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Does external auditor coordination influence internal auditor effort?

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ABSTRACT

The purpose of this study is to investigate how the level of controls testing coordination with the external auditor affects internal auditors' effort. The internal auditor's planned substantive testing audit hours are the measure of effort in this study. Regulators and stakeholder organizations have encouraged more collaboration between external and internal auditors to improve audit efficiency. The effect of external auditor coordination on internal auditors' planned audit hours has important implications for audit efficiency and effectiveness. An experiment is conducted with 112 internal auditors to examine the hypothesized effect. The study uses a 2 × 2 between-subjects design and manipulates fraud risk and external auditor coordination. Consistent with my prediction, I find that coordination moderates the relationship between fraud risk and planned audit hours. The results illustrate that although high external auditor controls testing coordination decreases internal auditors' planned substantive testing audit hours, internal auditors are more sensitive to responding to fraud risk when external auditor controls testing coordination is high.

1. Introduction

The Institute of Internal Auditors (IIA) and the American Institute of Certified Public Accountants' (AICPA) Auditing Standards Board (ASB) provide guidance regarding the coordination between internal and external auditors. IIA standards state that the chief audit executive should coordinate activities with external providers of assurance (e.g., external auditors) to ensure proper coverage and minimize duplication of effort (Institute of Internal Auditors, 2017). The ASB's Auditing Standard AU Section 322 (2003, paragraph 0.23) suggests that external auditors and internal auditors coordinate their work by "holding periodic meetings, scheduling audit work, providing access to internal auditors' working papers, reviewing audit reports, and discussing possible accounting and auditing issues." AU Section 322 also states that external auditors may request direct assistance from internal auditors with external auditors supervising, reviewing, evaluating and testing the work performed by internal auditors (American Institute of Certified Public Accountants' Auditing Standards Board (ASB), 2003). While the auditing literature provides evidence about how coordination impacts the work of external auditors (Gramling, Maletta, Schneider, & Church, 2004; Krishnamoorthy & Maletta, 2016; Lin, Pizzini, Vargus, & Bardhan, 2011; Pizzini, Lin, & Ziegenfuss, 2015), little is known about how external auditor coordination impacts the work of internal auditors. Understanding how internal auditors' behavior is affected by their coordination with external auditors is important because it is an economically important relationship that can be facilitated by a richer understanding of the nuanced interaction between both types of auditors.

The purpose of this study is to examine how the level of controls testing coordination (CTC) with the external auditor affects internal auditors' audit planning related to substantive testing audit effort. In this study, external auditor coordination represents the extent that internal auditors collaborate with external auditors during the controls testing process. Previous auditing research describes the reduction of task duplication, cost efficiency benefits and audit work plan improvement that are positive outcomes of coordination between internal and external auditors (Pike, Chui, Martin, & Olvera, 2016; Soh & Martinov-Bennie, 2011) but it also provides evidence that external auditor coordination effects internal auditors' fraud risk assessments (Wang & Fargher, 2017). From an audit efficiency standpoint, internal-external auditor coordination may result in overall less audit effort, but internal auditors' audit effort may change at different rates based on different environmental factors (e.g., external auditor coordination with audit work and fraud risk). What is still unclear in the auditing literature is how different environmental factors influence internal auditors' audit planning and audit effort. I hypothesize that two environmental factors,

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fraud risk and the level of CTC with the external auditor, will influence internal auditors' audit effort related to the number of planned substantive testing hours.

The study employs a 2 × 2 between-subjects experiment manipulating the factors of fraud risk (low or high) and level of CTC with the external auditor (low or high). I examine the effects of these independent variables on internal auditors' planned substantive testing audit hours. Planned audit hours measure the internal auditors' work effort. I rely on substitutes for leadership theory (Kerr & Jermier, 1978) to develop a hypothesis about the potential difference in the planned substantive testing audit effort made by internal auditors with low external auditor coordination compared to that of internal auditors with high external auditor coordination. Howell, Dorfman, and Kerr (1986) describe how leader substitute moderator variables guide, neutralize (have different effects at different levels) and impact dependent variables. The high external auditor CTC condition in this study states that internal auditors' work will be supervised, reviewed and evaluated by the external auditor, while the low external auditor CTC condition states that internal auditors' work will only be relied upon by the external auditor (with a request to access internal auditor workpapers). Based on the leader substitute moderator variable model, I expect that external auditor coordination will have a moderating effect on internal auditors' effort. This study includes 112 internal auditor participants representing both public companies and nonpublic organizations in 17 different industries.

The results indicate that high external auditor CTC has contrasting effects on internal auditors' planned substantive testing audit effort under different conditions. I find that internal auditors budget less substantive testing audit effort when external auditor CTC is high than when external auditor CTC is low. I also find that internal auditors under the high external auditor coordination condition respond to increased fraud risk at a reduced rate than internal auditors under the low external auditor coordination condition. This finding is surprising given that an increase in fraud risk should also increase planned audit effort (no matter the coordination level with the external auditor). Based on moderation analysis, I find that internal auditors budget more substantive testing hours under the high fraud risk condition than under the low fraud risk condition when CTC with the external auditor is high. Overall, the findings suggest that more CTC with external auditors heightens internal auditors' sensitivity to fraud risk.

The results of this study have research and practice implications. From a research perspective, the findings provide evidence that the level of external auditor coordination influences internal auditors' effort. Only one published study to date examines external auditor coordination and fraud risk assessments from the internal auditing perspective (Wang & Fargher, 2017); most of the auditing literature focuses on the factors that affect external auditors' reliance on the work of internal auditors (Brody, 2012; Gramling et al., 2004; Krishnamoorthy & Maletta, 2016; Lin et al., 2011; Pizzini et al., 2015). This study also responds to previous calls for research to: (1) explore the relationship between internal auditors' sensitivity to fraud risk factors and their subsequent auditing procedures (Church, McMillan, & Schneider, 2001), (2) separately consider internal auditors in a direct assistant or reliance role (Prawitt, Sharp, & Wood, 2011), (3) consider the coordination of internal and external audit work (Bame-Aldred, Brandon, Messier, Rittenberg, & Stefaniak, 2013; Lenz & Hahn, 2015) and (4) examine the combined effect of external auditor coordination and fraud factors on internal auditors' work (Martin, Sanders, & Scalan, 2014). From a practice perspective, the findings of the study suggest that high CTC with the external auditor influences internal auditors' substantive testing audit effort and sensitivity to fraud risk. The results provide audit efficiency insight that internal audit managers and chief audit executives can use to evaluate the cost effectiveness of the internal audit function, monitor internal auditors' resource allocation decisions, and review internal audit results (Eulerich, Kremin, & Wood, 2019). The unexpected result that internal auditors budget less effort when coordinating with external auditors suggests that external auditors should critically review audit plans and internal auditor budgeted hours when coordinating audit work. The fraud sensitivity results can be used by internal audit managers and chief audit executives to assess the risk management processes related to internal audit quality (Trotman & Duncan, 2018) and coordinate fraud risk activities with external auditors.

The next section discusses background information, reviews the literature and develops the hypothesis. The subsequent sections present the experimental design, method, results and conclusion.

2. Background and hypothesis development

2.1. External auditor coordination and internal audit effort

The majority of existing auditing literature at the intersection of external and internal auditing discusses external auditors' reliance on the internal audit function. Some of the factors that influence this reliance on internal auditors include: internal auditors' detailed workpaper documentation (Brink & Witt, 1982), inherent risk (Maletta, 1993), how external auditors define reliance (Campbell, 1994), external audit fee pressure from clients (Gramling, 1999), the extent of coordination between external and internal auditors (Felix, Gramling, & Maletta, 2001), PCAOB accountability (Petherbridge & Messier, 2015) and external auditors' evidence-gathering choices (Pike et al., 2016). Although the aforementioned studies document coordination from the external auditor perspective, fewer studies consider how the internal audit function is influenced by coordination with external auditors. Felix, Gramling, and Maletta (1998) discuss how the coordination between internal and external auditors can serve to increase the effectiveness of internal auditors' contributions to financial statement audits. Felix et al. (2001) provide evidence that organizations can influence the extent of internal auditor contribution by facilitating more coordination between internal and external auditors. Abbott, Parker, and Peters (2012) provide evidence of a moderating relationship between internal audit function assistance and coordination with the external auditor based on archival data. Martin et al. (2014) find that there is a high level of external auditor involvement in internal audit departments' audit work programs. Lastly, Wang and Fargher (2017) show that external auditor coordination has an effect on internal auditors' fraud risk assessments. Felix et al. (1998) and Felix et al. (2001) support the view that internal-external auditor coordination improves overall audit quality, while Abbott et al. (2012), Martin et al. (2014) and Wang and Fargher (2017) illustrate that internal-external audit coordination affects audit efficiency, audit planning and fraud risk judgments. Based on the prior literature, this study seeks to gain a deeper understanding of how coordination with external auditors affects internal auditors' audit planning effort.

Specifically, this study investigates whether internal auditors' CTC with external auditors impacts internal auditors' substantive testing effort at different levels of fraud risk. Internal controls are an important link in the internal-external auditor relationship. Both auditor groups have a shared interest in internal control risk management, internal auditors are concerned about monitoring their organizations' internal control environment and external auditors are concerned about the effectiveness of internal control over financial reporting. Given that the results of controls testing influence the scope of substantive testing and that Pike et al. (2016) discuss that external auditors are involved in internal auditors' internal control testing process, this study explores how CTC influences internal auditors' substantive testing hours. Previous studies (Martin et al., 2014; Pike et al., 2016) provide evidence that when internal auditors receive guidance from external auditors with their audit programs, they perceive that their work has been "validated" and is improved by external auditors' assistance. The high external auditor coordination condition in this study is measured as external auditors asking internal auditors for their direct assistance in performing tests of controls while supervising, reviewing and evaluating internal

auditors' work and holding weekly meetings with them. The dependent variable measure in this study is internal auditors' planned substantive testing hours.

2.2. Substitutes for leadership theory

Since controls testing work dictates substantive testing work, the external auditor CTC with internal auditors is viewed as a substitution for later internal audit substantive testing work in this study. Based on the substitutes for leadership theory, Kerr & Jermier (1978, p. 395) define a substitute as "a person or thing acting or used in place of another." I apply management research's leader substitute moderator variable model (Howell et al., 1986) to direct my examination of the external auditor CTC substituting for internal auditor planned substantive testing audit hours in this study. Three conditions of the leader substitute moderator variable model are: (1) there must be a logical reason why the substitute should provide the guidance indicated by the dependent variable, (2) the substitute must be a neutralizer-moderator; meaning that at certain levels, it must weaken the leader behavior's effect on the dependent variable and (3) the substitute must have an impact on the dependent variable (Howell et al., 1986). Kerr and Jermier (1978) state that leader substitution guidance is offered in the form of task structuring. I posit that the guidance, sense of validation and work improvement that internal auditors perceive from external auditors' involvement in their audit planning (Martin et al., 2014; Pike et al., 2016) places external auditors in a leader role when coordinating with internal auditors. Related to the first leader substitute moderator variable model condition, I expect that external auditor CTC provides guidance for the internal auditors' planned substantive testing hours (the dependent variable in this study). Related to the second condition, I expect that the low and high external auditor CTC will have different effects on internal auditors' planned substantive testing hours. Although, prior research discusses how coordination between internal and external auditors reduces duplication of tasks and promotes cost efficiency (Soh & Martinov-Bennie, 2011), I believe that this outcome may not hold at different levels of fraud risk as previous research (Wang & Fargher, 2017) provides evidence that external auditor coordination influences internal auditors' fraud risk assessments. Related to the third condition, prior auditing research provides evidence that external auditor coordination has an impact on internal auditors' audit planning (Martin et al., 2014; Pike et al., 2016). In sum, I predict that the level of fraud risk on internal auditors' planned substantive testing audit hours will be moderated by the level of external auditor CTC, where internal auditors will respond more strongly to high external auditor CTC compared to low external auditor CTC:

Hypothesis. High external auditor controls testing coordination moderates the relationship between fraud risk and planned internal auditor substantive testing hours.

3. Method

3.1. Participants

The participants are 112 internal audit professionals representing seven IIA chapters and companies in the U.S.[1] Given the fraud flags listed in the study, I attempted to survey participants with sufficient internal audit work experience. Internal auditors representing different industries were also surveyed in order to obtain generalizable results.

Survey questionnaires (see Appendix) were distributed to participants online via email invitation and in person at local IIA Chapter meetings. In total, requests were sent to 2534 target participants. I received 199 total responses, but only 112 were usable. Fifteen surveys had missing data, eight surveys were incomplete, two respondents failed the attention check (outsource assumption), 35 failed the manipulation check (coordination level with the external auditor),[2] two respondents failed both checks, 19 outliers were removed,[3] and six respondents did not have internal audit experience. This study's response rate of 7.85% is comparable to that of other studies with internal auditor samples (Abbott, Parker, & Peters, 2010; Stefaniak, Houston, & Cornell, 2012). The average completion time for the experiment was 11 min.

3.2. Research design

The experiment involves a 2 × 2 between-subjects design. Fraud risk is manipulated as low or high, following Norman, Rose, and Rose (2010), and external auditor CTC is manipulated as low or high (see Appendix). Adapting AU Section 322 (American Institute of Certified Public Accountants' Auditing Standards Board (ASB), 2003), the high external auditor coordination condition states:

The external auditor asks for your direct assistance in performing tests of controls over cash and accounts receivable. The external auditor will supervise, review, and evaluate your work as well as hold weekly meetings with you.

The low external auditor coordination condition states:

The external auditor will be relying on work that you have already performed for testing controls over cash and accounts receivable. The external auditor requests access to your working papers.

Prawitt et al. (2011) highlight the importance of researchers separately considering the use of internal auditors as assistants (operationalized as high coordination in this study) and reliance on work previously performed by the internal audit function (operationalized as low coordination in this study). This separate consideration is essential because their study finds an association between external audit fee reductions and the direct assistance of internal auditors, but not reliance on work previously performed by internal auditors (Prawitt et al., 2011) which implies that different coordination levels may have different effects on the internal-external auditor relationship.

3.2.1. Independent and moderating variables

The level of fraud risk is the independent variable. It is manipulated as either low (0) or high (1), following Norman et al. (2010). The low fraud risk condition includes six low fraud cues (e.g., low degree of competition, or market saturation and insignificant declines in customer demand and decreasing business failures in either the industry or overall

[1] The chapter presidents of these IIA chapters emailed their members the survey link on behalf of the author. Participants were also solicited to sign up for the online version of the survey at local chapter meetings and the author was allowed to distribute paper versions of the survey at two chapter meetings.

[2] Nineteen of the 35 respondents who failed the manipulation check were also missing other data from their survey responses. Manipulation check failure coupled with missing data could suggest inattentiveness to the survey.

[3] The outliers are removed based on Boxplot analysis that identified them as extreme data points. The main results of this study do not generalize to the sample that includes these outliers. The observations range from 4 to 3500 planned internal audit hours. The range of the low-end outliers is 4 to 5 h (8 h is the lowest observation included in this study's sample). The range of the high-end outliers is 600 to 3500 h (550 h is the highest observation included in this study's sample). Additionally, I conduct a *t*-test on the years of professional internal audit experience comparing the outlier group to the participant group. I find a statistically significant difference between the two groups: mean years of professional internal audit experience for the outlier group = 6.21, mean years of professional internal audit experience for the participant group = 11.01, $t = 2.050$, $p = 0.042$ (two-tailed). One potential cause of the extreme data points for the outlier group is significantly less internal audit experience than the participant group as the average years of internal audit experience for other studies that used variations of the adapted instrument are 8.84 (DeZoort & Harrison, 2008) and 9.60 (Norman, Rose, and Rose (2010)).

economy). In contrast, the high fraud risk condition includes six high fraud risk cues (e.g., high degree of competition, or market saturation and significant declines in customer demand and increasing business failures in either the industry or overall economy).

As expressed in my hypothesis, the moderating variable is external auditor coordination. As discussed above, the level of external auditor coordination is manipulated as either high (the external auditor asks the internal auditor for direct assistance with performing controls testing, in which the internal auditor will work under the direct supervision of the external auditor and have highly coordinated audit activities) or low (the external auditor relies on the controls testing work already performed by the internal auditor, in which the internal auditor will have very little interaction with the external auditor). This aspect of my research design adapts from AU Section 322 (American Institute of Certified Public Accountants' Auditing Standards Board (ASB), 2003), Felix et al. (2001), Abbott et al. (2012), and Pizzini et al. (2015). AU Section 322 provides guidance about how external auditors should use the work that has already been (independently) performed by internal auditors or use internal auditors to provide direct assistance under the external auditor's supervision (American Institute of Certified Public Accountants' Auditing Standards Board (ASB), 2003). Furthermore, archival auditing studies have measured coordination using a four-point scale ranging from a relationship characterized as coexistence ("1"), coordination ("2"), integration ("3") and partnering ("4") (Abbott et al., 2012; Felix et al., 2001). Thus, controls testing direct assistance (partnering) is operationalized as high external auditor coordination (1), whereas relying on control testing work already performed (coordination) is operationalized as low external auditor coordination (0). Hayes' (2013) moderation analysis method is used to examine whether the effect of the level of fraud risk on substantive testing hours varies based on the different levels of coordination (high or low), which cannot be determined using an ANCOVA.

Covariates in the moderation analysis are experience, gender and age based on previous studies with internal auditor samples (Fullerton & Durtschi, 2004; Norman et al., 2010). Also, professional skepticism is included as a covariate to control for higher skeptics increasing their audit effort (Hurtt, 2010). Choo and Tan (2000) provide evidence that a skeptical attitude influences the ability to detect fraud. Burnaby, Howe, and Muehlmann (2011) document that internal auditors identify skepticism as being the most effective skill at detecting top fraud risks. Quadackers, Groot, and Wright (2014) find that professional skepticism is positively correlated with external auditors' number of budgeted hours. Previous studies (Cohen, Dalton, & Harp, 2014; Quadackers et al., 2014) use the Hurtt Professional Skepticism Scale (HPSS) (Hurtt, 2010) to measure auditors' neutrality. The HPSS is used to measure the professional skepticism of internal auditors in this study (see the Appendix).

3.2.2. Dependent variable

Planned internal audit substantive testing hours is the dependent measure. Previous auditing studies illustrate that planned hours are a more direct measure of audit effort than external audit fees (Caramanis & Lennox, 2008; Che, Langli, & Svanstrom, 2018; Cohen, Krishnamoorthy, & Wright, 2007). Participants are asked to indicate the number of audit hours that they would budget for substantive audit testing. Planned audit hours is measured as the audit planning action in this study (Hoffman & Zimbelman, 2009).

3.3. Instrument and procedure

The participants completed an instrument (see Appendix) consisting of the following sections: (1) introduction and consent, (2) company background information (company, industry, financial reporting requirements, control environment, financial information and fraud risk flags), (3) external auditor coordination level, (4) professional skepticism scale questions and (5) demographic questions, and attention and manipulation checks. The case materials present a publicly-held company that has stable financial health, competent managers and a reputable internal audit department. The case materials are adapted from previous studies (DeZoort & Harrison, 2008; Norman et al., 2010). In addition, the Director of Internal Audit at a Fortune 500 company reviewed the survey instrument to ensure a realistic setting. The instrument was also given to five internal auditors working in three different industries for pilot testing and feedback (and modified based on the expert feedback).

Internal auditors who completed the online version of the survey accessed the instrument via a link that was emailed to them. The survey link was randomized, and participants were randomly assigned to one of the four treatment conditions. After providing consent, the participants were presented with information about the internal audit function, hypothetical company, related financial information and coordination level with the external auditor. The participants were then asked to rate the overall risk of financial statement fraud on a seven-point Likert-type scale with 1 = low and 7 = high (adapted from Norman et al., 2010). Next, participants were asked to indicate how many hours they would allocate to substantive audit testing, following Quadackers et al. (2014). The next portion of the study assessed the internal auditors' professional skepticism (a covariate in this study as discussed above), in which participants completed the Hurtt Professional Skepticism Scale. Following Hurtt (2010), participants were informed only that the scale is designed to measure personal characteristics and that there are no right or wrong answers to the questions. In the final section of the survey, participants answered demographic, and attention and manipulation check questions.

4. Results

4.1. Attention and manipulation checks

Participants were asked one attention check question and one manipulation check question. First, participants were asked whether the internal audit function is non-outsourced or outsourced, following Norman et al. (2010). Second, they were asked whether the external auditor will rely on work that has already been performed (for testing controls over cash and accounts receivable) or asks for direct assistance. As stated previously, two respondents failed the outsourced attention check (1.0%), 35 failed the coordination manipulation check (17.6%) and two failed both checks (1.0%). This failure rate is similar to that appearing in other internal auditor studies (Boyle, DeZoort, & Hermanson, 2015; Norman et al., 2010).

4.2. Demographics

Demographic information and the randomized experimental condition groups for the 112 participants are reported in Table 1.[4] There are ten more female (61) than male (51) participants. The age range is 22 to 65 years old, with 35% of the participants falling in the 25–34 age range. 64% of the internal auditors are very experienced (72 have more than five years of professional internal audit experience, and 40 have fewer than five years of experience). Forty-six of the participants also have external audit experience. A majority of the participants, 95 (or 84.8%) currently work in a non-outsourced internal audit department. The participants work in various industries, with the highest concentrations in government, healthcare, banking, higher education and shipping.

[4] To assess non-response bias, I conduct a *t*-test on the dependent variable comparing early responders to late responders. I find no statistically significant difference between the two groups: mean hours for early responders = 125.74, mean hours for late responders = 151.55, $t = -0.998$, $p = 0.320$ (two-tailed).

Table 1
Demographic information of the participants ($n = 112$).

Panel A: Overall demographic information		
Gender	Female	61
	Male	51
Age	22–24 years old	3
	25–34	39
	35–44	31
	45–54	23
	55 years or older	16
Total years of professional experience in *internal* audit	<5 years	40
	5–15	44
	>15	28
Total years of professional experience in *external* audit	1–5	32
	5–14	14
Current position	Non-outsourced	95
	Outsourced	2
	Other	15
Industry	Banking	14
	Casino and Gambling	1
	Finance and Insurance	7
	Government	16
	Healthcare	16
	Higher Education	13
	Manufacturing	6
	Professional Services	4
	Real Estate	3
	Shipping	12
	Technology	1
	Other	19
Professional certifications	CFE	23
	CIA	42
	CPA	42
Member of The Institute of Internal Auditors	Yes	106
	No	6
Highest degree	Bachelor's Degree	51
	Graduate Degree	61
Professional skepticism score	Mean	142
	Range	119–176
Evaluated fraud risk prior to this case	Yes	91
	No	21

Panel B: Summary demographic information by experimental condition		
Experimental conditions	Condition group number	Number of participants
Low coordination, low fraud risk	1	28
High coordination, low fraud risk	2	28
Low coordination, high fraud risk	3	28
High coordination, high fraud risk	4	28

Condition group number	1	2	3	4
Gender				
Female	17	12	15	17
Male	11	16	13	11
Average age	44	39	40	40
Mean years of internal audit experience	14	9	10	10
Mean years of external audit experience	1	2	1	3

Table 1 shows the demographic information for the 112 internal auditor participants. Panel A provides the overall demographic information and Panel B details summary demographic information by experimental condition.

Seventy-eight hold at least one certification, with the CIA and CPA designations being the most common. Members of the IIA constitute 94.6%. 54% of the participants hold a graduate degree. Related to measuring professional skepticism, the mean score on the HPSS is 142 [with a range from 119 to 176 (of 180 possible points)]. The internal auditors' average HPSS score is slightly higher than that of Hurtt (2010)'s original external auditor sample (139). Ninety-one (or 81.3%) of the participants have evaluated fraud risk prior to receiving the survey.

4.3. Covariate

This study is designed to examine the effects of fraud risk and external auditor coordination on internal auditors' planned audit hours. There is a possibility that internal auditors' years of external audit experience could affect their estimates of planned audit hours (Wang & Fargher, 2017). Therefore, years of external audit experience is included as a covariate in the study's analyses.

4.4. ANCOVA and moderation analyses

Table 2 reports the pairwise Spearman and Pearson correlation matrix for the study's variables. None of the independent variables are highly correlated with each other, and so problematic multicollinearity is apparently not an issue. A few of the variables have significant correlations with hours. A significant positive correlation exists between planned substantive testing audit hours and fraud risk. Coordination is significantly negatively correlated with planned audit hours. Age is significantly negatively correlated with planned audit hours. Internal auditors' external audit (EA) experience's significant negative association with planned audit hours provides additional validation of the use of ANCOVA in analyzing and interpreting the results.

Panel A of Table 3 reports the means for planned internal audit substantive testing hours under each treatment condition. When external auditor CTC is low, internal auditors plan 140.43 budgeted substantive testing hours under the low fraud risk condition compared to 185.29 h under the high fraud risk condition. When external auditor CTC is high, internal auditors plan 60.64 budgeted substantive testing hours under the low fraud risk condition as compared to 153.46 h under the high fraud risk condition. To investigate the effect of external auditor CTC on internal auditors' planned substantive testing hours at different levels of fraud risk, I conduct *t*-tests on the dependent variable by comparing the coordination groups. The comparison of means section of Table 3, Panel A presents results related to my hypothesis. Surprisingly, the analysis shows only a marginally significant difference ($t = -1.244$, $p = 0.096$) between the low and high fraud risk groups under the low external auditor CTC condition. There is a statistically significant difference ($t = -3.072$, $p \leq 0.001$) between the low and high fraud risk groups under the high external auditor CTC condition. There is also a statistically significant difference ($t = 2.294$, $p = 0.051$) between the low and high external auditor CTC testing groups. Overall, the comparison of means results provide support for my hypothesis and imply that internal auditors are more sensitive to fraud risk under the high external auditor CTC condition than the low external auditor CTC condition. Panel B of Table 3 presents the ANCOVA results. The ANCOVA analysis indicates that a significant negative relationship exists between internal auditors' years of professional external audit experience and the number of planned internal audit substantive testing hours ($p = 0.026$), while controlling for fraud risk and external auditor CTC. Panel B of Table 3 also shows a marginally significant coordination effect ($F = 3.682$, $p = 0.058$).

Since the fraud risk-coordination interaction is not significant in Table 3 ($F = 1.472$, $p = 0.228$), Hayes' (2013) moderation analysis

Table 2
Spearman and Pearson (in parentheses) correlation coefficients (n = 112).

Variables	Hours	Fraud Risk	Coordination	IA Experience	EA Experience	Gender	Age
Fraud risk	0.209*						
	(0.264**)						
Coordination	−0.245**	0.000					
	(−0.214*)	(0.000)					
IA experience	−0.030	−0.024	−0.123				
	(−0.142)	(−0.095)	(−0.111)				
EA experience	−0.286**	−0.032	0.236*	−0.116			
	(−0.210*)	(0.077)	(0.198*)	(−0.116)			
Gender	0.151	−0.054	0.054	0.054	−0.143		
	(0.118)	(−0.054)	(0.054)	(0.094)	(−0.033)		
Age	−0.195*	−0.044	−0.120	0.732**	0.098	−0.070	
	(−0.242*)	(−0.067)	(−0.113)	(0.654**)	(0.229*)	(−0.065)	
Skepticism	0.107	0.038	0.007	0.035	−0.073	−0.157	0.024
	(0.112)	(0.032)	(0.012)	(0.077)	(−0.099)	(−0.128)	(0.043)

**, * Denote significance at the 0.01 and 0.05 levels, respectively, two-tailed.
Table 2 shows the Spearman and Pearson correlation coefficients. Hours is the number of planned internal audit hours. Fraud risk is a dummy variable for high or low fraud risk (0 = low, 1 = high). Coordination is a dummy variable for high or low controls testing coordination with the external auditor (0 = low, 1 = high). IA experience is years of professional internal audit experience. EA experience is years of professional external audit experience. Gender is a dummy variable for the sex of the participant (0 = female, 1 = male). Age is the age of the participant in years. Skepticism is the participant's score on the HPSS.

Table 3
Effects of fraud risk and external auditor coordination on planned internal audit hours.

Panel A: Means (std. dev.) for planned internal audit hours

	Low coordination	High coordination	Total
Low fraud risk	140.43	60.64	100.54
	(111.90)	(26.89)	(90.13)
	n = 28	n = 28	n = 56
High fraud risk	185.29	153.46	169.38
	(154.63)	(157.59)	(155.52)
	n = 28	n = 28	n = 56
Total	162.86	107.05	134.96
	(135.63)	(121.41)	(131.17)
	n = 56	n = 56	n = 112

Comparison of means

Group	Low coordination *By fraud risk level*	High coordination *By fraud risk level*	Coordination *By coordination level*
t-value	−1.244	−3.072	2.294
p-value	0.096	<0.001	0.051

Panel B: ANCOVA results

	Df	MSE	F-stat	p-value
Fraud risk	1	148,134.515	9.922	0.002
Coordination	1	54,970.142	3.682	0.058
Fraud risk X coordination	1	21,980.605	1.472	0.228
Covariate: Years of external audit experience	1	76,224.901	5.105	0.026
Error	107	14,929.973		

Table 3 shows the effects of fraud risk and external auditor CTC on planned internal audit substantive testing hours. Panel A reports the means for planned internal audit substantive testing hours by experimental condition and results from t-tests comparing the means between experimental conditions (all *p*-values are two-tailed). Panel B reports the ANCOVA that tests the effects of fraud risk and coordination on planned internal audit hours.

Table 4
Moderation analysis using the PROCESS Procedure (Hayes, 2013).

Hours = α + β_1*Fraudrisk* + β_2*Coordination* + β_3*Fraudrisk* × *Coordination* + *Covariates*

Panel A: The effects of fraud risk and coordination on planned internal audit hours and demographic covariates

Variable	Predicted Sign	Coefficient Estimate	t-statistic	p-value
Intercept		3.8117	3.4311	**0.0009**
Fraudrisk (*FR*)	+	0.0448	0.1921	0.8480
Coordination (*C*)	−	−0.7636	−3.2135	**0.0018**
FR × *C*	+/−	0.7055	2.1287	**0.0357**
IA Experience	−	−0.0047	−0.3976	0.6917
EA Experience	−	−0.0443	−1.4079	0.1622
Gender	+/−	0.3867	2.2760	**0.0249**
Age	−	−0.0143	−1.3273	0.1873
Profskept	+	0.0098	1.3382	0.1838
R^2	22.67%			
n	112			

Panel B: The conditional effect of fraud risk on planned internal audit hours at values of coordination

					95% Confidence Interval	
Coordination	Effect	SE	t-statistic	p-value	Lower Limit	Upper Limit
Low	0.0448	0.2333	0.1921	0.8480	−0.4178	0.5074
High	0.7503	0.2335	3.2138	**0.0017**	0.2873	1.2133

Table 4 shows the moderation analysis using Hayes' PROCESS procedure (Hayes, 2013). Hayes (2013, 223) notes that "[e]vidence of an association between *X* [*Fraudrisk*] and *Y* [*Hours*] is not required in order for *X*'s [*Fraudrisk's*] effect to be moderated." Panel A reports the effects of fraud risk and coordination on planned internal audit hours and demographic covariates. Panel B reports the conditional effect of fraud risk on planned internal audit hours at the different levels of coordination and shows that fraud risk's effect on planned internal audit substantive testing hours is statistically significant under the high coordination condition.

procedure is used to examine an interaction effect. This moderation analysis includes a regression and a test of the key conditional effect of interest (the level of external auditor CTC).[5] The following model is used to test the relationship between planned internal audit substantive testing hours and possible predictor variables:

$$Hours = \alpha + \beta_1 Fraudrisk + \beta_2 Coordination + \beta_3 Fraudrisk \times Coordination + Covariates.$$

where:

Hours = planned internal audit substantive testing hours.

Fraudrisk = dummy variable for high or low fraud risk (0 = low, 1 = high).

Coordination = dummy variable for high or low CTC with the external auditor (0 = low, 1 = high).

Fraudrisk × *Coordination*
= interaction term between fraud risk and coordination.

Covariates.

IA experience = years of professional internal audit experience.

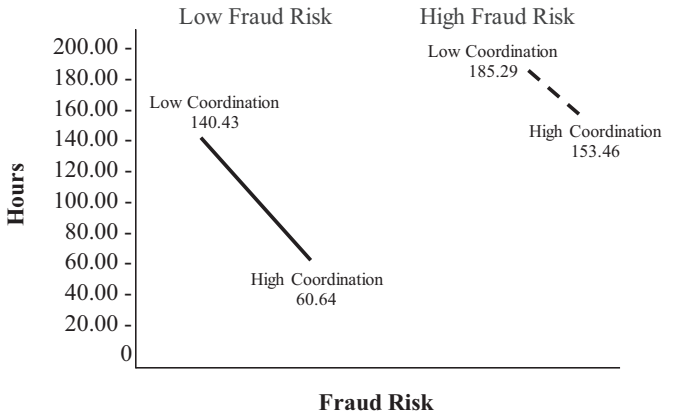

Fig. 1. Graph of mean planned internal audit hours by fraud risk level.
Fig. 1 graphs planned internal audit hours for the fraud risk (low, high) and external auditor controls testing coordination (low, high) treatment combinations. Participants were asked to indicate how many hours they would want to budget for substantive testing of the cash and accounts receivable accounts.

EA experience = years of professional external audit experience.

Gender = dummy variable for the sex of the participant (0 = female, 1 = male).

Age = age of the participant in years.

Profskept = the participant's score on the HPSS.

Table 4 displays the results of the moderation analysis. The regression in Panel A shows that planned internal audit substantive testing hours are significantly negatively related to external auditor coordination ($p = 0.002$), significantly positively related to fraud risk subject to the interaction between fraud risk and external auditor coordination (*FR* × *C*, $p = 0.036$), and significantly positively related to gender ($p = 0.025$), with $R^2 = 0.227$. My hypothesis predicts that the level of external auditor CTC will moderate the relationship between fraud risk and planned internal audit substantive testing hours. The estimated positive coefficient of *FR* × *C* indicates that the effect of fraud risk on planned internal audit substantive testing hours does depend on the level of external auditor CTC and provides support for the hypothesis. In addition, Panel B shows that this critical conditional effect is significant (p = 0.002) under the high external auditor CTC condition (*Coordination* = 1), based on a 95% confidence interval.

Fig. 1 illustrates the interaction between fraud risk and coordination. It shows that internal auditors indicate fewer planned substantive testing audit hours under the low fraud risk condition. However, internal auditors indicate significantly more planned substantive testing audit hours under the high fraud risk condition than under the low fraud risk condition when the level of CTC with the external auditor is high. This finding coupled with the comparison of means analysis from Panel A of Table 3 suggests that internal auditors are more sensitive to fraud risk when there is high external auditor CTC than when there is low external auditor CTC.

4.5. Additional analysis

The correlation and ANCOVA analyses both indicate that there is a significant negative relationship between internal auditors' years of professional external audit experience and the number of planned internal audit substantive testing hours. I also conduct a *t*-test on the dependent variable by comparing internal auditors with no external audit experience to internal auditors with external audit experience. The results illustrate that there is a statistically significant difference between the two groups, the internal auditors with external audit experience plan significantly less substantive testing hours than the internal auditors with no external audit experience. This finding could suggest that internal auditors with external audit experience are exhibiting audit

[5] As stated previously, the Hayes moderation analysis method is used to test whether the level of fraud risk's effect on hours is different based on the different levels of external auditor CTC (low or high) which cannot be determined using an ANCOVA. Untabulated ANOVA post-hoc comparisons using the Tukey HSD test indicate that the mean number of hours for the low fraud risk, high coordination group is significantly different from the high fraud risk, low coordination group ($p = 0.031$) and the high fraud risk, high coordination group ($p = 0.002$).

efficiency behavior that is emphasized in the external audit environment or that the internal auditors with external audit experience have, on average, fewer years of internal audit experience.

5. Conclusion

This study investigates internal auditors' sensitivity to fraud risk and the effect of the level of external auditor controls testing coordination on internal auditors' audit effort as measured by planned substantive testing internal audit hours. The findings indicate that the level of external auditor coordination influences internal auditors' effort. While increased external auditor CTC results in fewer planned internal audit substantive testing hours, an interaction effect indicates that the effect of fraud risk on internal auditors' planned audit hours is moderated by the extent of coordination with the external auditor. That is, the effect of fraud risk on internal auditors' planned substantive testing audit hours depends on external auditor coordination (specifically high external auditor CTC). An interesting finding is that the magnitude of the planned substantive testing hours changes at a different rate when external auditors participate in the controls testing work (under the high external auditor coordination condition) with internal auditors seeming to be less sensitive to high fraud risk under the low external auditor CTC condition. Since DeZoort and Harrison (2008) provide evidence that internal auditors report moderate levels of responsibility for fraud detection, this finding provides insight that more CTC with the external auditor could raise internal auditors' accountability for responding to fraud risk and detecting fraud.

Previous auditing studies have mostly examined coordination from the external auditor perspective but since relationships are a two-way street, it is important to examine how coordination affects the actions of internal auditors. This study provides evidence that the level of external auditor coordination impacts internal auditors' audit planning. Tysiac (2015) discusses how the duties of internal and external auditors intersect and mentions that frequent communication between internal and external auditors can enhance audit quality (Center for Audit Quality and the Institute of Internal Auditors, 2015). This study contributes to the literature by examining this relationship from the internal auditing perspective and providing insight from an understudied aspect of the internal-external auditor relationship that serves to improve internal control and audit quality.

This study is subject to some limitations. First, the evaluation of fraud risk is a complex task and the limited amount of information provided in this study's case would be insufficient in most internal auditors' work environment. Second, although planned audit hours are used as a measure of effort in external auditor studies, they may not be as homogeneous among a diverse sample of internal auditors who work for companies of varying sizes with different business objectives. While controlling for industry type was considered,[6] I did not collect internal audit staff size data that may have addressed this issue. Third, the high rate of respondents failing the coordination manipulation check question (about 18%) suggests that some participants were not being fully attentive to or did not understand whether they were directly assisting the external auditor or only providing workpapers, even though this is stated in the instrument twice. Fourth, the exclusion of extreme data outliers (resulting from internal auditors with significantly fewer average years of internal audit experience than the study's participant group) is a potential limitation to the results and inferences of this study.

Future research can explore possible factors that help explain why internal auditors exert less effort when coordinating with external auditors. It can also examine whether the moderation effect extends to internal audit managers, as previous studies highlight management's strong organizational identity (Golden, Dukerich, & Fabian, 2000) and primary concern for effective and efficient audits (KPMG & Forbes, 2016). Additional research using different tasks, problem-solving scenarios and decision aids can be conducted to explore how coordination affects internal auditors' actual performance (Mala & Chand, 2015). A recent study by Morais and Franco (2019) documents that internal auditors have a higher perception than external auditors that coordination can increase trust and cooperation. A future study could manipulate internal auditors' trust of external auditors and investigate whether trust influences internal audit procedures.

The results of this study have implications for research and practice. Prior research mainly focuses on coordination from the external auditor perspective, but this study provides evidence that coordination also has an effect on internal auditors' actions. This study also answers four previous calls for research to closely examine: (1) internal auditors' sensitivity to fraud and subsequent auditing procedures, (2) the two coordination roles of internal auditors (direct assistance or reliance), (3) the coordination of internal and external audit work and (4) the combined effect of coordination and fraud factors on internal auditors' work. The study's findings alert internal audit managers and chief audit executives that different levels of external auditor coordination affect internal auditors' resource allocation decisions at different rates. In order to avoid potential coordination losses and improve risk management, internal audit managers should consider closely monitoring internal auditors' resource allocation decisions under different environmental conditions. Even though it is well-documented that coordination benefits external auditors, this study's findings suggest that the internal-external auditor working relationship is mutually beneficial.

Declaration of Competing Interest

None

Data availability

The survey data for this study is available upon request from the author.

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Appendix A. Survey Instrument

(Adapted from DeZoort & Harrison, 2008, and Norman et al., 2010)

When reading the case materials and responding to the questions, please make the following assumptions:

[6] When the variable *INDUSTRY* is included as a covariate in the regression model, it is not significant ($p = 0.637$).

1. Assume that you currently serve as an internal auditor for High Quality Tools, Inc. (HQT) and that the internal audit function is not outsourced. *[For reviewers: the manipulation of the level of coordination with the external auditor is included in the assumption below].*

2. Assume that the external auditor asks for your direct assistance in performing tests of controls over cash and accounts receivable. The external auditor will supervise, review and evaluate your work as well as hold weekly meetings with you. **[Assume that** the external auditor will be relying on work that you have already performed for testing controls over cash and accounts receivable. The external auditor requests access to your working papers.**]**

I. Background

Introduction

HQT is a tool manufacturer that sells to distributors and select retailers. HQT is a publicly-held firm and must file annual reports with governmental regulators. The company has had stable financial health and growth. Prior year results and current year planning indicate that HQT has effective internal controls and competent management and directors. The internal audit department, of which you are a member, has a good reputation.

Summary (Unaudited) 2014 Annual Financial Information

Revenues	US $13 million
Pretax Income	US $1.4 million
Net Income	US $1.0 million
EPS	US $1.05/share (forecast $1.04/share)
A/R (net)	US $1.0 million
Inventory	US $2.8 million
Current Assets	US $4.7 million
PP&E (net)	US $3.9 million
Total Assets	US $10.5 million
Current Liabilities	US $2.0 million
Total Liabilities	US $5.6 million
Total Equity	US $4.9 million

II. Fraud Risk Checklist

Statement on Auditing Standards No. 99 includes a checklist of 40 red flags that may indicate risks of fraud. Below are HQT business characteristics noted by the internal audit function for 2014:

*[For reviewers: the following 6 cues were presented to participants in the **low** fraud risk manipulation]*

- Low degree of competition or market saturation.
- Insignificant declines in customer demand and decreasing business failures in either the industry or overall economy.
- Little need to obtain additional debt or equity financing to stay competitive-including financing of major research and development or capital expenditures.
- Moderate ability to meet debt repayment or other debt covenant requirements.
- Low vulnerability to rapid changes, such as changes in technology, product obsolescence, or interest rates.
- Insignificant amount of operations located or conducted across international borders where differing business environments and cultures exist.

*[For reviewers: the following 6 cues were presented to participants in the **high** fraud risk manipulation]*

- High degree of competition or market saturation.
- Significant declines in customer demand and increasing business failures in either the industry or overall economy.
- Need to obtain additional debt or equity financing to stay competitive-including financing of major research and development or capital expenditures.
- Marginal ability to meet debt repayment or other debt covenant requirements.
- High vulnerability to rapid changes, such as changes in technology, product obsolescence, or interest rates.
- Significant operations located or conducted across international borders where differing business environments and cultures exist.

[For reviewers: the manipulation of the level of coordination with the external auditor is repeated in the sentence below].

The external auditor asks for your direct assistance in performing tests of controls over cash and accounts receivable. The external auditor will supervise, review, and evaluate your work as well as hold weekly meetings with you. **[**will be relying on work that you have already performed for testing controls over cash and accounts receivable. The external auditor requests access to your working papers.**] :**

What do you believe is the overall risk of financial statement fraud for HQT?

1	2	3	4	5	6	7
Low Risk			Moderate Risk			High Risk

Indicate how many hours you want to budget this year for substantive testing the cash and accounts receivable accounts.

Budgeted hours in 2014: _____ hours.

[*The instrument also included Hurtt's (2010) professional skepticism survey and demographic questions that asked one attention and one manipulation check question.]*

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