

The Reliance of External Auditors on Internal Audit's Use of Continuous Audit

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Abstract: As a response to the increased demand for timely and ongoing assurance over the effectiveness of risk management and control systems, companies are moving towards a more automated control environment through the implementation of continuous audit modules. The purpose of this study is to evaluate external auditors' reliance on internal audit's work when advanced audit techniques are introduced by the internal auditor and the impact this reliance has on budgeted audit hours. Prior literature suggests that internal control deficiencies also have an impact on external auditor reliance and the audit budget. The reliance decision of an external auditor has important economic consequences and implications for efficiency and effectiveness of the overall audit. In recent years, the PCAOB has encouraged greater such reliance to improve audit efficiency. An experiment is conducted with 87 experienced external auditors to investigate the theorized effects. Using a 2 x 2 between subjects factorial design, the frequency of the internal audit (traditional vs. continuous audit) and prior year material weakness (absent vs. present) are manipulated. Consistent with predictions, we find that auditors are willing to rely more on internal audit work in a continuous audit environment than in a traditional environment, and this effect is magnified when the prior year audit report on the effectiveness of internal controls indicates that controls are working properly. The presence of a material weakness, however, negatively impacts judgments on the budget for the valuation of a complex account. In addition, both material weakness and continuous audit have an impact on the overall audit budget, which is reduced only when the company has no prior year material weakness and a functioning continuous audit module is put in place. The results show that auditors increase budgeted hours for the engagement at a higher rate when the client uses traditional internal audit procedures.

Keywords: Continuous Audit; Continuous Monitoring; Material Weakness; Internal Audit Reliance; Audit Budgets

1. INTRODUCTION

Companies are under constant pressure to improve the reliability and accountability of their financial information in order to comply with regulatory bodies and to compete for capital in the evolving global business environment. As a response to global demands for timely and ongoing assurance over the effectiveness of risk management and control systems, companies are increasingly moving towards automated control environments through the implementation of technologies such as continuous audit modules (PwC 2006; IIA 2009; Protiviti 2013). Continuous audit is defined as “a method used to perform control and risk assessments automatically on a more frequent basis” (Coderre, 2006, pg. 1). Continuous audit technology allows ongoing audit testing of financial transactions and associated controls in real time. The internal audit profession is thus better equipped for addressing the needs of stakeholders, in spite of the challenges it faces: questionable internal audit value, independence issues, fraud, and scarcity of skilled resources (Coderre, 2006).

There are mixed results regarding the spread of continuous audit technology. On the one hand, survey results reported by the profession (PwC 2006, IIA 2009) show a large majority of respondents have adopted, or plan to adopt, continuous auditing approaches in at least some area of their business processes, while on the other hand, Vasarhelyi et al. (2012) find that companies are only at the initiation phase in the audit maturity model, thus underlining the limited assimilation of continuous audit in the internal audit process. Nonetheless, a recent Protiviti (2013) survey shows on-going year-over-year increases in automation of IT processes and controls that establish a foundation for continuous auditing implementation and provide cost savings in SOX compliance. Still, it remains unknown as to how willing auditors will be to rely on these automated control systems and internal auditors’ use of continuous auditing—will

external auditors place greater or lesser reliance on evidence collected through automated continuous auditing technologies versus human monitoring? (Kuhn and Sutton 2010).

The purpose of this study is to evaluate the impact of internal audit's adoption of continuous auditing on the degree of reliance external auditors place on internal audit's work. Prior literature suggests that internal control deficiencies also have an impact on external auditor reliance and may impact the degree to which reliance is expanded via the use of continuous auditing by internal audit. Felix et al. (2001) show that the reliance decision of the external auditor has important economic consequences and implications for efficiency and effectiveness of the overall audit. In line with these findings, the Public Company Accounting Oversight Board (PCAOB) issued Auditing Standard No. 5 encouraging external auditors to make greater use of work already completed by the internal auditor (PCAOB 2007). Accordingly, this study focuses specifically on whether the implementation of continuous audit, moderated by the absence or presence of a prior year material weakness in internal controls, impacts the auditor's decision making process to rely on internal audit's work performed during the year and the resulting impact on the audit budget.

An experiment is conducted with 87 external auditors to investigate the theorized effects. Using a 2 x 2 between subjects factorial design, we manipulate the frequency of the internal audit (traditional vs. continuous audit) and a prior year material weakness (absent vs. present). Participants are presented with a case about a continuing client, background information on the client's business, industry, and management, the findings of the prior year audit report on the effectiveness of internal controls, as well as an overview of the current internal control environment. Both the manipulation for continuous audit and the one for an identified prior year material weakness affect the same complex account. Three dependent variables are measured:

auditor reliance, change in budgeted audit hours for the high complexity account which is affected, and change in budgeted audit hours for the overall engagement.

Consistent with predictions, we find that auditors are willing to rely more on internal audit work in a continuous audit environment than in a traditional environment, and this effect is magnified when the prior year audit report on the effectiveness of internal controls indicates that controls were working properly. In addition, both continuous audit and material weakness impact the overall audit budget, whereby the budget is reduced only when the company has a functioning continuous audit module in place and no prior year material weakness exists. The results show that auditors increase budgeted hours for engagements at a higher rate when the client uses traditional internal audit procedures.

Our findings are of interest to both theory and practice. Most of the continuous audit literature focuses on continuous audit from the internal auditors' perspective, although more recent studies explore in some detail the relationship between the frequency of the audit and external auditor or management decision making (e.g. Glover et al. 2008, Hunton et al. 2008). Increasing regulatory changes are driving external auditors to further scrutinize internal controls and to be more demanding when relying on client employees when planning the nature, timing and extent of audit procedures (Protiviti, 2013). The automation of internal audit is becoming more appealing and can help mitigate the cost implications and increase the effectiveness and efficiency of the audit (Protiviti 2013). This paper broadens our understanding of the role of internal auditors, an important component of corporate governance, and their influence on external auditors' decision making. In light of steadily rising audit costs, our results should be of interest to the audit profession, senior management, regulators, and users of financial statements

in their evaluations of companies which have implemented or are planning to implement continuous audit modules.

This paper is organized as follows. The second section discusses a brief background, the theory, and develops the research hypotheses for our study. The third and fourth sections address the research method and results, while the final section provides conclusions and opportunities for future research.

2. BACKGROUND, THEORY, AND HYPOTHESES DEVELOPMENT

2.1. Background of the study

In 2006, a survey conducted by PricewaterhouseCoopers found that 50% of US companies used continuous audit techniques, while 31% of the rest had made plans in this direction (PwC 2006). Similarly, the IIA and ACL found in a joint global study in 2006 that 36% of respondents had adopted a continuous auditing approach in at least some select areas of their business, while 39% were planning to implement continuous auditing in the near future (Brannen, 2006).

While traditional audit techniques focus testing on a small sample of the total transaction population, continuous audit modules allow for the timely identification of inconsistencies and weaknesses in the company policies and controls by monitoring all transactions in real-time (Coderre, 2006). Continuous auditing includes both continuous control monitoring (CCM) and continuous data assurance (CDA). Examples of CCM are procedures for monitoring access controls and authorizations, system configurations, and business process settings; while CDA includes procedures for verifying master data, transactions, and key process metrics using analytics (Alles et al. 2006, 2008, 2010). Jans et al. (2013) explore the implications to both external and internal audit of process mining the event logs captured by ERP systems and

provide a detailed description of how this procedure is used for control monitoring and data assurance. Following the standard route in technology adoption, the manual audit procedures are being automated and, subsequently, reengineered to fully exploit the capabilities of the technology (Jans et al. 2013).

One of the first continuous audit systems, implemented at AT&T Bell Laboratories, was designed to integrate the different systems of an organization, sharing information in online or close-to-online processing mode for evaluation purposes (Vasarhelyi and Halper 1991). A subsequent continuous auditing implementation at Siemens tested the viability of continuous audit techniques, including the possibility of integrating continuous auditing modules with the current audit process, lightening the burden of the internal audit function, and reengineering manual audit procedures (Alles et al. 2006, Vasahelyi et al. 2010).

The external auditor's willingness to rely on internal audit's processes for control monitoring can be affected, however, by the discovery of a deficiency in internal controls over financial reporting (Felix et al. 2001). The Sarbanes Oxley Act of 2002 requires companies to disclose details about their systems of internal controls. Section 302 of this act requires publicly traded companies to list all deficiencies in internal controls, together with any fraud involving employees in internal activities to be disclosed on a quarterly and annual basis¹, while annual reporting on the effectiveness of internal controls over financial reporting is required by Section 404.² According to the Securities and Exchange Commission's Release No. 33-8829 issued in 2007, a material weakness is defined as "a deficiency, or combination of deficiencies, in internal

¹ "Certification of Disclosure in Companies' Quarterly and Annual Reports", Securities and Exchange Commission, Release No. 33-8124 (2002) available at <http://www.sec.gov/rules/final/33-8124.htm> accessed Dec. 2, 2011

² "Management's Report on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports", Securities and Exchange Commission, Release No. 33-8238 (2003) available at <http://www.sec.gov/rules/final/33-8238.htm> accessed Dec. 2, 2011

control over financial reporting, such that there is a reasonable possibility that a material misstatement of the registrant's annual or interim financial statements will not be prevented or detected on a timely basis".³

Prior literature addressing material weaknesses identified during the annual audit provides mixed results regarding external auditor's reliance on internal audit's work. Findings from early studies examining small samples of real auditor working papers to explain changes in audit planning associated with client risk found no strong connection (Bedard 1989, Mock and Wright 1993, Mock and Wright 1999). More recent studies highlight a correlation between higher quality internal audit functions and lower likelihoods of material weaknesses (Lin et al. 2011), as well as management being less likely to manipulate earnings (Prawitt et al. 2009).

Identifying a significantly higher audit risk for an audit client leads to increases in audit fees, although there is no evidence that the increased effort is connected to the internal audit deficiency (Felix et al. 2001, Canada et al. 2009; Hackenbrack and Knechel 1997, O'Kneefe et al. 1994). The Bell et al. (2001) and Bedard and Johnstone (2006) studies confirm a correlation between increased auditor fees and labor hours. Furthermore, archival research finds that auditors increase the tests performed, and consequently the total labor hours, for clients with an identified internal control deficiency in an effort to lower inherent and information risks of the audit (Hogan and Wilkings 2008).

2.2. Theory and hypotheses development

This study is based on Hogarth's (1980) theory on information assimilation for judgment and choice decision making. According to the Hogarth theory, information assimilation has four

³ "Definition of a Significant Deficiency", Securities and Exchange Commission, Release No. 33-8829 (2007) available at <http://www.sec.gov/rules/final/2007/33-8829.pdf>, accessed Dec. 2, 2011

stages: information acquisition, processing, output, and feedback – a process which takes into account that a judgment is impacted both by the individual decision maker (the auditor) and the environment. Information acquisition represents the process of searching and identifying relevant data. The processing stage represents evaluating the information and its impact on an intermediary judgment within the overall decision making process. The output is selecting the best alternative and making a decision, while the feedback stage is a learning experience, during which the subject observes and evaluates the response of the environment to his/her decision (Hogarth 1980). The theory is used to evaluate the decision processes underlying auditor's reliance on information received from internal audit, as well as the impact on decision outcomes (i.e., budgeted audit hours).

Internal auditors' work is generally guided by the COSO control framework and the five integrated components necessary for a strong internal control system: control environment, risk assessment, control activities, information and communication, and monitoring activities. The control environment is built around management, stemming from their integrity and ethical values, their oversight responsibility, commitment to competence, and accountability efforts, setting the "tone at the top" for the company. The risk assessment encompasses the evaluation of both internal and external risks which could hinder reaching the companies' objectives. The controls activities are focused on policies and procedures set in place over the regular activities of the business, such as approvals and authorizations, reconciliations, segregation of duties. The information and communication component refers to procedures to ensure information is properly disseminated down, across, and up the organization, focusing on the information system as a key player. The monitoring activities assess the quality of the information system's

performance over time, and ensure upper management is properly informed of deficiencies and proper corrective action (AICPA 2005, COSO 1992, 2013).

Hogarth's (1980) framework of judgment and choice takes into account the impact of the individual decision maker and the environment, therefore looking not only at individual characteristics acquired through experience and training, but also at the nature and perceived quality of the information presented. Therefore, in the presence of detection risk (the frequency and nature of internal audit testing) and control risk (feedback provided by the presence of a material weakness in the previous year), an external auditor is no longer evaluating the probability of either risk in isolation, but rather must assess the combined probability of a material misstatement in the financial statements existing under both risks. The presence of a material weakness in a prior year can impact the evaluation of the control environment, while the presence of a continuous audit system may have a positive effect on the assessment of control activities, information and communication, and/or monitoring activities as articulated within the COSO framework (1992, 2013).

Abbott et al (2011) and Bame-Aldred et al. (2012) find that increased audit efficiency is correlated with higher reliance on the internal audit function. Auditors with technical backgrounds assess automated control procedures as more effective than non-automated ones (Viator and Curtis 1998), while more frequent monitoring discourages management misbehavior (Hunton et al. 2008). On the other hand, in a traditional internal audit environment where a sample of transactions is audited periodically, the presence of a material weakness in the prior year's report would lead the auditor to assess a higher probability of a material weakness over internal controls being detected during the current engagement. As a result, the audit team is

expected to perform more extensive tests over the financial statements to ensure they are fairly presented. This leads to the following related hypotheses:

H1a: The external auditor will rely more on internal audit work in a continuous audit environment than a traditional audit environment.

H1b: The external auditor will rely less on internal audit work when a prior year audit reports a material weakness over internal controls.

H1c: The differential effect of the internal audit testing approach (CA versus traditional) on external auditor's reliance on internal audit work will be lower in the presence of a prior year material weakness than in the absence of a prior year material weakness.

Prior studies identify increased regulatory pressure for more thorough audit reviews, thus highlighting the need for time budgets (Lambert and Agoglia 2011). Another aspect related to the audit budget is the audit fee, which was found in a recent survey by Protiviti (2013) to maintain a persistent year-over-year increase. Further, companies can expect to pay an additional 35% in audit fees when they have a material weakness (Hogan and Wilking 2008) as the external auditors will most likely increase their efforts both in the year of the first report of a material weakness and in subsequent years. The presence of a material weakness discovered in year zero represents an anchor for the auditor's estimate for the following year's engagement time budget. It affects the decision process of external auditors during the planning stage of the audit engagement, impacting the total budgeted hours (Hogan and Wilking 2008). If the auditor assesses the likelihood of discovering a material weakness during the current year's audit engagement as high (risky control environment), tests over financial data should be expanded. On the other hand, when tests over internal controls reveal that effective internal controls are in place, existing tests over financial data are considered sufficient and may even be tapered.

The findings of prior studies are consistent with the expectation that external auditors behave in accordance with the audit risk model, expanding their tests, increasing budgeted audit hours, and increasing audit fees for riskier clients (Mock and Wright 1993, Bedard 1989, O’Keefe et al. 1994, Hackenbrack and Knechel 1997, Mock and Wright 1999, Bell et al. 2001, Felix et el 2001, Bedard and Johnstone 2006). Accurate budgeting is important for audit firms, as underbudgeting causes a loss in profits and overworked staff, while overbudgeting leads to higher total audit fees, potentially causing dissention with the client and leaving the audit more susceptible to competing bids by other firms.

In a continuous audit environment, financial information and associated controls are audited on a continuous (real time) basis, which increases both the timeliness and verifiability of the financial data⁴ (Conceptual Framework for Financial Reporting 2008) as any inconsistencies are reported and subsequently fixed as they are detected, in accordance with the effective internal control principle of information and communication (COSO 1992, 2013). Moreover, based on Hogarth’s framework, the consistency of information sources influences the information processing during decision formulation. Confidence in a judgment also increases in the presence of consistent information sources.

When looking at the valuation of a complex account which is impacted both by a continuous audit environment and a material weakness, the auditor should consider the effectiveness of the continuous audit system. On the one hand, auditors should increase their efforts to gain confidence in the technology and the manner in which it is configured and utilized. On the other

⁴ “Conceptual Framework for Financial Reporting: The Objective of Financial Reporting and Qualitative Characteristics and Constraints of Decision-Useful Financial Reporting Information”, Financial Accounting Standards Board (FASB), Financial Accounting Series, May 29, 2008, retrieved from <http://www.gasb.org/cs/BlobServer?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1175818772037&blobheader=application%2Fpdf>

hand, an effective technology can save time in documenting exceptions and assuring consistency in processing of transactions associated with the account in question. Thus, the presence of a continuous audit system coupled with effective internal controls over financial reporting in the prior year should translate into lower risk and lead to minimization of budgeted hours for the current year. This leads to the following hypotheses regarding changes in the budgeted hours for the audit of a high complexity account:

H2a: The external auditor will budget fewer hours for the audit of a high complexity account in a continuous audit environment than in a traditional audit environment.

H2b: The external auditor will budget more hours for the audit of a high complexity account when the prior year audit identified a material weakness over internal controls.

H2c. A continuous audit environment will provide the largest reduction in budgeted audit hours for the valuation of a high complexity account when the prior year audit identified effective internal controls.

When considering the overall budget for an audit engagement, the auditor can choose to perform more tests in accordance with the guidance from the regulatory bodies who are asking for more thorough reviews of internal controls, or decrease the total amount of hours needed to express an opinion on the financial statements. Again, a continuous audit system provides the opportunity for fewer tests to be performed during the audit of the financial statements, as more controls are in place and the auditor can place greater reliance on their effectiveness, in accordance with the COSO (1992, 2013) principles of control activities, information and communication, and monitoring activities. A material weakness signals a deficiency in the control environment and translates to more scrutiny from the auditor who needs to perform enough work to assess if the problem identified in the previous year has been solved and its

impact on the audit of the financial statement accounts. Given the constant pressure from clients to lower audit fees, auditors should have the greatest opportunity to lower fees in a continuous audit environment when the internal controls over financial reporting are working effectively. This leads to the final set of hypotheses:

H3a: The external auditor will budget fewer audit hours for the engagement in a continuous audit environment than in a traditional audit environment.

H3b: The external auditor will budget more audit hours for the engagement when the prior year audit identified a material weakness over internal controls.

H3c. A continuous audit environment will provide a smaller reduction in budgeted audit hours for the engagement when the prior year audit identified a material weakness over internal controls.

3. RESEARCH METHOD AND DESIGN

To test the hypotheses, we employ a 2 x 2 between-subjects experiment with 2 treatment conditions: frequency of internal audit testing (continuous audit or traditional audit) and prior period material weakness (present vs. absent). The experiment was distributed electronically using social media and personal connections within firms to reach external auditors with at least three years of experience and working for one of the large international audit firms. The participants were asked to evaluate their level of reliance on internal audit's work, the resulting adjustment of budgeted audit hours for the main audit segment targeted by the internal auditors, and the adjustment to the overall budget for the audit engagement. They were compensated with their choice of a \$5 Amazon or Starbucks gift card.

Participants

One hundred auditors participated and were randomly assigned to one of four experimental conditions. However, one person was dropped from the final sample for having only two years of audit experience, while twelve failed our manipulation checks. The results reported are based on the responses from the remaining 87 participants. The average participant is 32 years old, has 5.76 years of audit experience, and at least a bachelor's degree. Approximately 54% of respondents were seniors and 28% managers, while 77% of the sample reported having prior experience with clients who implemented continuous audit systems (see Table 1).

[INSERT TABLE 1 ABOUT HERE]

Experimental procedure

The experimental materials used in this study are adapted from the cases in Glover et al. (2008) and manipulations applied in Hunton et al. (2008). The scenario describes a continuing audit client with a steady increase in sales, but who is pressuring the auditor to reduce the fee associated with the audit engagement. The case includes findings from the prior year audit engagement regarding internal controls, a description of the internal control environment, and information on the complexity of the inventory valuation account (see Appendix A for detailed case descriptions). After reading the study materials, participants are asked to answer questions measuring the dependent variables, two manipulation checks, and demographic questions.

Independent variables

Both independent variables are tested using between-subjects manipulations. The frequency of audit is manipulated as periodic (traditional) or continuous audit, as participants are informed about the internal control environment and management's implementation of the continuous audit system. The traditional audit assumes uncertainty about the timing and the sample selected

for evaluation (Anderson and Young, 1988), as “the internal audit department audits on a rotating basis such that most divisions are audited once every three years, but higher risk units are audited annually.” The continuous audit environment includes procedures to address control on the one hand and data on the other, as some companies do not have automated process controls or they are not accessible (Kogan et al, 1999; Krell, 2006; Alles et al., 2006; Coderre, 2006). The continuous audit manipulation is described as a transaction-based monitoring system, which “collects and compares actual and budgeted information on projects from the system’s database and tests transactions for unexpected variations, errors, and control violations.” In both the traditional and continuous audit scenarios, significant variances and control exceptions are reported to management, either at the end of the audit, or continuously as they are identified, respectively.

The material weakness condition is manipulated using the findings of the tests over internal controls during the prior year audit engagement, which revealed either that the internal controls over financial reporting are effective in all material respects, or that there was a material weakness found in the controls affecting the inventory valuation account, a higher risk account.

Dependent variables

After the background and the operationalization of the two manipulations, the participants are asked to make decisions about the extent of reliance on internal audit’s work, the adjustment of the budget allocated for the higher risk account (inventory valuation), and the adjustment of the final budget for the audit engagement. The participants’ reliance (RELIANCE) on internal audit work is measured similarly to Glover et al. (2008), using an 11-point scale (where 0 = no reliance, 5 = moderate reliance, and 10 = extensive reliance).

The participants are then asked as to how they would adjust the budgeted audit hours for the higher risk account valuation, in percentages. On the one hand, more frequent reporting to management (continuous audit) would provide more confidence in the internal audit work, allowing the external auditor to reduce the budgeted hours, while on the other hand, the continuous audit system itself requires some level of testing before complete reliance can be assumed. Thus, participants make their choice on an 11-point scale anchored at “significantly decrease” (-5), “do not adjust” (0), and “significantly increase” (5).

The third dependent variable, the adjustment of the overall audit budget, is measured using a complete scale question (reduce to increase) where participants can choose any integer value between -100% and 0 for a reduction in budgeted hours and between 0 and 100% for an increase in budgeted hours.

Manipulation checks

After reading the case and answering the questions related to the main hypotheses, two questions were used to assess participants’ understanding of the key manipulations. The participants were asked to verify whether in the case they read there was a material weakness in internal controls at the end of the prior year and when the internal audit team performed the audit of inventory valuation. The results reported are compiled only using the answers of the participants who passed both manipulation check questions. Of the one hundred external auditors, twelve failed at least one of our manipulation checks.

4. RESULTS

The underlying theory and prior research suggest that internal control deficiencies interact with the audit environment and have implications for auditor reliance on internal audit work, as

well as cost implications stemming from perceived changes in the necessary work performed to reach an opinion over the fairness of the financial statements. The hypotheses are tested using univariate analyses of variance (ANOVA) coupled with planned comparisons as post-hoc procedures. The analyses compare the effects of internal audit frequency (continuous audit or traditional audit) and material weakness (present vs. absent) on the three dependent measures: reliance, adjustment of budgeted hours for the valuation of a high complexity account, and adjustment of budgeted hours for the overall audit engagement.

H1 predicts that the external auditor will rely more on internal audit work in a continuous audit environment than a traditional audit environment. However, an identified prior year material weakness will cause less reliance on the internal audit function. Panel A of Table 3 summarizes the descriptive statistics confirming the predicted directionality of the external auditors' reliance on the work performed by internal auditors, consistent with an ordinal interaction (see Figure 1). The participants in all conditions recommended that their firm rely at least somewhat moderately on the internal audit function (means ranging from 3.91 to 6.38 across treatments, on a 0 to 10 scale, where 0 = no reliance, 5 = moderate reliance, and 10 = extensive reliance).

[Insert Table 3 about here]

[Insert Figure 1 about here]

In Table 4, Panel B presents the results of the univariate ANOVA testing for effects on external auditors' reliance. The assessment of auditor reliance in continuous (traditional) audit is 6.00 (4.64), a statistically significant difference in a one-tailed test, $F(1,83)=6.058$ ($p=.008$). H1a is supported. The mean reliance for the material weakness conditions are 5.12 and 5.50 for absent and present conditions, respectively, which are not significantly different. H1b is not

supported. Finally, the results of the ANOVA do support the presence of the predicted ordinal interaction between continuous audit and material weakness, $F(1,83)=3.889$ ($p=.026$, one-tailed), indicating that auditors would significantly extend the level of reliance associated with a continuous audit in comparison to a traditional audit when there is no prior year material weakness while limiting that difference when there is a prior year material weakness. A planned comparison was employed to test the effect of the type of audit within the material weakness condition (Table 3, Panel C). When there is no prior year material weakness, the difference in reliance for a continuous versus traditional audit is significant ($t=3.117$, $p=.002$ one-tailed), but when there is a prior year material weakness that difference is not significant ($t=.348$, $p=.365$ one-tailed). H1c is supported.

H2 predicts that the audit budget for the valuation of a high complexity account is influenced by the frequency of audit testing (H2a), as well as the presence of a material weakness in the prior year (H2b). In addition, H2c predicts that auditors would perceive a greater opportunity for budgeted audit hour reduction for the account valuation in the presence of continuous audit, when there is no internal control deficiency identified in the prior year. The results of the univariate ANOVA are shown in Table 4. The means provided in Panel A show that the auditors' estimate of the adjustment was not dramatic (means ranging from $-.29$ to 1.14 across all four conditions, using a -5 to 5 scale, where -5 = significantly decrease and 5 = significantly increase).

[Insert Table 4 about here]

[Insert Figure 2 about here]

Panel B of Table 4 shows the results of the ANOVA, indicating a significant difference between the adjustment of audit hours in the presence and in the absence of a prior year material

weakness (H2b), $F(1,83)=4.373$ ($p=.020$, one-tailed). There was no significant difference between the type of audit conditions (H2a), $F(1,83)=1.006$ ($p=.160$, one-tailed). Thus, H2a is not supported while H2b is supported.

H2c predicts that the greatest budget reduction should arise from the introduction of continuous auditing into the specific audit segment when there was no prior year material weakness. A planned comparison is used with the weights 1, -3, 1, 1 for the traditional-no-material-weakness, continuous-audit-no-material-weakness, traditional-material-weakness, and continuous-audit-material-weakness conditions, respectively. The results shown in Panel C support this hypothesized effect, external auditors are most willing to reduce budgeted audit hours for a higher complexity account valuation when internal audit utilizes continuous auditing and when there is no identified prior year material weakness ($t=1.830$, $p=.036$ one-tailed). Thus, H2c is supported.

H3 states that the frequency of internal audit testing (continuous versus traditional) will influence the external auditor's adjustment of audit hours for the current year engagement. Auditors will budget fewer audit hours for an engagement in a continuous audit environment compared to a traditional audit environment, and they will budget more hours when there is a material weakness present. In addition, external auditors are predicted to put forth the greatest audit hour reduction when there is a continuous audit system in place and there was no material weakness identified in the previous year. Panel A of Table 5 shows the descriptive statistics for the adjustment of budgeted audit hours for the engagement in the four conditions. In both traditional audit conditions and the continuous-audit-material-weakness condition the means indicate increases in engagement budgets as more work is scheduled (means ranging from 9.14%-11.41%), while only the continuous-audit-no-material-weakness condition mean is

consistent with a reduction in budgeted hours (-9.52). The overall results are consistent with prior research which shows a trend toward increasing audit fees due to regulatory bodies asking for more thoroughness in audits.

[Insert Table 5 about here]

[Insert Figure 3 about here]

Panel B presents the results of the univariate ANOVA, showing support for the third set of hypotheses. Continuous audit (H3a) is a statistically significant factor affecting the budgeted hours for the engagement, $F(1,83)=1.832$ ($p=.090$, one-tailed). As expected, the second main effect, material weakness is also statistically significant, $F(1,83)=1.981$ ($p=.082$, one-tailed). Both H3a and H3b are supported. Similar to H2c, H3c predicts that the greatest budget reduction should arise from the introduction of continuous auditing when there was not prior year material weakness—a further improvement of the internal control environment. In order to test H3c, a planned comparison is used with the weights 1, -3, 1, 1 for the traditional-no-material-weakness, continuous-audit-no-material-weakness, traditional-material-weakness, and continuous-audit-material-weakness conditions, respectively. The results shown in Table 5, Panel C support the hypothesized effect, external auditors are most willing to reduce the overall audit budget when internal audit introduces continuous auditing and there is no prior year material weakness—a good control environment being improved by internal audit. The overall reduction in budgeted hours for the audit engagement in the continuous-audit-no-material-weakness condition is significantly different from the other conditions ($t=2.208$, $p=.015$ one-tailed). H3c is supported.

5. DISCUSSION AND CONCLUSIONS

The results of this study indicate that the presence of a continuous audit module has behavioral effects on external auditors' decision processes. Consistent with regulatory guidance, external auditors exhibit a willingness to place some degree of reliance on their client's internal audit work. The results of this study suggest auditors place a higher degree of reliance when automation of control monitoring and transaction testing is involved, namely continuous audit procedures. However, this benefit of audit automation diminishes for firms with a history of control problems as embodied by internal control deficiencies reported during the prior year's audit. We find that the auditor chooses the lowest budgeted hours for a high complexity account valuation when a continuous audit system is in place and there is no material weakness in internal controls identified in the prior year.

Consistent with the guidelines provided by COSO, our results also indicate that external auditors see a material weakness over internal controls as a key determinant in scheduling additional work for the current year audit within specific audit areas when a prior year material weakness over controls were reported with the prior year audit. The observed effects, even with enhanced internal control processes via continuous auditing modules, are likely induced in part by the external auditor's need to familiarize themselves with the technology implemented at the client's site, which would translate into additional hours spent testing the continuous audit system. Assessing the system design and robustness appears to warrant greater time when prior year control issues suggest the audit area covered by internal audit's continuous auditing modules may be riskier. Future research should explore further as to the balance between the need to evaluate new systems and the time savings that are garnered by improvements in internal control system processes as provided through continuous auditing.

Considering the overall budget for the engagement, our results are consistent with Protiviti's *2013 Sarbanes-Oxley Compliance Survey*, showing a year-over-year increase in external audit fees. External auditors are willing to reduce the audit budget for the engagement for a continuous audit client who did not have a material weakness identified in the prior year, but in all other conditions audit work was extended. Although the presence of continuous audit in a material weakness situation seems to imply an increase in budgeted hours for the engagement, this may only be a temporary effect. The external auditor needs to be more familiar with the technology updates and enhancements before adjusting the procedures for auditing the financial statements based on the output of the continuous audit system. This effect might be reversed in subsequent years, if the technology proves effective and robust regarding improvements. Future research should explore whether maturity of continuous auditing systems that provide reliable information on consistent enforcement of controls can help ameliorate the persistence in higher fees over subsequent years for firms who have had a reported material weakness.

This study extends prior research examining the effects of continuous audit on audit firms and subsequently, their clients. Our results are important for companies and managers who have implemented or are planning to implement continuous audit technologies in order to improve the effectiveness of internal controls (Masli et al. 2010), but also their investors, employees and other stakeholders. Our results show that the move toward a more automated environment improves auditor reliance on internal audit work and can translate into a reduction in budgeted hours, which can potentially lower audit fees. From a research perspective, this paper brings together continuous audit research with the material weakness literatures, in order to better understand the underlying effects of the presence of such a technology in internal audit environments—the arena in which such technologies are most extensively used.

A limitation of the current study is its narrow window of time. The study focuses on the one-year period after a material weakness has been reported in a continuous audit environment. As noted, further research is needed to fully understand the long-term implications of more automated procedures like continuous audit and their robustness for improvements when deficiencies are identified. The benefits may be more prevalent further out in the future when the auditor has more experience with internal audit's use of continuous auditing systems and as such systems both mature within the client and become more pervasive across the overall internal control environment of the client.

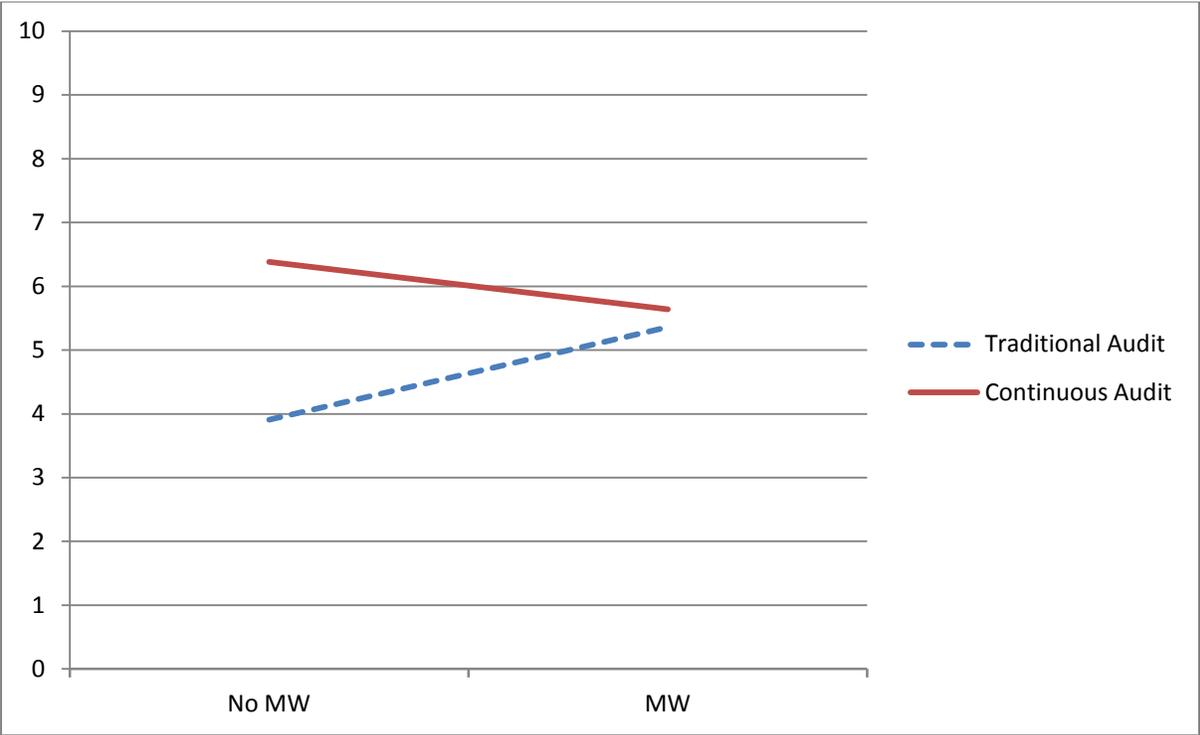
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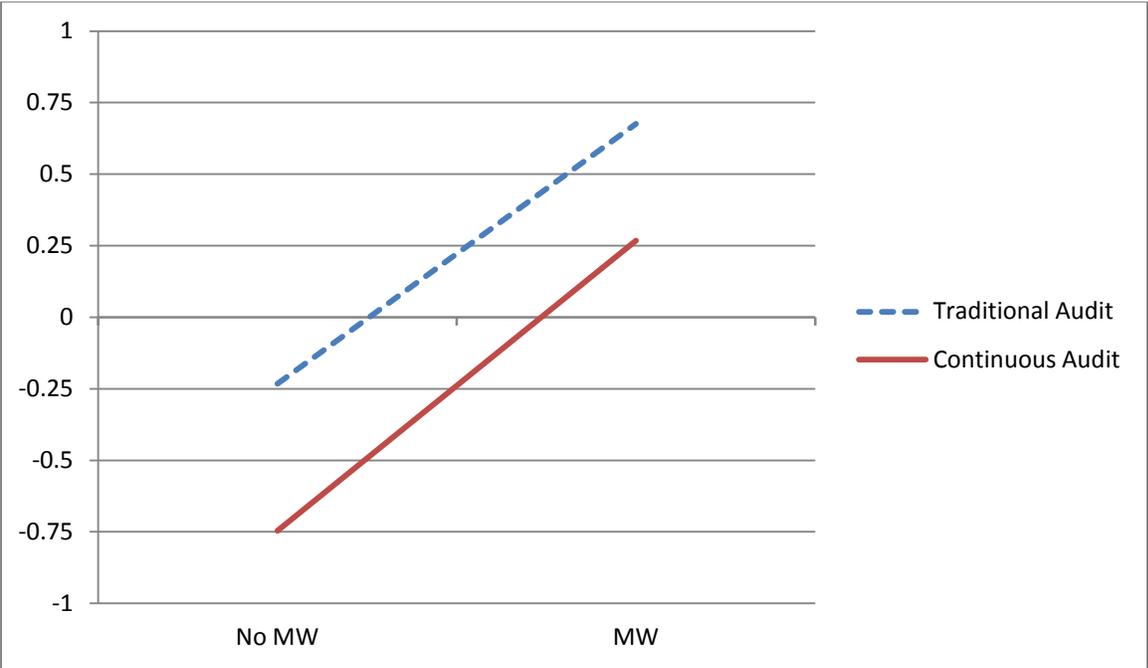
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Figure 1. Reliance on Internal Audit Work



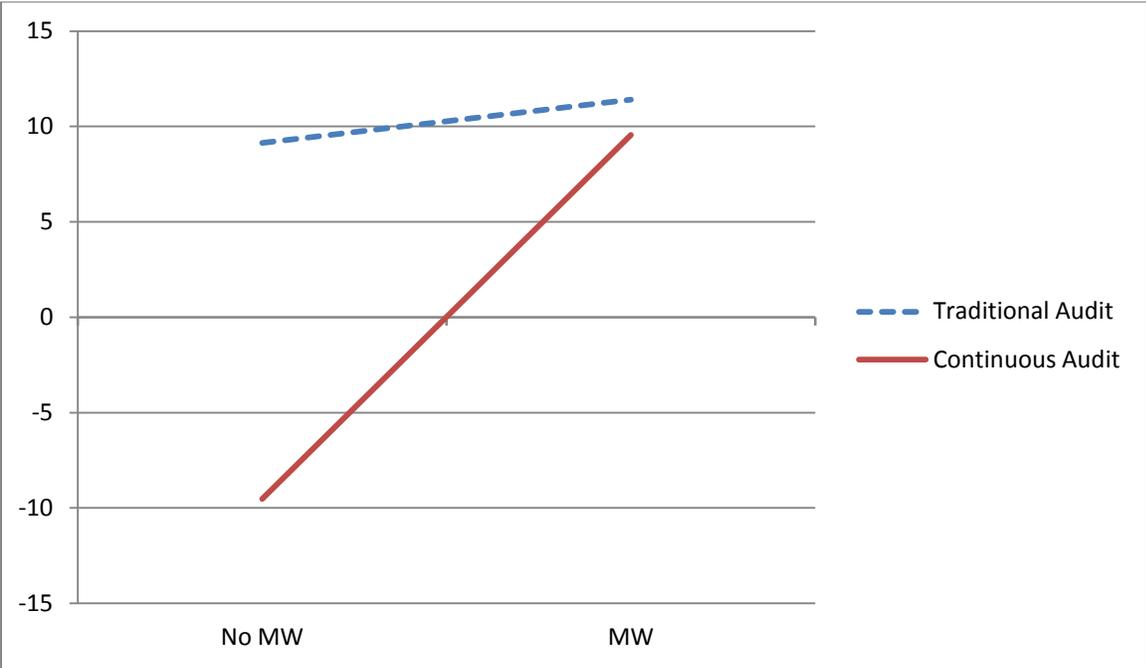
^a Dependent Variable Coding: (0 = No reliance, 5 = Moderate reliance, 10 = Extensive reliance)

Figure 2. Adjustment of budget based on Internal Audit Work (Mean Centered Data^a)



^a Dependent Variable Coding: The graphical representation uses mean centered data as the respondents did not use the full scale available (Field 2013, pg. 396-397). None of the participants used the end points of the scale. Qualitatively and statistically, the results are the same using both the raw and the mean centered data.

Figure 3. Adjustment of audit hours for current year's engagement^a



^a Dependent Variable Coding: (-100 to 0 = % Decrease, 0-100 = % Increase)

Table 1. Demographic information (N=87)

Age	<u>Number</u>	<u>Percent</u>
Under 25	2	2.30
25-29	26	29.89
30-34	33	37.93
35-39	20	22.99
40+	6	6.90
 Work experience		
3-4 years	40	45.98
5-7 years	25	28.74
8-11 years	22	25.29
 Title		
Staff auditor	11	12.64
Senior auditor	47	54.02
Audit manager	24	27.59
Audit director	4	4.60
Audit partner	1	1.15
 Experience with clients who implemented Continuous Audit		
Yes	67	77.01
No	20	22.99

Table 2. Number of Participants

	No Material Weakness	Material Weakness	Total
Continuous Audit	21	22	43
Traditional Audit	22	22	44
Total	43	44	87

Table 3. Summary of Reliance on work performed by internal auditors

Panel A: Cell Means – Mean (std. dev.) [Cell size]

	No material Weakness	Material Weakness	Average
Traditional Audit	3.91 (2.62) [22]	5.36 (2.95) [22]	4.64 (2.85) [44]
Continuous Audit	6.38 (2.11) [21]	5.64 (2.63) [22]	6.00 (2.39) [43]
Average	5.12 (2.67) [43]	5.50 (2.77) [44]	5.31 (2.71) [87]

Panel B: ANOVA Results

Source	df	Mean Square	F-Ratio	p-value (one tail)
Continuous Audit	1	40.943	6.058	.008
Material Weakness	1	2.740	.405	.263
Continuous Audit * Material Weakness	1	26.286	3.889	.026

Panel C: Planned Comparisons

	t-statistic	p-value (one tail)
CA-MW > Traditional-MW (0 1 0 -1)	.348	.365
CA-NoMW > Traditional-NoMW (1 0 -1 0)	3.117	.002

Table 4. Summary of Adjustment of audit hours budgeted for valuing inventory

Panel A: Cell Means – Mean (std. dev.) [Cell size]

	No material Weakness	Material Weakness	Average
Traditional Audit	.23 (2.51) [22]	1.14 (1.96) [22]	.68 (2.27) [44]
Continuous Audit	-.29 (2.00) [21]	.73 (2.06) [22]	.23 (2.07) [43]
Average	-.02 (2.26) [43]	.93 (1.99) [44]	.46 (2.17) [87]

Panel B: ANOVA Results

Source	df	Mean Square	F-Ratio	p-value (one tail)
Continuous Audit	1	4.621	1.006	.160
Material Weakness	1	20.080	4.373	.020
Continuous Audit * Material Weakness	1	.059	.013	.455

Panel C: Planned Comparison

	t-statistic	p-value (one tail)
CA-NoMW < CA-MW, Traditional-NoMW, Traditional-MW (-3 1 1 1)	1.830	.036

Table 5. Summary of Adjustment of audit hours for current year’s engagement

Panel A: Cell Means – Mean (std. dev.) [Cell size]

	No material Weakness	Material Weakness	Average
Traditional Audit	9.14 (45.79) [22]	11.41 (38.58) [22]	10.27 (41.86) [44]
Continuous Audit	-9.52 (25.40) [21]	9.55 (27.19) [22]	.23 (27.75) [43]
Average	.02 (38.01) [43]	10.48 (33.00) [44]	5.31 (35.74) [87]

Panel B: ANOVA Results

Source	df	Mean Square	F-Ratio	p-value (one tail)
Continuous Audit	1	2289.491	1.832	.090
Material Weakness	1	2475.671	1.981	.082
Continuous Audit * Material Weakness	1	1533.425	1.227	.136

Panel C: Planned Comparisons

	t-statistic	p-value (one tail)
CA-NoMW < CA-MW, Traditional-NoMW, Traditional-MW (-3 1 1 1)	2.208	.015

APPENDIX A

General Instructions

The following case materials contain information about Lunt Technologies, a continuing client. Based on the information provided, you will be asked several questions related to planning the audit of its December 31, 2012 financial statements.

Background Information about Lunt Technologies and the 2011 Audit

Business, Industry, and Management.

Lunt Technologies is a manufacturer and marketer of specialty products serving commercial enterprises and governmental entities, primarily in the western US. The Company was founded in 1989 and went public in 2000. Eighty million shares (traded on the American Stock Exchange) are outstanding.

Management compensation consists of a relatively high fixed salary and the opportunity to earn small, relatively insignificant bonuses. Through this compensation scheme, the board hopes to encourage management to improve the long-term financial performance of the Company.

The industry has experienced a steady increase in sales for the last year. This increase in sales has helped the Company to meet analysts' stock price expectations for the last 5 quarters - causing sizable gains in the Company's stock price. Key stockholders are pleased with the growth in value that the management team has achieved.

In the past 3 years your firm has conducted complete audits of Lunt Technologies. Management is currently pressuring your company to reduce the audit fee associated with the engagement.

Last Year's Audit dated December 31, 2011

In the past 3 years, your firm has issued a clean opinion over the fairness of the financial statements. Each year your firm has also issued a statement over the effectiveness of Lunt's internal controls.

MATERIAL WEAKNESS MANIPULATION

Last year, your firm found a material weakness in internal controls over inventory valuation as of December 31, 2011, based on the criteria established in Internal Control – Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

NO MATERIAL WEAKNESS MANIPULATION

Last year, your firm found that the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2011, based on the criteria established in Internal Control – Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

CONTINUOUS AUDIT MANIPULATION

Internal Control Environment

The company's internal audit department audits on a continuous basis such that business units' activities are monitored at all times. On a continual basis, automated software collects and compares actual and budgeted information on projects from the system's database and tests transactions for unexpected variations, errors and control violations. Specifically, sales and production costs are compared against projections, and recorded spoilage and quantities returned due to defects are examined. Significant variances and control exceptions are continuously reported to the unit by the internal audit department as these exceptions occur and are detected.

On the audit of the Company, a major accounting issue is inventory valuation. Inventory accounting in this industry is more complex than in other industries because of its unique manufacturing processes, significant overhead allocations, and high risk of inventory obsolescence. Your firm's experience with similar clients suggests that companies can overstate profits by overallocating overhead to inventory and underestimating inventory obsolescence. The Company's management must apply complicated accounting methods, involving several estimates and assumptions, to allocate manufacturing costs to inventory.

Inventory valuation

Throughout the 2012 fiscal year (current year audit), the internal auditors completed audit procedures to test the Company's inventory valuation. Internal audit's procedures included obtaining and verifying representations from management. Specifically, they completed procedures such as (1) reviewing costs included as overhead and used in the determination of overhead rates, and (2) reviewing inventory turnover ratios and sales trends to identify obsolete items. The internal auditors reported any discrepancies to the inventory account valuation as they were detected. Tests for the year indicated the account was properly valued.

TRADITIONAL AUDIT MANIPULATION

The company's internal audit department audits on a rotating basis such that most divisions are audited once every three years. During an audit, the auditors collect actual and budgeted information on projects from the system's database and tests transactions for unexpected variations, errors and control violations. Specifically, sales and production costs are compared against projections, and recorded spoilage and quantities returned due to defects are examined. Significant variances and control exceptions are reported to the unit by the internal audit department whenever the audit is complete.

On the audit of the Company, a major accounting issue is inventory valuation and accordingly the inventory accounting is audited by the internal audit every year. Inventory accounting in this industry is more complex than in other industries because of its unique manufacturing processes, significant overhead allocations, and high risk of inventory obsolescence. Your firm's experience with similar clients suggests that companies can overstate profits by overallocating overhead to inventory and underestimating inventory obsolescence. The Company's management must apply complicated accounting methods, involving several estimates and assumptions, to allocate manufacturing costs to inventory.

Inventory valuation

Late in the fiscal year ending December 31, 2012 (current year audit), the internal auditors completed audit procedures to test the Company's inventory valuation. Internal audit's procedures included obtaining and verifying representations from management. Specifically, they completed procedures such as (1) reviewing costs included as overhead and used in the determination of overhead rates, and (2) reviewing inventory turnover ratios and sales trends to identify obsolete items. After completing these procedures, the internal auditors reported that the inventory account was properly valued.