

The Price of the Audit Risks: Do Auditors Charge Audit Fees in Accordance with Audit Risks?

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ABSTRACT

The Audit Risk Model describes audit risk (AR) as a non-mathematical function of the risk of material misstatement (RMM) and the auditor's detection risk (DR). Prior studies report relationships between audit effort and various risk factors. This study provides empirical evidence on the validity of the well-known audit risk model by investigating whether auditors, in order to maintain an acceptable audit risk level, adjust audit effort in accordance with with levels of other risk factors in the audit risk model. To the extent that audit fees, internal control deficiency, and firms' complexity are proxies for audit effort, control risk, and inherent risk respectively. This study confirms the association among the audit effort to reduce the risk of material misstatement as described in the audit risk model. The results indicate that auditors alter detection risk level in accordance with either level of control risk or inherent risk, or both types of risks to maintain acceptable audit risk level and they also adjust audit fee accordingly.

Keywords: Audit Risks, Audit Fees, Risk of Material Misstatement, Internal Control, Firm Complexity

ความเสี่ยงราคาแพง : ผู้สอบบัญชีคิดค่าธรรมเนียม การสอบบัญชีตามความเสี่ยงในการตรวจสอบบัญชีจริงหรือ?

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บทคัดย่อ

โมเดลประเมินความเสี่ยงเป็นสมการแสดงความสัมพันธ์ระหว่างความเสี่ยงจากการแสดงข้อมูลที่ขัดต่อข้อเท็จจริง อันเป็นสาระสำคัญและความเสี่ยงในการตรวจสอบของผู้สอบบัญชี ผลการศึกษาในอดีตแสดงให้เห็นว่า ความพยายามในการตรวจสอบของผู้สอบบัญชีมีความสัมพันธ์กับปัจจัยความเสี่ยงหลายปัจจัย งานวิจัยนี้แสดงหลักฐานเชิงประจักษ์ที่สนับสนุนโมเดลประเมินความเสี่ยงซึ่งเป็นที่รู้จักกันอย่างแพร่หลายนี้ โดยการทดสอบว่าผู้สอบบัญชีมีการปรับเปลี่ยนระดับความพยายามในการตรวจสอบบัญชี เพื่อรักษาระดับความเสี่ยงในการสอบบัญชีให้อยู่ในระดับที่ยอมรับได้หรือไม่ โดยการใช้ค่าธรรมเนียมการสอบบัญชี ความบกพร่องของการควบคุมภายใน และความซับซ้อนของกิจการเป็นตัวแปรที่ใช้เป็นตัวแทนของความพยายามในการตรวจสอบ เพื่อลดความเสี่ยงจากการตรวจสอบ ความเสี่ยงจากการควบคุมและความเสี่ยงสืบเนื่อง การศึกษานี้ยืนยันความสัมพันธ์ระหว่างความพยายามลดความเสี่ยงในการตรวจสอบ ซึ่งเกิดจากความเสี่ยงจากการแสดงข้อมูลที่ขัดต่อข้อเท็จจริงอันเป็นสาระสำคัญ ผลการศึกษาแสดงให้เห็นว่า ผู้สอบบัญชีคิดค่าธรรมเนียมการสอบบัญชีตามระดับความเสี่ยงจากการควบคุม ความเสี่ยงสืบเนื่อง หรือความเสี่ยงทั้งสองประเภท เพื่อรักษาระดับความเสี่ยงในการตรวจสอบที่ต้องการและกำหนดค่าธรรมเนียมการสอบบัญชีตามระดับความเสี่ยงเหล่านั้น

คำสำคัญ: ความเสี่ยงในการตรวจสอบบัญชี ค่าธรรมเนียมการสอบบัญชี ความเสี่ยงจากการแสดงข้อมูลที่ขัดต่อข้อเท็จจริงอันเป็นสาระสำคัญ การควบคุมภายใน ความซับซ้อนของกิจการ

1. Introduction

Audit risk model discussed in Statement on Auditing Standards (SAS) No. 107 (American Institute of Certified Public Accountants [AICPA]. 2006a) provides guidance on auditor's response to assessed risk of material misstatement when performing an audit of financial statements which is closely similar to the definition described in the International Standard on Auditing; ISA200 [IFAC], 2020). Although the model is not a precise mathematical formula, i.e., all risk components cannot be explicitly measured, auditors find such model to be practical when planning appropriate detection risk level to reduce overall audit risk to the desired level.

Simunic (1980) suggests that audit fee is a function of price charged to clients pertains to client-specific business risk and quantity of audit effort put in audit service. Following Simunic (1980)'s theory, researchers use audit fee as a proxy for auditor's effort in performing service. Various studies provide empirical evidence on the relationship between the audit effort and level of a client company's inherent risk and/or control risks in order to maintain audit risk at the acceptable level. Simunic (1980), Pong and Whittington (1994), Bedard, Hoitash and Hoitash (2008), Hogan and Wilkins (2008), Hoitash, Hoitash and Bedard (2008), and Sabauri (2018) document that such inherent risk factors as size, complexity, internal audit contribution, and reliability of the financial statements of the client firms are possible risks that reflected in audit fee as a result of more audit effort exerted and higher audit cost. Audit fee is not only used as a proxy for audit risk, recent studies provide evidence that audit fee is also related with other risk factor such as internal control and governance of the client firms, the auditor premiums and other non-audit fees, or risk of earnings management (Hay, 2013; Doogar, Sivadasan and Solomon, 2015; Greiner, Kohbeck and Smith, 2017).

The purpose of this study is to examine the relationship between the risk of material misstatement (RMM), which includes the Inherent risk (IR) and the Control Risk (CR) components, and the detection risk (DR) as described in the Audit Risk Model in SAS No. 107 and the ISA200. The tests use association study method to investigate whether auditors adjust their audit effort in accordance with the assessed levels and changes in RMM to reach acceptable audit risk level.

Although this study provides empirical evidence of the large sample of U.S. public companies, which are subjected to the auditing standard SAS No. 107, the results are expected to apply to other companies under ISA200 since overall concept of the relationship among audit risk, risk of material misstatement and the detection risk is closely similar in both auditing standards. This study confirms the associations between inherent risk, control risk and detection risk indeed exist. The results indicate that auditors not only price the audit by considering overall business risks of the client firms, they also alter the audit fees in response to the change in control risk factors.

The paper proceeds as follows. Section 2 describes background, literature review, and the hypotheses. Section 3 discusses research methodology including sample selection and definition main variables and control variables. Section 4 presents the results followed by discussion and conclusion in section 5.

2. Prior Research and Hypotheses Development

2.1 Audit Risk Model

Audit risk is defined in the SAS No. 107 as “the risk that the auditor may unknowingly fail to appropriately modify his or her opinion on financial statements that are materially misstated” (SAS No. 107, paragraph 02), and similarly as “the risk that the auditor expresses an inappropriate audit opinion when the financial statement are materially misstated” in the ISA200 (ISA200, paragraph 16 (b)). This risk occurs at both the financial statement level and the individual account balance level. Auditor is required to perform the audit to reduce audit risk to an acceptable level, which is low enough for expressing an opinion that the financial statements give a true and fair view of the financial position of a client firm. According to the SAS No. 107 and the ISA200, audit risk is expressed as a function of the risk that the financial statements are materially misstated and the risk that the auditor will not detect such material misstatement. The audit risk model is stated in a non-mathematical formula as:

$$AR = RMM \times DR,$$

where, the risk of material misstatement (RMM) is the risk that the financial statements or account balances contains misstatement, and the detection risk (DR) is the risk that the auditor will not detect such misstatement. The risk of material misstatement comprises of inherent risk (IR) and control risk (CR). These risks relate to the business risks and control environment of the entity and are exist independently of the effectiveness of audit procedure and effort exerted by the auditor.

The two audit standards provide almost identical definitions of each type of risks as follows:

Inherent risk (IR) : the susceptibility of a relevant assertion to a misstatement that could be material, either individually or when aggregated with other misstatement (SAS No. 107, paragraph 21).

: the susceptibility of an assertion to a misstatement that could be material, either individually or when aggregated with other misstatements, assuming that there are no related controls (ISA200, paragraph 16, i,(i)).

Control risk (CR) : the risk that a misstatement that could occur in a relevant assertion and that could be material, either individually or when aggregated with other misstatement, will not be prevented or detected on a timely basis by the entity's internal control (SAS No. 107, paragraph 21).

: the risk that a misstatement that could occur in an assertion and that could be material, either individually or when aggregated with other misstatement, will not be prevented or detected and corrected, on a timely basis by the entity's internal control (SAS (ISA200, paragraph 16, i,(ii)).

Detection risk (DR) : the risk that the auditor will not detect a misstatement that exists in a relevant assertion that could be material, either individually or when aggregated with other misstatement (SAS No. 107, paragraph 24)

: the risk that the procedures performed by the auditor to reduce audit risk to an acceptably low level will not detect a misstatement that exists and that could be material, either individually or when aggregated with other misstatement (ISA200, paragraph 16 (d))

In addition to the SAS No.107 and the ISA200, the Statement of Auditing Standards No.109, *Understanding the Entity and Its Environment and Assessing the Risks of Material Statement: SAS No. 109*¹ (AICPA 2006b) guides that, to assess the risk of material misstatement of the financial statements and to design and perform the audit, auditor should obtain a sufficient understanding of the entity and its internal control.

In other words, auditor, when performing an audit, is required to consider audit risk and respond to the level of risk of material misstatement and maintain audit risk at an appropriate level. Auditors should adjust their audit procedures to decrease the number of misstatements by performing more effective audit procedures, performing audit procedure closer to year end, or increasing the extent of particular audit procedure (AICPA 2006b).

2.2 Empirical Studies on Association Among Audit Risk Model Components

Prior studies report relationship between audit effort, proxy by audit fees, and other audit risk factors. O'Keefe, Simunic and Stein (1994) as well as Hogan and Wilkins (2008) provide theoretical and empirical evidence on the relation between client characteristics and resource used by audit firms to obtain a desired level of assurance on accountability of financial statements. The result of their study

¹ SAS No. 109 is effective for audits of financial statements for periods beginning on or after December 15, 2006.

indicates that complexity and level of investment in foreign country have significant relationships with audit fees and all level of audit firms' labor resources used. Pong and Whittington (1994) study the determinants of audit fees in the listed company in the UK and find that diversification, as measured by the number of subsidiaries, leads to higher audit charges as a result of higher audit cost. Bell, Landsman and Shakelford (2001) and Lyon and Maher (2005) support this finding by reporting that auditors assess client's business risk then pass their expected cost to the client in the form of higher audit fees. Later studies that report a relationship between audit fees and inherent risk factors include Bedard, et al. (2008), Hogan and Wilkins (2008), Hoitash, et al. (2008), Greiner, et al. (2017) and Sabauri (2018) while Doogar, et al. (2015) interestingly find relationship between audit fees and unobserved audit production costs.

Other group of research provides empirical evidence on the relationship between internal control deficiency and audit fees. Raghunandan and Rama (2006), Hoitash, et al. (2008), Hogan and Wilkins (2008) study sample firms disclosing internal control deficiency or material weaknesses under Sarbanes-Oxley Act section 302 (SOX302) and SOX404. They focus their studies on the sample firms disclosing internal control over financial reporting in the period preceding or immediately after the enforcement of SOX and report the association between audit fees and internal control deficiency and/or material weaknesses.

2.3 Hypotheses Development

As mentioned earlier, auditing standards describe about the effect of inherent risk and control risk in determining desired audit risk level and planning an audit at either individual account balance level or at the financial statement level. Those standards suggest that inherent risk varies in each account balance or class of transactions due to nature of an account. Inherent risk at overall financial statement level increase with the existence of business risk pertains to the size and complexity of the entity. Audit risk is also affected by control risk which relate to the entity's environment and internal control. Control risk varies upon the effectiveness of the design and operation of internal control measures that prevent or detect the risk of misstatement in each account balance or financial statement level on a timely basis. Although inherent risk and control risk are independent risks of an entity, auditor may assess these risks separately or inclusively to determine the RMM level. In responses to the RMM, auditor manages detection risk which relates to substantive audit procedure to acceptable level.

As previously discussed, auditors may consider diversified firms as clients with higher business risks and charge higher audit fees accordingly. Moreover, the disclosure of effectiveness of internal control

should be considered as control risk factor that might result in higher risk of material statement. Based on the results of studies previously mentioned, firm complexity and internal control deficiency lead to higher audit fee. The hypotheses of this study, stated in its alternate form, are as follows:

H_a : *The higher level of firm complexity and the higher the number of internal control weaknesses, the higher audit fees.*

3. Research Methodology

3.1 Test Variables

3.1.1 Dependent Variable: Audit Fee

Numbers of recent studies provide evidence that audit fee is related with client firms risk factor such as internal control and governance of the client firms or even the auditor premiums and other non-audit fees (Hay, 2013; Doogar, et al., 2015), or risk of earnings management (Greiner, et al. 2017). For simplicity of this study, audit fee is used a proxy for the amount of work put in the audit service following the seminal work of Simunic (1980) in which audit fee is regarded as a function of price and quantity if audit effort. Audit fees are disclosed under the requirement of SOX404 and are available in the Audit Analytics database. The variable LnAFee, which is the natural logarithm of an audit fee, is used as a dependent variable to investigate the association between RMM and DR. The data is adjusted to obtain the normal distribution by taking natural logarithm of the dollar amount of audit fees.

3.1.2 Independent Variable: the Number of Material Weaknesses

All public companies registered with the Securities and Exchange Commission (SEC) have to follow specific regulations which require public companies to disclose meaningful financial and other information to the public in order to facilitate investor access to facts about securities prior to buying, and as long as they hold them.

Section 404 of Sarbanes-Oxley Act (SOX) 2002 requires auditor to report on the management assessment of internal control. Under the Auditing Standard No. 5, *An Audit of Internal Control over Financial Reporting That Is Integrated with an Audit of Financial Statements* issued by the Public Company Accounting Oversight Board, PCAOB 2007 (AS No. 5)², auditor of a public company will report that internal control is not effective if there are one or more material weaknesses in the client's

² AS No. 5 supersedes Auditing Standard No. 2 An Audit of Internal Control Over Financial Reporting Performed in Conjunction with An Audit of Financial statement (AS No. 2), and is effective for audits of financial statements for fiscal years ending on or after November 15, 2007.

internal control (the most severe level of internal control deficiency), otherwise, internal control is reported as effective. On the other hand, Section 302 of the SOX requires the management of a public company to also report the control deficiencies in the similar manner.

While SOX302 requires the management of all public companies to establish and maintain an adequate internal control structure and procedures for financial reporting, and report on such assessment of the effectiveness of internal control without requirement for auditor's opinion, SOX404 requires only public firms with market capitalization over \$75 million to provide the auditors' report in effectiveness of internal control. Using the number of material weaknesses disclosed under SOX302 could reduce bias toward larger firms (Doyle, Ge and McVey, 2007). Following Doyle et al. (2007), this study, the number of weaknesses disclosed in the management reports under the SOX section 302 (SOX 302) requirements is used as a measure of internal control effectiveness. The number of material weaknesses is a number of significant control deficiencies that result in more than a remote likelihood that a material accounting misstatement will not be prevented or detected (PCAOB Auditing Standard No. 2, 2004). The internal control weakness issues are tagged and classified into four categories including: Accounting Rule (GAAP/FASB) Application Failures (26 issues), Internal Control over Financial Reporting (21 issues), Financial Fraud, Irregularities & Misrepresentations (12 issues), and Exceptions (7 issues) (Audit Analytics, 2010).

3.1.3 Independent Variables: Level and Change in Firm Complexity

Level of complexity is measured by a continuous measure referred to as Entropy Measure as developed by Jacquemin and Berry (1979) and Palepu (1985). The measure of industrial diversification and geographical diversification are separately calculated using the model:

$$\text{Entropy} = \sum_{i=1}^m \left(P_i \ln \left(\frac{1}{P_i} \right) \right) \quad (1)$$

where m is the number of industrial or geographical segments in which a firm operates and P_i is the proportion of the firm's sales in the i th industry or geographical location to the firm's total sales. Entropy measure increases with the degree of diversification. That is the higher Entropy value, the more diversified (complexity) the firm is.

3.2 Control Variables

Following O'Keefe, Simunic and Stein (1994), Pong and Whittington (1994) Bell, et al. (2001), Lyon and Maher (2005), Raghunandan and Rama (2006), Bedard, et al. (2008), Hoitash, et al. (2008),

and Hogan and Wilkins (2008), the variables used as control variables are variables reported as the determinants of audit fee. These control variables include proxies for complexity, accounting risks, financial risks, and reporting risks. It is posited that auditor charge higher audit fee for firm with higher level of these risk factors. The variables definitions are summarized in Table 1.

Table 1 Variable Definitions

Variables		Definition
<i>Primary variables</i>		
Audit Fees	LnAFee	Natural logarithm of audit fees, in dollars (Audit Analytics)
Internal Control Weakness	Count_Weak	Number of internal control weaknesses disclosed (Audit Analytics-SOX 404-internal control:COUNT_WEAK).
Degrees of Firm Complexity	EntropyB, EntropyG	Business diversification measures based on Palepu (1985). Geographical diversification measures based on Palepu (1985).
<i>Control Variables</i>		
<i>Proxy for Complexity</i>		
Size	L_MktCap	Natural logarithm of Market value of equity (Compustat Annual: Share price x Number of shares outstanding)
Foreign Operation	ForOpr	An indicator variable equals to1 if a firm has foreign sales (CompustatAnnual:ForSale), 0 otherwise.
<i>Proxies for accounting risks</i>		
Accrual Quality Measures	Ab_Res	Absolute value of Residuals from the annual cross-sectional industry regression of total accruals following Doyle, et al., 2007.
Growth	R_Growth	The decile rank of sales growth rate (% change in Compustat Annual:SALE)
Inventory	Inventory	Average inventory (Compustat Annual: $((INVT_t + INVT_{t-1})/2)/AT$)
<i>Proxies for financial risks</i>		
Debt to Asset	DTA	Current debt to total assets (CompustatAnnual: LCT/AT)
Loss	Loss	An indicator variable equals to1 if Net Income is a negative value (CompustatAnnual: NI), 0 otherwise.

Table 1 Variable Definitions (Cont.)

Variables		Definition
Operating Cash Flows	CFO	Net Operating Cash Flows scaled by total asset (CompustatAnnual: OANCF/AT)
<i>Proxy of reporting risk</i>		
Big 4 Auditor	Auditor	An indicator variable equals to 1 if auditor is PWC, Deloitte, Ernst&Young, or KPMG (Audit Analytics), 0 otherwise.

The proxies for complexity include firm size; measured by market capital and whether the firm has foreign operation. Firms which are more complicated or operate in foreign country are expected to have higher business risk. The variable *L_MktCap* is measured as the natural logarithm of a firm's market value of equity whereas the variable *ForOpr* is an indicator variable which equals to 1 if a firm has foreign sales.

Accounting risk is proxy by three variables, *Ab_Res*, *R_Growth*, and *Inventory* because firms with higher abnormal accruals, sales growth, and inventory level are expected to have higher accounting risk due to higher volume of transactions and estimations. *Ab_Res* is a firm-level accrual quality. It is calculated based on the absolute values of residuals of the cross-sectional residual estimated from the following regression:

$$\Delta WC_t = b_0 + b_1 CFO_{t-1} + b_2 CFO_t + b_3 CFO_{t+1} + b_4 \Delta Rev_t + b_5 PPE_t + \epsilon_t \quad (2)$$

where ΔWC_t is a measure of accrual in year *t*, calculated by adding the increase in account receivables (*RECCH*) and inventory (*INVCH*), decrease in accounts payable (*APALCH*) and tax payable (*TXACH*) and increase in other assets (*AOLOCH*), *CFO* is cash flow from operation, ΔRev and *PPE* are the changes in revenue and gross property, plant and equipment, respectively. The data is regressed by year, and within the 48 Fama and French (1997) industry classification. The sample is required have at least 20 observations in each industry group. All variables are deflated by average total assets. This calculation of accrual measure is an implication of Dechow and Dichev (2000) and Jones' (1991) and controls for management discretion in influencing earning quality as suggested in McNichols (2002) and Kothari, et al. (2005).

The firm's sales growth is defined as the decile rank of percentage of sales growth (*R_Growth*). The variable *Inventory* is defined as the average inventory in the data year, scaled by the value of assets. Firms with higher accounting risk are expected to be charged higher audit fee.

Whether the firm suffers from financial risk is indicated by three control variables, DTA, Loss and CFO. The DTA is the ratio of current debt to total asset which measures firm leverage. The variable Loss is set to be equal to the value one if net income for the year is a negative value. CFO is net operating cash flows scaled by total asset. Firms with financial distress are expected to have a higher financial risk.

The last control variable is whether the firm uses one of the big 4 auditors as an auditing and assurance service provider. The quality of auditors who provide audit services expected to be higher if the auditor is from one of the big 4 firms. Thus, the proxy for reporting risk (Auditor) is whether the auditor is PWC, Deloitte, EY or KPMG.

3.3 Research Method

To primarily investigate the relation between each test variables and control variables, univariate and bivariate statistics on each of the variable are analyzed. Pearson's and Spearman's rank correlation coefficients are used to measure the strength and direction of the linear relationship between pairs of variables.

In the Audit Analytics database, the number of material weaknesses is tagged and classified into four categories. These categories include Accounting Rule (GAAP/FASB) Application Failures (26 issues), Internal Control over Financial Reporting (21 issues), Financial Fraud, Irregularities & Misrepresentations (12 issues), and Exceptions (7 issues) (Audit Analytics, 2010). Since the number of weakness is a discrete variable that could range from 0-66 issues. We would expect it to be more sensitive and better captures the associations between control risk and other audit risks than the auditors' opinion on effectiveness of internal control proxies used in previous studies.

The model used to investigate the association between level of audit risk factors, using number of internal control weakness, is as follows;

$$\text{LnAFee} = \beta_0 + \beta_1 \text{EntropyB} + \beta_2 \text{EntropyG} + \beta_3 \text{Count_Weak} + \beta_i \text{ControlVariable}_i + \varepsilon \quad (3)$$

3.4 Data and Sample Selection Procedure

The initial data is obtained from companies that file the information about audit fees and the company's management's opinion on effectiveness of internal control under Section 302 and 404 of the Sarbanes-Oxley Act (SOX 302 and SOX 404) in the Audit Analytic database. Sample firms are then matched with firms that report the number of business and geographical segments in the Compustat Segment database and firms with financial data available in Compustat Fundamental Annual. Although the financial data appearing in the Compustat Segment and the Compustat Annual

databases include the data starting in the fiscal years 1950, the data available for the disclosure of audit fees and internal control efficiency under SOX 302 and SOX 404 is available for the fiscal year ending after November, 15, 2004³. The number of the non-accelerated listed firms that fully disclose its internal control effectiveness information under the provisions of the law is presumed to start in 2005. To obtain sufficient number of data for association study, the sample firms-year, thus, ranges from 2004 to 2010 (the year of law enforcement, the first full year of the law compliance, and an additional of five following years). The sample firms are screened to eliminate specific nature of regulations and strategic objectives. Firms in the utility, finance, and banking industries (SIC codes 4900–4999 and 6000–6999) are eliminated. Firms are also required to have the total of either business or geographical segment sales within one percent of total reported firm sales for each year in the sample period. To mitigate outliers, continuous variables are winsorized by setting the value below the 1st percentile and above the 99th percentile to be equal the value for the 1st or 99th percentile values respectively. This selection procedure results in a total sample of 2,745 firm-years with 818 distinct firms⁴.

4. Results

4.1 Descriptive Statistics, Univariate Analysis, and Bivariate Analysis:

Table 2 presents descriptive statistics for overall characteristics of the key variables for the full sample firms. All variable used in this study appears to be symmetrical and normally distributed.

Table 2 A: Descriptive Statistics for Variable of Interest (n = 2,745)

Variables	Mean	Std. Dev.	Q1	Median	Q3
LnAFee	13.9131	0.9712	13.2481	13.8272	14.5266
Count_Weak	0.1548	0.6094	0.0000	0.0000	0.0000
EntropyB	0.3021	0.4263	0.0000	0.0000	0.6196
EntropyG	0.5273	0.5263	0.0000	0.4503	0.9620

³ Section 404 of Sarbanes Oxley Act is effective for firm with fiscal year ended on or after November 15, 2004.

⁴ Within 2,745 observations obtained from the screening process, only two industrial codes grouped according to Fama and French (1997) 48 industries consist of more than 10% of the total observations. These two industrial groups are Business service (13.11%) and Electronic Equipment (10.13%).

Table 2B: Descriptive Statistics for Control Variables

(n = 2,745)

Variables	Mean	Std. Dev.	Q1	Median	Q3
L_MktCap	6.5269	1.5722	5.4085	6.3942	7.4952
ForOpr	0.6295	0.4830	0.0000	1.0000	1.0000
Ab_Res	0.0903	0.1343	0.0177	0.0448	0.1052
R_Growth	4.6128	2.8705	2.0000	5.0000	7.0000
Inventory	0.0960	0.1081	0.0041	0.0671	0.1423
DTA	0.2246	0.1361	0.1253	0.1949	0.2926
Loss	0.3184	0.4659	0.0000	0.0000	1.0000
CFO	0.0584	0.1701	0.0287	0.0905	0.1431
Auditor	0.8273	0.3780	1.0000	1.0000	1.0000

The investigation of the correlation among the dependent, independent and control variables using the Pearson's correlations and the Spearman's rank correlations are shown in Table 3. The results reveal that Audit fees are correlated with other variables except for the number of material weaknesses. These results are contradicted to those reported in Hogan and Wilkins (2008) who use sample firms from the period prior to the implementation of SOX302 and assume that the management disclosure of internal control over financial statement under SOX302 exist in sample firms in the sample period. The difference in sample selection between this study and that of Hogan and Wilkins (2008) could result in self-selected bias in firms reporting effectiveness of internal control under different sections of the law.

Table 3 Pearson's and Spearman's Correlations Between Audit Fees and Other Variables

LnAFee	Pearson's		Spearman's	
	Coefficient	Prob. > r ^a	Coefficient	Prob. > r ^a
Count_Weak	-0.0070	(0.7138)	0.0075	(0.6939)
EntropyB	0.4428	(<0.0001)	0.3944	(<0.0001)
EntropyG	0.4087	(<0.0001)	0.4213	(<0.0001)
L_MktCap	0.6624	(<0.0001)	0.6339	(<0.0001)
ForOpr	0.3406	(<0.0001)	0.3411	(0.0001)

Table 3 Pearson’s and Spearman’s Correlations Between Audit Fees and Other Variables (Cont.)

LnAFee	Pearson’s		Spearman’s	
	Coefficient	Prob. > r ^a	Coefficient	Prob. > r ^a
AbRes	-0.1399	(<0.0001)	-0.1392	(<0.0001)
R_Growth	-0.0973	(<0.0001)	-0.1018	(<0.0001)
Inventory	0.1249	(<0.0001)	0.2282	(<0.0001)
DTA	0.1300	(<0.0001)	0.2057	(<0.0001)
Loss	-0.2165	(<0.0001)	-0.2134	(<0.0001)
CFO	0.2554	(<0.0001)	0.1419	(<0.0001)
Auditor	0.4078	(<0.0001)	0.4060	(<0.0001)

^a Prob. > |r| under H₀: ρ = 0.

4.2 The Test of the Hypothesis:

The objective of this section is to investigate the association between audit fees and levels of audit risk factors. For the total 2,745 observations used in this study, there are 226 observations (8.23%) with reported material weakness. The highest number of material weakness is 4 (for 36 observations). The linear regression which comprises degree of diversification (EntropyB and EntropyG) and the number of internal control weaknesses, controlled for other factors influencing audit fee [model (3)] is employed. Table 4 presents the result of the test for association between RMM and audit fees.

Table 4 Model for Audit Fees and Variables for Inherent Risk and Control Risk

$$\text{Model: LnAFee} = \beta_0 + \beta_1 \text{EntropyB} + \beta_2 \text{EntropyG} + \beta_3 \text{Count_Weak} + \beta_i \text{ControlVariable}_i + \varepsilon$$

	Dependent Variable: ln (Audit Fee)							
	(1)		(2)		(3)		(4)	
	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a
Intercept	10.8924***	(<0.0001)	10.7546***	(<0.0001)	10.9073***	(<0.0001)	10.7711***	(<0.0001)
Count_Weak	0.0703***	(0.0002)	0.0860***	(<0.0001)	-		-	
EntropyB	0.5052***	(<0.0001)	-		0.5077***	(<0.0001)	-	
EntropyG	0.2977***	(<0.0001)	-		0.3022***	(<0.0001)	-	

Table 4 Model for Audit Fees and Variables for Inherent Risk and Control Risk (Cont.)

	Dependent Variable: ln (Audit Fee)							
	(1)		(2)		(3)		(4)	
	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a	Coefficient	(Pr > t) ^a
LnMktCap	0.3279***	(<0.0001)	0.3684***	(<0.0001)	0.3267***	(<0.0001)	0.3674***	(<0.0001)
ForOpr	0.0771**	(0.0280)	0.3778***	(<0.0001)	0.0755**	(0.0320)	0.3804***	(<0.0001)
AbRes	-0.1834**	(0.0337)	-0.2899***	(0.0020)	-0.1969**	(0.0249)	-0.3070***	(0.0011)
R_Growth	-0.0325***	(<0.0001)	-0.0403***	(<0.0001)	-0.0323***	(<0.0001)	-0.0402***	(<0.0001)
Inventory	0.2358**	(0.0389)	0.4920**	(<0.0001)	0.2382**	(0.0374)	0.4978***	(<0.0001)
DTA	0.9041***	(<0.0001)	0.9065***	(<0.0001)	0.9347***	(<0.0001)	0.9483***	(<0.0001)
Loss	0.2088***	(<0.0001)	0.2025***	(<0.0001)	0.2186***	(<0.0001)	0.2146***	(<0.0001)
CashFlow	0.4033***	(<0.0001)	0.4200***	(<0.0001)	0.3941***	(<0.0001)	0.4091***	(<0.0001)
Auditor	0.4380***	(<0.0001)	0.4520***	(<0.0001)	0.4289***	(<0.0001)	0.4409***	(<0.0001)
Adjusted R ²	0.6253		0.5688		0.6251		0.5660	

a***, **, * are Pr > |t| (two tailed test) under H₀: $\rho = 0.$, of 0.01, 0.05, and 0.1, respectively.

Column (1) of table 4 displays the results of the regression in model (3) (Hypothesis H_a) which include both components of RMM risk proxies and the control risk proxies. As expected, the levels of inherent risk and control risk have significant associations with audit fees. The result in column (2) and (3) depict statistically significant positive relationship between audit fees and control risk and inherent risk, separately. Interestingly, the R² of the result in the specification (3) appears to be higher than that of the specification (2). This is consistent with the correlation results shown in the table 3, the degree of firm complexity measures have higher correlation with audit fees than the internal control weakness measure. Column (4) shows the regression result which include only control variables for the incremental of audit fees. Consistent with previous studies, audit fees are a function of firm's complexity, accounting risks, financial risks, and reporting risk.

5. Discussion and Conclusion

This study uses association study technic to investigate the association between factors for risk of material misstatement (RMM), which include inherent risk (IR) and control risk (CR), and detection risk (DR). Degrees of firm diversification and internal control deficiency are employed as proxies for levels of inherent risk and control risk respectively, while audit fee is a proxy for auditor's effort to perform an audit.

It is hypothesized that auditors adjust audit effort in accordance with level of the risk factors in audit risk model in order to maintain an acceptable audit risk level. The association between proxies for IR, CR, and DR are tested using the OLS regression models which estimate natural logarithm of audit fee as a function of IR and CR factors and other control variables. The results indicate that auditor does consider inherent risk and control risk and exert his or her effort in audit accordingly. This result is consistent with studies by Pong and Whittington (1994), Bell, Landsman and Shakelford (2001) and Lyon and Maher (2005) which report that auditors charge higher audit fees to clients with higher business risk, and Raghunandan and Rama (2006), Bedard, Hoitash and Hoitash (2008), Hogan and Wilkins (2008), Hoitash, Hoitash and Bedard (2008) and Sabauri, (2018). which provide evidence that audit fees are increased with the existence of internal control deficiency.

This study not only adds to existing studies by extending the study period to extend the number of data by which would increase the accuracy and generalizability of association study, but it also includes alternative proxies for firm's inherent risk, namely Entropy indexes and number of internal control weaknesses as reported under SOX404 requirements as a proxy for control risk. The results of this study are expected to apply to both companies under the US and other jurisdiction following the ISA200 since overall concept of the relationship among audit risk, risk of material misstatement and the detection risk is closely similar in both auditing standards.

As mentioned in Hay (2013), Doogar, Sivadasan and Solomon (2015), and Greiner, et al. (2017), audit fees might reflect other component of audit engagements rather than only audit risks. On the contrary, other proxy may be used as a measurement for audit risk. For future studies, researchers might consider other appropriate measurement for audit risks or auditor's effort instead of merely using audit fees.

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