# Auditor Choice under Client Information Uncertainty

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## ABSTRACT

This paper examines the auditors chosen by companies whose financial statements with information uncertainty and infers that these companies may choose specialist auditors to signal the credibility of the financial statements and improve market perception. We develop comprehensive measurements of information uncertainty from the auditor's point of view and further disentangle the information uncertainty effects into fundamental volatility uncertainty and information quality uncertainty. We use an auditor switching sample of U.S. companies from 2001-2009 to examine whether the information uncertainty is an issue of auditor choice or not. Consistent with our conjecture, companies under information uncertainty prefer to hire specialist auditors. Evidence partially supports that, relative to companies under fundamental volatility uncertainty, companies suffering information quality uncertainty are more inclined to choose specialist auditors.



**Key words:** *auditor choice, information uncertainty, auditor expertise.*

## 1. Introduction

Many previous studies examine the determinants of auditor choice (Carcello and Neal 2003; Francis et al. 1999; Chaney et al. 2004; Blouin et al. 2007; Chen et al. 2008; Pittman and Fortin 2004). The two main factors are Big N CPA firms (Copley and Douthett 2002) and specialist auditors (Abbott and Parker 2000; Beasley and Petroni 2001; Ettredge et al. 2009). However, as we know, there is no previous paper regards information uncertainty as on factor of auditor selection. Therefore, we expand these reasons and propose that information uncertainty is also one factor that may affect auditor choices.

Grounding on the markets' perception of auditor switching, we argue that the perception of outsiders influences the company's auditor choice. Watson (2002) applies game theory and opines that managers make their strategies depending on their expectations of investor behavior. For example, companies choose to hire auditors to provide a high-quality audit in order to acquire a lower cost of capital (Pittman and Fortin 2004), and reduce underpricing in the stock market (Balvers et al. 1988; Titman and Trueman 1986). That is, the perceptions of stakeholders outside the business operations affect the auditor selection decisions by the management. Extending from this point, we argue that the management of companies under information uncertainty decide if it is necessary to hire specialist auditors to improve investors' perceptions by conjecturing whether investors care information uncertainty or not. Based on previous literature, companies with higher degrees of information uncertainty often make stakeholders lower their reliance upon company information and sometimes short or downgrade these filers (Merton 1987; Beneish et al. 2005; Beneish et al. 2008). Furthermore, prior studies point out that psychological biases are increased when there is more uncertainty (Hirshleifer 2001; Daniel et al. 1998, 2001; Zhang 2006)[1]. Shareholders and creditors avoid making investments into companies with high information uncertainty. Hence, we propose that companies under information uncertainty are more inclined to choose specialist auditors to alleviate the negative impact of information uncertainty.

Hiring a specialist auditor may be an effective and efficient solution to alleviate the impact perceived by stakeholders for companies under information uncertainty. Prior research indicates that specialist auditors have detailed and insightful industry knowledge that helps them acquire more accurate and non-error auditing skills (Solomon et al. 1999). They are more effectively when assessing

[1] In psychology, people systematically overweight / underweight certain types of information, for example, people often overweight on more salient / less reliable and underweight on more abstract/statistical evidence (Griffin and Tversky 1992; Jiang et al. 2005).

inherent risk specific to the industry in which they specialize (Taylor 2000) and detecting errors for clients in their specialized industry (Owhoso et al. 2002). Moreover, they also develop their task knowledge distinct to their specialty (Thibodeau 2003) and assess audit risk more accurately (Low 2004) and effectively (Moroney 2007), as well as interpret and complete partial cue patterns (Hammersley 2006). The specialist auditor is capable of providing higher audit quality for their chosen specialty, reducing uncertainty (Fortin and Pittman 2007) and enhancing the reliability of financial information (Elliott and Jacobson 1998). Therefore, companies whose financial statements are characterized by information uncertainty are more likely to hire specialist auditors to alleviate the degree of uncertainty embedding in their financial statements. For this reason, the management of the company with high degree of information uncertainty has incentive to hire a specialist auditor. This paper first proposes that the uncertainty of the company's information environment is an important factor in auditor choice decisions.

Previous studies define information uncertainty as "ambiguity with respect to the implications of new information concerning a firm's value" (Jiang et al. 2005; Zhang 2006; Autore et al. 2009) or "incomplete knowledge about signal quality" (Epstein and Schneider 2008). Hirshleifer (2001) and Zhang (2006) posit that the measurement of information uncertainty consists of a company's underlying fundamental volatility and its quality of information. Zhang (2006) further points out that, although both parts contribute to the information uncertainty of a company's value, it is difficult to distinguish in empirical research. Based on above statements, we term the first source of information uncertainty "fundamental volatility uncertainty", because this uncertainty results from the variation of a company's fundamental value. The second source is "information quality uncertainty", because this uncertainty lies in the quality of financial signals. In addition, the information role the auditor plays is to preserve a more reliable reporting experience for financial statement users (Dye 1993), and many prior studies also state that one of the most important audit demands is reducing information risk[2] (Knechel et al. 2008). Hence, we infer that the auditor is an important mechanism to alleviate the information uncertainty especially the information quality uncertainty.

Unlike prior studies using several alternative and sporadic proxies for information uncertainty in a non-structured manner (Zhang 2006; Autore et al. 2009), we develop an integrated information uncertainty framework from an auditor's point of view. Following the definition of information uncertainty and the requirements of

[2] Information risk is the likelihood of the information with incomplete and incorrect.

Statements on Auditing Standards (SASs), we identifies five dimensions which auditors concern when getting knowledge of audit clients during audit work and build an information uncertainty structure. The representative proxies for above five dimensions include the external environment, corporate life cycle, corporate governance, uncertainty level of financial reporting numbers and internal control weakness disclosure. We then integrate these indicators into a comprehensive measurement and also develop the integrated proxies for fundamental volatility uncertainty and information quality uncertainty.

We conduct logit regression on an auditor switching sample of U.S. public companies listed on the NYSE, AMEX and NASDAQ during 2001 to 2009. For the sake of acquiring accurate estimation of auditor specialization, this paper uses the actual audit fees to measure the variables of auditor specialization instead of using indirect proxy, e.g. auditees' total sales. Our empirical results provide evidence that the company suffering information uncertainty favors choosing the specialist auditor. Furthermore, companies under information quality uncertainty are more inclined to choose specialist auditors, relative to companies under fundamental volatility uncertainty. That is, the management appreciates the value of specialist auditor especially when encountering information quality uncertainty.

This paper contributes to literature of auditor choice and information uncertainty in many ways. First, it is the first paper to directly link auditor choice with client information uncertainty. Expanding the literature of factors that affect auditor choice (Ettredge et al. 2009), we propose information uncertainty is also a factor of auditor choice. The information uncertainty affects both the stakeholder's perceived quality of financial-related information and the actual reporting quality. A specialist auditor can mitigate its information uncertainty problems because he is equipped with (1) specific knowledge of the industry where he specializes (Taylor 2000; Thibodeau 2003) and (2) superior ability and skill to perform accurate error-free audits (Solomon et al. 1999; Low 2004; Hammersley 2006; Moroney 2007). Therefore, whether a company is under information uncertainty or not is a critical factor of auditor choice. This paper enriches the stream of auditor choice research by proposing an extra determinant for choosing an auditor, i.e., the stakeholders' perceived auditee information quality.

Second, this paper operationalizes an abstract concept of information uncertainty and proposes a framework of information uncertainty from the view point of the auditors. As we known, no prior research constructs the operational proxies of information uncertainty with a structural way. Therefore, we base on auditor's standards and borrow basic auditing theory to connect information uncertainty and auditors' practical work. In other words, our operational proxies of information

uncertainty are down-to-earth concepts that auditors realistically execute when starting their daily audit work.

Third, we not only built an integrated measurement but overcome the separation difficulty of information uncertainty. This paper decomposes a company's source of information uncertainty into fundamental volatility and information quality under the framework of information uncertainty from the auditor's point of view. Although Zhang (2006) states that it is empirically difficult to distinguish one from the other, we differentiate the attribute of five dimensions which modified from the procedure of getting knowledge during audit and disentangle information uncertainty into fundamental volatility and information quality.

Finally, this paper compares the impact of two sources of information uncertainty on specialist auditor choice and provides evidences that the content of information quality uncertainty makes more the management hire the specialist than fundamental volatility uncertainty. Consistent with Dye (1993), the management inclines to hire a specialist auditor especially when under information quality uncertainty for auditor's information role. Our result indicates that specialist auditors can manifest their capabilities better when companies are experiencing information quality uncertainty.

The following section provides a comprehensive review of the relevant literature and describes the formulation of our research hypotheses. The sample employed and research methodologies will be described in Section 3. Section 4 reports our empirical evidences. Section 5 discusses conclusions and some implications for future research.

## 2. Literature Review and Hypotheses Development

### 2.1 Information Uncertainty Framework

Environmental uncertainty is a basic concept for organizational framework design (Chandler 1962) and an important line of research all along. Based on prior studies, environmental uncertainty is the degree by which changes in an organization's operations will be affected by external environmental factors, such as unpredictable actions of customers, suppliers, competitors and regulatory groups (Dess and Beard 1984; Drago 1998). Furthermore, environmental uncertainty is difficult to observe for its randomization in nature and difficulty to predict (Ghosh and Olsen 2009).

Although information uncertainty is focus on information environment, it is part of environmental uncertainty. Griffin and Tversky (1992) states that people systematically overweight/underweight certain types of information in psychology, for example, people often overweight on more salient/less reliable and underweight on more abstract/statistical evidence (Jiang et al. 2005). In addition, prior studies

argue that information availability (Arbel and Strebel 1982; Barry and Brown 1984; Merton 1987) and information precision are key determinants of equilibrium prices (Merton 1987; Beneish et al. 2005; Beneish et al. 2008). Therefore, the level of information uncertainty is important for it affects the evaluation of the company's value.

In this paper, we focus on financial-related information environment, i.e., information uncertainty. When financial statements cannot accurately reflect their companies' precise economic conditions, these financial statements represent information uncertainty. Purposeful concealment by management, uncertainty of the macro-economic situation, and deficiencies within the financial reporting system will cause information uncertainty. No matter what the cause is, this information uncertainty may eventually lead management and investors, even auditors, to make decisions based on ambiguous, uncertain or incorrect information. Eventually, the stock price will be discounted for investors revise their beliefs about the quality of a company' financial reporting in excess of the credibility (Beneish et al. 2005). Therefore, information uncertainty is a very important issue for both stakeholders and companies.

Based on prior studies, information uncertainty is defined as ambiguity with respect to the implications of new information concerning a firm's value (Jiang et al. 2005; Zhang 2006; Autore et al. 2009). Like previous studies, an observed signal ($s$) is a combination of a company's fundamental value ($v$), e.g. future cash flow or dividend, and a noise term ($e$). The variance of the signal, var($s$), is a measurement for information uncertainty. More specifically, var($v$) represents the volatility of a company's underlying fundamental value and the noise term var($e$). Consistent with Epstein and Schneider (2008) who propose that incomplete knowledge about signal quality is also a source of information uncertainty. We define var($e$) as the quality of information. Therefore, we establish two types of information uncertainty, i.e., the fundamental volatility uncertainty (Jiang et al. 2005; Zhang 2006; Autore et al. 2009) and the information quality uncertainty (Epstein and Schneider 2008). The content of fundamental volatility uncertainty represents the uncertain level of a company's core value. For instance, an important potential order with high profits is pretty uncertain and causes the fundamental volatility uncertainty of a company. On the other hand, the content of information quality uncertainty refers to the unreliable level of a company's financial information. For example, the internal control system of financial reporting contains material deficiencies which lead to information quality uncertainty of the company.

Although Zhang (2006, p. 105) states that "…both effects contribute to the uncertainty of a firm's value and it is hard to empirically disentangle one from the

other as observed stock volatility and other empirical constructs capture both effects." We attempt to differentiate between the fundamental volatility uncertainty and the information quality uncertainty within our original framework of information uncertainty in the viewpoint of the auditor.

**2.2 The Information Uncertainty Framework**

Previous studies relating to the uncertainty issue, e.g. Zhang (2006) and Autore et al. (2009), usually use several dispersed proxies for information uncertainty and lack a structured approach. They show that many factors contribute to the higher level of information uncertainty, which means the more ambiguous a company's value information is. As we know, there is no prior study provides the information uncertainty structure that can be readily generalized, we propose an original framework for information uncertainty and auditor specialization in order to analyze the issue structurally.

Since an auditor plays an information role which facilitates more reliable reporting in the market (Dye 1993), Knechel et al. (2008) state that the great majority of prior studies find reducing information risk to be the most important audit demand. For example, the classical agency theory illustrates how an auditor is asked to eliminate the information asymmetry[3] between management and outsiders (Francis and Wilson 1988). Although one of the important functions of an audit is providing a guarantee of information quality, there is no past paper examines how an audit directly links with information environment. Because the auditor plays an important role in information uncertainty as discussed above, we attempt to build a framework of information uncertainty from the auditor's angle in this paper. This study scrutinizes potential factors and the relationship between auditor's risks and information uncertainty.

According to SAS No. 108 and No. 109, there are several phases in performing a financial statement audit, including obtaining an understanding of the organization and its environment, identifying risks that may result in material misstatements, evaluating the organization's response to those risks, assessing the risk of material misstatement and evaluating results and issuing audit report. Obtaining an understanding of the organization and its environment is very important not only at the beginning of the audit but throughout an audit, because the assessment is done depending on evidence collected in the first phase and audit risks affect the design of

[3] Information asymmetry is a situation where the parties to a transaction have unequal information, so that an unfair exchange often results. Akerlof (1970) illustrated that if no signalling is in effect, and if there is information asymmetry on quality between buyers and sellers, an adverse selection of low-quality goods will occurred thereafter.

follow-up audit procedures as well as the scope of the audit (SAS No. 108)[4]. Therefore, phase one, obtaining an understanding of the organization and its environment, is often the most critical part during the entire audit and its execution quality easily differentiates specialist auditors from non-specialist ones.

In order to precisely assess the risk of material misstatements based on the auditor's understanding of the client, the Generally Accepted Auditing Standards (GAAS) require the auditor to gain an overall understanding and plan out the audit work accordingly. For this reason, SAS No. 109, Understanding the Entity and Its Environment and Assessing the Risks of Material Misstatement, supersedes SAS No. 55, emphasizes that gaining an understanding of the client is a substantial part of the audit evidence and has a great impact on the risk assessment for material misstatements throughout the audit.

The auditor will alleviate the uncertainty level of his auditee's financial information by developing an appropriate audit plan based on his knowledge of the auditee's current status and environment, e.g. the industry it belongs to, as well as the potential future challenges. SAS No. 109 and International Standard on Auditing (ISA) 315[5] describe procedures that should be followed while gathering information in order to gain a more accurate understanding of the client and its environment. Because the auditor has to put forth considerable effort to obtain appropriate and sufficient evidence to assess acceptable audit risk, control risk and inherent risk, SAS No. 109 suggests five dimensions through which the auditor may better understand their clients. They include "Industry, Regulatory, and Other External Factors", "Nature of the Entity", "Objectives and Strategies and Related Business Risks", "Measurement and Review of the Entity's Financial Performance" and "Internal Control"[6].

To elaborate on how these audit procedures and concepts relate to information uncertainty, this study utilizes the above-mentioned practical structure suggested by auditing standards to illustrate what dimensions an auditor needs to undertake in order

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[4] SAS No. 108, Planning and Supervision, supersedes SAS No. 22 and re-emphasizes that planning is continuous throughout the engagement duration as the audit evidence accumulates. In these standards, in order to reduce audit risk, auditors are suggested to consider events or circumstances that may negatively impact their abilities to plan the audit.

[5] Similar to SAS No. 108 and SAS No. 109 issued by the Auditing Standards Board, International Standard on Auditing (ISA) 310 explores the importance of obtaining knowledge of the business for "such knowledge is used by the auditor in assessing inherent and control risks and in determining the nature, timing and extent of audit procedures". ISA 315, whose title is exactly the same as SAS No. 109, requires procedures for gaining understanding of the client with the same basic outline but with more detailed rules.

[6] Elder et al. (2010) summarize the auditing standards and similar to SAS No. 109, formulate a framework by which to "understand client's business and industry".

to understand the client's business, and what kind of audit strategy may be required to improve the audit quality. From the auditor's perspective, Figure 1 shows that how company-specific financial statement information uncertainty connects to the aforementioned five dimensions, their representative components and finally the choice of specialist auditors.

[Insert Figure 1 here]

In this paper, we propose representative indicators for each of the five dimensions. Above five dimensions include external factors, corporate life cycle, corporate governance, uncertainty in financial reporting numbers and weaknesses of internal control over financial reporting respectively. Although Zhang (2006) states that the fundamental volatility uncertainty and the information quality uncertainty are difficult to distinguish in empirical research, we assign these five indicators into two hypotheses by their attributes. The first three indicators pertain to the content of fundamental volatility uncertainty, because the clients' external environments, governance levels and life stages are related to their businesses and operations. The external pressure (external factors), the nature (life stage) and the system of strategy making (corporate governance) all affect the value and the future of a company. These components also result in the uncertainty concerning its core business and perspective, which is fundamental volatility uncertainty. The last two indicators belong to the information quality uncertainty. The uncertainty of reporting numbers and weaknesses of internal controls in financial reporting are concerned with the credibility of financial information. If a company suffers uncertainty in reporting numbers or material weaknesses in its internal control system, these signals indicating unreliabilites of the company's financial information may lead to investors' misunderstanding of company value. We discuss the details of each indicator in following sections.

***2.2.1 External Factor***

In the dimension of "Industry, Regulatory, and Other External Factors", SAS 109 states that an auditor shall obtain an understanding of the industry, as well as regulatory and other external factors, e.g., product competition, the regulatory environment and general economic conditions. Therefore, we adopt the Herfindahl index and the P/E ratio (price-to-earnings ratio) to proxy the competition level and the particular inherent risk of the specific industry. The Herfindahl index measures the degree of monopoly and is widely adopted in sociology (Voicu. 2011). A higher Herfindahl index indicates a less competitive industry wherein companies are usually investor-unfriendly and offer insufficient and incomplete information which causes information uncertainty.

The P/E ratio reflects the investor's perceived risk in a given company's future

earnings. Higher P/E ratios suggest that a company has promising prospects with high risk, signifying information uncertainty. Both the Herfindahl index and the P/E ratio exhibit actual business situations that companies face. Hence, this dimension is classified to fundamental volatility uncertainty instead of the information quality uncertainty. Specialist auditors may mitigate these uncertainty conditions resulting from the external environment by utilizing their superior knowledge of (1) environmental, economic, and contextual factors that affect contingent errors (Kreutzfeldt and Wallace 1986); and (2) the industry dynamics and its impact on clients' incentives to misstate financial information (Shields et al. 1996).

***2.2.2 Corporate Life Cycle***

In the "Nature of the Entity" dimension, the auditor should understand the nature of the client's business and industry; including the entity's operations, its ownership, governance, investment type, financing and organizational structure (SAS No. 109). We adopt the measurement of corporate life cycle to capture the current business development status of the company and its business nature. The corporate life cycle stage measures the auditee's current business development status and probable future.

This life cycle concept originated from marketing science and product life cycle (Rink and Swan 1979), and it proposes that all companies will experience four stages: start-up, growth, maturity and decline (Gomez-Mejia 1992; Black 1998). Corporate life cycle is generally applied to research of mutual funds (Black 1998) and in the earnings response coefficient (Lev 1989). Anthony and Ramesh (1992) provide evidence that companies in the growth stage relative to companies in the decline stage have larger response coefficients, both in sales income and capital expenditure.

Black (1998) proposes that the relative importance of a company's earnings, operating cash flow, and financing cash flow differs as the company enters different life cycle stages. In the early stages, based on Anthony and Ramesh (1992) and Black (1998), the corporation usually has a high sales growth rate, which results from larger production equipment investment, and a relatively low dividend payment rate. In the later stages of the life cycle, the corporation generally features a lower sales growth rate, lower rate of investment in production equipment, and higher dividend payment rate. Hence, we follow prior studies which adopt the four life cycle descriptors to determine which life cycle stage a corporation is in (Anthony and Ramesh 1992; Black 1998; Chin et al. 2005; Taso et al. 2010).

The corporate life cycle stage reflects business conditions of an individual company and the whole industry it belongs to, e.g., its operating perspectives and expected future demands. This measurement reflects an intuition that companies

have different vision, mission and strategy in different life cycle stages. Companies in the growth stage invest large amount of money for expansion of sizes, plants and equipments (Dechow and Ge 2006; Fairfield 2006), which results in rapid sales growth with promising prospects (Chin et al. 2005). However, the fundamental volatility risk that the persistence of cash flows of the company in growth stage is lower than the company in stagnant stage (Taso 2010), and that the preliminary management system may not be capable of handling huge business operation and strategy can result in information uncertainty for companies in the growth stage. Furthermore, because corporate life cycle measures the business status and future position of a company, we consider it as the content of fundamental volatility uncertainty.

***2.2.3 Corporate Governance***

In the dimension of "Objectives and Strategies and Related Business Risks," SAS 109 prescribes that an auditor examines the client's objectives[7] related to the reliability of financial reporting, effectiveness and efficiency of operations, and compliance with regulations. Therefore, we adopt corporate governance as the representative component for this phase. Corporate governance is one important element of business control environment and affects the whole process of major business decisions making. Companies with effective boards react to market volatility and fundamental operation issues more successfully. They issue more frequent earnings forecasts and their forecasts tend to be more accurate (Ajinkya et al. 2005; Karamanou and Vafeas 2005). Previous studies suggest that better corporate governance reduces earnings management and, thereby, lowers information asymmetry (Kanagaretnam et al. 2007). In contrast, companies with weaker corporate governance heighten their level of information uncertainty as a result of dereliction in the governance system. They often are less effective to respond to the fundamental volatility corporate environment encountered.

According to Taylor (2000), specialist auditors possess more understandings of the clients' procedures and policies set up for preventing, detecting and correcting errors, and recognize the irrationalities better by capitalizing this knowledge. The soundness of a company's corporate governance determines its core business operations, strategy and future growths; hence we view the measurement of corporate governance as one component of the content of fundamental volatility uncertainty.

***2.2.4 Uncertainty in Financial Reporting Numbers***

In the "Measurement and Review of the Entity's Financial Performance"

[7] Strategies are defined as the operational approaches made by the management to achieve its objectives (SAS No. 109).

dimension, Dechow and Skinner (2000) base on the fact that stakeholders rarely detect management's discretion in accrual decisions and suggest that the accrual flexibility that GAAP allows creates information asymmetry. Ghosh and Olsen (2009) infer that accruals-related strategic choices must be examined, especially in analyzing organizations under environmental uncertainty, since uncertain environment is bound to increase earnings variability. In this paper, we adopt Francis et al.'s (2007) uncertainty measurement for accrual-based financial reporting numbers to obtain information about the uncertain level of accounting accruals found in financial statements.

Based on prior research, if accruals fail to relate to current/surrounding cash flows or fundamental variables, i.e., fixed assets and revenue changes, information uncertainty is regarded as high (Francis et al. 2007). Therefore, the uncertainty measurement of financial reporting numbers is designed to determine the variability and uncertainty of reporting numbers in financial statements. Accordingly, this uncertainty of reporting numbers directly relates to the information quality of financial statements. In this paper, we classify this measurement into the content of information quality uncertainty. Furthermore, audit specialization is useful when the audtitee's financial reporting numbers show uncertainty because a specialist auditor is equipped with thorough understanding of industry specific errors in various accounts (Ashton 1991) and unique industry audit risks (Wright and Wright 1997).

***2.2.5 Internal Control Weakness over Financial Reporting***

In the dimension of "Internal Control," many prior studies discuss the nature of companies that voluntarily complied with internal controls requirements (Ge and McVay 2005; Bronson et al. 2006; Ashbaugh-Skaife et al. 2007), the nature of companies which complied with Section 302 (Bronson et al. 2006; Ashbaugh-Skaife et al. 2007), Section 404 (Ettredge et al. 2006) and both Section 302 and Section 404 (Doyle et al. 2007a; Ashbaugh-Skaife et al. 2008; Hogan and Wilkins 2008; Hoitash et al. 2009; Hoitash et al. 2008). However, we extend this discussion to the auditor's role in detecting internal control weaknesses. Based on audit standards, the quality of internal control system determines the reliability of the financial statements and the control risk level of the audit (Elder et al. 2010). If an auditee's internal control system is deemed weak, the auditor would increase control risk and insert an extra amount of effort to assure that the financial statements reflect the true financial condition. Accordingly, the auditor's experience and skill become more critical than in normal circumstances. Beneish et al. (2008) utilize material internal control weakness disclosure as a proxy of lower perceived reporting quality in order to examine investor reactions to information uncertainty, and find that disclosing companies show negative abnormal returns and increases in their costs of capital.

That is, companies with weak internal control mechanisms demonstrate higher probabilities of measurement errors in financial reports or information ambiguity for stakeholders; these internal control weakness disclosures may help outsiders identify those companies whose financial statements are under information uncertainty.

Because financial statements are the output of the internal control system over financial reporting, the soundness of this system directly affects the quality of financial information. That is, if the internal control system of a company has any material weakness, its financial statements will contain errors accordingly. Material weaknesses of the internal control system over financial reporting are substantially related to information quality; hence, we view this issue of material weaknesses in internal control system as one component of the content of information quality uncertainty.

In summary, we attempt to develop an information uncertainty framework basing on auditor's perspectives. We deem a company in high information uncertainty situation when it encounters the following conditions in the prior year: (1) its Herfindahl index and P/E ratio are high; (2) its business life cycle is in the growth stage; (3) its overall corporate governance is weak; (4) it shows high uncertainty measurements of financial reporting numbers; and (5) it disclosed material weaknesses of internal control over financial reporting. As to different sources of information uncertainty, (1), (2) and (3) belong to the content of fundamental volatility uncertainty, whereas (4) and (5) attribute to the content of information quality uncertainty.

**2.3 Auditor Choice and Information Uncertainty**

In regard to auditor choice research, some studies explain how client-specific characteristics affect the choice of a high quality auditor. For example, industry-specialist auditor selection is positively related to both audit committee independence and activity (Abbott and Parker 2000) and to the board of directors' independence in the property-liability insurance industry (Beasley and Petroni 2001). Ettredge et al. (2009) summarize three different levels of high-quality audit demands, including client-specific, industry-level and country-level factors, and their cross-country sample shows that these three sources of client-specific demand indeed affect auditor choice decisions.

Previous studies on auditor choice address many reasons why companies switch their auditors. Some reasons relate opinion shopping, companies switch their auditors to obtain the type of audit opinions they want (Lennox 2000; Carcello and Neal 2003). Moreover, documented by Francis et al. (1999), Big N CPA firms demonstrate higher qualities of withholding aggressive and opportunistic earnings manipulation by management, so companies may switch to non-Big accounting firms

to increase aggressive earnings management behavior. In these circumstances, the management satisfies their specific managerial purpose by switching auditors to gain credibility of outsiders. Other reasons for switching auditors includes changes in management, disagreements over reporting matters, conflicts over audit fees (Schwartz and Menon 1985) and factors involving practical aspects of audit work. Blouin et al. (2007) propose that agency costs and switching costs are critical for the decision to switch auditors. The management is likely to choose an auditor with high quality to alleviate the underpricing in stock market (Balvers et al., 1988; Titman and Trueman, 1986) and signal that the financial information is trustworthy.

**2.4 Auditor Specialization Choice and Information Uncertainty (H1)**

Based on prior research (Gramling and Stone 1998; Beasley and Petroni 2001), three main reasons have been identified to explain why industry specialist auditors are demanded and what advantages they possess: (1) better audit technologies (Dopuch and Simunic 1980), (2) lower costs through economies-of-scale (Caves 1992), and (3) superior knowledge formed by economies-of-knowledge. Moreover, specialist auditors provide higher quality of audit (Balsam et al. 2003; Dunn and Mayhew 2004; Krishnan 2005; Cahan et al. 2008), because they interpret findings better even within incomplete partial cue patterns which suggest a mistake (Hammersley 2006), and exhibit better capability for industry-specific errors detection (Bonner and Lewis 1990; Bédard and Biggs 1991; Owhoso et al. 2002). Moreover, companies with specialist auditors to exhibit lower levels of information asymmetry (Almutairi et al. 2009). Hence, we infer that the specialist auditor provide higher audit quality even when auditee is under information uncertainty.

There are two sources of information uncertainty: fundamental volatility uncertainty (Jiang et al. 2005; Zhang 2006; Autore et al. 2009) and information quality uncertainty (Epstein and Schneider 2008). In fundamental volatility uncertainty part, it is possible that specialist auditors are capable of alleviating the risk of fundamental volatility. The fundamental volatility uncertainty may stem from instability in a company's core value ($s$). Due to the rich industry knowledge and penetrations of development tendencies, specialist auditors may be able to ease that uncertainty by depicting a more accurate business environment which auditees face.

In information quality uncertainty part, we consider that specialist auditors may decrease the level of information quality uncertainty. Because specialist auditors are more experienced and equipped with professional audit techniques, they can detect unusual or unreasonable information more easily without being misled into wrong judgments (Bonner and Lewis 1990; Bédard and Biggs 1991; Owhoso et al. 2002; Hammersley 2006) and reduce the information risk (Knechel et al. 2008). Moreover, Krishnan (2005) provides evidence that specialist auditors help their clients

disclose bad news in a more timely manner than non-specialist auditors. That is, specialist auditors reduce the level of information uncertainty by enhancing their clients' transparencies of financial information sooner. In sum, specialist auditors are capable of providing better quality of financial information that leads to lower information uncertainty.

Facing with clients whose financial statements are exposed to information uncertainty, specialist auditors may apply more thorough procedures to examine financial reports from stem to stern and include more capable and experienced auditors in the engagement team. After hard works of specialist auditors, the audited financial statements provide certain assurance of information reliability not only for perceived quality (Balsam et al. 2003; Knechel et al. 2007) but in actual quality (Krishnan 2003; Dunn and Mayhew 2004; Balsam et al. 2003). We conjecture that companies will find it worthwhile to hire specialist auditors to enhance the transparency and quality of their financial information, because stakeholders may further raise the stock price of these companies for their higher perceived information quality and lower information uncertainty (Merton 1987; Beneish et al. 2005; Beneish et al. 2008). Therefore, our first hypothesis is stated as follows:

**H1:** Companies under information uncertainty are more inclined to choose specialist auditors.

To further test the impact of different types of information uncertainty, H1 is divided into H1a, H1b and H1c:

**H1a:** Companies under comprehensive information uncertainty are more inclined to choose specialist auditors.

**H1b:** Companies under fundamental volatility uncertainty are more inclined to choose specialist auditors.

**H1c:** Companies under information quality uncertainty are more inclined to choose specialist auditors.

### 2.5 Auditor's Information Role and Information Quality Uncertainty (H2)

Dye (1993) proposes that there are two sources of audit demand. One source is based on the fact that stakeholders need independent professionals to assure of the quality of a company's financial information, defined as the "information role". The other source is based on the need of stakeholders requiring auditors to provide insurance protection, e.g. indemnifications, in case of audit failures, defined as the "insurance role."[8] Because the auditor's insurance role is apparent only when the

[8] Prior studies have examined the auditor's information role and insurance role in the IPO market; this line of research has yielded mixed results because of data limitation (Menon and Williams 1994; Willienborg 1999; Weber and Willenborg 2003).

bankruptcy of accounting firms occurred, for example, the Laventhol and Horwath bankruptcy (Menon and Williams 1994; Baber et al. 1995), the major role which auditors play in normal circumstances is the information role.

According to previous studies, the purpose of auditing is to reduce uncertainty about companies (Fortin and Pittman 2007; Autore et al. 2009) and enhance the reliability of financial information (Elliott and Jacobson 1998). The superior audit technology of auditor specialists emerges in their detailed and insightful industry knowledge which allows them to have more accurate non-error frequency knowledge (Solomon et al. 1999), in effectiveness when assessing inherent risk which specific to their specialty (Taylor 2000) and when detecting errors for their specialty (Owhoso et al. 2002), in accuracy (Low 2004) and effectiveness (Moroney 2007) of audit risk assessment, and in interpretation of incomplete partial cue patterns (Hammersley 2006). Based on above statements, auditor specialists appear to have better capabilities in performing audit work and detecting potential errors especially when companies under information uncertainty, relative to non-specialist auditors. The specialist auditor makes a greater reduction in information uncertainty for his unique audit technology and industry-specific knowledge. Therefore, we infer that the major value of specialist auditors is enhancing the financial information quality of their audit clients.

Unlike the producing process and quality of financial statements focus on the information quality uncertainty, the content of fundamental volatility uncertainty emphasizes on the business value. Because the auditor is not directly involved with client's business decisions, the specialist auditor has limited capability to affect the daily operation and business strategy. Following DeAngelo (1981), who posits that a quality auditor will discover the breach of financial reporting system and reveal it, we infer that specialist auditors can manifest their audit effectiveness more under the information quality uncertainty, relative to the fundamental volatility uncertainty. Therefore, we conjecture that companies are more inclined to hire specialist auditors when under information quality uncertainty than under fundamental volatility uncertainty. Our hypothesis two is as follows:

**H2:** Companies under information quality uncertainty are more inclined to choose specialist auditors than companies under fundamental volatility uncertainty.

## 3. Research Design

### 3.1 Information Uncertainty Proxies

#### *3.1.1 External Factor*

We construct an external factor by combining the Herfindahl index and the mean P/E ratio of particular industry. This study first defines a high Herfindahl index (the industry P/E ratio) as 1 if the Herfindahl index (the industry P/E ratio) of a

specific industry is larger than the median value of our sample; it is 0 otherwise. Thereafter, we sum these two variables and compare that with the median of our sample. We finally get external factors (*EXTERNAL*) to measure the risk of information uncertainty resulting from external environment.

### *3.1.2 Corporate Life cycle*

Based on prior studies (Anthony and Ramesh 1992; Black 1998a, b; Chin et al. 2005; Taso et al. 2010), four main variables related to corporate life cycle are considered, including sales growth, capital expenditure, dividend, and firm age. Generally speaking, companies in the early stages of life cycle have higher sales growth rate. In the growth stage, companies usually tend to invest their funds in production equipment and lower their dividend payment rates relatively. On the contrary, in the later stages of the life cycle, companies experience a lower sales growth rate, lower investment rate in production equipment, and higher dividend payment rate.

Following Taso et al. (2010), this paper adopts the tierce method to differentiate sample companies into three groups by using a single composite life cycle score employing above four variables, to determine a company's life cycle stage. For each individual life cycle score composite variable, we define the growth stage as 0, maturing stage as 1, and stagnant stage as 2. We then obtain a composite score (*LIFECYCLE*) and classify the company scoring within the scope of 0-2 as in the growth stage, maturing stage within the scope of 3-5, and stagnant stage within the scope of 6-8.

### *3.1.3 Corporate Governance*

Following prior research in corporate governance (Dhaliwal et al. 2007; Carcello et al. 2008; Hoitash et al. 2009), we employ a scoring system to measure the overall strength of corporate governance based on the board of directors' size, independence, tenure, frequency of meetings, and the average number of directorships held by non-executive directors. In accordance with the previous literature evidence, we expect the above respective five variables to be negatively (Yermack 1996; Core et al. 1999), positively (Beasley 1996; Klein 2002b), positively (Beasley 1996; Bédard et al. 2004), positively (Carcello et al. 2002) and positively (Fama 1980; Fama and Jensen 1983; Carcello et al. 2002) associated with good governance. We define the board size score as 1 if the size of the board is smaller than the median board size in our sample, and as 0 otherwise. The other factors are regarded as 1 if the variable is greater than the median, and as 0 otherwise. Afterward the sum of these five component scores (*CG*) is used as our composite variable for board strength.

### *3.1.4 Uncertainty Measurement of Financial Reporting Numbers*

Following Francis et al. (2007), the information uncertainty is high when

accruals map poorly into cash flows or company fundamentals variables known to be related to accruals. Therefore, they develop an information uncertainty measurement based on the residuals from the accrual-based model which are proposed by prior studies (Dechow and Dichev 2002; Francis et al. 2005). Because this uncertainty measurement only includes factors relating to financial statement numbers, we regard this proxy as an uncertainty measurement of financial reporting numbers (*FS_UNCERTAINTY*). This measurement is computed as the standard deviation of each company's residual, $\upsilon_{it}$, using the equation below and calculated over years t-4 through t.

$$TCA_{it} = \varphi_0 + \varphi_1 CFO_{it-1} + \varphi_2 CFO_{it} + \varphi_3 CFO_{it+1} + \varphi_4 \triangle Rev_{it} + \varphi_5 PPE_{it} + \upsilon_{it} \quad (2\text{-}1)$$

where:

$TCA_{it}$ = change in current assets − change in current liabilities −change in cash + change in debt in current liabilities;

$TA_{it}$ = $TCA_{it}$ − depreciation and amortization expense;

$CFO_{it}$ = net income before extraordinary items − $TA_{it}$;

$\triangle Rev_{it}$ = change in revenues;

$PPE_{it}$ = gross value of property, plant and equipment.

All variables in equation (2-1) are scaled by average total assets. Following Francis et al. (2007), we estimate equation (2-1) in cross-section for each industry whose industry groups have at least 20 companies in year t. And larger standard deviations of residuals, uncertainty measurement of financial reporting numbers, indicate greater information uncertainty.

### *3.1.5 Internal Control Weakness over Financial Reporting*

In this paper, we use material weaknesses in internal control over financial reporting under Section 302 of SOX. Variable *MW* is defined as the disclosure of a material weakness in the prior 10-k report. More specifically, *MW* equals 1 if the internal control report, which is required by Section 302, discloses at least one internal control weakness.

### *3.1.6 Information Uncertainty Comprehensive Measurement*

As we propose that the above variables could be representative proxies of information uncertainty from the stand point of the auditor, we further develop comprehensive information uncertainty indices for the fundamental volatility uncertainty (*FVU*) and the information quality uncertainty (*IQU*). The comprehensive proxy is calculated by summing up the above-mentioned respective measurements.

Following the concept of combining individual governance characteristics to create a summary measurement by Bushman et al. (2004) and DeFond et al. (2005), we capture the degree of information uncertainty by using a summary measure that

combines five information uncertainty characteristics evaluated by auditors in their routine audit process, into a single dichotomous variable. Our objective in combining several information uncertainty characteristics is to create a comprehensive measure that captures the client's the fundamental volatility uncertainty and the information quality uncertainty.

Because external environment, corporate life cycle and corporate governance are related to the uncertainty of fundamental volatility, we compute *FVU* firstly by calculating dichotomous measures for these three information uncertainty characteristics for each observation, such that 1 indicates high information uncertainty and 0 indicates low information uncertainty. According to our definitions, a company is regarded as under high information uncertainty if it has high external factor score, is in growth stage and shows weak corporate governance. We code companies 1 (under information uncertainty) if their (1) external factor scores are more than the sample median; (2) life cycles are in growth stage and (3) corporate governance scores are less than the sample median. We further construct a fundamental volatility uncertainty summary measure by summing these two dichotomous measures for each sample observation and then creating an equally weighted aggregated dichotomous variable based on the median of the summed values.

As to the information quality uncertainty, we also apply the above-mentioned method to obtain *IQU*. The uncertainty level of financial reporting numbers and internal control weakness disclosures contribute to the content of information quality uncertainty. Companies show high uncertainty of financial reporting numbers and disclose material internal control weaknesses are regarded as under high information quality uncertainty. We code companies 1 (under information uncertainty) if their (1) financial reporting numbers' uncertainty measurements are higher than the sample median and (2) internal control disclosure contains material weaknesses. After summing these two dichotomous measures, *IQU* is denoted as 1 if the summation is above the median in whole sample.

Applying the same approach to acquire a proxy of comprehensive information uncertainty (*COMIU*), we compute a sum of five dummy measures from the five dimensions in the information uncertainty framework. We thereafter mark *COMIU* as 1 if this summation is above the median in the whole sample, and 0 if below the median. Overall, the higher the value of comprehensive measurement of information uncertainty, including *COMIU*, *FVU* and *IQU*, the higher degree of information uncertainty the company faces.

**3.2 Empirical Model**

Krishnan (2003) operationalizes auditor industry specialization using two

approaches, including auditor market share and portfolio share, these two proxies are commonly used by prior studies (Balsam et al. 2003; Romanus et al. 2008). Auditor market share captures differentiation across competing audit firms within-industry and is estimated by dividing the total sales of each auditor's clients in a particular industry by total industry sales. Moreover, the auditor portfolio share captures differentiation across industries within-audit firm and is estimated as an auditor's client sales in each industry divided by the auditor's firm-wide client sales.

Unlike previous studies which use only client sales as a proxy to estimate industry market share of the Big 5 auditors (Krishnan 2003; Balsam et al. 2003; Dunn and Mayhew 2004; Lim and Tan 2008), we utilize actual audit fees to calculate specialization measurements[9]. In this paper, our auditor specialization measurement, which is estimated by auditor market shares, is as follows:

$$SPEC_{ik} = \frac{\sum_{i=1}^{I_{jk}} AUDFEE_{ijk}}{\sum_{j=1}^{J_k}\sum_{i=1}^{I_{jk}} AUDFEE_{ijk}} \quad (2\text{-}2)$$

where *AUDFEE* is the audit fee, and the numerator is the sum of the audit fees of all clients ($I_{jk}$) of audit firm *j* in industry *k*, for which we adopt the two-digit SIC codes to identify industry categories (Lim and Tan 2008). The denominator in model (4) is the audit fee of all clients of audit firm *j* summed over all *J* audit firms. Consistent with prior studies (Lys and Watts 1994; Chung and Kallapur 2003; Lim and Tan 2008), we define the auditors with the top 3 industry market shares as the auditor specialist[10]. Consistent with Ettredge et al. (2009)[11], we estimate the following logistic regression model of auditor choice to test the hypothesis one which posits that companies incline to choose specialist auditors under information uncertainty:

$$SPEC_{it}=\beta_0 + \beta_1 IU_{it-1} + \beta_2 LnSALE_{it} + \beta_3 LEV_{it} + \beta_4 MB_{it} + \beta_5 CAPINT_{it} + \beta_6 ISSUE_{it} + \beta_7 REGIND_{kt} + \beta_8 ICAUDIT_{it} + \beta_9 POSTSOX_{it} + \varepsilon_{it} \quad (2\text{-}3)$$

where:

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[9] SEC issued a requirement in November 2000 that public companies have to disclose audit and audit-related fees paid to their auditors. This disclosure rule was effected for proxy statements filed after February 5, 2001 (SEC Final Rule S7-13-00).

[10] Using number of clients as the base avoids the bias toward larger clients that is implied by using sales as the base. Therefore, following Lim and Tan (2008), we also measure auditor specialization using the number of clients as the base.

[11] Ettredge et al. (2009) investigate international client choice of industry specialist auditors from among the Big N and use client-specific, industry-level and country-level factors hypothesized to enhance or decrease Big N clients' demand for industry expertise. Since our sample is restricted to United States only, the country-level factors are not considered in our study.

$SPEC_{it}$ = a dichotomous variable coded 1 if a company switches its auditor to a specialist in industry *k* (top 3 industry market shares), and zero otherwise;

$IU_{it-1}$ = It is the lag measurement of the client's information uncertainty. It includes the comprehensive information uncertainty index (*COMIU*), the information quality uncertainty (*IQU*) and the fundamental volatility uncertainty (*FVU*). *IQU* is combined with the uncertainty measurement of financial statements (*FS_UNCERTAINTY*) and disclosure of material internal control weaknesses (*MW*); *FVU* is combined with the external factor (*EXTERNAL*), corporate life cycle (*LIFECYCLE*), corporate governance (*CG*);

$LnSALE_{it}$ = the log of company *i*'s sales;

$LEV_{it}$ = the long-term debt-to-asset ratio of company *i*;

$MB_{it}$ = company *i*'s market-to-book equity ratio;

$CAPINT_{it}$ = company *i*'s capital intensity measured by gross property, plant, and equipment divided by sales;

$ISSUE_{it}$ = a dichotomous variable coded 1 if company *i*'s book value of equity increases by more than 15 percent from the prior year, and zero otherwise;

$REGIND_{kt}$ = a dichotomous variable coded one if company *i*'s industry k is regulated, and zero otherwise;

$ICAUDIT_{it}$ = a dichotomous variable coded one if company *i*'s 10-k report is audited, i.e., its internal control report is recorded in Audit Analytics's IC404 Database, and zero otherwise;

$POSTSOX_{it}$ = a dichotomous variable coded one if company *i* is in post-SOX period, i.e., 2004-2009, and zero otherwise.

The variable $IU_{it}$ represents the level of information uncertainty and includes three comprehensive proxies. H1a posits that companies under information uncertainty choose specialist auditors, we predict *COMIU* to be positive. In order to test whether the fundamental volatility uncertainty (H1b) and the information quality uncertainty (H1c) affect specialist auditor choice, we also rerun equation (2-3) respectively. Because H1b (H1c) examines whether companies with high fundamental volatility information uncertainty are inclined to choose specialist auditors, we predict the coefficient of *FVU* (*IQU*) to be positive.

As to control variables of client-specific factors, client size ($LnSALE_{it}$), financial leverage ($LEV_{it}$), and the need for external capital ($ISSUE_{it}$) are included to control the effect of opportunities for managers to expropriate capital. The market-to-book equity ratio ($MB_{it}$) and $CAPINT_{it}$ are proxy for growth opportunities

and capital intensity respectively. For industry-level factors, we include variable $REGIND_{kt}$. Since the regulated industries are subject to specialized reporting rules and filing requirements set by government or private sector regulatory bodies, specialist auditors are supposed to be familiar with above regulations. We then employ $REGIND_{kt}$ to represent regulated industries. Following Ettredge et al. (2009), we define an industry as regulated if the companies belong to one of the following industries: railroad (SICs 4011 and 4100), trucking (4210 and 4213), airlines (4512, 4513, 4522, and 4581), telephone communications (4812 and 4813), electric companies (4911), gas companies (4922, 4923, 4924), personal credit (6141), and insurance (6311), and zero otherwise.

As to H2, we attempt to compare the coefficients between comprehensive measures of the fundamental volatility uncertainty (*FVU*) and the information quality uncertainty (*IQU*). We combine both *FVU* and *IQU* into one logistic regression model as follows:

$$SPEC_{it}=\beta_0 + \beta_1 FVU_{it-1} + \beta_2 IQU_{it-1} + \beta_3 LnSALE_{it} + \beta_4 LEV_{it} + \beta_5 MB_{it} + \beta_6 CAPINT_{it} + \beta_7 ISSUE_{it} + \beta_8 REGIND_{kt} + \beta_9 ICAUDIT_{it} + \beta_{10} POSTSOX_{it} + \varepsilon_{it} \quad (2\text{-}4)$$

Based on above discussion, we infer that the effect of information quality uncertainty is stronger than the fundamental volatility uncertainty concerning specialist auditor choice. In this paper, we predict *IQU* to show higher impact on specialist auditor choice relative to *FVU*.

## 4. Empirical Results

### 4.1 Sample

Because we attempt to examine whether information uncertainty is an important factor of auditor selection, we restrict our sample to the auditor switching companies and investigate whether companies under information uncertainty prefer to choose specialist auditors. This study uses an auditor switching sample of listed companies on the NYSE, AMEX and NASDAQ from 2001 to 2009[12]. This study collects financial numbers, corporate governance, internal control disclosures and audit fees from Compustat annual files, RiskMetrics and Audit Analytics respectively. Although the RiskMetrics database contains rich corporate governance information, its linkage with Compustat is incomplete[13] and almost half of the sample is lost. We adopt the material weaknesses disclosed in Section 302 in lieu of Section 404 of the Sarbanes-Oxley Act (SOX) to enlarge our sample size. Moreover, as the date for

[12] In order to maximize our sample, we start with year 2001, for 2001 is the first year we can find Section 302 of the Sarbanes-Oxley Act (SOX) in Audit Analytics Database.

[13] We use ticker, cusip and possible name to merge these two databases.

non-accelerated filers to comply with Section 404 was extended several times[14] and finally a permanent exemption was granted for smaller public companies in the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, internal control disclosures continue to be reported under Section 302 for these smaller companies. There are 27,611 observations with available IU-related data, but only 2,268 observations have experienced auditor switches. After deleting the missing values, our final switch sample with available information from all databases contains 1,417 company/year observations.

**4.2 Descriptive Statistics for Variables**

Panel A in Table 1 shows the descriptive statistics of our sample. *COMIU* is similar with *FVU* in mean and standard deviation. Unlike *FVU*, the number of observations under *IQU* is around half of our sample which indicates that over 50% of the observations contains information quality uncertainty. As to control variables, *LEV*, *MB* and *CAPINT* are left-skewed and the frequencies of *REGIND* and *POSTSOX* are less than the half of the sample. Over 50% of our sample is denoted as auditor specialist (*SPEC*), probably due to the fact that (1) our sample only contains auditor change cases, and (2) the final observations tend to be bigger companies whose data are available in multi databases. Panel B in Table 1 shows descriptive statistics for components of information uncertainty.

[Insert Table 1 here]

In order to further investigate the relationship between companies under information uncertainty and their likelihood of hiring specialist auditors, we also perform chi-square frequencies tests. In Figure 2, Panel A shows a contingency table between *SPEC* and *COMIU*. Seventy-six companies (82.26%) hire specialist auditors among 92 companies facing comprehensive information uncertainty (*COMIU*). Panel B [C] in Figure2-2 exhibits that 85 (80.19%) [467 (64.15%)] companies hire specialist auditors among 106 [728] companies under fundamental volatility [information quality] uncertainty. Consistent with H1, there is a significant association between whether companies face information uncertainty and the likelihood of their choosing specialists as succeeding auditors because all chi-square frequencies tests provide significant supports.

[Insert Figure 2 here]

Table 2 demonstrates the descriptive statistics and univariate tests using

[14] The SEC has previously extended the deadline for compliance with the auditor attestation requirement for non-accelerated filers on several occasions. According to the latest extension before the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, non-accelerated filers must provide an auditor's attestation report on internal control over financial reporting beginning with annual reports for fiscal years ending on or after June 15, 2010.

different *IU* proxies to partition the sample. Panel A uses a comprehensive measurement of information uncertainty (*COMIU*) as criterion to separate out the companies under information uncertainty. Consistent with our H1, Panel A indicates that the companies in *COMIU* subgroup are apt to hire specialist auditors and have larger sales. In the median test, comparisons show that companies in the *COMIU* subgroup are with higher leverage, capital intensity, and lower market-to-book equity ratio. Panel B in Table 2 employs the fundamental volatility uncertainty (*FVU*) as a criterion and its results are similar with Panel A.

In Table 2, Panel C adopts information quality uncertainty (*IQU*) as partition variable. According to the criterion *IQU*, 728 observations (51.38%) are classified as information quality uncertain. The sample of information quality uncertainty relative to the non-uncertainty group is composed of less companies in regulated industries and more companies subject to 404 internal control reports.

[Insert Table 2 here]

Table 3 presents the Pearson and Spearman correlations for the dependent and explanatory variables. Consistent with our expectation, *SPEC* is positively and significantly correlated with all measurements of information uncertainty, i.e., *COMIU*, *FVU* and *IQU*. The correlation coefficients between *COMIU* and *FVU* (*IQU*) are >0.9 (<0.3) with a 10% significance level, which means *FVU* is highly correlated with *COMIU* but *IQU* is far less correlative than *FVU*. All other correlation coefficients are <0.8, and that means multicollinearity is not a problem in this sample. We will provide evidence of the variable associations after controlling for all of the posited effects.

[Insert Table 3 here]

**4.3 Multivariate Result**

Table 4 reports the results of multivariate logistic regressions with switching to specialist auditors (*SPEC*) as the dependent variables. The pseudo $R^2$s are approaching 20% and goodness-of-fit tests show that models are proper. In Model 1to Model 3, the coefficients of information uncertainty proxies, including *COMIU*, *IQU* and *FVU*, are significantly positive. These results provide significant evidence to support H1 (H1a, H1b and H1c) and indicate that companies facing all kind of information uncertainty in prior years prefer to hire specialist auditors when switch auditors. Our H2 posits that companies under information quality uncertainty (*IQU*) are more inclined to choose specialist auditors than companies under fundamental volatility uncertainty *(FVU*). In Model 4, the joint test is positive but insignificant. Although the likelihood of switching to a specialist auditor for *IQU* is larger than *FVU*, there is no evidence to reject the null hypothesis that *IQU* is equal to *FVU*. We can also observe that the positive coefficient of *IQU* is in a 1% significance level (p <

0.000), which is larger than *FVU*'s 10% significance level (p = 0.087).

Moreover, the odd ratio of *IQU* in model (4), i.e., 0.617, indicates its economic significance is 1.853. The *FVU*'s odd ratio is 0.481 and its economic significance is 1.677. That is, information quality uncertainty has more economical influence upon choosing a specialist auditor than fundamental volatility uncertainty. In summary, our empirical results provide evidences that companies under information uncertainty, including comprehensive, fundamental volatility and information quality uncertainty, prefer specialist auditors when switch auditors and strongly support H1. As to H2, although there is no strong statistical proof, the economic significance shows that companies facing information quality uncertainty are more willing to hire specialist auditors than companies facing fundamental volatility uncertainty.

[Insert Table 4 here]

**4.4 Additional Tests**

We also adopt several alternative measures of auditor specialization as robustness checks and perform additional tests. First, we re-estimate the *SPEC* with total fee base. Because the services provided by auditors are either audit fee or non-audit fee, the non-audit fee is also an important issue in auditing research. Specifically, some prior studies propose that the non-audit service improve audit quality through knowledge spillover effects (Arruñada 1999). Others doubt that non-audit service fees impair auditor independence (Frankel et al. 2002). Therefore, we use total fees to compute the SPEC and also denote the top 3 firms within the industry and year they belong to as the specialist auditors. The results are shown in Table 5 and exhibit similar signs with main results in Table 4.

[Insert Table 5 here]

Second, we follow Mayhew and Wilkins (2003) and Knechel et al. (2007) who employ a threshold of 30% to classify the auditors as industry specialists since their sample periods covered the Big 5 and Big 4 periods. Therefore, as our sample is taken during the Big 4 period, we also consider an auditor as a specialist for holding a more than 30% market share. The 30% threshold of market share is based on the percentage of audit fees of clients in the industry. We also denote *SPEC* as any auditor with a market share of 30% or more (Neal and Riley 2004; Lim and Tan 2008). These results show that all measures of information uncertainty are insignificant and positive.

Third, following Lim and Tan (2008), we also measure auditor specialization using the number of clients as the base. However, the coefficients of information uncertainty measurements are insignificant and positive and the joint test is still insignificant. Thus, these findings only partially support H1.

Fourth, in order to differentiate the effects between *FVU* and *IQU*, we follow the concept of Francis et al. (2005) who propose a two-stage method to separate the innate and discretionary components of accrual quality. Although we classify *FS_UNCERTAINTY* as one component of *IQU* in this paper, it may contain the influence of *FVU*. Because *FS_UNCERTAINTY* is estimated as the standard deviation of 5 years rolling residuals after regressing total current accrual on cash flow, revenues and property, plant and equipment. To mitigate this issue, so we perform an extra regression for *FS_UNCERTAINTY*. The second stage of regression is designed to control the effect of *FVU*, we use the components of *FVU* as independent variables. The equation is as below:

$$FS\_UNCERTAINTY_{it} = \gamma_0 + \gamma_1 HINDEX_{kt} + \gamma_2 INDPE_{kt} + \gamma_3 LIFECYCLE_{it} + \gamma_4 CGSCORE_{it} + \omega_{it} \quad (2\text{-}6)$$

where:

$HINDEX_{kt}$ = the 2-digital SIC based Herfindahl index of the industry *k* in time *t*; and

$INDPE_{kt}$ = the mean P/E ratio of the industry *k* in time *t*.

The new two-stage *FS2_UNCERTAINTY* is denoted as $\omega_{it}$ and this new two-staged proxy is be adopted to estimate the *COMIU2* and *IQU2* accordingly. Table 6 show the results of this new method. Except for the insignificant *IQU*, the *COMIU* and *FVU* are still significantly positive.

[Insert Table 6 here]

Finally, auditor switch cases include auditor dismissals and resignations. An auditors' resignation is a signal showing the concern over financial reporting by the prior auditor and more likely to link with the indicator of risk than dismissals (Menon and Williams 2008). Following the separation suggesting of Krishnan and Krishnan (1997), we reduce our sample to only dismissal cases. The results are shown in Table 7. Similar to our main result, consistent with our H1, *COMIU*, *FVU* and *IQU* are positive and significant. As to H2, there is no strong statistical proof, but the significance of *IQU* is higher than *FVU* in model (4).

[Insert Table 7 here]

## 5. Conclusions

This study examines companies' decisions to choose auditors when their financial statements are characterized by uncertain information. Based on previous studies, the company under information uncertainty will cause stakeholders to lower the stock price and their reliance upon company financials (Merton 1987; Beneish et al., 2005; Beneish et al., 2008). In addition, the auditor selection decision of the management will affected by stakeholders' perceptions. That is, companies under information uncertainty may hire specialist auditors to defend the credibility of their

financial statements. Therefore, we hypothesize that companies under information uncertainty would engage specialist auditors to alleviate their information uncertainty.

Because developing an effective audit plan is a key for high quality audit work and obtaining a thorough understanding of the client's business and environment is essential in the audit planning phase, we based on audit standards analyze the process of understanding an auditee's business environment and establish a framework of information uncertainty from the viewpoint of an auditor. We not only construct a comprehensive measurement for information uncertainty, but also differentiate different types of information uncertainty, which previous papers perceived as difficult (Zhang, 2006). That is, we disentangle fundamental volatility and information quality uncertainty within our framework. Because one of the demands of audit is to reduce information risk (Knechel et al., 2008), we further suggest that the specialist auditor manifest his value most under information quality uncertainty.

In order to get the accurate estimation of auditor specialization, we use the actual audit fees to directly compute the *SPEC* variables instead of using indirect measurements of total sales of auditees. After empirical tests in U.S. market, the empirical results consistent with our conjectures and indicate that companies under information uncertainty prefer to hire specialist auditors. The results further show that companies suffering information quality uncertainty are more likely to choose specialist auditors compared to companies suffering fundamental volatility uncertainty. The final implication is that when facing information quality uncertainty, companies under information uncertainty are more likely to hire specialist auditors who possess higher outsider reliance.

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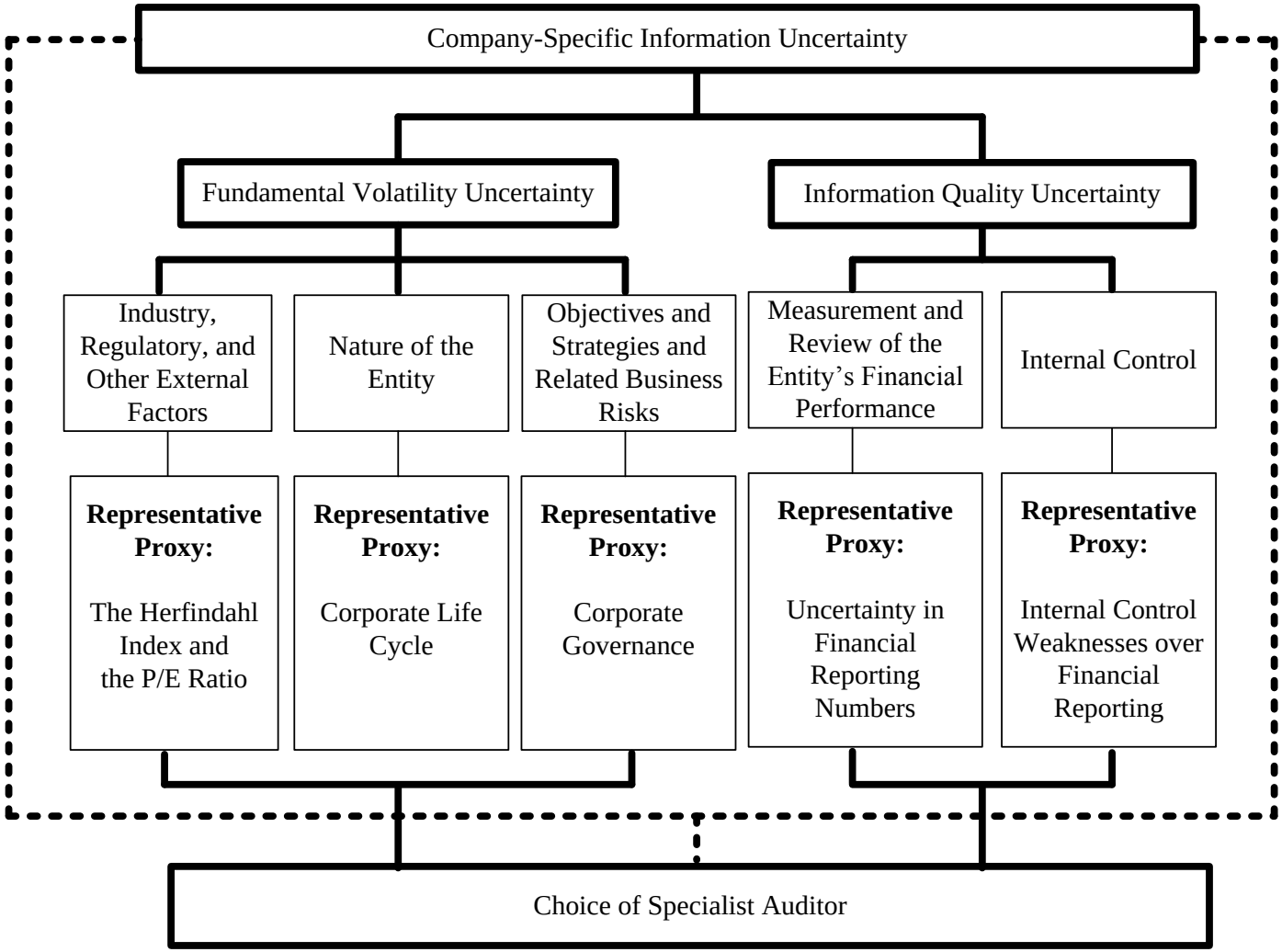


**FIGURE 1 A Framework of Company-Specific Information Uncertainty and Choice of Specialist Auditor**

**Panel A: *SPEC* and *COMIU***

| | | *SPEC* | | |
|---|---|---|---|---|
| | | 0 | 1 | Total |
| *COMIU* | 0 | 681 | 644 | 1,325 |
| | 1 | 16 | 76 | 92 |
| | Total | 697 | 720 | 1,417 |

Pearson $\chi 2 = 39.8008$ p-value=0.000

**Panel B: *SPEC* and *FVU***

| | | *SPEC* | | |
|---|---|---|---|---|
| | | 0 | 1 | Total |
| *FVU* | 0 | 676 | 635 | 1,311 |
| | 1 | 21 | 85 | 106 |
| | Total | 697 | 720 | 1,417 |

Pearson $\chi 2 = 39.5608$ p-value=0.000

**Panel C: *SPEC* and *IQU***

| | | *SPEC* | | |
|---|---|---|---|---|
| | | 0 | 1 | Total |
| *IQU* | 0 | 436 | 253 | 689 |
| | 1 | 261 | 467 | 728 |
| | Total | 697 | 720 | 1,417 |

Pearson $\chi 2 = 106.5512$ p-value=0.000

**FIGURE 2 IU and Auditor Specialist Selection**

**TABLE 1**

**Descriptive Statistics (N = 1,417)**

Panel A: Descriptive Statistics for Logistic Model

| Variable | Mean | Standard Deviation | Min | Median | Max |
|---|---|---|---|---|---|
| *SPEC* | 0.508 | 0.5 | 0 | 1 | 1 |
| *COMIU* | 0.065 | 0.246 | 0 | 0 | 1 |
| *FVU* | 0.075 | 0.263 | 0 | 0 | 1 |
| *IQU* | 0.514 | 0.5 | 0 | 1 | 1 |
| *LnSALE* | 4.706 | 2.214 | -6.908 | 4.763 | 10.895 |
| *LEV* | 0.532 | 0.63 | 0.001 | 0.451 | 11.242 |
| *MB* | 1.717 | 3.558 | 0.001 | 0.968 | 56.803 |
| *CAPINT* | 1.539 | 9.062 | 0 | 0.362 | 253 |
| *ISSUE* | 0.317 | 0.465 | 0 | 0 | 1 |
| *REGIND* | 0.45 | 0.498 | 0 | 0 | 1 |
| *ICAUDIT* | 0.105 | 0.307 | 0 | 0 | 1 |
| *POSTSOX* | 0.442 | 0.497 | 0 | 0 | 1 |

Panel B: Descriptive Statistics for Components of Information Uncertainty

| Variable | Mean | Standard Deviation | Min | Median | Max |
|---|---|---|---|---|---|
| *EXTERNAL* | 0.954 | 0.707 | 0 | 1 | 2 |
| *LIFECYCLE* | 0.513 | 0.52 | 0 | 1 | 2 |
| *CGSCORE* | 2.965 | 0.87 | 1 | 3 | 5 |
| *FS_UNCERTAINTY* | 66.762 | 265.234 | 0.002 | 12.462 | 3816.559 |
| *MW* | 0.113 | 0.317 | 0 | 0 | 1 |

| | | |
|---|---|---|
| $SPEC_{it}$ | = | a dichotomous variable coded 1 if a company switch its auditor to the specialist one, i.e., top 3 industry market share with in industry *k*, and zero otherwise; |
| $COMIU_{it-1}$ | = | the lag measurement of the client's including comprehensive information uncertainty index (*COMIU*), which combined with external factor (*EXTERNAL*), corporate life cycle (*LIFECYCLE*), corporate governance (*CG*), uncertainty measurement of financial statements (*FS_UNCERTAINTY*) and disclosure of material internal control weaknesses (*MW*); |
| $FVU_{it-1}$ | = | the lag fundamental volatility uncertainty, which includes external factor (*EXTERNAL*), corporate life cycle (*LIFECYCLE*) and corporate governance |

| | | |
|---|---|---|
| | | (*CG*); |
| $IQU_{it-1}$ | = | the lag information quality uncertainty, which combines measurements of financial statement uncertainty (*FS_UNCERTAINTY*) and material internal control weaknesses (*MW*); |
| $LnSALE_{it}$ | = | the log of company *i*'s sales; |
| $LEV_{it}$ | = | the long-term debt-to-asset ratio of company *i*; |
| $MB_{it}$ | = | company *i*'s market-to-book equity ratio; |
| $CAPINT_{it}$ | = | company *i*'s capital intensity measured by gross property, plant, and equipment divided by sales; |
| $ISSUE_{it}$ | = | a dichotomous variable coded 1 if company *i*'s book value of equity increases by more than 15 percent from the prior year, and zero otherwise; |
| $REGIND_{kt}$ | = | a dichotomous variable coded one if company *i*'s industry k is regulated, and zero otherwise; |
| $ICAUDIT_{it}$ | = | a dichotomous variable coded one if company *i*'s 10-k report is under SOX 404, i.e., its internal control report is recorded in Audit Analytics's IC404 Database, and zero otherwise; |
| $POSTSOX_{it}$ | = | a dichotomous variable coded one if company i is in post-SOX period, i.e., 2004-2009, and zero otherwise; |
| $HINDEX_{kt}$ | = | the 2-digital SIC based Herfindahl index of the industry k in time t; |
| $INDPE_{kt}$ | = | the mean P/E ratio of the industry k in time t; |
| $EXTERNAL_{kt}$ | = | a composite score which is composed by and ; |
| $LIFECYCLE_{it}$ | = | a composite score to determine a company's life cycle stage; |
| $LC\_GROWTH_{it}$ | = | 1 if company i is in the growth stage; |
| $CGSCORE_{it}$ | = | a composite score to measure the overall strength of corporate governance; |
| $FS\_UNCERTAINTY_{it}$ | = | proxy for uncertainty measurement of financial reporting numbers; and |
| $MW_{it}$ | = | 1 if the internal control report, which is required by Section 302, discloses at least one internal control weakness. |

## TABLE 2

## Descriptive Statistics for Information Uncertainty and Non-Information Uncertainty Subsamples

*Panel A: Classified by COMIU*

| | *COMIU* = 1 (N = 92) | | | | | *COMIU* = 0 (N = 1325) | | | | | t-test[a] | | Wilcoxon Z[b] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Standard Deviation | Min | Median | Max | Mean | Standard Deviation | Min | Median | Max | Mean | t-value | Median | z-value |
| *SPEC* | 0.826 | 0.381 | 0 | 1 | 1 | 0.486 | 0.500 | 0 | 0 | 1 | 0.340 | 6.395*** | 1 | 6.307*** |
| *LnSALE* | 7.383 | 1.350 | 4.247 | 7.369 | 10.895 | 4.520 | 2.141 | -6.908 | 4.612 | 10.855 | 2.862 | 12.649*** | 2.757 | 12.294*** |
| *LEV* | 0.555 | 0.244 | 0.083 | 0.550 | 1.396 | 0.530 | 0.648 | 0.001 | 0.444 | 11.242 | 0.026 | 0.376 | 0.106 | 3.297*** |
| *MB* | 1.213 | 1.232 | 0.062 | 0.802 | 5.110 | 1.752 | 3.663 | 0.001 | 0.979 | 56.803 | -0.539 | -1.407 | -0.177 | -1.985** |
| *CAPINT* | 1.134 | 1.331 | 0.028291 | 0.556 | 6.216 | 1.567 | 9.365 | 0 | 0.356 | 253.000 | -0.434 | -0.444 | 0.200 | 2.778*** |
| *ISSUE* | 0.283 | 0.453 | 0 | 0 | 1 | 0.319 | 0.466 | 0 | 0 | 1 | -0.037 | -0.730 | 0 | -0.730 |
| *REGIND* | 0.370 | 0.485 | 0 | 0 | 1 | 0.455 | 0.498 | 0 | 0 | 1 | -0.086 | -1.595 | 0 | -1.594 |
| *ICAUDIT* | 0.141 | 0.350 | 0 | 0 | 1 | 0.103 | 0.304 | 0 | 0 | 1 | 0.039 | 1.169 | 0 | 1.169 |
| *POSTSOX* | 0.424 | 0.497 | 0 | 0 | 1 | 0.444 | 0.497 | 0 | 0 | 1 | -0.020 | -0.371 | 0 | -0.371 |

Panel B: Classified by *FVU*

| | *FVU* = 1 (N = 106) | | | | | *FVU* = 0 (N = 1311) | | | | | t-test[a] | | Wilcoxon Z[b] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Standard Deviation | Min | Median | Max | Mean | Standard Deviation | Min | Median | Max | Mean | t-value | Median | z-value |
| *SPEC* | 0.802 | 0.400 | 0 | 1 | 1 | 0.484 | 0.500 | 0 | 0 | 1 | 0.318 | 6.375*** | 1 | 6.288*** |
| *LnSALE* | 7.198 | 1.363 | 4.247 | 7.096 | 10.895 | 4.505 | 2.146 | -6.908 | 4.592 | 10.855 | 2.694 | 12.717*** | 2.503 | 12.604*** |
| *LEV* | 0.534 | 0.259 | 0.083 | 0.543 | 1.396 | 0.531 | 0.650 | 0.001 | 0.444 | 11.242 | 0.003 | 0.051 | 0.099 | 2.524** |
| *MB* | 1.320 | 1.268 | 0.062 | 0.874 | 5.127 | 1.749 | 3.680 | 0.001 | 0.970 | 56.803 | -0.430 | -1.196 | -0.096 | -1.040 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *CAPINT* | 1.090 | 1.325 | 0.028291 | 0.549 | 6.216 | 1.576 | 9.413 | 0 | 0.355 | 253.000 | -0.486 | -0.531 | 0.194 | 2.759*** |
| *ISSUE* | 0.292 | 0.457 | 0 | 0 | 1 | 0.319 | 0.466 | 0 | 0 | 1 | -0.026 | -0.561 | 0 | -0.561 |
| *REGIND* | 0.396 | 0.491 | 0 | 0 | 1 | 0.454 | 0.498 | 0 | 0 | 1 | -0.058 | -1.147 | 0 | -1.147 |
| *ICAUDIT* | 0.142 | 0.350 | 0 | 0 | 1 | 0.102 | 0.303 | 0 | 0 | 1 | 0.039 | 1.268 | 0 | 1.268 |
| *POSTSOX* | 0.425 | 0.497 | 0 | 0 | 1 | 0.444 | 0.497 | 0 | 0 | 1 | -0.019 | -0.387 | 0 | -0.387 |

Panel C: Classified by *IQU*

| | *IQU* = 1 (N = 728) | | | | | *IQU* = 0 (N = 689) | | | | | t-test[a] | | Wilcoxon Z[b] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Standard Deviation | Min | Median | Max | Mean | Standard Deviation | Min | Median | Max | Mean | t-value | Median | z-value |
| *SPEC* | 0.641 | 0.480 | 0 | 1 | 1 | 0.367 | 0.482 | 0 | 0 | 1 | 0.274 | 10.726*** | 1 | 10.319*** |
| *LnSALE* | 5.564 | 2.185 | -4.605 | 5.695 | 10.895 | 3.799 | 1.853 | -6.908 | 3.994 | 7.749 | 1.765 | 16.353*** | 1.700 | 15.785*** |
| *LEV* | 0.537 | 0.454 | 0.005 | 0.493 | 7.984 | 0.526 | 0.774 | 0.001 | 0.407 | 11.242 | 0.010 | 0.309 | 0.086 | 4.385*** |
| *MB* | 1.604 | 4.072 | 0.001 | 0.887 | 56.803 | 1.837 | 2.917 | 0.007 | 1.115 | 44.607 | -0.234 | -1.237 | -0.228 | -4.929*** |
| *CAPINT* | 1.308 | 6.039 | 0 | 0.378 | 148.200 | 1.783 | 11.418 | 0 | 0.351 | 253.000 | -0.475 | -0.986 | 0.027 | 0.397 |
| *ISSUE* | 0.302 | 0.460 | 0 | 0 | 1 | 0.332 | 0.471 | 0 | 0 | 1 | -0.030 | -1.220 | 0 | -1.220 |
| *REGIND* | 0.409 | 0.492 | 0 | 0 | 1 | 0.492 | 0.500 | 0 | 0 | 1 | -0.083 | -3.136*** | 0 | -3.126*** |
| *ICAUDIT* | 0.133 | 0.340 | 0 | 0 | 1 | 0.075 | 0.264 | 0 | 0 | 1 | 0.058 | 3.557*** | 0 | 3.542*** |
| *POSTSOX* | 0.411 | 0.492 | 0 | 0 | 1 | 0.476 | 0.500 | 0 | 0 | 1 | -0.065 | -2.479** | 0 | -2.474** |

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

[a] Tests the hypothesis that the means for the groups are significantly different from each other.

[b] Tests the hypothesis that the medians for the groups are significantly different from each other.

See Table 1 for variable definitions.

**TABLE 3**

**Correlation Matrices**

| | *SPEC* | *COMIU* | *FVU* | *IQU* | *LnSALE* | *LEV* | *MB* | *CAPINT* | *ISSUE* | *REGIND* | *ICAUDIT* | *POSTSOX* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SPEC* | 1 | 0.1676* | 0.1671* | 0.2742* | 0.3685* | 0.1079* | -0.0902* | 0.1140* | 0.0299 | -0.0587* | -0.0493* | -0.3029* |
| *COMIU* | 0.1676* | 1 | 0.9267* | 0.2563* | 0.3267* | 0.0876* | -0.0528* | 0.0738* | -0.0194 | -0.0424 | 0.0311 | -0.0099 |
| *FVU* | 0.1671* | 0.9267* | 1 | 0.2015* | 0.3350* | 0.0671* | -0.0276 | 0.0733* | -0.0149 | -0.0305 | 0.0337 | -0.0103 |
| *IQU* | 0.2742* | 0.2563* | 0.2015* | 1 | 0.4195* | 0.1165* | -0.1310* | 0.0105 | -0.0324 | -0.0831* | 0.0941* | -0.0657* |
| *LnSALE* | 0.3574* | 0.3187* | 0.3203* | 0.3987* | 1 | 0.3105* | -0.2451* | -0.0306 | 0.0343 | -0.1854* | 0.1259* | -0.0257 |
| *LEV* | -0.0274 | 0.01 | 0.0013 | 0.0082 | -0.0588* | 1 | -0.4251* | 0.0963* | 0.0032 | -0.1869* | -0.0427 | -0.0881* |
| *MB* | -0.0705* | -0.0374 | -0.0318 | -0.0329 | -0.2545* | 0.0992* | 1 | -0.0876* | 0.2345* | 0.2573* | 0.0819* | 0.1660* |
| *CAPINT* | -0.0319 | -0.0118 | -0.0141 | -0.0262 | -0.2689* | 0.0610* | 0.0346 | 1 | -0.0699* | -0.1145* | -0.0228 | -0.1043* |
| *ISSUE* | 0.0299 | -0.0194 | -0.0149 | -0.0324 | 0.0222 | -0.0399 | 0.1119* | 0.0128 | 1 | -0.0056 | 0.0435 | 0.0773* |
| *REGIND* | -0.0587* | -0.0424 | -0.0305 | -0.0831* | -0.1612* | -0.0971* | 0.0584* | -0.0724* | -0.0056 | 1 | 0.0001 | 0.0861* |
| *ICAUDIT* | -0.0493* | 0.0311 | 0.0337 | 0.0941* | 0.1083* | -0.039 | 0.0363 | 0.0109 | 0.0435 | 0.0001 | 1 | 0.3848* |
| *POSTSOX* | -0.3029* | -0.0099 | -0.0103 | -0.0657* | -0.0241 | -0.0085 | 0.0485* | -0.0367 | 0.0773* | 0.0861* | 0.3848* | 1 |

* indicates significance at the 10%.

See Table 1 for variable definitions.

This table reports correlations for the regression variables with Pearson correlations presented below the diagonal and Spearman correlations presented above the diagonal.

**TABLE 4**

**Logistic Regression Results for Auditor Switching Sample**

| | H1a | H1b | H1c | H2 |
|---|---|---|---|---|
| | Model (1) | Model (2) | Model (3) | Model (4) |
| Intercept | -1.426*** | -1.543*** | -1.433*** | -1.476*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *COMIU* | 0.684** | | | |
| | (0.028) | | | |
| *IQU* | | 0.632*** | | 0.617*** |
| | | (0.000) | | (0.000) |
| *FVU* | | | 0.562** | 0.481* |
| | | | (0.045) | (0.087) |
| *LnSALE* | 0.432*** | 0.396*** | 0.433*** | 0.378*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *LEV* | -0.289* | -0.301* | -0.284* | -0.293* |
| | (0.094) | (0.083) | (0.099) | (0.088) |
| *ISSUE* | 0.019 | 0.015 | 0.019 | 0.013 |
| | (0.328) | (0.462) | (0.332) | (0.511) |
| *MB* | 0.016** | 0.015** | 0.016** | 0.014* |
| | (0.026) | (0.038) | (0.025) | (0.054) |
| *CAPINT* | 0.220* | 0.249* | 0.217 | 0.256* |
| | (0.098) | (0.063) | (0.101) | (0.056) |
| *REGIND* | 0.162 | 0.163 | 0.159 | 0.158 |
| | (0.198) | (0.198) | (0.206) | (0.214) |
| *ICAUDIT* | 0.194 | 0.126 | 0.194 | 0.125 |
| | (0.348) | (0.545) | (0.347) | (0.548) |
| *POSTSOX* | -1.535*** | -1.510*** | -1.534*** | -1.514*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Sample Size | 1417 | 1417 | 1417 | 1417 |
| Pseudo $R^2$ | 18.44% | 19.39% | 18.39% | 19.54% |
| Goodness of Fit $\chi^2$ | 1439.554 | 1414.690 | 1439.034 | 1415.999 |
| Model $\chi^2$ | 362.197 | 380.727 | 361.244 | 383.799 |
| Joint test | | | | |
| *IQU-FVU* = 0 | | | | 0.136 |
| t-value | | | | 0.43 |

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; p value is listed in parenthesis. See Table 1 for variable definitions.

**TABLE 5**

**Logistic Regression Results for Auditor Switching Sample with Total Fee Based Dependent Variable**

| | H1a | H1b | H1c | H2 |
|---|---|---|---|---|
| | Model (1) | Model (2) | Model (3) | Model (4) |
| Intercept | -1.639*** | -1.782*** | -1.645*** | -1.690*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *COMIU* | 0.909*** | | | |
| | (0.005) | | | |
| *IQU* | | 0.652*** | | 0.632*** |
| | | (0.000) | | (0.000) |
| *FVU* | | | 0.750*** | 0.672** |
| | | | (0.009) | (0.019) |
| *LnSALE* | 0.431*** | 0.400*** | 0.432*** | 0.375*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *LEV* | -0.222 | -0.234 | -0.216 | -0.224 |
| | (0.189) | (0.168) | (0.200) | (0.181) |
| *MB* | 0.009 | 0.005 | 0.009 | 0.003 |
| | (0.637) | (0.813) | (0.646) | (0.896) |
| *CAPINT* | 0.017** | 0.016** | 0.017** | 0.015** |
| | (0.014) | (0.018) | (0.013) | (0.031) |
| *ISSUE* | 0.239* | 0.267** | 0.236* | 0.277** |
| | (0.069) | (0.044) | (0.072) | (0.037) |
| *REGIND* | 0.239* | 0.243* | 0.235* | 0.236* |
| | (0.056) | (0.053) | (0.061) | (0.062) |
| *ICAUDIT* | 0.099 | 0.03 | 0.1 | 0.027 |
| | (0.634) | (0.885) | (0.630) | (0.897) |
| *POSTSOX* | -1.328*** | -1.296*** | -1.326*** | -1.302*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Sample Size | 1417 | 1417 | 1417 | 1417 |
| Pseudo $R^2$ | 17.45% | 18.30% | 17.37% | 18.60% |
| Goodness of Fit $\chi^2$ | 1478.705 | 1436.643 | 1478.631 | 1441.708 |
| Model $\chi^2$ | 342.706 | 359.414 | 341.275 | 365.341 |
| Joint test | | | | |
| *IQU-FVU* = 0 | | | | -0.04 |
| t-value | | | | -0.124 |

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; p value is listed in parenthesis. See Table 1 for variable definitions.

**TABLE 6**

**Logistic Regression Results for Auditor with Two-staged Proxies**

| | H1a | H1b | H1c | H2 |
|---|---|---|---|---|
| | Model (1) | Model (2) | Model (3) | Model (4) |
| Intercept | -1.433*** | -1.426*** | -1.433*** | -1.278*** |
| | (0.000) | (0.003) | (0.000) | (0.009) |
| *COMIU* | 0.562** | | | |
| | (0.045) | | | |
| *IQU* | | -0.085 | | -0.153 |
| | | (0.844) | | (0.725) |
| *FVU* | | | 0.562** | 0.569** |
| | | | (0.045) | (0.043) |
| *LnSALE* | 0.433*** | 0.456*** | 0.433*** | 0.432*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *LEV* | -0.284* | -0.291* | -0.284* | -0.281 |
| | (0.099) | (0.094) | (0.099) | (0.103) |
| *ISSUE* | 0.217 | 0.210 | 0.217 | 0.219* |
| | (0.101) | (0.113) | (0.101) | (0.098) |
| *MB* | 0.019 | 0.021 | 0.019 | 0.019 |
| | (0.332) | (0.288) | (0.332) | (0.336) |
| *CAPINT* | 0.016** | 0.017** | 0.016** | 0.016** |
| | (0.025) | (0.016) | (0.025) | (0.026) |
| *REGIND* | 0.159 | 0.165 | 0.159 | 0.158 |
| | (0.206) | (0.188) | (0.206) | (0.208) |
| *ICAUDIT* | 0.194 | 0.194 | 0.194 | 0.190 |
| | (0.347) | (0.346) | (0.347) | (0.358) |
| *POSTSOX* | -1.534*** | -1.530*** | -1.534*** | -1.534*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Sample Size | 1417 | 1417 | 1417 | 1417 |
| Pseudo $R^2$ | 18.39% | 18.18% | 18.39% | 18.40% |
| Goodness of Fit $\chi^2$ | 1439.034 | 1440.231 | 1439.034 | 1438.777 |
| Model $\chi^2$ | 361.244 | 357.017 | 361.244 | 361.369 |
| Joint test | | | | |
| *IQU-FVU* = 0 | | | | -0.722 |
| t-value | | | | -1.353 |

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; p value is listed in parenthesis. See Table 1 for variable definitions.

**TABLE 7**

**Logistic Regression Results for Auditor Dismissal Sample**

| | H1a | H1b | H1c | H2 |
|---|---|---|---|---|
| | Model (1) | Model (2) | Model (3) | Model (4) |
| Intercept | -1.326*** | -1.452*** | -1.338*** | -1.387*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *COMIU* | 0.751** | | | |
| | (0.021) | | | |
| *IQU* | | 0.664*** | | 0.646*** |
| | | (0.000) | | (0.000) |
| *FVU* | | | 0.590** | 0.481 |
| | | | (0.046) | (0.105) |
| *LnSALE* | 0.414*** | 0.377*** | 0.416*** | 0.360*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *LEV* | -0.281 | -0.287 | -0.278 | -0.281 |
| | (0.112) | (0.103) | (0.116) | (0.108) |
| *ISSUE* | 0.226* | 0.249* | 0.225 | 0.257* |
| | (0.100) | (0.073) | (0.101) | (0.064) |
| *MB* | 0.017 | 0.012 | 0.017 | 0.010 |
| | (0.386) | (0.554) | (0.385) | (0.604) |
| *CAPINT* | 0.015** | 0.014* | 0.015** | 0.013* |
| | (0.037) | (0.054) | (0.035) | (0.074) |
| *REGIND* | 0.182 | 0.183 | 0.177 | 0.177 |
| | (0.162) | (0.163) | (0.173) | (0.177) |
| *ICAUDIT* | 0.058 | -0.017 | 0.059 | -0.017 |
| | (0.790) | (0.940) | (0.785) | (0.938) |
| *POSTSOX* | -1.417*** | -1.388*** | -1.412*** | -1.389*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Sample Size | 1302 | 1302 | 1302 | 1302 |
| Pseudo $R^2$ | 16.82% | 17.86% | 16.73% | 18.02% |
| Goodness of Fit $\chi^2$ | 1322.045 | 1299.983 | 1320.565 | 1302.329 |
| Model $\chi^2$ | 302.481 | 321.279 | 300.911 | 324.048 |
| Joint test | | | | |
| *IQU-FVU* = 0 | | | | 0.165 |
| t-value | | | | 0.492 |

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively; p value is listed in parenthesis. See Table 1 for variable definitions.