

THE EFFECTS OF HUMAN RESOURCES IN INTERNAL AUDIT ON EXTERNAL AUDIT PRICING DECISION

Moon Kyung Cho *

* Division of International Banking & Finance Studies, A.R. Sanchez, Jr. School of Business, Texas A&M International University, USA
Contact details: 5201 University Blvd., A.R. Sanchez, Jr. School of Business, Texas A&M University, Laredo, TX 78041, USA



Abstract

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This study presents evidence that external audit fees are negatively and significantly associated with the proportion of general internal auditors. Further, external audit hours are negatively and significantly associated with the proportion of general auditors without affecting external unit audit price. In addition, the results of the data adjusted for firm size suggest that audit fees and audit hours decrease for smaller firms as the proportion of general internal auditor increases. The result implies that both small firms and their external auditors are encouraged to utilize more general internal auditors in performing an external audit. The author finds no evidence that external audit fees are associated with internal auditor expertise or experience. This shows that external auditors are not likely to rely on internal auditors' professional judgment in performing an external audit due to reduced auditor independence.

Keywords: Human Resources in Internal Audit, External Audit Pricing, External Audit Fees, External Audit Hours, External Unit Audit Price

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1. INTRODUCTION

The United States Committee of Sponsoring Organizations of the Treadway Commission (COSO 2013) breaks down the five components of internal control: control environment, risk assessment, control activities, information and communication, and monitoring activities into 17 principles to achieve internal audit objectives at the firm level. Among the five internal control components, principle 4 of the control environment indicates, "The organization demonstrates a commitment to attract, develop, and retain competent individuals in alignment with internal control objectives". This is accomplished by allocating a sufficient number of internal auditors with competency to support the firm's internal control system. This study elucidates

the link between human resources in internal audit and external audit pricing decision by examining external audit fees, external audit hours, and an external unit audit price.

Firms are motivated to find an acceptable level of information risk between firms and stakeholders by identifying the optimal internal control. The presence of information risk drives firms to hire external auditors, and external auditors involve internal auditors to attain a holistic understanding of firms' control environment. Thus, an examination of cross-sectional differences in external audit fees, external audit hours, and the external unit audit price would reveal direct evidence as to what type of human resources in the internal audit have affected external audit pricing decision.

Regulators, firms and auditors may find the effects of human resources in the internal audit on external audit pricing decision-useful based on three reasons. First, the Public Company Accounting Oversight Board (PCAOB) has responded to the Securities Exchange Commission's (SEC) concerns over deteriorated internal audit quality by securitizing inspections over the issuance of adverse internal control opinions (Defond & Lennox, 2017). The increases in the issuance of PCAOB inspection reports drive external auditors to be more rigorous about their internal control audits, which in turn, increase external audit fees. In the midst of continuous costs and benefits analysis of the Sarbanes-Oxley Act of 2002 (SOX) 404b by the PCAOB in association with disclosure of internal control effectiveness, regulators may find the results of this study useful whether the collaboration between in-house internal auditors and external auditors may provide an opportunity to improve audit quality in a cost-effective manner without deteriorating external auditors' independence. Next, as the demand of data analytics in the internal audit function increases, it is critical to recognize how to overcome "inadequate staffing or skills for big data analytics" by having a retrospective view to examine what type of traditional human resources in the internal audit has affected external auditors' professional judgement. The optimal mixture of human resources with financial literacy and technical skills in the internal audit will meet the future market demand (Russom, 2011; Deloitte, 2016). Lastly, SOX 404 (b) exemption culminated auditor oversight of the effectiveness of firms' internal control over financial reporting for firms with public floats of less than \$75 million has produced audit savings for clients (Ge et al., 2017). This reduced litigation and legal costs for using auditor-provided internal control effectiveness disclosures, which ultimately decreases the auditor-against litigations. On the other hand, it may lead to even higher litigation risk if ineffective internal controls are uncovered, especially for smaller firms (Doyle et al., 2007). Thus, to the extent of litigation risk due to ineffective internal controls, an examination of human resources in the internal audit on external audit pricing decision may provide useful information to external auditors.

Archival research into human resources in internal audit focuses on the effects of internal audit function as a whole on external audit fees (Felix et al., 2001), external auditors' decision to rely on the internal audit function (Glover et al., 2008; Prawitt et al., 2011; Messier et al., 2011), the effect of human resource investment on disclosure of weaknesses in internal controls (Choi et al., 2013), or the impact of statutory internal auditor characteristics and operating efficiency (Cho et al., 2015). No prior studies, to the best of the author's knowledge, examine the association of human resources in internal audit and external audit pricing decision. While most prior research depends on external audit fees as the only measure to signal either improved audit quality or a threat of auditor independence from external auditors' attributes (Krishnan et al., 2005; Higgs & Skantz, 2006; Ghosh et al., 2009), this study dissects external audit fees into external audit hours (a measure of auditor effort), and external unit audit price (a measure of auditor competency) as a combination of internal systems costs and external audit. Subsequently, this study suggests how the sufficiency (the proportion

of internal auditors in specialized fields) and competency (professional and industry experience at the management level or at the staff level) of internal auditors impacts external audit pricing decision.

This study uses the US firms within the Global Audit Information Network (GAIN hereafter) database provided by the Institute of Internal Auditors (IIA, hereafter) as the primary dataset. The GAIN database covers various types of institutions such as publicly traded firms, private firms, and educational and governmental institutions and collects data on their internal audit practices. Since the IIA does not identify the responding organizations, the samples are matched with total assets, total revenues, and operating industry according to Fama and French (1997) industry classifications, and are identified with necessary audit, financial, and corporate governance variables. Through this process, a total 175 firm-year observations for the fiscal years 2008 to 2012 are obtained.

The results present evidence that external audit fees are negatively and significantly associated with the proportion of general internal auditors. Further, external audit hours are negatively and significantly associated with the proportion of general auditors without affecting external unit audit price. In addition, the results of the data adjusted for firm size suggest that audit fees and audit hours decrease for smaller firms as the proportion of general internal auditor increases. This implies that both small firms and their external auditors are encouraged to utilize more general internal auditors in performing an external audit. The author finds no evidence that external audit fees are associated with internal auditor expertise or experience. In essence, external auditors are not likely to rely on internal auditors' professional judgment in performing an external audit due to reduced auditor independence.

This study provides the first empirical evidence concerning the effects of human resources in the internal audit on external audit fees, external audit hours, and the external unit audit price by using unique audit hour data collected by the IIA, which is not publicly available in the US. This study explores whether external audit fees increase when external audit hours or the external unit audit price increase, or both (Simunic, 1980; O'Keefe et al., 1994; Bae et al., 2016) in the light of human resources in internal audit based on principle 4 of the control environment according to COSO (2013) internal audit objectives.

The paper proceeds as follows. Section 2 describes the relevant literature and develops testable hypotheses. Section 3 describes the research design. Section 4 reports the empirical results. Section 5 offers conclusions and implications.

2. RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1. Human resources in internal audit

Following the spirit of a resource-based view, organizations may sustain competitive advantage based on core components such as physical capital, human resources, organizational resources, and financial capital (Barney, 1991, 2001). One of the major components in the internal control system is human resources. For example, COSO (2013) states that organizations shall commit to attract, develop,

and retain competent internal auditors as one control environment principles. This indicates that allocation of a sufficient number of internal auditors with competency (e.g., expertise, experience) to support the firm's internal control system is necessary in order to achieve the anticipated firm outcome (Huselid, 1995; Pennings et al., 1998). Verreault and Hyland (2005) also support that it is essential to incorporate human resource management in internal audit with a focus on risk management paradigm to create value-added internal audit function within organizations.

After a series of accounting irregularities, several studies examine the association between human resources in internal audit (Ge & McVay, 2005; Choi et al., 2013) or human resources in external audit (Cheng et al., 2009; Kang et al., 2017) and external audit quality. Ge and McVay (2005) report that insufficient number of internal auditors with inadequate technical expertise is the most common reason for internal control weaknesses in the U.S., and Choi et al. (2013) pinpoint that adequate human resource management is negatively associated with the disclosure of internal control weaknesses, and positively association with the remediation of the internal control weaknesses.

Cheng et al. (2009) examine the association between human resources in external audit and external audit quality using Taiwanese audit firms. They find that external auditor education expenditure, external auditor tenure, and the number of CPAs at the audit firm level have positive effects on external audit quality, measured by the natural log of audit firms' revenues. Kang et al. (2017) provide additional evidence that higher compensation to external auditors in Korean audit firms increases audit quality, measured by the level of conservatism of audit clients' financial statements.

While these studies consistently support that better human resources in internal audit or external audit significantly improve external audit quality, this study bridges a gap between human resources in internal audit and external audit by investigating whether the collaboration of human resources in internal audit in external audit affects external auditor's pricing decision.

2.2. External audit pricing decision

Prior studies present mixed evidence on the association between external audit pricing decision and internal audit (Wallace 1984; Anderson and Zeghal 1994; O'Keefe et al., 1994; Hackenbrack and Knechel 1997; Mock and Wright 1999; Glover et al., 2008; Messier et al., 2011). For example, O'Keefe et al. (1994) and Hackenbrack and Knechel (1997) find that external audit fees are significantly associated with variations in the number of external audit hours put in by external audit firms rather than internal auditors due to client characteristics rather than internal audit. In a similar vein, Mock and Wright (1999) find a non-significant association between the level of and changes in client risk (e.g., management aggressiveness, misstatement) and external audit plans.

In contrast, Wallace (1984) finds that use of the internal audit function reduces growing external audit fees by improving a firm's accounting controls, as internal auditors perform financial examinations on external auditors. Further, Anderson and Zeghal (1994) find that firms with the internal audit

function utilize 44 percent of total audit costs on external audit fees. This indicates that the internal audit function is significantly correlated with the external audit function. Among the studies in the 2000s, Glover et al. (2008) report that external auditors are likely to utilize the internal audit function as long as the inherent risk is low, and external auditors rely more on work performed by internal auditors for objective tasks than subjective tasks when inherent risk is high. Messier et al. (2011) also find that external auditors charge higher external audit fees to firms that use the internal audit function as a management training ground, which tends to make the internal audit less objective.

While prior studies discussed above coherently show that external auditors' decision to rely upon on internal audit function is associated with external audit fees, none of previous studies examine how quantitative (the number of internal auditors) and qualitative (expertise, experience) human resources at individual level impacts external audit pricing decision measured with external audit fees, external audit hours, and external unit audit price or, possibly, both.

2.3. Hypothesis development

As an external audit is a subsystem of a firm's financial reporting system, which consists of internal systems costs and audit services provided by external auditors (Simunic 1980), it is critical to find out how firms and their external auditors utilize the mix of internal audit of human resources to meet the demand of external auditing. One of five principles may be at work; the control environment may support internal control systems as part of the organizational structure itself if there is a sufficient number of competent internal auditors with expertise and experience.

External audit fees are significantly associated with variations in the number of external audit hours put in by external audit firms rather than internal auditors due to client characteristics rather than internal audit (O'Keefe et al., 1994; Mock & Wright, 1999). On the other hand, internal audit impacts external audit pricing decision based on audit risk in client's internal control environment (Glover et al., 2011), and the inherent limitation of internal auditor's independence in performing external audit (Messier et al., 2011).

Thus, it is an empirical question whether the sufficiency and competency of internal auditors in specific fields, professional and industry experience at the management level or at the staff level are associated with external audit fees. Therefore, the first hypothesis is in the null form:

H₁: External audit fees are not significantly associated with the human resources in internal audit.

Simunic (1980), Simunic and Stein (1996) suggest an external audit fee model, which is a function of the expected audit risk and audit effort. While audit risk is the present value of possible future losses due to external audit failure (e.g. an issuance of an unqualified opinion without detecting financial misstatements), audit effort is the cost incurred by human resources participated in the external audit project. Audit effort consists of two components: external audit hours and external unit audit price. The external audit hours and external unit audit price change as the level of audit risk changes. For example, external auditors may ask for

audit premiums to cover higher expected future losses due to audit failures when audit risk is high. On the other hand, external auditors may offer audit discounts based on the efficient audit engagement when audit risk is low. In either case, external audit hours and external unit audit price affect external audit fees.

Among few studies that discuss about audit hours and unit audit price (Simunic, 1980; Palmrose, 1986; Bae et al., 2016), Simunic (1980) reports that external audit fees demonstrate audit efforts based on greater external audit hours or unit audit price charged by external auditors who are industry specialists as a means of audit premiums. Palmrose (1986) also finds that greater external audit hours exerted by Big N auditors result in better audit quality to clients in evidence acquisition, but there is no significant association between external auditors who are industry specialists and either external audit fees or external audit hours. Based on the seminal work of Simunic (1980) and Palmrose (1986), recently, Bae et al. (2016) show that audit premiums are driven by a greater quantity of low-cost junior level external auditors for high external audit hours rather than external auditors' industry specialization.

If external auditor's audit premiums are driven by a greater number of low-cost junior level external auditors, conversely, audit discounts may be attained by utilizing a greater number of internal auditors with deep industry or firm-specific knowledge, without sacrificing audit quality. On the other hand, audit quality may be deteriorated by relying upon internal auditors who may be a threat

of auditor independence from external auditors' perspective. Thus, using internal auditors may generate greater audit premiums to protect external auditors from potential auditor against litigations. Thus, it is unclear whether external audit hours and unit audit prices are associated with the sufficiency and competency of internal auditors, which depends on external auditors' professional judgment.

Thus, an examination of cross-sectional differences in external audit fees, external audit hours, and the external unit audit price would reveal direct evidence as to what drives audit fee premiums or discounts when the sufficiency and competency of internal auditors are considered. This leads to the next two hypotheses in the null form:

H₂: External audit hours are not significantly associated with Human Resources in Internal Audit.

H₃: External unit audit prices are not significantly associated with Human Resources in Internal Audit.

3. RESEARCH DESIGN

3.1. Research model

The author estimates the OLS regression as shown in equation (1) to determine the effects of human resources in internal audit on external audit fees. Subsequently, the author estimates the OLS regression following equation (2) to test the effects of human resources in internal audit on external audit hours as well as external unit audit price, which are external audit fees per hour:

$$AF_{it} = \beta_0 + \beta_1 BU_{it} + \beta_2 IT_{it} + \beta_3 FRA_{it} + \beta_4 ENV_{it} + \beta_5 CMGR_{it} + \beta_6 PMGR_{it} + \beta_7 IMGR_{it} + \beta_8 CSTF_{it} + \beta_9 PSTF_{it} + \beta_{10} ISTF_{it} + \beta_{11} SIZE_{it} + \beta_{12} IR_{it} + \beta_{13} COMX_{it} + \beta_{14} LEV_{it} + \beta_{15} ROA_{it} + \beta_{16} LOS_{it} + \beta_{17} NAF_{it} + \beta_{18} BIGN_{it} + \beta_{19} SPEC_{it} + \beta_{20} YE_{it} + \beta_{21} CUR_{it} + \beta_{22} ACQ_{it} + \beta_{23} FSALE_{it} + \beta_{24} IMW_{it} + \beta_{25} RES_{it} + \beta_{26} ALAG_{it} + \beta_{27} ATEN_{it} + \beta_{28} INDEP_{it} + \beta_{29} CCH_{it} + \beta_{30} REG_{it} + \beta_{31} LIT_{it} + Year\ dummies + Industry\ dummies + e_t \quad (1)$$

$$AH_{it}, AP_{it} = \beta_0 + \beta_1 BU_{it} + \beta_2 IT_{it} + \beta_3 FRA_{it} + \beta_4 ENV_{it} + \beta_5 CMGR_{it} + \beta_6 PMGR_{it} + \beta_7 IMGR_{it} + \beta_8 CSTF_{it} + \beta_9 PSTF_{it} + \beta_{10} ISTF_{it} + \beta_{11} SIZE_{it} + \beta_{12} IR_{it} + \beta_{13} COMX_{it} + \beta_{14} LEV_{it} + \beta_{15} ROA_{it} + \beta_{16} LOS_{it} + \beta_{17} IAFH_{it} + \beta_{18} BIGN_{it} + \beta_{19} SPEC_{it} + \beta_{20} YE_{it} + \beta_{21} CUR_{it} + \beta_{22} ACQ_{it} + \beta_{23} FSALE_{it} + \beta_{24} IMW_{it} + \beta_{25} RES_{it} + \beta_{26} ALAG_{it} + \beta_{27} ATEN_{it} + \beta_{28} INDEP_{it} + \beta_{29} CCH_{it} + \beta_{30} REG_{it} + \beta_{31} LIT_{it} + Year\ dummies + Industry\ dummies + e_t \quad (2)$$

Where:

AF: The natural log of external audit fees;

AH: The natural log of external audit hours which combine both internal auditors and external auditors to complete the external audit project;

AP: The natural log of external audit fees divided by external audit hours, which combine both internal auditors and external auditors;

IATH: The natural log of internal audit hours to provide direct assistance to support external audit requested by external auditors;

IATP: The natural log of external audit fees divided by internal audit hours to provide direct assistance to support external audit requested by external auditors;

BU: Ratio of the number of general auditors to the total number of employees of a firm;

IT: Ratio of IT expertise internal auditors to the total number of employees of a firm;

FRA: Ratio of the number of fraud expertise internal auditors to the total number of employees of a firm;

ENV: Ratio of environmental expertise internal auditors to the total number of employees of a firm;

CMGR: Total number of professional certifications (CPA, CIA, CISA, CMA etc.) possessed by chief audit executives, directors, and managers level;

PMGR: 1 if the professional experience of chief audit executives, directors, and managers level are above the median of the entire sample, and 0 otherwise;

IMGR: 1 if industry experience of chief audit executives, directors, and managers level are above the median of the entire sample, and 0 otherwise;

CSTF: Total number of professional certifications (CPA, CIA, CISA, CMA etc.) possessed by supervisors and staff level;

PSTF: 1 if the professional experience of by supervisors and staff level are above the median of the entire sample, and 0 otherwise;

ISTF: 1 if industry experience by supervisors and staff level are above the median of the entire sample, and 0 otherwise;

SIZE: The natural logarithm of total assets (in USD '000);

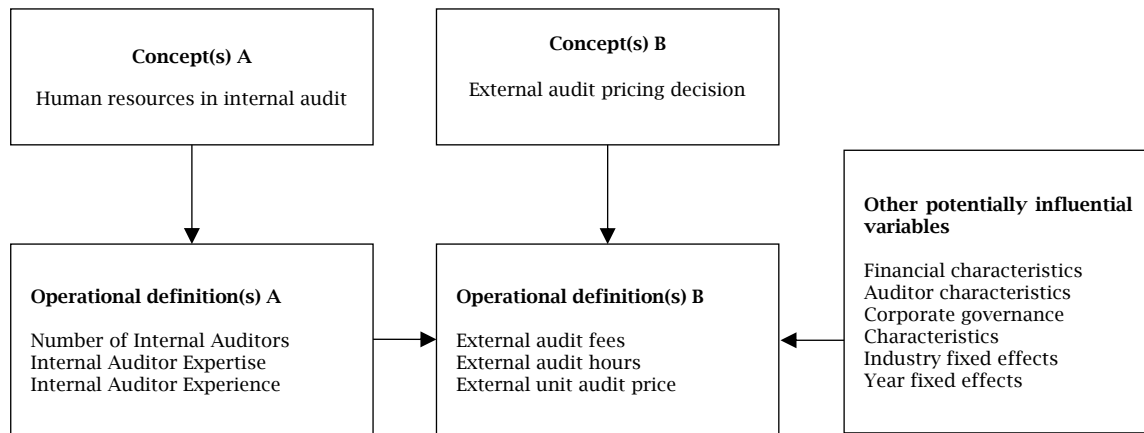
IR: Sum of inventory and receivables divided by total assets;

COMX: The number of business segments that the company has;
LEV: Total liabilities divided by total assets;
ROA: Net income divided by total assets;
LOS: An indicator if net income before extraordinary items is less than zero;
NAF: Non-audit fees paid by a company to its external auditor scaled by the external audit fee;
IAFH: Internal audit hours to provide direct assistance to support a financial audit of external auditing;
BIGN: Indicators if a firm is one of Deloitte, PwC, KPMG, or EY;
SPEC: A dichotomous variable that indicates whether the external auditor is an industry specialist auditor at the national level;
YE: A dichotomous variable indicating whether the company's fiscal year-end is December (yes = 1, no = 0).
CUR: Current assets divided by current liabilities;
ACQ: A dichotomous variable taking the value of 1 if a company has any nonzero amount listed acquisition-related accounts in their statement of cash flows, and 0 otherwise;
FSALE: A dichotomous variable indicating whether a company has any foreign sales listed in the Compustat segments file (yes = 1, no = 0);
IMW: A dichotomous variable indicating whether a firm experienced an internal control weakness;
RES: 1 if firm announced a restatement during the year, 0 otherwise;

ALAG: The difference between a company's fiscal year-end and the date the audit report was issued;
ATEN: The number of years the external audit has provided the company's external audit;
INDEP: Percentage of the board of directors who are considered to be independent;
CCH: 1 if the CEO is also the chairperson of the company, not of the Board of Directors, and 0 otherwise;
REG: 1 if the industry is regulated, and 0 otherwise;
LIT: 1 if the industry is a high litigation-risk industry, and 0 otherwise.
YEAR: Year dummies;
IND: Industry indicators.

The author includes a predictive validity framework (Libby box) of the research model in Figure 1. At the conceptual level, this study examines the effects of human resources in the internal audit on external audit pricing decision. At the operational levels, human resources in internal audit are measured by the number of internal auditors, internal auditor expertise, and internal auditor experience. Afterwards, external audit pricing decision is measured by external audit fees, external audit hours, and an external unit audit price. Lastly, the author controls other potentially influential variables (financial characteristics, auditor characteristics, corporate governance characteristics, industry fixed effects and year fixed effects).

Figure 1. Predictive validity framework (Libby boxes)



3.2. External audit fees, external audit hours, and external unit audit price

The first dependent variable, external audit fees, or *AF*, is the natural logarithm of external audit fees following Messier et al. (2011); the second, *AH* is the natural logarithm of external audit hours; the last dependent variable, *AP*, is the natural logarithm of external audit fees divided by the number of external audit hours according to Bae et al. (2016). The independent variable, human resources in internal audit with sufficiency is measured by the number of internal auditors with specific audit specialist. *BU* is the ratio of the number of general internal auditors to the total number of employees; *IT* is the ratio of information technology (IT, hereafter) expertise internal auditors to the total

number of employees; *FRA* is the ratio of fraud expertise internal auditors to the total number of employees; and *ENV* is the ratio of environmental expertise to the total number of employees.

3.3. Human resources in internal audit

Following Choi et al. (2013), the author measures human resources in internal audit with competency measured with expertise and experience. *CMGR* is the total number of professional certifications (CPA, CIA, CISA, CMA, etc.) possessed by chief audit executives and directors (management level); *PMGR* is equal to 1 if the values of the professional experience of internal auditors at the management level for this variable are above the median of the entire sample, and 0 otherwise; *IMGR* is equal to 1 if the values of the industry experience of internal

auditors at the management level for this variable are above the median of the entire sample, and 0 otherwise. *CSTF* is the total number of professional certifications (CPA, CIA, CISA, CMA, etc.) possessed by supervisors and staff (staff level); *PSTF* is equal to 1 if the values of the professional experience of internal auditors at staff level for this variable are above the median of the entire sample, and 0 otherwise. *ISTF* is equal to 1 if the values of the industry experience of internal auditors at the staff level are above the median of the entire sample, and 0 otherwise.

3.4. Control variables

Control variables similar to those utilized in prior studies are selected (Cahan et al., 2008; Messier et al., 2011; Choi et al., 2013; Bae et al., 2016). Following Messier et al. (2011), the author includes *SIZE* because larger firms demand greater audit effort, which results in higher external audit fees and external audit hours; *IR* is a measure of inherent risk; *COMX* causes auditors to charge higher fees and require additional coordination when operations are more complex; *LEV* is included because external auditors charge higher fees when firms are highly leveraged; *ROA* and *LOS* are included because external audit fees and external audit hours are higher for poorly performing firms; *NAF* is included in equation (1) because prior studies find mixed evidence in relation to the impact of non-audit fees on external audit fees (Palmrose, 1986; Whisenant et al., 2003); In a similar vein, *IAFH* is included in equation (2) since the nature of internal audit hours to provide direct assistance to support financial external audit is mainly for low-level objective tasks, which needs to be controlled to examine the association between the sufficiency and competency of internal auditors and external audit fees (Simunic, 1980; Palmrose, 1986; Bae et al., 2016).

BIGN and *SPEC* are included since Big N audit firms generally charge higher fees, and industry specialists demand higher external audit fees and more external audit hours (Bae et al., 2016); following Messier et al. (2011), firms with non-December 31 year-ends generally receive fee discounts (*YE*), as well as the current ratio (*CUR*), are controlled because liquidity may be negatively associated with external audit fees; the author also includes firms involved in acquisition activities (*ACQ*) and whether there are any foreign sales or not (*FSALE*) since external auditors exert greater audit efforts when firms have complex operations; the author also includes material weaknesses in internal control (*IMW*) and restatements (*RES*) during the year because such disclosures increase overall audit risk for external auditors, which result in higher external audit fees to protect external auditors from potential legal action; the difference in days between a company's fiscal year-end and the date the audit report was issue (*ALAG*) is included to control potential issues in the audit, which require greater audit efforts; the number of years the external auditor has provided the company's external audit (*ATEN*) are added to control the length of the auditor-client independent relationship.

In addition, corporate governance quality variables are included in both equations following the protocol in prior studies (Carcello et al., 2002;

Knechel & Willekens, 2006). The percentage of members on the Board of Directors that are considered to be independent (*INDEP*); the CEO is also the chairman of the Board of Directors (*CCH*) are included to control internal corporate governance mechanism; industry dummies for regulated industries, *REG*¹, and for high litigation-risk industries, *LIT*², because audit efforts are higher in these two types of industries. Finally, year and industry fixed effects are controlled. See Table 1 for variable definitions.

4. EMPIRICAL RESULTS

4.1. Sample selection

The GAIN database covers a wide range of institutions such as publicly-traded firms, private firms, educational and governmental institutions, and their internal audit practices. The sample consists of firms whose information is available from the GAIN (Global Audit Information Network) Benchmarking System (The Institute of Internal Auditors, Inc., Lake Mary, Florida, USA) from the 2007-2016 Questionnaires(s)³. The IIA surveys provide various information related to internal audit practices including organizational information, resources, oversight functions in relation to chief audit executives and audit committees, audit planning activities, audit implementation, and performance management. The content of the survey varied slightly prior to 2008, but none of the questions and answers in relation to variables included in this study was changed during the sample period from 2008 to 2012. Panel A of Table 2 presents a sample selection summary.

Panel B of Table 2 shows the yearly distribution of total firm-year observations. The frequency of total observations ranges from 32 to 39 per fiscal year, which is evenly distributed from 2008 to 2012. In addition, panel C of Table 2 presents the differences in industry composition within the sample firms. Fama and French (1997) industry classification of sample firm-year observations is used. Among the sample firms, firms in utilities (26.29 percent), business services (6.29 percent), electrical equipment (10.29 percent), transportation (5.71 percent), retail (6.86 percent), banking (10.29 percent), and insurance (9.71 percent) industries have frequently reported internal audit resource related information to the IIA during the sample period.

¹ The author classifies firms as regulated using the following two-digit SIC codes following prior studies (Hogan & Jeter, 1999; Cahan, Godfrey, Hamilton and Jeter, 2008). Companies are coded as regulated if their two-digit SIC codes are 10 (metal mining), 12 (coal mining), 13 (oil and gas extraction), 14 (mining and quarrying of non-metallic minerals), 20 (food and kindred products), 29 (petroleum refining and related industries), 40 (railroad transportation), 41 (transit, passenger, transportation), 42 (motor freight transportation), 44 (water transportation), 45 (air transportation), 46 (pipelines, except natural gas), 48 (communications), 49 (electric, gas, and sanitary services), 60 (depository institutions), 61 (non-depository credit institutions), 62 (security and commodity brokers, dealers), 63 (insurance carriers), 64 (insurance agents, brokers, and services), and 67 (holding and other investment offices).

² For high litigation-risk industries, the author also classifies firms using the following two-digit SIC codes following Hogan and Jeter (1999) and Cahan, Godfrey, Hamilton and Jeter (2008): 28 (chemicals and allied products), 35 (industrial and commercial machinery, and computer equipment), 36 (electronic and other electrical equipment and components, except computer equipment), 38 (measuring, analyzing, and controlling instruments), 60 (depository institutions), 67 (holding and other investment offices), and 73 (business services).

³ Visit <http://na.theiia.org/GAIN> for more information.

Table 1. Variable definitions

<i>Dependent Variables:</i>	
$AFEES_{it}$:	Fees (in USD '000);
AF_{it} :	The natural log of external audit fees;
AH_{it} :	The natural log of external audit hours which combine both internal auditors and external auditors to complete the external audit project;
AP_{it} :	The natural log of external audit fees divided by external audit hours which combine both internal auditors and external auditors;
<i>Independent Variables:</i>	
BU_{it} :	Ratio of the number of general auditors to the total number of employees of a firm;
IT_{it} :	Ratio of IT expertise internal auditors to the total number of employees of a firm;
FRA_{it} :	Ratio of the number of fraud expertise internal auditors to the total number of employees of a firm;
ENV_{it} :	Ratio of environmental expertise internal auditors to the total number of employees of a firm;
$CMGR_{it}$:	Total number of professional certifications (CPA, CIA, CISA, CMA etc.) possessed by chief audit executives, directors, and managers level;
$PMGR_{it}$:	1 if the professional experience of chief audit executives, directors, and managers level are above the median of the entire sample, and 0 otherwise;
$IMGR_{it}$:	1 if industry experience of chief audit executives, directors, and managers level are above the median of the entire sample, and 0 otherwise;
$CSTF_{it}$:	Total number of professional certifications (CPA, CIA, CISA, CMA etc.) possessed by supervisors and staff level;
$PSTF_{it}$:	1 if the professional experience of by supervisors and staff level are above the median of the entire sample, and 0 otherwise;
$ISTF_{it}$:	1 if industry experience by supervisors and staff level are above the median of the entire sample, and 0 otherwise;
<i>Control Variables:</i>	
$SIZE_{it}$:	The natural logarithm of total assets (in USD '000) ;
IR_{it} :	Sum of inventory and receivables divided by total assets;
$COMX_{it}$:	The number of business segments that the company has;
LEV_{it} :	Total liabilities divided by total assets;
ROA_{it} :	Net income divided by total assets;
LOS_{it} :	An indicator if net income before extraordinary items is less than zero;
NAF_{it} :	Non-audit fees paid by a company to its external auditor scaled by the external audit fee;
$IAFH_{it}$:	internal audit hours to provide direct assistance to support an external financial audit;
$BIGN_{it}$:	Indicators if a firm is one of Deloitte, PwC, KPMG, or EY;
$SPEC_{it}$:	A dichotomous variable that indicates whether the external auditor is an industry specialist auditor at the national level;
YE_{it} :	A dichotomous variable indicating whether the company's fiscal year-end is December (yes = 1, no = 0).
CUR_{it} :	Current assets divided by current liabilities;
ACQ_{it} :	A dichotomous variable taking the value of 1 if a company has any nonzero amount listed acquisition-related accounts in their statement of cash flows, and 0 otherwise;
$FSALE_{it}$:	A dichotomous variable indicating whether a company has any foreign sales listed in the Compustat segments file (yes = 1, no =0);
IMW_{it} :	A dichotomous variable indicating whether a firm experienced an internal control weakness;
RES_{it} :	1 if firm announced a restatement during the year, 0 otherwise;
$ALAG_{it}$:	The difference between a company's fiscal year-end and the date the audit report was issued;
$ATEN_{it}$:	The number of years the external auditor has provided the company's external audit;
$INDEP_{it}$:	Percentage of the Board of Directors that are considered to be independent;
CCH_{it} :	1 if the CEO is also the chairperson of the company, not of the Board of Directors, and 0 otherwise;
REG_{it} :	1 if the industry is regulated, and 0 otherwise;
LIT_{it} :	1 if the industry is a high litigation-risk industry, and 0 otherwise.

Table 2. Sample selection (Part I)

<i>Panel A. Sample selection summary</i>		
Firm-year responses from the GAIN matched with Compustat and Institutional Shareholder Services (ISS) data from 2008 to 2012 based on total assets, total revenues, and operating the industry		457
Less firm-year responses because audit fees, audit hours, and unit audit price data are unavailable		(116)
Less firm-year responses because internal auditor human resources data is unavailable		(166)
Total number of firms used in multivariate regressions		175
<i>Panel B. Samples by year</i>		
<i>Year</i>	<i>Firm-year observation</i>	<i>% of sample</i>
2008	32	18.29
2009	35	20.00
2010	37	21.14
2011	39	22.29
2012	32	18.29
Total	175	100.00
<i>Panel C. Samples by industry</i>		
<i>Industry</i>	<i>Total</i>	<i>% of sample</i>
Healthcare	2	1.14
Medical Equipment	1	0.57
Pharmaceutical	1	0.57
Chemical	5	2.86
Construction Materials	1	0.57
Automobiles & Trucks	1	0.57
Petroleum & Natural Gas	4	2.29
Utilities	46	26.29
Communication	6	3.43
Business Services	11	6.29
Computers	6	3.43
Electrical Equipment	18	10.29

Table 2. Sample selection (Part II)

Panel C. Samples by industry		
Industry	Total	% of sample
Measuring, Control Equipment	1	0.57
Business Supplies	1	0.57
Shipping Containers	1	0.57
Transportation	10	5.71
Wholesale	7	4.00
Retail	12	6.86
Restaurants, Hotels, Motels	6	3.43
Banking	18	10.29
Insurance	17	9.71
Total	175	100.00

4.2. Descriptive statistics

Table 3 shows descriptive statistics for all variables examined in this study. In essence, the external audit fee variable (*AF*), external audit hours (*AH*), and the external unit audit price (*AP*) vary depending on firms. Of most interest to this study are the sufficiency and competency of internal auditors. The sufficiency of internal auditors according to each speciality field indicates that the largest percentage of internal auditors are general auditors (*BU*), and the smallest percentage of internal auditors are environment auditors (*ENV*). The competency of internal auditors indicates that an internal auditor at the management level has average 3 audit related professional certifications (*CMGR*), and approximately 65.7 percent and 90.3 percent of internal auditors (*PMGR*, *IMGR*) at the management level reported professional and industrial experiences greater than the median of the entire sample firms. Further, an internal auditor at the staff level has average 8 audit related professional certifications (*CSTF*), and approximately 36 percent and 38.9 percent of internal auditors at the staff level (*PSTF*, *ISTF*) reported professional and industrial experiences greater than the median of the entire sample firms. Control variables show that internal audit resources are valued across the board regardless of the size of companies, and the sample firms are in the relatively complex operational environment. This implies that a greater need of internal audit function, utilization of Big N external auditors, and a focus on internal corporate governance are critical, especially among highly litigious or regulated industries (e.g. utilities, banking, and insurance industries).

Table 4 provides the Pearson correlation matrix for the variables in model equations (1) and (2). Panel A of Table 4 shows how *AF*, *AH*, *AP* are correlated with the internal control variables. Both *AF* and *AH* are negatively and significantly associated with *BU* and *IT* at the 1 percent level. This indicates that the ratio of the number of general auditors to the total number of employees, as well as the ratio of IT expertise internal auditors to the total number of employees, are negatively associated with external audit fees and external audit hours. In contrast, *AF* is positively and significantly associated with *CMGR*, *CSTF*, and *IMGR* at the 1 percent level. In a similar vein, *AH* is positively and significantly associated with *CMGR* and *IMGR* at the 1 percent level. *AH* is positively and significantly associated with *PSTF* at the 5 percent level, and with *ISTF* at the 10 percent level. This implies that a total number of professional certifications at the management level and at the staff level are positively associated with external audit fees, and both professional and industry experience at the management and at the staff level are positively associated with external audit hours.

Panel B of Table 4 shows how the correlation between *AF*, *AH*, and *AP* are correlated with control variables. *AF* is positively and significantly associated with *SIZE*, *COMX*, *BIGN*, and *FSALE* at the 1 percent level, also positively and significantly associated with *LEV*, *ACQ*, and *IMW* at the 5 percent level, and lastly, positively and significantly associated with *CUR* at the 10 percent level. The positive and significant associations between *AF* and the firm risk characteristics variables described above indicate that firms with more complex operations are associated with higher external audit fees to reduce information asymmetry between firms and stakeholders, which is consistent with Messier et al. (2011). Further, *AH* is positively and significantly associated with *SIZE*, *LEV*, and *BIGN* at the 1 percent level, positively and significantly associated with *COMX*, *ACQ*, and *FSALE* at the 5 percent level, and positively and significantly associated with *CUR* and *CCH* at the 10 percent level. The results indicate that companies with bigger and complex operations are more likely higher Big N auditors, and more likely to allow the CEO and chairman duality. Finally, *AP* is positively and significantly associated with *LOS* and *FSALE* at the 5 percent level and 10 percent level respectively. This shows that firms pay higher external unit audit price to external auditors in the presences of greater financial issues or more operational complexity. An evaluation of the variance inflation factors associated with this regression analysis suggests that multicollinearity is not a concern⁴.

4.3. Main results

4.3.1. Human resources in internal audit and external audit fees

Table 5 presents the results of the empirical analyses using equations (1). In column (1), the coefficient on *BU* (0.462) is negative and significant at the 1 percent level when the dependent variable is *AF*. Thus, external audit fees are negatively and significantly associated with the proportion of general internal auditors. In column (2), the coefficient on *BU* (0.971) is positive and significant at the 10 percent level when the dependent variable is *AF* for companies with total assets equal to or greater than the median value for the entire sample (when size is measured with the natural logarithm of the number of total employees, the result remains qualitatively the same). On the other hand, in column (3), the coefficient on *BU*

⁴ The Pearson correlation matrix reveals no large correlations between the independent variables in the regression analysis, with the exception of *BU* and *IT* (p-value <.001), for which a high correlation of 0.430 is found. The maximum variance inflation factor is 4.252 when both the *BU* and *IT* variables are included in the regression model. When these variables are excluded and the analysis is conducted again, the direction of the results remain unchanged.

(0.703) is negative and significant at the 1 percent level. The results of the data adjusted for firm size suggest that audit fees decrease for smaller firms as the proportion of general internal auditor increases.

Overall, the directions of control variables are aligned with prior studies (Cahan et al., 2008; Messier et al., 2011; Choi et al., 2013; Bae et al., 2016).

Table 3. Descriptive statistics

Variables (N=175)	Mean	Std	1Q	Med	3Q	Min	Max
<i>Dependent Variables:</i>							
AFEES (in USD '000) _{it}	3.087	3.211	1.100	1.800	3.727	92	17,857
AF _{it}	14.518	0.928	13.911	14.403	15.131	11.430	16.698
AH _{it}	9.145	0.959	8.576	9.210	9.616	5.704	11.226
AP _{it}	5.373	0.552	5.153	5.306	5.508	4.246	9.760
<i>Independent Variables:</i>							
BU _{it}	0.219	0.304	0.058	0.138	0.276	0.008	3.200
IT _{it}	0.052	0.064	0.009	0.030	0.076	0.000	0.403
FRA _{it}	0.009	0.020	0.000	0.000	0.011	0.000	0.133
ENV _{it}	0.005	0.016	0.000	0.000	0.000	0.000	0.146
CMGR _{it}	3.443	2.145	2.000	3.000	4.000	0.000	13.000
PMGR _{it}	0.657	0.793	0.000	0.000	1.000	0.000	2.000
IMGR _{it}	0.903	0.856	0.000	1.000	2.000	0.000	2.000
CSTF _{it}	7.859	8.454	2.000	5.000	11.000	0.000	41.000
PSTF _{it}	0.360	0.599	0.000	0.000	1.000	0.000	2.000
ISTF _{it}	0.389	0.650	0.000	0.000	1.000	0.000	2.000
<i>Control Variables:</i>							
AT (in USD'000) _{it}	12,252	18,641	1,549	4,203	15,531	229	164,687
SIZE _{it}	8.450	1.502	7.345	8.344	9.651	5.433	12.012
IR _{it}	0.210	0.189	0.067	0.155	0.293	0.000	0.779
COMX _{it}	9.034	10.925	0.000	6.000	12.000	0.000	57.000
LEV _{it}	0.225	0.229	0.039	0.205	0.324	0.000	1.511
ROA _{it}	0.027	0.096	0.010	0.032	0.059	-0.631	0.241
LOS _{it}	0.109	0.312	0.000	0.000	0.000	0.000	1.000
NAF _{it}	0.174	0.189	0.032	0.111	0.261	0.000	0.912
IAPH _{it}	2.472	3.405	0.000	0.000	5.992	0.000	10.204
BIGN _{it}	0.857	0.351	1.000	1.000	1.000	0.000	1.000
SPEC _{it}	0.200	0.401	0.000	0.000	0.000	0.000	1.000
YE _{it}	0.840	0.368	1.000	1.000	1.000	0.000	1.000
CUR _{it}	1.393	1.273	0.648	1.180	1.812	0.000	7.801
ACQ _{it}	0.383	0.488	0.000	0.000	1.000	0.000	1.000
FSALE _{it}	0.314	0.466	0.000	0.000	1.000	0.000	1.000
IMW _{it}	0.029	0.167	0.000	0.000	0.000	0.000	1.000
RES _{it}	0.051	0.222	0.000	0.000	0.000	0.000	1.000
ALAG _{it}	52.64	33.95	52.00	56.00	60.00	-297.00	198.00
ATEN _{it}	0.745	6.416	0.000	0.000	0.000	0.000	81.811
INDEP _{it}	37.511	40.571	0.000	0.000	81.818	0.000	92.308
CCH _{it}	0.291	0.456	0.000	0.000	1.000	0.000	1.000
REG _{it}	0.566	0.497	0.000	1.000	1.000	0.000	1.000
LIT _{it}	0.331	0.472	0.000	0.000	1.000	0.000	1.000

Notes: Each of the continuous variables is winsorized at the 1percent and 99percent levels to mitigate outliers. All variables are described in Table 1.

Table 4. Pearson's correlation (Part I)

<i>Panel A. Audit fees, audit hours, and unit audit price and internal audit human resources variables</i>												
Variable	AH	AP	BU	IT	FRA	ENV	CMGR	PMGR	IMGR	CSTF	PSTF	ISTF
AF	0.829 <.0001	0.240 0.001	-0.434 <.0001	-0.270 0.000	-0.085 0.266	0.070 0.356	0.501 <.0001	0.001 0.989	0.291 <.0001	0.529 <.0001	0.154 0.041	0.131 0.085
AH	1	-0.344 <.0001	-0.403 <.0001	-0.348 <.0001	-0.040 0.602	0.124 0.103	0.447 <.0001	-0.005 0.943	0.346 <.0001	0.610 <.0001	0.223 0.003	0.203 0.007
AP		1	-0.030 0.698	0.152 0.044	-0.073 0.337	-0.097 0.201	0.065 0.392	0.011 0.883	-0.111 0.142	-0.171 0.024	-0.127 0.093	-0.133 0.080
BU			1	0.430 <.0001	0.119 0.116	0.004 0.958	-0.113 0.137	0.216 0.004	0.101 0.185	-0.108 0.157	0.161 0.033	0.175 0.021
IT				1	0.274 0.000	0.028 0.712	-0.100 0.188	0.119 0.118	0.092 0.224	-0.068 0.373	0.054 0.482	0.016 0.832
FRA					1	0.213 0.005	0.019 0.804	0.002 0.982	0.103 0.177	-0.015 0.848	-0.005 0.949	-0.037 0.624
ENV						1	0.071 0.351	0.087 0.253	0.138 0.068	0.172 0.023	0.173 0.022	0.049 0.521
CMGR							1	0.059 0.434	0.238 0.002	0.420 <.0001	0.005 0.950	0.074 0.334
PMGR								1	0.315 <.0001	0.167 0.027	0.165 0.029	0.215 0.004
IMGR									1	0.468 <.0001	0.327 <.0001	0.502 <.0001
CSTF										1	0.342 <.0001	0.233 0.002
PSTF											1	0.525 <.0001

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1percent and 99percent levels to mitigate outliers. All variables are described in Table 1.

Table 4. Pearson's correlation (Part II)

Panel B. Audit fees, audit hours, and unit audit price and control variables																								
Variable	AH	AP	SIZE	IR	COMX	LEV	ROA	LOS	NAFEE	IAFH	BIGN	JOINT	YE	CUR	ACQ	FSALE	IMW	RES	ALAG	ATEN	INDEP	CCH	REG	LIT
AF	0.829	0.240	0.669	-0.052	0.280	0.227	0.040	0.048	0.074	0.104	0.315	0.052	-0.039	0.132	0.180	0.239	0.180	-0.027	0.0852	0.0311	0.1632	0.1885	-0.1148	0.0204
	<.0001	0.001	<.0001	0.491	0.000	0.003	0.602	0.528	0.328	0.170	<.0001	0.494	0.613	0.082	0.017	0.001	0.017	0.719	0.2624	0.6827	0.0309	0.0125	0.1303	0.7886
AH	1	-0.344	0.648	-0.053	0.220	0.208	0.065	-0.050	0.097	0.096	0.284	0.057	-0.018	0.136	0.175	0.158	0.109	-0.011	0.0201	0.0109	0.0939	0.1423	-0.0906	0.0106
		<.0001	<.0001	0.486	0.003	0.006	0.394	0.510	0.203	0.205	0.000	0.454	0.809	0.073	0.021	0.037	0.151	0.886	0.7917	0.886	0.2163	0.0603	0.233	0.8891
AP		1	-0.002	0.004	0.088	0.020	-0.046	0.168	-0.043	0.008	0.036	-0.011	-0.033	-0.014	-0.001	0.127	0.114	-0.027	0.1083	0.0334	0.1112	0.0696	-0.0355	0.0159
			0.979	0.958	0.248	0.790	0.546	0.026	0.571	0.919	0.636	0.881	0.667	0.850	0.991	0.093	0.134	0.721	0.1538	0.6613	0.143	0.3598	0.6408	0.835
SIZE			1	-0.238	0.086	0.175	0.099	-0.078	0.112	0.054	0.237	0.101	0.085	-0.194	-0.066	-0.032	-0.063	-0.093	0.0202	-0.0108	0.2289	0.276	0.3163	-0.04
				0.002	0.257	0.020	0.192	0.305	0.141	0.477	0.002	0.183	0.264	0.010	0.386	0.673	0.405	0.220	0.7909	0.8873	0.0023	0.0002	<.0001	0.5993
IR				1	0.033	-0.213	-0.075	0.022	0.049	0.007	-0.019	-0.087	-0.139	0.102	0.208	0.104	0.116	0.098	0.1309	-0.0321	0.0332	0.0705	-0.3749	0.1829
					0.667	0.005	0.323	0.777	0.523	0.930	0.802	0.251	0.066	0.180	0.006	0.172	0.126	0.195	0.0842	0.6731	0.6625	0.3542	<.0001	0.0154
COMX					1	0.006	0.097	-0.001	0.192	-0.276	0.174	-0.015	-0.315	0.282	0.190	0.611	0.044	-0.053	-0.0742	0.004	0.0017	-0.0113	-0.2819	0.1961
						0.933	0.202	0.989	0.011	0.000	0.022	0.847	<.0001	0.000	0.012	<.0001	0.567	0.486	0.3289	0.9586	0.982	0.8825	0.0002	0.0093
LEV01						1	-0.103	0.020	0.022	0.068	-0.121	0.075	0.031	-0.091	-0.030	-0.124	0.036	-0.026	-0.1288	0.0464	-0.1665	-0.0737	0.2201	-0.3554
							0.173	0.796	0.772	0.373	0.111	0.322	0.681	0.230	0.694	0.103	0.639	0.736	0.0893	0.5424	0.0277	0.3321	0.0034	<.0001
ROA							1	-0.639	-0.164	0.026	0.027	0.066	-0.044	0.185	0.193	0.079	-0.263	0.012	-0.1009	0.0232	0.1964	0.0866	-0.0528	0.0425
								<.0001	0.031	0.734	0.721	0.384	0.561	0.014	0.010	0.302	0.000	0.872	0.184	0.7606	0.0092	0.2545	0.4877	0.5762
LOS								1	0.073	0.048	0.037	-0.037	-0.048	-0.029	-0.120	0.080	0.161	-0.081	0.1426	-0.0407	-0.1065	-0.0217	-0.0648	0.0274
									0.335	0.530	0.622	0.629	0.527	0.702	0.114	0.291	0.034	0.285	0.0597	0.5932	0.1606	0.7755	0.3942	0.7186
NAFEE									1	-0.025	0.122	-0.128	0.030	0.006	0.147	0.180	0.203	0.071	0.1024	-0.0499	-0.112	-0.0102	-0.0039	0.0933
										0.746	0.108	0.091	0.695	0.932	0.052	0.017	0.007	0.352	0.1777	0.5118	0.14	0.8933	0.9589	0.2197
IAFH										1	0.016	0.041	0.045	-0.018	-0.016	-0.039	-0.071	0.078	0.0738	-0.048	-0.0542	0.0396	0.059	-0.0146
											0.835	0.587	0.551	0.812	0.834	0.604	0.348	0.306	0.3319	0.5278	0.4762	0.6031	0.4383	0.8479
BIGN											1	0.204	0.000	0.141	-0.053	0.101	0.070	-0.053	0.1529	0.0476	0.3137	0.2259	-0.0941	-0.0248
												0.007	1.000	0.063	0.487	0.186	0.357	0.488	0.0433	0.532	<.0001	0.0027	0.2153	0.7448
JOINT												1	-0.249	0.029	-0.212	0.000	-0.086	0.013	0.0513	-0.0352	0.0784	0.0252	-0.0807	-0.1093
													0.001	0.701	0.005	1.000	0.259	0.865	0.5	0.6439	0.3027	0.7411	0.2884	0.1501
YE													1	-0.280	-0.014	-0.242	-0.019	0.031	-0.0281	0.0078	-0.0353	0.0398	0.3723	-0.0901
														0.000	0.853	0.001	0.806	0.683	0.7118	0.918	0.6424	0.6011	<.0001	0.2359
CUR														1	0.267	0.462	0.082	-0.053	0.0605	0.0643	0.0696	-0.1013	-0.5698	0.2834
															0.000	<.0001	0.278	0.482	0.4267	0.3979	0.3604	0.1823	<.0001	0.0001
ACQ															1	0.159	0.008	-0.128	-0.0297	-0.0554	0.0535	-0.058	-0.2697	0.0783
																0.036	0.915	0.092	0.6965	0.4669	0.4822	0.4461	0.0003	0.3031
FSALE																1	0.106	-0.046	0.0567	-0.0148	-0.046	-0.0279	-0.425	0.3078
																	0.165	0.544	0.4565	0.8458	0.5453	0.7144	<.0001	<.0001
IMW																	1	0.271	0.2349	0.0541	-0.159	-0.11	-0.1957	0.1707
																		0.000	0.0018	0.477	0.0356	0.1474	0.0094	0.0239
RES																		1	0.1607	-0.0069	-0.1733	-0.1493	-0.0048	0.0009
																			0.0337	0.9275	0.0218	0.0486	0.95	0.9901
ALAG																			1	0.0298	0.0718	0.0644	-0.0873	0.1369
																				0.695	0.345	0.397	0.251	0.071
ATEN																				1	0.053	0.086	0.014	0.010
																					0.490	0.257	0.849	0.893
INDEP																					1	0.714	-0.077	0.028
																						<.0001	0.314	0.712
CCH																						1	0.055	0.029
																							0.474	0.700
REG																							1	-0.363
																								<.0001

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1% and 99% levels to mitigate outliers. All variables are described in Table 1.

Table 5. Human resources investment in internal audit and external audit fees

Variable	Exp. Sign	Dep=AF					
		(1) FULL		(2) SIZE ≥ Median		(3) SIZE < Median	
		Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept		11.615	23.690***	7.214	6.100***	13.944	10.650***
BU	-/+	-0.462	-2.770***	0.971	1.840*	-0.703	-3.190***
IT	-/+	-0.423	-0.480	1.850	0.950	-1.971	-1.350
FRA	-/+	-3.203	-1.640	8.750	1.740*	-2.241	-0.930
ENV	-/+	4.822	1.640	2.725	0.720	-2.322	-0.360
CMGR	-/+	0.036	1.600	0.003	0.090	0.070	1.110
PMGR	-/+	0.039	0.690	0.077	1.050	-0.121	-0.970
IMGR	-/+	-0.061	-1.080	0.037	0.430	0.128	1.030
CSTF	-/+	0.007	1.130	-0.007	-0.850	-0.027	-0.970
PSTF	-/+	-0.051	-0.640	-0.014	-0.120	-0.098	-0.660
ISTF	-/+	-0.019	-0.260	-0.117	-1.200	-0.055	-0.410
SIZE	+	0.377	7.930***	0.718	7.400***	0.125	0.750
IR	+	0.035	0.120	0.651	1.220	0.141	0.330
COMX	+	0.006	1.000	0.003	0.310	0.014	0.950
LEV	+	0.234	0.970	0.359	0.850	-0.175	-0.360
ROA	-	-0.124	-0.220	-1.545	-1.020	-0.073	-0.090
LOS	+	0.170	1.070	-0.255	-1.070	-0.043	-0.170
NAFEE	-/+	-0.805	-4.070***	-0.713	-1.850*	-0.423	-1.340
BIGN	+	-0.080	-0.620	-0.971	-2.330**	0.281	1.570
JOINT	+	0.061	0.610	-0.008	-0.060	-0.015	-0.070
YE	+	0.027	0.190	0.657	1.940*	-0.257	-1.040
CUR	-	-0.066	-1.260	-0.149	-0.970	-0.003	-0.030
ACQ	+	0.241	2.770***	-0.074	-0.460	0.189	1.460
FSALE	+	0.339	2.910***	0.339	1.700*	0.078	0.340
IMW	+	0.473	1.950*	1.174	3.010***	0.810	2.030*
RES	+	0.024	0.140	-0.060	-0.240	0.164	0.730
ALAG	+	0.002	1.270	-0.003	-0.560	0.000	0.010
ATEN	-/+	0.002	0.390	0.000	-0.040	-0.050	-1.540
INDEP	+	0.002	1.470	0.004	1.780*	-0.001	-0.380
CCH	+	-0.066	-0.550	-0.224	-1.240	-0.171	-0.800
REG	-/+	-0.868	-3.430***	0.665	0.800	-0.623	-1.480
LIT	-/+	-0.313	-1.260	1.487	1.350	-0.500	-1.300
Yr_dummies		Included		Included		Included	
Ind_dummies		Included		Included		Included	
F-stat		14.830***		11.550***		7.120***	
Adj R ²		0.82		0.86		0.80	
N		175		88		87	

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1percent and 99percent levels to mitigate outliers. All variables are described in Table 1.

4.3.2. Human resources in internal audit and external audit hours

Table 6 shows the results of the equation (2) by firm size in relation to *AH*. In column (1), the coefficient on *BU* (0.660) is negative and significant at the 1 percent in association with *AH*. Thus, the result indicates that external audit hours decrease as the ratio of the number of general auditors to the total number of employees increases. Further, the coefficients of *CSTF* (0.028) and *ISTF* (0.198) are positive and significant at the 1 percent level and 5 percent level respectively. This shows that external audit hours increase as the number of professional certifications attained by internal auditors and industry experience of internal auditors at the staff level increase. In column (2), the coefficient on *CSTF* (0.028) is positive and significant at 10 percent level in association with *AH*. The result indicates that internal auditor competency measured with the number of professional certification attained by internal auditors at the staff level is weakly associated with greater audit hours for larger firms. The weak result in larger firms may be attributed to the effect of the economics of scale (Bae et al., 2016) that the internal audit function as a departmental unit has an incremental impact to decrease external audit hours rather than at the internal audit personnel. In column (3), the coefficients of *BU* (0.01) and *FRA* (6.464) are negative and significant at

the 5 percent in association with *AH*. The results support that greater proportion of general auditors and fraud internal auditors decrease external audit hours for smaller firms.

4.3.3. Human resources in internal audit and external unit audit price

Table 7 shows the results of the equation (2) by firm size in relation to *AP*. The model in column (1) is not robust since the F-test of the overall significance is insignificant. In column (2), the coefficient on *BU* (1.638) and *IT* (5.455) are positive and significant at the 10 percent level in association with *AP*. This implies that the greater proportion of general auditors and that of IT auditors increase external unit audit price for larger firms. Further, the coefficient on *PMGR* (0.255) is positive and significant at the 5 percent level, but the coefficient of *CSTF* (0.035) is negative and significant at the 5 percent level. This shows that professional competency at the management level increases external audit unit price, and the number of professional certification at the staff level decreases external audit unit price for larger firms. In column (3), none of the coefficients is significantly associated with *AP* for smaller firms. The result shows that the sufficiency and competency of internal auditors are insignificantly associated with external unit audit price for smaller firms.

Table 6. Human resources in internal audit and audit hours

Variable	Exp. Sign	Dep=AH					
		(1) FULL		(2) SIZE ≥ Median		(3) SIZE < Median	
		Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept		7.362	11.360***	5.482	2.570**	7.212	4.340***
BU	-/+	-0.660	-2.990***	-0.655	-0.680	-0.601	-2.170**
IT	-/+	-1.712	-1.480	-3.595	-1.020	-1.073	-0.580
FRA	-/+	-0.454	-0.180	10.520	1.150	-6.464	-2.150**
ENV	-/+	5.894	1.520	6.620	0.940	-1.524	-0.190
CMGR	-/+	0.024	0.830	-0.013	-0.230	-0.011	-0.150
PMGR	-/+	-0.090	-1.160	-0.180	-1.310	0.073	0.460
IMGR	-/+	-0.013	-0.170	-0.008	-0.050	0.123	0.800
CSTF	-/+	0.028	3.140***	0.028	1.810*	-0.033	-0.900
PSTF	-/+	-0.042	-0.410	0.171	0.760	-0.077	-0.410
ISTF	-/+	0.198	2.030**	0.067	0.360	0.135	0.800
SIZE	+	0.235	3.740***	0.240	1.370	0.235	1.110
IR	+	0.242	0.650	-1.810	-1.870*	1.014	1.930*
COMX	+	-0.011	-1.330	-0.031	-2.080**	0.028	1.520
LEV	+	0.365	1.130	0.954	1.260	-0.304	-0.500
ROA	-	-1.081	-1.440	0.545	0.200	-1.661	-1.710*
LOS	+	-0.288	-1.370	-0.344	-0.800	-0.438	-1.380
IAFH	-/+	-0.004	-0.210	-0.024	-0.880	0.031	1.050
BIGN	+	-0.069	-0.400	-0.620	-0.860	0.022	0.060
JOINT	+	-0.025	-0.190	0.268	0.350	-0.192	-0.850
YE	+	-0.048	-0.250	0.021	0.090	0.136	0.530
CUR	-	-0.106	-1.520	0.497	0.810	0.329	1.060
ACQ	+	0.111	0.980	-0.204	-0.730	-0.059	-0.410
FSALE	+	0.208	1.350	-0.058	-0.200	-0.077	-0.480
IMW	+	0.040	0.130	0.453	1.260	-0.122	-0.410
RES	+	0.055	0.240	1.631	2.310**	0.257	0.510
ALAG	+	0.002	1.280	-0.134	-0.290	0.104	0.350
ATEN	-/+	0.000	0.050	0.005	0.510	0.000	0.110
INDEP	+	-0.002	-1.190	-0.002	-0.210	-0.025	-0.560
CCH	+	0.060	0.370	-0.004	-0.930	-0.002	-0.530
REG	-/+	-0.142	-0.430	0.079	0.230	0.221	0.830
LIT	-/+	0.854	2.620***	2.261	1.500	-0.133	-0.260
Yr_dummies		Included		Included		Included	
Ind_dummies		Included		Included		Included	
F-stat		8.240***		4.190***		4.150***	
Adj R ²		0.70		0.66		0.67	
N		175		88		87	

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1% and 99% levels to mitigate outliers. All variables are described in Table 1.

Table 7. Human resources in internal audit and unit audit price (Part I)

Variable	Exp. Sign	Dep=AP					
		(1) FULL		(2) SIZE ≥ Median		(3) SIZE < Median	
		Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept		4.225	6.520***	1.726	0.940	6.854	4.000***
BU	-/+	0.211	0.960	1.638	1.970*	-0.118	-0.410
IT	-/+	1.568	1.350	5.455	1.800*	-1.021	-0.540
FRA	-/+	-1.277	-0.500	-1.829	-0.230	4.171	1.350
ENV	-/+	-1.300	-0.340	-4.021	-0.660	-0.963	-0.120
CMGR	-/+	0.012	0.400	0.015	0.320	0.081	1.000
PMGR	-/+	0.151	1.960*	0.255	2.160**	-0.208	-1.270
IMGR	-/+	-0.038	-0.500	0.045	0.340	-0.002	-0.010
CSTF	-/+	-0.023	-2.670***	-0.035	-2.630**	0.010	0.270
PSTF	-/+	-0.017	-0.170	-0.180	-0.940	-0.011	-0.050
ISTF	-/+	-0.177	-1.810*	-0.189	-1.170	-0.194	-1.110
SIZE	+	0.135	2.160**	0.477	3.160***	-0.126	-0.580
IR	+	-0.126	-0.340	2.467	2.970***	-0.860	-1.590
COMX	+	0.015	1.810*	0.033	2.610**	-0.013	-0.680
LEV	+	-0.113	-0.350	-0.593	-0.910	0.168	0.270
ROA	-	1.169	1.560	-2.090	-0.890	1.536	1.530
LOS	+	0.429	2.040**	0.091	0.240	0.374	1.140
IAFH	-/+	-0.002	-0.120	0.022	0.940	-0.021	-0.680
BIGN	+	-0.064	-0.370	-0.107	-0.170	-0.438	-1.080
JOINT	+	0.099	0.750	-1.227	-1.860*	0.461	1.990*
YE	+	0.075	0.390	-0.028	-0.140	-0.158	-0.600
CUR	-	0.033	0.470	0.162	0.310	-0.599	-1.870*
ACQ	+	0.051	0.460	0.058	0.240	0.050	0.340
FSALE	+	0.087	0.570	-0.015	-0.060	0.262	1.570
IMW	+	0.353	1.110	-0.112	-0.360	0.175	0.580
RES	+	-0.016	-0.070	-0.458	-0.760	0.589	1.130
ALAG	+	-0.001	-0.330	0.070	0.180	0.027	0.090
ATEN	-/+	0.002	0.270	-0.007	-0.960	0.000	-0.150

Table 7. Human resources in internal audit and unit audit price (Part II)

Variable	Exp. Sign	Dep=AP					
		(1) FULL		(2) SIZE ≥ Median		(3) SIZE < Median	
		Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
INDEP	+	0.005	2.420**	0.001	0.210	-0.032	-0.690
CCH	+	-0.155	-0.950	0.008	2.180**	0.001	0.220
REG	-/+	-0.623	-1.870*	-0.297	-1.020	-0.389	-1.420
LIT	-/+	-1.024	-3.150***	-1.594	-1.230	-0.502	-0.930
Yr_dummies		Included		Included		Included	
Ind_dummies		Included		Included		Included	
F-stat		1.320		2.590***		1.730*	
Adj R ²		0.09		0.49		0.32	
N		175		88		87	

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1% and 99% levels to mitigate outliers. All variables are described in Table 1.

4.3.4. Human resources in internal audit and audit fees, internal audit assisted audit hours, and unit audit price

Table 8 presents the results of the empirical analysis using internal audit hours provided direct assistance to support external auditors and the external unit audit price based on external audit fees divided by the internal audit hours provided direct assistance

to support external auditors. The natural log of internal audit hours to provide direct assistance to support external audit (IATH) and the natural log of external audit fees divided by IATH to provide direct assistance to support external auditor (IATP) have been used as dependent variables. The sample size is reduced from 175 to 138 because of the sample limitations that some firms that did not report IATH.

Table 8. Human resources in internal audit and audit fees, internal audit assisted audit hours, and unit audit price

Variable	Exp. Sign	(1) AF		(2) IATH		(3) IATP	
		Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept		11.056	20.950***	3.519	2.210**	7.537	4.820***
BU	-/+	-0.352	-2.060**	0.176	0.340	-0.529	-1.040
IT	-/+	-0.807	-0.850	-0.659	-0.230	-0.148	-0.050
FRA	-/+	-3.263	-1.580	5.522	0.890	-8.784	-1.430
ENV	-/+	4.283	1.340	1.984	0.210	2.299	0.240
CMGR	-/+	0.043	1.830*	-0.033	-0.470	0.076	1.090
PMGR	-/+	0.001	0.010	-0.095	-0.480	0.096	0.500
IMGR	-/+	0.001	0.020	0.056	0.290	-0.054	-0.290
CSTF	-/+	0.003	0.440	0.077	3.470***	-0.074	-3.370***
PSTF	-/+	-0.073	-0.750	-0.003	-0.010	-0.070	-0.240
ISTF	-/+	0.019	0.220	-0.023	-0.090	0.042	0.160
SIZE	+	0.399	7.330***	0.121	0.740	0.278	1.720*
IR	+	0.577	1.830*	0.033	0.030	0.545	0.580
COMX	+	0.012	1.750*	0.007	0.340	0.005	0.240
LEV	+	0.343	1.370	2.021	2.690***	-1.678	-2.270**
ROA	-	0.127	0.150	-0.187	-0.070	0.314	0.120
LOS	+	0.240	1.390	0.665	1.280	-0.425	-0.830
NAFEE	-/+	-0.609	-2.330**	0.501	0.640	-1.109	-1.430
JOINT	+	-0.314	-1.940*	0.908	1.860*	-1.222	-2.550**
YE	+	-0.028	-0.260	-0.224	-0.680	0.196	0.610
CUR	+	-0.031	-0.200	0.345	0.730	-0.376	-0.810
ACQ	-	0.010	0.140	0.299	1.320	-0.289	-1.290
PSALE	+	0.166	1.770*	0.322	1.140	-0.156	-0.560
IMW	+	0.045	0.320	-0.898	-2.120**	0.943	2.260**
RES	+	0.164	0.460	0.098	0.090	0.066	0.060
ALAG	+	0.095	0.460	0.135	0.220	-0.040	-0.070
ATEN	+	0.002	1.390	-0.005	-1.090	0.007	1.580
INDEP	-/+	0.003	0.510	-0.003	-0.190	0.005	0.370
CCH	+	0.001	0.720	-0.002	-0.410	0.003	0.660
REG	+	-0.003	-0.030	0.085	0.210	-0.088	-0.220
LIT	-/+	-0.801	-2.680***	-1.028	-1.140	0.227	0.260
Yr_dummies		Included		Included		Included	
Ind_dummies		Included		Included		Included	
F-stat		11.730***		2.470***		2.520***	
Adj R ²		0.814		0.375		0.38	
N		138		138		138	

Notes: *, **, and *** indicate significance (two-tailed tests) at the 0.10, 0.05, and 0.01 levels, respectively. Each of the continuous variables is winsorized at the 1% and 99% levels to mitigate outliers. All variables are described in Table 1.

In column (1), the coefficient on BU (0.352) is negatively and significantly associated with AF at the 5 percent level. This indicates that utilization of a greater ratio of general internal auditor decreases external audit fees. The coefficient of CMGR (0.043) is positively but weakly associated with AF at the 10 percent level, which indicates that more competent

internal auditors with a greater number of professional certifications at the management level slightly increase external audit fees. In column (2), the coefficient on CSTF (0.077) is positively and significantly associated with IATH at the 1 percent level. The result indicates that the competency of internal auditors at the staff level with more

professional certifications exert greater efforts when they assist external auditors. Lastly, column (3) shows that the coefficient on *CSTF* (0.074) negatively and significantly associated with *IATP* at the 1 percent level, which shows that more competent internal auditor with the more number of professional certifications at the staff level has lower external unit audit price for providing direct assistance to external auditors.

The results imply that external audit fees neither increase nor decrease since greater internal audit hours to provide direct assistance to support external auditors offset the corresponding external unit audit price at the staff level. Based on the results, external auditors are likely utilized internal auditors at the staff level for objective tasks, rather than subjective tasks (Glover et al., 2008), and external auditors are not likely to rely on internal auditors' professional judgment in performing an external audit, which may be a threat of auditor independence.

5. CONCLUSIONS AND IMPLICATIONS

This study presents evidence that external audit fees are negatively and significantly associated with the proportion of general internal auditors. Further, external audit hours are negatively and significantly associated with the proportion of general auditors without affecting external unit audit price. The results of the data adjusted for firm size suggest that audit fees and audit hours decrease for smaller firms as the proportion of general internal auditor increases. This implies that both small firms and their external auditors are encouraged to utilize more general internal auditors in performing an external audit. The author finds no evidence that external audit fees are associated with internal

auditor expertise or experience. In essence, external auditors are not likely to rely on internal auditors' professional judgment in performing an external audit due to reduced auditor independence. The results remain qualitatively the same when internal audit hours to provide direct assistance to support external auditors are used instead of the total external audit hours. Finally, internal audit hours to provide direct assistance to support external auditors are positively associated with the total number of professional certifications at the staff level. On the other hand, the external unit audit price based on internal audit assisted audit hours is negatively associated with the total number of professional certifications at the staff level. The results consistently support that external auditors utilize competent general internal auditors at the staff level.

This study provides the first empirical evidence concerning the effects of human resources in the internal audit on external audit pricing decision by using unique audit hour data collected by the IIA, which is not publicly available in the US. This study extends prior studies in an internal audit by showing that the sufficiency and competency of internal auditors at the individual level has an aggregate impact on external audit fees. Regulators, firms and auditors may find this study useful that the collaboration between in-house internal auditors and external auditors may provide an opportunity to improve audit quality in a cost-effective manner without deteriorating external auditors' independence. Finally, this study has a relatively small sample size based on survey data compared to other studies which use a large sample of publicly available data. Thus, it is limited to generalize the results of this study to all other firms.

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