements, we also find that jurors perceive no difference in assurance when the auditor uses ADAs versus traditional statistical sampling audit testing procedures (means = 5.84 vs. 5.77, respectively; $p = 0.419$, two-tailed; untabulated). Taken together, these audit quality and assurance findings suggest that jurors agree with auditors’ contention that ADAs lead to comparatively higher quality audits but provide no greater assurance than traditional sampling testing techniques.

5. Conclusion

In this study, we examine whether and to what extent auditors’ use of audit data analytics in the substantive testing phase of the audit and the type of internal control over financial reporting (ICFR) opinion affect both the perceived level of audit quality and jurors’ assessment of auditor negligence after an audit failure. We develop our predictions based on attribution theory and particularly blame attribution. To test our expectations, we conducted a 2x2 between-subjects full factorial experiment where we manipulated the auditor’s testing methodology (audit data analytics versus traditional sampling) and the ICFR opinion issued (unqualified versus adverse). We also measured, as a mediating factor, the extent of the attribution of blame for a negligence suit filed by an investor in one of our hypothetical auditor’s clients. Using a sample of jury-eligible

\textsuperscript{17} Participants responded to the question “What level of assurance that internal controls are operating effectively do you think Smith CPAs actually provided?” on a scale ranging from 1 (No Assurance) to 10 (Absolute Assurance).

\textsuperscript{18} Participants responded to the question “What level of assurance that the financial statements are free of material misstatement do you think Smith CPAs actually provided?” on a scale ranging from 1 (No Assurance) to 10 (Absolute Assurance), emphasis included in the original instrument provided to participants.
participants, we note three main findings. First, we find that the ICFR opinion directly affects how jurors assess negligence and suggests that adverse opinions provide a signal to financial statement users of the potential for financial reporting related issues. These adverse opinions result in lower perceptions of auditor negligence. Second, we find that when auditors issue an unqualified ICFR opinion, a lack of a salient signal of otherwise problematic or questionable financial reporting quality, jurors make higher negligence assessments when auditors employ traditional statistical sampling techniques than when they employ ADA techniques. Lastly, mediation analysis indicates that the effects of the ICFR opinion on jurors’ assessment of auditor negligence is explained by jurors’ attribution of blame among auditors, management, and the investors who incur a loss by relying on the financial statements (i.e., the plaintiff). We find that when auditors issue an adverse ICFR opinion, jurors attribute less blame to auditors (correspondingly, more blame to management and the investor) for the audit failure resulting in a financial loss thereby assessing auditors as less guilty of negligence.

Our study is one of the first to directly examine whether the use of more advanced audit methodologies enhances jurors’ perceptions of audit quality and assurance. Proponents contend that the use of ADAs will not only enhance audit effectiveness and efficiency but will also result in reduced audit risk and liability because auditors will be able to achieve a higher level of assurance. Our results suggest that jurors indeed perceive higher audit quality when auditors use ADAs, especially in situations where auditors face litigation exposure in an audit failure context. This study potentially has implications for regulators interested in additional audit quality indicators and factors to consider if auditing standards require revision to encourage or support auditors’ leveraging of technology to enhance the efficiency and effectiveness of the audit. Our study has implications for practitioners interested in or currently using ADAs techniques in the
audit process, despite audit practitioners’ assertions that use of these techniques will have no effect on financial statement users’ perceptions of audit quality and the level of assurance provided.

Our study also contributes to the auditing literature regarding the effects of ICFR opinion disclosure as well as factors that affect jurors’ negligence judgments. In line with what Hammersley et al. (2008) find regarding the affect disclosure of ICFR opinions have on stock prices, we find that the disclosure of ICFR opinions provide a context within which jurors differentially attribute blame for an audit failure, interpret auditors’ efforts to improve audit quality, and influence jurors’ negligence decisions. Our study also provides avenues for future research on the effects of audit testing disclosure and complements prior and contemporaneous research on the use of technology to enhance the audit process (e.g., Brown-Liburd et al. 2015; Barr-Pulliam 2017a; Rose et al. 2017).
References


Ernst & Young. 2015 *How big data and analytics are transforming the audit*. Available at: http://www.ey.com/Publication/vwLUAssets/ey-reporting-issue-9/$FILE/ey-reporting-issue-9.pdf#page=10


KPMG. 2012 Leveraging data analytics and continuous auditing processes for improved audit planning, effectiveness, and efficiency. White Paper. Available at: https://assets.kpmg.com/content/dam/kpmg/pdf/2016/05/Leveraging-Data-Analytics.pdf


_____. 2016b. AS 1015: Due Professional Care in the Performance of Work. Washington, DC.


TABLE 1
Participant demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Percentage or Mean (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior jury service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>93</td>
<td>11.6%</td>
</tr>
<tr>
<td>No</td>
<td>707</td>
<td>88.4%</td>
</tr>
<tr>
<td>Prior experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawyer</td>
<td>20</td>
<td>2.5%</td>
</tr>
<tr>
<td>Investor</td>
<td>186</td>
<td>23.3%</td>
</tr>
<tr>
<td>None</td>
<td>594</td>
<td>74.3%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>464</td>
<td>58.0%</td>
</tr>
<tr>
<td>Male</td>
<td>333</td>
<td>41.6%</td>
</tr>
<tr>
<td>Self-Identified as Other</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Age</td>
<td>800</td>
<td>37.1 (12.2)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td>118</td>
<td>14.8%</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>424</td>
<td>53.0%</td>
</tr>
<tr>
<td>Trade School</td>
<td>111</td>
<td>13.9%</td>
</tr>
<tr>
<td>High School</td>
<td>147</td>
<td>18.4%</td>
</tr>
<tr>
<td>Number of Accounting Courses</td>
<td>800</td>
<td>1.0 to 2.0 courses (.00)</td>
</tr>
<tr>
<td>Number of Finance Courses</td>
<td>800</td>
<td>1.0 to 2.0 courses (.33)</td>
</tr>
</tbody>
</table>
### TABLE 2
Descriptive statistics

<table>
<thead>
<tr>
<th>ICFR Audit Opinion</th>
<th>Variable</th>
<th>Statistical Sampling</th>
<th>Audit Data Analytics</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N = 84</td>
<td>N = 68</td>
<td>N = 152</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(41.6%)</td>
<td>(34.3%)</td>
<td>(38.0%)</td>
</tr>
<tr>
<td>Unqualified</td>
<td>Guilty</td>
<td>N = 118</td>
<td>N = 130</td>
<td>N = 248</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(58.4%)</td>
<td>(65.7%)</td>
<td>(62.0%)</td>
</tr>
<tr>
<td></td>
<td>Not Guilty</td>
<td>N = 202</td>
<td>N = 198</td>
<td>N = 400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44.25</td>
<td>37.97</td>
<td>41.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(34.0)</td>
<td>(32.4)</td>
<td>(33.4)</td>
</tr>
<tr>
<td></td>
<td>Extent of Guilt</td>
<td>33.58</td>
<td>38.52</td>
<td>36.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(31.8)</td>
<td>(34.7)</td>
<td>(33.3)</td>
</tr>
<tr>
<td>Adverse</td>
<td>Guilty</td>
<td>N = 59</td>
<td>N = 68</td>
<td>N = 127</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(29.4%)</td>
<td>(34.2%)</td>
<td>(31.8%)</td>
</tr>
<tr>
<td></td>
<td>Not Guilty</td>
<td>N = 142</td>
<td>N = 131</td>
<td>N = 273</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(70.6%)</td>
<td>(65.8%)</td>
<td>(68.2%)</td>
</tr>
<tr>
<td></td>
<td>Extent of Guilt</td>
<td>33.58</td>
<td>38.52</td>
<td>36.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(31.8)</td>
<td>(34.7)</td>
<td>(33.3)</td>
</tr>
<tr>
<td>Total</td>
<td>Guilty</td>
<td>N = 143</td>
<td>N = 136</td>
<td>N = 279</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(35.5%)</td>
<td>(34.3%)</td>
<td>(34.9%)</td>
</tr>
<tr>
<td></td>
<td>Not Guilty</td>
<td>N = 260</td>
<td>N = 261</td>
<td>N = 521</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(64.5%)</td>
<td>(65.7%)</td>
<td>(65.1%)</td>
</tr>
<tr>
<td></td>
<td>Extent of Guilt</td>
<td>38.93</td>
<td>38.25</td>
<td>38.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(33.3)</td>
<td>(33.5)</td>
<td>(33.4)</td>
</tr>
</tbody>
</table>

Verdict is a binary measure where Not Guilty = 0 and Guilty = 1. Percentage of total participants in cell in parentheses.

Extent of Guilt is a continuous measure of jurors’ perception of auditor negligence where 0% (100%) = completely not guilty (guilty): Mean (Standard deviation).
TABLE 3
Tests of Hypotheses

Panel A: ANOVA of Jurors Perception of Auditor Extent of Guilt (N = 800)

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHOD (H1)</td>
<td>1</td>
<td>89.40</td>
<td>0.081</td>
<td>0.388</td>
</tr>
<tr>
<td>OPINION (H2)</td>
<td>1</td>
<td>5122.95</td>
<td>4.63</td>
<td>0.016</td>
</tr>
<tr>
<td>METHOD x OPINION (H3)</td>
<td>1</td>
<td>6292.05</td>
<td>5.70</td>
<td>0.008</td>
</tr>
<tr>
<td>Between-subjects error</td>
<td>796</td>
<td>1104.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Variable Definitions: Dependent Variable (Extent of Guilt) is a continuous measure of jurors’ perception of auditor negligence where 0% (100%) = completely not guilty (guilty). METHOD = Manipulated between-subjects as traditional sampling (0) vs. audit data analytics (1). OPINION = Manipulated between-subjects as an unqualified (0) vs. adverse (1) internal control over financial reporting opinion. Traditional sampling vs. audit data analytics. One-tailed p-values.

Panel B: Simple Effects Planned Contrast Tests of H3

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Contrasts</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>t-Stat</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell 1 &gt; Cell 2 (H3)</td>
<td>1 -1 0 0</td>
<td>6.28</td>
<td>3.32</td>
<td>1.89</td>
<td>0.030</td>
</tr>
<tr>
<td>Cell 3 = Cell 4 (H3)</td>
<td>0 0 1 -1</td>
<td>-4.94</td>
<td>3.32</td>
<td>-1.49</td>
<td>0.069</td>
</tr>
</tbody>
</table>

*Dependent Variable (Extent of Guilt) is a continuous measure of jurors’ perception of auditor negligence where 0% (100%) = completely not guilty (guilty). 2 (OPINION) x 2 (METHOD) factorial experimental groups tested include: Unqualified-Traditional Sampling (Cell 1); Unqualified-Audit Data Analytics (Cell 2); Adverse-Traditional Sampling (Cell 3); and Adverse-Audit Data Analytics (Cell 4). One-tailed p-values; equal variances not assumed.
**Figure 1** Interactive Effects of Audit Methodology and Audit Opinion

Dependent Variable (Extent of Guilt) is a continuous measure of jurors’ perception of auditor negligence where 0% (100%) = completely not guilty (guilty). **METHOD** = Manipulated between-subjects as traditional sampling (0) vs. audit data analytics (1). **OPINION** = Manipulated between-subjects as an unqualified (0) vs. adverse (1) internal control over financial reporting opinion.
Figure 2 Results of Mediation Analysis for Blame Attribution

Standardized Coefficients (t-statistics and p-values, two-tailed) shown for each path. *Denotes p-values are significant at least at the 0.05 level.

**OPINION** = ICFR audit opinion issued (0=Unqualified, 1=Adverse)

**GUILT** = Jurors assessment of auditor negligence ranging from 0% (Completely not guilty) to 100% (Completely guilty)

**BLAME VARIABLES:** All measured on a 10-point scale anchored on 1 (Not at all responsible) and 10 (Completely responsible)

- **BLAME AUDITOR** = “In your opinion, did the auditor’s actions (Smith CPAs) cause the plaintiff’s (Bierhoff Pension Fund) loss?”
- **BLAME MANAGEMENT** = “In your opinion, to what extent is management of Rapid Shipping (the company) responsible for the subsequent misstatement in sales revenue?”
- **BLAME PLAINTIFF** = “In your opinion, to what extent is Bierhoff Pension Fund (the plaintiff) responsible for the losses that they suffered?”
Appendix 1 Flow the Experiment

Stage One
- Jury Eligibility Test
- Informed Consent

Stage Two
- Background Information and Comprehension Checks
  - Audit of Internal Controls over Financial Reporting (ICFR)
  - Reasonable Assurance
  - Due Professional Care
  - Audit Opinions on the Financial Statements

Stage Three
- Random Assignment to Experimental Conditions
- Transcript of Trial
- Juror Enters Verdict
- Post Experimental Questionnaire
  - Audit Quality
  - Due Professional Care
  - Blame Attribution (Auditor vs Management vs Investor)
  - Level of Assurance Provided
  - Demographics
- End Experiment
Appendix 2 Manipulation of Independent Variables

Audit Methodology (METHOD)

Statistical Sampling Techniques Manipulation:
To test Rapid’s revenue account balance, Smith CPAs used audit statistical sampling techniques to examine a portion (i.e., less than 100%) of transactions from the entire population of Rapid’s 2013 shipping transactions. This audit approach allows Smith CPAs to draw conclusions, based on the analysis of the sample, about the effectiveness of internal controls over Rapid’s 2013 shipping transactions. For the sample of shipping transactions selected, Smith CPAs performed cutoff tests to identify shipping orders placed before or after the 2013 yearend. To ensure these were valid revenue transactions, Smith CPAs validated that each transaction from the sample received the required minimum number of scans. This ensures that automatically generated revenue entries in the accounting system actually occurred and were complete.

Audit Data Analytic Techniques Manipulation:
To test Rapid’s revenue account balance, Smith CPAs used audit data analytics software techniques to electronically examine the entire population (i.e., 100%) of Rapid’s 2013 shipping transactions. This audit approach allows Smith CPAs to draw conclusions, based on the analysis of the entire population, about the effectiveness of internal controls over Rapid’s 2013 shipping transactions. For the entire population of shipping transactions, Smith CPAs performed cutoff tests to identify shipping orders placed before or after the 2013 yearend. To ensure these were valid revenue transactions, Smith CPAs validated that each transaction from the entire population received the required minimum number of scans. This ensures that automatically generated revenue entries in the accounting system actually occurred and were complete.

ICFR Audit Opinion (OPINION):

Unqualified Opinion Manipulation:
Smith CPAs did not detect material weaknesses in internal controls related to revenue recognition. Since their opinion about internal controls influences the level of audit testing they perform on revenue recorded in the financial statements, they were negligent because they did not execute an appropriate level of testing of the amount Rapid recorded in the financial statements. Consequently, they did not detect the material revenue misstatement when they audited Rapid’s financial statements. Therefore, they are directly to blame.

Adverse Opinion Manipulation:
Smith CPAs detected material weaknesses in internal controls related to revenue recognition. Since their opinion about internal controls influences the level of testing they perform on revenue recorded in the financial statements, they were negligent because they did not execute an appropriate level of testing of the amount Rapid recorded in the financial statements. Consequently, they did not detect the material revenue misstatement when they audited Rapid’s financial statements. Therefore, they are directly to blame.