Audit Effort and the Unit Audit Price of Industry Specialist Auditors: Evidence from Korea

Gil S. Bae
School of Business
Korea University
Seoul, Korea 136-701
+82-2-3290-1951
gilbae@korea.ac.kr

Seung Uk Choi
School of Business
Korea University
Seoul, Korea 136-701
suchoi@korea.ac.kr

Joon Hwa Rho
College of Business
Chungnam National University
Daejon, Korea
Phone: +82-42-821-5544
jhrho@cnu.ac.kr

This draft: January 2013

Audit Effort and Unit Audit Price of Industry Specialist Auditors: Evidence from Korea

Abstract

Higher audit fees associated with auditor industry specialization, as documented in previous studies, could be a reflection as to whether industry specialist auditors (ISA) either charge a higher unit price for their effort and/or provide a higher quantity of audit services. We ask (1) whether auditor industry specialization leads to higher audit effort as measured by audit hours and if so, (2) how the extended audit effort of ISA is related to audit fee premiums associated with auditor industry specialization. Exploiting a field setting in Korea where audit effort information is required to be disclosed in the firms' annual reports, we find that industry specialization leads to significantly higher audit effort relative to non-ISA. When the audit effort and audit fees are analyzed together as audit fees per hour, i.e., unit audit price, industry specialization reveals no association or even a negative association with the unit audit price, indicating that higher total audit fees associated with ISA, which prior studies view as an ISA audit fee premium, could be attributable primarily to audit quantity differences in the audit effort between ISA and non-ISA, but not to a higher unit audit price.

Key words: Industry specialist auditors; Audit effort; Audit fee premium; Audit quality

Data availability: All data can be obtained from publicly available sources.

JEL Classification: M4, M42

1. Introduction

The existence and the source of audit fee premiums and their relation to audit quality continues to be of interest to auditing researchers. In an early and seminal audit pricing study, Simunic (1980 p. 162) posits that cross-sectional differences in audit fees can represent either the effect of quantity differences in audit effort or the unit price differences, suggesting that audit effort and unit price are two potential explanations for an audit fee premium.[1] While there is a lot of research on audit fee premiums (e.g., an audit fee premium of the Big N auditors or industry specialist auditors (ISA), who are believed to provide higher quality audits), almost all extant literature uses *total* audit fees to show the existence of an audit fee premium associated with allegedly high quality auditors in their client firms,[2] yet, remains generally vague as to the source of an audit fee premium. That is, although some previous studies argue that the source of an audit fee premium might be the Big N or ISA' pricing power over clients (Huang et al. 2007; Cahan et al. 2011; Numan and Willenkens 2012), thereby alluding that the unit audit price of the Big N auditors or ISA might be higher than that of their respective counterparts, they have not provided direct evidence to support their argument in the sense of Simunic's (1980) insight regarding the source of an audit fee premium--quantity differences and/or unit price difference in audit effort.

Davis et al. (1993) is an exception. They use the audit-hour and billing rate to examine the effect of providing audit clients with non-audit services as knowledge spillovers and audit production efficiencies that could produce economic rents for the auditor, and find that the higher audit fees of purchasers of non-audit services are associated with the

[1] Another possibility, of course, is the inadequate control for client characteristics that drive the quantity of audit services rendered. To address this concern, we employ selection models later in the paper.

[2] It is noteworthy that, unlike most subsequent studies, Simunic (1980) was unable to find a Big N (7) audit fee premium perhaps because he employed a unit price (i.e., total audit fees divided by total assets) as the dependent variable, not audit fees per se, as in most subsequent studies.

proportional increase in audit effort, not with the higher billing rate. Although they also examine the role of audit-hour and billing rate in explaining the cross-sectional differences in total audit fees as we do, their focus is on the effect of knowledge spillovers that could lead to economic rents. Therefore, they too do not provide a direct answer to our question concerning the source of audit fee premiums for high quality audit, and in particular, for industry specialization. Thus, the following questions remain largely unanswered in the extant literature: Do higher quality auditors spend more audit effort proportional to higher audit fees? Do higher quality auditors charge higher total audit fees because they spend more effort to audit the financial statements of clients or do they charge higher audit fees because they charge a higher unit price for their effort? Or is it both?

Although the central issue in most previous studies is the audit fee premium of the Big N auditors and its implication to audit quality[3] (Simunic 1980; Francis 1984; Francis and Stokes 1986; O'Keefe et al. 1994; Whisenant et al. 2003; Chaney et al. 2004; Lawrence et al. 2011), a separate thread of literature on the audit market (Craswell et al. 1995; Ferguson et al. 2003; Mayhew and Wilkins 2003; Huang et al. 2007; Cahan et al. 2011; Numan and Willenkens 2012) examines an audit fee premium associated with ISA. ISA are auditors whose training and experience are largely concentrated in a particular industry (Solomon et al. 1999), and therefore are believed to possess a comprehensive understanding of a company's characteristics (Dunn and Mayhew 2004). Consistent with this, archival research has related industry specialization to various proxies of earnings quality (Balsam et al. 2003), disclosure quality (Dunn and Mayhew 2004) and cost of either equity or debt capital (Ahmed et al. 2008; Fernando et al. 2008; Li et al. 2010). Predicating on the high audit quality associated with

[3] To the extent that fees proxy for the level of the service provided (Davis et al. 1993; Whisenant et al. 2003), the existence of a fee premium relates to the audit quality. Francis (2004), however, cautions that a fee premium might not imply higher audit quality if its source is primarily more pricing power over clients.

ISA demonstrated in the literature, several previous studies hypothesize and find that ISA can command an audit fee premium.[4] Given the findings that ISA also provide systematically higher quality audit services relative to non-ISA (Balsam et al. 2003; Dunn and Mayhew 2004), Simunic (1980) and O'Keefe et al.'s (1994) insight into the source of the cross-sectional differences in audit fees directly relates to the audit fee premium associated with ISA.

Yet, while there is a considerable amount of research that documents an ISA audit fee premium and relates it to various factors, including ISA market share and client size, there is scant research on the level of audit effort and unit price as the potential source of an audit fee premium associated with ISA. The paucity of research is perhaps because researchers lack data on audit effort in most jurisdictions, including the U.S. Consequently, the current understanding of the source of the ISA audit fee premium is primitive.

Our research exploits a field setting outside the U.S.--in Korea--where information on audit effort is required to be disclosed in the firm's annual reports. Drawing on the insight in Simunic (1980) and O'Keefe et al. (1994), we hypothesize that higher audit fees associated with ISA could be a reflection of whether ISA either provide a higher quantity of audit services[5] or charge a higher unit audit price for their effort; or possibly, both.

Answers to these questions are important because for one thing, audit effort is directly related to audit quality (Palmrose 1986; Deis and Giroux 1996; Carcello et al. 2002). Therefore, evidence of ISA' systematically higher audit effort will reinforce the notion that

[4]While the majority of prior studies find an ISA fee premium, evidence of an ISA audit fee premium is not always consistent, and if found, it is related to the client's firm size or ISA's market share. Specifically, Palmrose (1986) and Pearson and Trompeter (1994) do not find a significant association between industry specialization and audit fees. Similarly, Stein and Cadman (2007) report that high market share fee premiums are attributed to a small set of industries in which ISA have a dominant position.

[5]The determinant of the quantity of audit effort might be two-fold; while Simunic (1980) views that the management of the audited company (auditee) demands a specific quantity of audit effort, Lim and Tan (2008) argue that auditors' concern regarding reputation losses and litigation exposure from low quality audit is an important, if not the primary, determinant of audit effort.

the audit quality of ISA is higher relative to that of non-ISA. The answers are also vital due to their guidance to the interpretation of an audit fee premium, which is associated with the ISA as demonstrated in the literature (Craswell et al. 1995; Ferguson et al. 2003; Mayhew and Wilkins 2003; Cahan et al. 2011; Numan and Willenkens 2012). Specifically, if an ISA fee premium is attributable largely to higher audit effort (i.e., extended audit hours), then the ISA fee premium has an obvious but important interpretation: Audit fees of ISA are higher because they exert higher audit effort, not because they charge a higher unit price, reflecting the existence of potential rents through, for instance, their market power, as implied in some previous studies (Cahan et al. 2011; Numan and Willenkens 2012), and their expertise in the respective industry (Dunn and Mayhew, 2004).

Using the 2002 --2010 Korean audit market data, we find that ISA spend significantly higher audit effort relative to non-ISA. Furthermore, when audit fees and audit hours are analyzed together in one analysis, the results reveal that the unit price per audit effort of ISA is either lower than or indifferent from that of non-ISA, depending on the methodology employed. This indicates that, although ISA, on average, charge higher *total* audit fees than do non-ISA, they also increase their audit effort proportionally, yielding no higher unit price. This suggests that higher total audit fees of ISA do not arise from economic rents, as implied in previous studies.

We attempt to address auditor selection bias that might affect our interpretation in two different ways: a Heckman two-stage approach and a propensity score matching approach. The results from these approaches do not alter our main finding that higher audit fees associated with ISA are attributable to increased audit effort, not higher unit price. The results are robust to several sensitivity checks. Specifically, the results are unaffected by the differences in client size, the level of specialist dominance and competition in the client

firm's industry and the client firm governance level.

Our work has three contributions to the extant literature. First, we provide compelling evidence that ISA spend more audit effort than non-ISA based on the field setting. Second, our finding reveals that higher total audit fees associated with ISA are likely to be charges to a higher quantity of audit service, indicating that the investigation of audit effort in conjunction with audit fees provides additional insights into understanding the nature of the ISA fee premium documented in prior research. Third, consistent with the recent research that directs its attention to the impact of a non-random auditor selection on various issues in accounting and auditing (e.g., Clatworthy et al. 2009; Lawrence et al. 2011), we demonstrate that using a score matching approach leads to an interpretation that the unit audit price of ISA is indistinguishable from that of non-ISA.

Our findings are also subject to caveats. First, our results are from the Korean audit market, as to which we provide some general background in the next section. Although it might be true that the basic structure of the Korean audit market is generally similar to that of other countries, given the idiosyncrasies of different audit markets, the generalization of our finding to other audit markets should be conducted with care. Second, while information regarding audit effort is disclosed in Korea, the more detailed audit hour information by staff level is not available. To the extent that total hours do not reflect the potential differences in the mix of audit firm personnel across client firms (Palmrose 1986; Davis et al. 1993), the interpretation of our results is accordingly limited.

The paper proceeds as follows. In section II, the literature review and hypotheses are presented. Section III provides the data and the research method. Empirical results are reported in section IV. The study concludes in section V.

2. Literature review and hypothesis

General background of the Korean accounting and audit markets

The Act on External Audit of Stock Companies, enacted on December 31, 1980 (Act No. 3290) requires that both listed and unlisted companies with total assets equal to or larger than KRW 7 billion (USD 6.6 million at the exchange rates prevailing in January 2013) to file audited financial statements annually with the FSS (Financial Supervisory Services) (World Bank 2004) within 90 days (annual reports) and 45 days (quarterly reports), which is publicly available at the FSS's disclosure website.[6] Korea implemented the Korea-adopted International Financial Reporting Standards (K-IFRS) in the fiscal year of 2011, applicable to all public companies. K-IFRS are a translation of the English-version of IFRS, and were translated by the Korean Accounting Standard Board (KASB) from the original IFRS statements.[7] The Korean auditing standards are also consistent with the international practice. More specifically, in the aftermath of the 1997 Asian financial crisis, Korea adopted the International Standards on Auditing (IAS) in 1999 in order to align its auditing standards with international practices. Hence, the current K-GAAS is a translation of the ISA, except for local regulatory matters.[8]

Class action lawsuits regarding security transactions have been only relatively recently allowed beginning in 2003, under which lawsuits are permitted for losses related to misstatements in the financial statements and for audit failures for which the company and/or the auditor is responsible. Perhaps due to the prohibition of class action lawsuits before 2003,

[6] CEOs and CFOs of public companies in Korea are required to personally certify all disclosures of the company, including the annual and quarterly reports, financial statements and fair disclosure items, and properly establish and maintain internal controls for financial reporting by signing the annual reports. This requirement is similar to those of Section 320 and 404 reporting of the Sarbanes-Oxley Act.

[7] Prior to 2011, Korean public companies were required to prepare their financial statements in accordance with the Korean Generally Accepted Accounting Principles (K-GAAP) established by the Korean Accounting Standard Board (KASB). The K-GAAP was generally similar to the U.S. GAAP.

[8] Until 1998, the Korean Generally Accepted Auditing Standards (K-GAAS) were similar to the U.S. GAAS.

the incidence of litigation against auditors is rare. Specifically, only 14 lawsuits were filed against auditors during the 1991-2000 period; however, in the 2001-2004 period, 13 lawsuits were filed against the Big 4 accounting firms (World Bank 2004, 8).

The Korean Big 4 auditors are affiliated to the international (global) Big 4 auditors. More specifically, although there have been several changes in the pairing due to in part audit firm mergers both in Korea and in the international Big 4 firms, currently Samil is a member firm of PricewaterhouseCoopers (PWC), Samjung of KPMG International, Hanyoung of Ernst & Young (E&Y) and Anjin of Deloitte Touche Tohmatsu Limited (DTTL). As member firms, the Korean Big 4 firms are authorized to use the names of the international Big 4 firms. The international Big 4 firms provide several measures and safeguards to the Korean Big 4 firms in order to establish and maintain high audit quality and practice such that they can be consistent with those of the international Big 4 audit firms.[9] Based upon this, it is reasonable to believe (or there is no reason to believe otherwise) that the audit reports of the Korean Big 4 auditors maintain an audit quality as high as those of the other international Big 4 auditors (including the U.S. and the U.K.).[10]

The Korean GAAS requires auditors to maintain their quality control procedures, which are comprised of both firm- and engagement-level quality controls. Audit firms'

[9] Moreover, the international Big 4 firms often assign their own partners and professional staffs to monitor the risk management of important engagements (particularly for U.S.-listed Korean company audits). In such cases, the working papers are required to be prepared in English so as to enable the global partners to review them. Moreover, the international Big 4 headquarters acquire risk insurance policies that cover all the member firms and allocate the insurance premium to each member firm commeasurable to the perceived risks of the specific country member. This makes the member firms particularly conscious of the audit quality because the allocated insurance premium will directly affect the profitability of the country member and perhaps, more importantly, the perceived audit quality of the country member firm. Specifically, risk related matters, such as audit litigation results and global quality review results, or other risk matters, such as independence issues, usually trigger an increase in the insurance premium allocated to the country's firms.

[10] The global Big 4 networks usually require periodic self-reports from Korean member firms as to how they comply with global policies with respect to audit methodology, risk management, independence, etc. All of the global Big 4 networks dispatch quality review teams (consisting of international member firms' partners and managers) every year to the affiliated Korean Big 4 audit firms to review the working papers of the Korean Big 4 firms' audits. Frequently, expatriate partners from global networks reside in Korea in order to monitor the compliance of local risk management and global policies.

quality control programs are reviewed periodically by the regulator (the Securities and Futures Commission of the Financial Supervisory Service), whose role is similar to the PCAOB in the U.S. The Big 4 firms are subject to a review every two years while the non-Big 4 firms are reviewed every three to five years, depending on the public company clients that the audit firms audit. Small audit firms that audit less than 1% of all the public company population are not subject to the FSS's quality control reviews; but instead, they are subject to peer-review type reviews by the Korean Institute of Certified Public Accountants.

The independent assessment of the Korean accounting and auditing practice has been generally positive. For instance, the World Bank Report on the Observance of Standards and Codes in Korea (World Bank 2004), issued in June 2004 following due diligence missions carried out in November 2003 and April 2004, concludes that since 1997, the Korean government has taken significant measures to improve accounting and auditing standards and practices as well as to strengthen the underlying institutions, which are expected to contribute to the production of high quality corporate financial reporting in Korea (World Bank 2004).

Audit quality, audit fees and audit effort

There is considerable research on whether the Big N auditors can command an audit fee premium and, if so, whether this premium represents a lack of competition in the audit market or quality differences in the competitive audit markets (Simunic 1980; Palmrose 1986; Whisenant et al. 2003; Clatworthy et al. 2009; Lawrence et al. 2011). The findings are conflicting, perhaps due to several factors:(1) differences in the audit market investigated, (2) specific research methodology employed (e.g., without selection bias control in early studies and selection bias control in later studies using either a Heckman two-stage regression analysis or a score-matching method in more recent papers, such as Clatworthy et al. 2009 or Lawrence et al. 2011), (3) dependent variables used in the analysis (for example, Simunic

(1980) utilizes audit fees divided by total assets as the dependent variable in contrast to most other studies that simply use audit fees) and (4) client listing status and client size. Nevertheless, the overall conclusion is that the Big N auditors (i.e., higher quality auditors) command an audit fee premium.[11]

Extending previous studies, a strand of research directs its attention to audit quality and audit fee differences of ISA. ISA are believed to possess a comprehensive understanding of a company's characteristics (Dunn and Mayhew, 2004); therefore, their audit quality is predicted to be higher in comparison with non-ISA. Findings in archival research are largely consistent with the prediction that the audit quality of ISA is high. In particular, Gramling et al. (2001) find a positive association between auditor industry specialization and the ability of client earnings to predict future cash flows; Balsam et al. (2003) find that industry specialist clients have lower levels of discretionary accruals and higher earnings response coefficients than non-specialist client firms. Similarly, Krishnan (2003) finds that clients of ISA have lower levels of discretionary accruals, suggesting that industry specialization helps deter the use of accruals-based earnings management tactics. Carcello and Nagy (2004) document that clients of ISA are less likely to be involved in SEC enforcement actions. Recently, several studies examine the effect of ISA on the cost of capital and discover that the use of ISA significantly reduces the cost of equity and debt (Ahmed et al. 2008; Li et al. 2010; Fernando et al. 2008).[12]

Given the high audit quality associated with ISA, researchers hypothesize and find that ISA can command an audit fee premium. For instance, Palmrose (1986) examines the

[11] Simunic (1980) is an exception. He was unable to find a Big N (7) audit fee premium perhaps because he employed a unit price, as measured by total fees divided by total assets as the dependent variable, not audit fees per se.

[12] Specifically, Li et al. (2010) report that firms with specialists are less likely to receive a lower credit rating by 0.859 times relative to firms with non-specialist auditors, and their bond spread is 17 basis points lower if they are clients of city-level only.

relation between audit fees, audit hours and auditor industry specialization using a relatively small sample (361 and 302 observations in the analysis of fees and hours, respectively). Although she finds that auditor size has a significantly positive association with both audit fees and audit hours, no significant relation is observed between industry specialization and either audit fees or audit hours.[13] In contrast, most subsequent studies focus exclusively on documenting the evidence of an ISA fee premium. For instance, Casterella et al. (2004) find that industry specialization can lead to a fee premium for smaller U.S. companies; however, the greater bargaining power of larger client firms can effectively offset such effect. Francis et al. (2005) find evidence of an audit fee premium in city-level (as opposed to national) industry specialization.[14]

As Simunic (1980) observes, higher audit fees associated with auditor industry specialization could be a reflection of whether ISA either provide higher quantity of audit services or charge a higher unit price for their effort. Nevertheless, there is scant research on the level of audit effort and unit price as the source of higher audit fees associated with ISA.

Hypotheses

Predictions regarding the effect of industry specialization on audit effort, as measured by audit hours, are not clear. To the extent that ISA are more concerned with reputation losses and litigation exposure (Lim and Tan, 2008), it is plausible that they might be willing to increase audit hours in order to preserve their reputation in the competitive audit market.[15] It is also possible that firms that require more audit effort may systematically favor

[13] She, however, cautions that since audit hours may not reflect the differences in the mix of audit firm personnel or level of effort, the interpretation of the findings concerning audit hours should be performed with care.

[14] Studies using Australian or Hong Kong data (Craswell et al. 1995; DeFond et al. 2000; Ferguson et al. 2003) document an ISA audit fee premium in the subset of industries or firms. Huang et al. (2007) echo Stein and Cadman (2007), suggesting that a specialist fee premium is related to the client segment.

[15] This argument is analogous to the suggestion in previous studies that the Big N auditors spend more hours, reflecting "greater productive activities (evidence acquisition) in providing higher levels of assurance (higher

ISA, leading to increased audit effort. Conversely, ISA who possess a comprehensive understanding of the client company's characteristics might be able to achieve the same level of assurance by spending less effort, relative to non-ISA, through higher production efficiency,[16] leading to a potential negative association between ISA and audit effort.

Not surprisingly, evidence in the two previous studies is mixed. While Palmrose (1986) finds that the association between audit hours and ISA is insignificant, Deis and Giroux (1996) report a significantly negative association between industry specialization and audit effort. Their findings, however, are based on a sample with relatively few observations (Palmrose 1986) or from a single heavily regulated industry, public schools (Deis and Giroux 1996), making the generalization of the results tenuous. Therefore, how industry specialization relates to audit hours still remains an unresolved question.

Predictions regarding the unit audit price are also unclear. Although ISA might charge higher *total* audit fees, if they also spend different audit effort, as suggested above, then the net effect of higher audit fees is ambiguous. Also, due to a large client base, ISA can spread their fixed costs (e.g., training and development costs) to more clients (Dunn and Mayhew, 2004), possibly leading to a lower unit price. Conversely, because of their higher audit quality and dominance in their respective industry (i.e., the lack of competition) (Cahan et al. 2011; Numan and Willenkens 2012), ISA can charge a higher unit price. Based on this, two hypotheses are proposed in the alternative form.

H1: *Audit effort of ISA is different from that of non-ISA.*

---

quality) to clients" (Palmrose 1986, p.108). Carcello et al. (2002) also propose a similar definition of higher audit quality as "greater assurance, which requires more audit work." Consistent with this argument, Deis and Giroux (1996) also use audit hours as a proxy for audit quality.

[16] Although the context is somewhat different, Simunic (1984), Beck et al. (1988) and Davis et al. (1993) argue that the knowledge acquired while providing nonaudit services may "spill over" to the production of the audit, and thus generate audit production efficiency.

H2: *Unit audit price (i.e., audit fees per audit hour) of ISA is different from that of non-ISA.*

3. Data and research method

Data

Our sample period begins in 2002, because the data on audit fees and audit hours are available from 2002 in the annual reports.[17] We obtain the financial statements data from the Total Solution (TS) 2000 provided by Korea Listed Companies Association. We select firms with a fiscal year-end of December in order to ensure that the financial data is correctly matched with the audit fee and audit hour data. Because almost all firms in The Korea Composite Stock Price (KOSPI) index have a December year-end, this requirement is not overly restrictive.[18] Continuous variables at the 1% and 99% levels are winsorized. There are 11,776 observations in the TS 2000 database, of which 4,440 observations have been dropped due to missing financial information necessary to calculate the variables used in the study. In addition, audit fees, audit hours or auditor identity data is not available for 951 observations. Also, industries with fewer than 20 per two-digit industry-year observations are deleted from the sample. Hence, our final sample consists of 4,256 firm-year observations from 2002 to 2010. The sample selection procedures and the sample year and industry distribution (by two-digit industry code) are presented in Table 1 panels A, B and C, respectively.

Table 2 presents the variable means and medians (panel A) and the correlation matrix

[17] Since firms are required to provide information of audit fees and audit hours over a three year period from 2003, technically, 2001 is the first year when the information is available. Many firms, however, either do not report 2001 information or provide unreliable information, particularly on audit hours. Hence, we drop 2001 from the sample.

[18] All financial firms are required to have a March year-end in Korea, which accounts for the majority of non-December-year-end firms.

(panel B). The mean (median) audit firm market share is 0.12 (0.08). The average log of audit fees and the log of audit hours are 17.84 and 6.33, respectively. Audit quality proxies measured by either the Dechow and Dichev (2002) model or the McNichols (2002) model differ little, averaging 0.08 in both.[19] The mean foreign holdings are approximately five percent. The Big N auditors' market share is slightly less than one half, 0.48.

Columns (2) and (3) provide the means and medians by the specialist status. The univariate comparison illustrates that ISA charge premiums in total audit fees but also increase the audit hours. When fees and hours are analyzed together in the form of audit fees per audit hour, the finding shows that ISA relate to *lower* audit fees per audit hour relative to non-ISA. The audit quality of ISA is higher than that of non-ISA. As demonstrated in the comparison of the control variables, the results also indicate that client firms that hire ISA are different from those that choose non-ISA in almost all aspects.[20]

Table 2 panel B reports the Pearson correlations among the main variables. Both audit fees and audit hours are positively associated with the auditor market share, suggesting that industry specialization relates positively to audit fees as well as audit hours. Not surprisingly, audit fees and audit hours exhibit a significant positive association. Further, confirming the findings in previous studies, industry specialization is positively associated with the audit quality in our sample. Consistent with the finding in panel A, ISA are positively correlated with most control variables.

---

[19] The Dechow and Dichev (2002) model is as follows:

$$\Delta WC_{it}=\beta_0+\beta_1 CFO_{it-1}+\beta_2 CFO_{it}+\beta_3 CFO_{it+1}+\tau_{it},$$

where ΔWC = changes in the working capital measured as the increase in current assets plus decrease in cash and cash equivalents plus decrease in current liabilities plus increase in long term debt deflated by total assets, CFO = cash flow from operations divided by total assets, and τ_{it} is the error term.The absolute value of the residuals from the model is proxied as earnings quality, which in turn is proxied as audit quality. The McNichols (2002) model modifies the Dechow and Dichev (2002) model slightly by including two additional terms: $\Delta Sales$ (change in current sales divided by total assets) and PPE (property, plant and equipment divided by total assets).

[20] This suggests that it is important to control the self-selection bias in the analysis.

The research methods

Since client sales and total assets are two widely used proxies of industry specialization (Balsam et al. 2003; Krishnan 2003; Mayhew and Wilkins 2003; Dunn and Mayhew 2004; Lim and Tan 2008), we use both factors to estimate the industry market share of an auditor. Specifically, the following equation describes our measure:

$$MKTSHR_{ik} = \frac{\sum_{j=1}^{J_{ik}} \sqrt{SALES\ (or\ ASSETS)_{ijk}}}{\sum_{i=1}^{I_k} \sum_{j=1}^{J_{ik}} \sqrt{SALES\ (or\ ASSETS)_{ijk}}}$$

In the above, i, j and k denote audit firms, client firms and client industries, respectively. I_k represents the number of audit firms in industry k and J_{ik} equals the number of clients of audit firm i in industry k. $MKTSHR_{ik}$ is auditor i's market share in industry k, which proxies the auditor's industry specialization. *SALES* (or *ASSETS*)$_{ijk}$ represents client sales (or total assets) of client firm j, which is in industry k for auditor i.

Following the literature, we define industry specialization in three different ways: (1) a continuous measure of the market share (Lim and Tan 2008), (2) any auditor with a market share of 20% or more (Mayhew and Wilkins 2003)[21] and (3) the auditor with the largest industry market share and its market share exceeding 10% higher than the second largest auditor (Mayhew and Wilkins, 2003; Lim and Tan, 2008). Figure 1 presents the ISA's market share by year using two definitions above (definitions (2) and (3)). When ISA are defined as auditors with a market share of 20 % or more, their average market share is 23.35 percent in 2002, and continues to increase to 26.81 percent in 2005. However, it begins to decline to 17.50 percent in 2010. The specialist market share, when ISA are defined as the auditors with

[21] Previous studies also use a 24% market share in order to determine industry specialization (Neal and Riley 2004).

the largest industry market share, and their market share exceeding 10% higher than the second largest auditor experiences a more pronounced decline over time.

In our empirical analyses, both audit fees and audit hours are regressed on ISA and control variables in order to determine the relation between industry specialization and audit price, audit hours and unit audit price (i.e., audit price per audit effort). Specifically, the regression model employed is as follows.[22]

$$Log\ (Fees, Hours, or\ Fees\ per\ hour)_{it} = \alpha_0 + \alpha_1 ISA_{it} + Controls + \varepsilon_{it} \quad (1)$$

where, *Fees* is the natural logarithm of audit fees; *Hours* is the natural logarithm of audit hours; *Fees per hour* is the natural logarithm of audit fees divided by audit hours; *ISA* is industry specialist auditors defined either as a continuous variable or a dummy variable depending on the model calculated by the square root of client sale; and ε is the error term. We include the conventional control variables that are commonly employed in the literature. Specifically, we include the following: the natural log of total assets (*Log (TA)*); total liabilities divided by total assets (*Leverage*); ownership of largest shareholder and related parties (*Holdings*); net income divided by total assets (*ROA*); a dummy variable that takes 1 if the firm reported a loss during previous year (*Loss*); receivables and inventory divided by total assets (*Complexity*); foreign ownership (*Foreign*); a dummy variable that takes 1 if the firm receives a modified audit opinion (*Opinion*); a dummy variable that takes 1 if the auditor is a Big N auditor (*Big N*); the length of the auditor-client relationship in years (*Tenure*); a

[22] The controls are as the following: natural log of total assets; total liabilities divided by total assets; ownership of largest shareholder and related parties; net income divided by total assets; a dummy variable that takes 1 if the firm reported a loss during the previous year, and 0 otherwise; receivables and inventory divided by total assets; Foreign ownership; a dummy variable if firm receives a modified audit opinion, and 0 otherwise; a dummy variable that takes 1 if the firm hires a Big N auditor, and 0 otherwise; year dummies; and industry dummies.

dummy variable that takes 1 if the audit is an initial audit engagement (*Initial Audit*); year dummies (*Year*); and industry dummies (*Industry*).

4. Empirical findings

Industry specialization and audit fees

We first replicate the existence of an ISA audit fee premium using our sample. In Table 3 panel A, where the dependent variable is the log of audit fees (*Log(fees)*), the coefficient on *ISA* is 0.380 and is significant at the 0.01 level when industry specialization is defined as the auditor market share as presented in model (1). This is consistent with the interpretation that industry specialization leads to an audit fee premium in the Korean audit market. In contrast to the findings in some prior studies that document a fee premium in relatively limited contexts (e.g., relatively small sample size (DeFond et al., 2000), specific industry (DeFond et al. 2000), client size (Casterella et al. 2004), or auditor market dominance (Huang et al. 2007)), our finding is not only statistically significant, but is also obtained from a large sample with no restrictions. In model (2), where industry specialization is a dummy variable that takes 1 if an auditor's market share is 20 percent or more, the coefficient estimate of *ISA* defined this way is 0.052 with a t-value of 3.36. Similarly, when ISA are defined as auditors with the largest market share and the difference between the market share of the largest auditor and the second largest auditor is equal to or greater than 10 percent in model (3), the coefficient on *ISA* is 0.098 and is significant at the 0.01 level. In sum, irrespective of the differences in the definition of auditor industry specialization, the results provide consistent evidence that industry specialization leads to a significant audit fee premium in our sample.

The directions of the coefficients of the control variables are generally consistent

with what prior studies find. For instance, size, as measured by the log of total assets, leverage, prior period loss, foreign ownership and audit firm size all have positive and significant coefficients. Somewhat unexpectedly, however, the complexity is negatively associated with audit fees. The adjusted R-squares of the models are 66 percent irrespective of the differences in the definition of ISA employed.

Industry specialization and audit effort

The relation between ISA and audit effort is reported in panel B of Table 3. The results of the regression model estimation reveal that ISA spend significantly more audit effort; specifically, the coefficient on *ISA*, defined as a continuous variable in model 1, is 0.686 and is significant; similarly, the coefficient estimates of *ISA* in models (2) and (3) are 0.147 and 0.205, respectively, and are significant at the 0.01 level.

Unlike Palmrose (1986), who finds no relation using a relatively small sample, and Deis and Giroux (1996), who find a significant negative relation based on a single heavily regulated industry (public schools) between ISA and audit hours, we find a strong positive association between ISA and audit hours using a large sample consisting of industries of a broad range. Hence, our finding provides persuasive evidence that ISA exert significantly more audit effort relative to non-ISA. The coefficients of the control variables are largely consistent with our prior expectation. Specifically, audit hours are positively related to *Log (TA)*, *ROA*, *Foreign*, *Big N* and *Tenure*.

The results presented in panels A and B suggest two points. First, although ISA are believed to possess a comprehensive understanding of a company's characteristics in the respective industry, this does not lead to a diminished audit effort; instead, ISA provide more audit effort, consistent with the argument by Lim and Tan (2008) that ISA spend more effort perhaps to preserve their reputation of providing higher quality audit in the competitive audit

market. Second, since ISA relate to an increased audit effort, whether ISA charge a higher unit audit price relative to non-ISA is ambiguous; that is, while previous studies conclude that ISA charge a fee premium based on the evidence obtained from the analysis, which relies on *total* audit fees, whether industry specialization leads to a higher unit price is an empirical matter due to the existence of the contemporaneous higher audit effort.

Industry specialization and unit audit price

Having demonstrated that ISA are associated with both higher total audit fees and more audit effort relative to non-ISA, we now turn to an investigation of the effect of industry specialization on unit audit price associated with ISA. Table 3 panel C presents the result.

Across the three specifications of industry specialization, the coefficient on *ISA* is convincingly negative. Specifically, the coefficient estimate of *ISA* is -0.288 with a t-value of 2.46 in model (1). When ISA are defined as auditors with 20 percent or more market share in model (2), the coefficient on *ISA* is -0.091 and is significant at the 0.01 level. Finally, in model (3), where auditors with a dominant market share are defined as ISA, the coefficient on *ISA* is -0.106 and is significant. This indicates that while ISA charge higher audit fees than do non-ISA, they also spend even more than the proportional audit effort that is large enough to offset the effect of the increase in audit fees; hence, the net effect of industry specialization results in a lower unit audit price. One possible interpretation of this finding is that ISA are able to spread industry-specific training costs over more clients, as suggested in Mayhew and Wilkins (2003). Our finding, however, is not consistent with the argument that ISA can extract rents from their clients using their dominant market position, as implied in some previous studies (Cahan et al. 2011; Newman and Willenkens 2012).

The results also portray that client firm size measured by total assets and leverage are positively, and ROA, loss and complexity are negatively associated with unit price. Both *Big*

N and *Tenure* have a negative coefficient, suggesting that unit price is lower for the Big N auditors as well as for the auditors with a longer tenure in the client firm. These results, however, are based on an OLS regression analysis with no control of potential selection bias. In the next section, we attempt to explicitly control for potential selection bias using a conventional Heckman two-stage method and a more recent score matching method.

Industry specialist auditor selection model

So far, firms are implicitly assumed to randomly select ISA. This, however, is unlikely to hold in practice; certain firms are more likely to select ISA than are other firms. If firms do self-select in the choice of ISA, then it is important to control for this selection bias in order to ensure that any observed relation between ISA and audit fees, audit hours and unit price is not due to the omission of variables representing this bias.

While previous studies that have examined ISA audit fee premiums are generally silent about this possibility, two studies are exceptions, explicitly admitting a possibility that firms self-select ISA. First, invoking DeFond (1992) and Francis and Wilson (1988), who demonstrate that firms' agency costs are positively associated with the demand for high quality audits (i.e., the Big N auditors), DeFond et al. (2000) posit that the demand for ISA is systematically associated with agency costs. Their result, based on the analysis of ownership and debt in the Hong Kong audit market, is generally supportive of this conjecture. Similarly, Dunn and Mayhew (2004) argue that clients select auditors as part of their overall disclosure strategy. Specifically, they suggest that potentially, lower fees, enhanced audit quality and disclosure advice as well as signaling motives are factors which affect the demand for ISA. Nevertheless, neither study has explicitly incorporated selection bias in its main tests.

First, we attempt to correct for the selection bias using a two-stage procedure of Heckman (1979) and Lee (1979). In the first stage, we estimate a probit model with an ISA

dummy as the dependent variable, and the reasons for hiring ISA, i.e., firm characteristics selected based on the argument DeFond et al. (2000) and Dunn and Mayhew (2004). Specifically, we employ the following ISA selection probit regression model. In the model, ISA are defined as the auditors with 20 percent or larger market share.[23] The first-stage probity ISA selection model is:

$$ISA_{it} = \beta_0 + \beta_1 ATO_{it} + \beta_2 Export_{it} + \beta_3 Liquidity_{it} + \beta_4 Sub_{it} + \beta_5 Growth_{it} + \beta_6 Log(TA)_{it} + \beta_7 Leverage_{it} + \beta_8 Holdings_{it} + \beta_9 ROA_{it} + \beta_{10} Loss_{it} + \beta_{11} Complex_{it} + \beta_{12} Foreign_{it} + \beta_{13} Opinion_{it} + \beta_{14} BigN_{it} + Year + Industry + \tau_{it} \quad (2)$$

where, *ATO* is sales divided by total assets; *Export* is sales outside the country divided by total sales; *Liquidity* is current assets divided by current liabilities; *Sub* is the natural log of one plus subsidiaries; *Growth* is the growth rate of total assets; *Log (TA)* is the natural log of total assets; *Leverage* is total liabilities divided by total assets; *Holdings* is the ownership of the largest shareholder and its related parties; *ROA* is net income divided by total assets; *Loss* is 1 if the firm reported a loss during the previous year, and 0 otherwise; *Complex* is receivables and inventory divided by total assets; *Foreign* is foreign ownership; *Opinion* is 1 if the firm receives a modified audit opinion, and 0 otherwise; *BigN* is 1 for the Big N auditors, and 0 otherwise; *Year* is the year dummy; *Industry* is the industry dummy; and τ is the error term.

We compute the Inverse Mills Ratio (IMR) for each observation using the estimates from the probit model, and include it as an independent variable in the second stage regressions of audit fees or audit hours on their respective determinants. Table 4 reports the results. In model (1), where audit fees are the dependent variable, the coefficient on *ISA* is 0.175 and is significant at the 0.01 level, suggesting that our earlier finding withstands the

[23] In an unreported table, the results are qualitatively unchanged if ISA are defined as the auditors whose market share is the largest among auditors and is also larger than that of the second largest market share by 10 percent or larger.

addition of self-selection control in the model. Similarly, the coefficient estimate of *ISA* is 0.390 with a t-value of 4.81 in model (2), where the dependent variable is audit fees. This indicates that the finding that ISA spend more effort demonstrated in the earlier analysis is not an artifact of omitted self-selection bias. Finally, when the dependent variable is audit fees per audit hour in model (3), the coefficient on *ISA* is -0.207 and is significant at the 0.01 or higher level. In sum, the findings that industry specialization leads to higher audit fees and also higher audit hours but lower audit fees per audit hour are not attributable to selection bias.

Although a Heckman two-stage approach has been extensively employed in the extant auditing literature, several recent studies (e.g., Armstrong et al. 2010; Francis et al. 2010; Lawrence et al. 2011) argue that a more effective approach to control for selection bias is the propensity score matching, developed by Rosenbaum and Rubin (1983).[24] One advantage of the matching models is that unlike the Heckman (1979) selection model, which relies on a specific functional form (i.e., a linear model), the matching models do not rely on a specific functional form, providing a more direct estimate of the treatment effects. Hence, the matching models mitigate the potential impact of nonlinearities in estimating the treatment effects when the underlying functional form is nonlinear. Using a matching model is particularly appealing in our setting in that it is difficult to identify variables that influence the auditor selection in the first-stage regression in the Heckman (1979) selection model, but not the audit-quality proxy in the second-stage regression.[25]

We employ the following logit model to estimate the propensity of selecting ISA, where ISA are defined as the auditors with 20 percent or larger market share.

[24] According to Armstrong et al. (2010), the previously documented relation between equity-based compensation and accounting irregularities does not hold if propensity-score matching is employed.
[25] Lawrence et al. (2011, p. 262-263) notes that matching models, despite their advantages, also suffer from several caveats. See Lawrence et al. for further discussion on the potential drawbacks of matching models.

$$ISA_{it} = \gamma_0 + \gamma_1 Leverage_{it} + \gamma_2 Log(TA)_{it} + \gamma_3 ATO_{it} + \gamma_4 Liquidity_{it} + \gamma_5 Quick_{it} + \gamma_6 ROA_{it} + \gamma_7 Loss_{it} + Year + Industry + \varepsilon_{it} \quad (3)$$

where, *Leverage* is total liabilities divided by total assets; *Log (TA)* is the natural log of total assets; *ATO* is sales divided by total assets; *Liquidity* is current assets divided by current liabilities; *Quick* is current assets divided by current liabilities; *ROA* is net income divided by total assets; *Loss* is 1 if the firm reported a loss during previous year, and 0 otherwise; *Year* is the year dummy; *Industry* is the industry dummy; and ε is the error term.

This model is consistent with the widely-used model in the auditor selection literature (e.g., Louis 2005). We estimate the propensity-score model by including all control variables. Following Lawrence et al. (2011), we then match, without replacement, a non-ISA client with each specialist client that has the closest predicted value from equality within a maximum distance of three percent. This caliper distance matching results in 467 observations (51.9 percent of initial 900 observations with ISA and 3,356 observations with non-ISA) with a matched counterpart.

Table 5 panel A presents the result of the univariate comparison of the client firms with ISA and non-ISA using the full and propensity-score matched samples. In the full sample, 900 and 3,356 client firm-years have ISA and non-ISA, respectively. The test of means indicates that client firms of ISA and non-ISA differ in almost all characteristics that are included in the logit regression. More specifically, the client firms that hire ISA tend to be larger in size, more profitable and more levered. In the matched sample consisting of 467 observations, the significant differences in several variables observed in the full sample disappear, suggesting that the matching is effective in properly balancing the client firms with an ISA and a non-ISA.

Panel B of Table 5 presents the univariate difference in means of audit fees, audit

effort and unit audit price of ISA and non-ISA (models (1), (2) and (3), respectively) as well as the estimate of coefficient on ISA in the multivariate analysis. The univariate test results indicate that ISA charge higher fees and spend more audit effort in their client firms. Moreover, the unit audit price of ISA tends to be lower compared to non-ISA. This finding is essentially identical to what we have found so far in the previous analyses.

In the multivariate test, the coefficient on ISA, when the dependent variable is *log (Fees)* and *log (Hours)* in models (4) and (5), is 0.053 and 0.117, respectively, which are significant at the 0.1 and 0.05 levels, respectively. It is noteworthy that the ISA audit fee premium is less evident (significant only at the 0.1 level) when client firms are matched by their propensity scores. However, when the unit audit price is regressed on ISA in model (6), the coefficient on *ISA* is no longer significant, repudiating the findings in the previous analyses which rely on OLS and the Hackman two-stage regression approach, where the coefficient on *ISA* was consistently negatively significant. The insignificant coefficient on *ISA* indicates that ISA do not charge either a higher or lower unit audit price relative to non-ISA. It also suggests that the lower unit audit price associated with ISA, documented in the previous analyses, perhaps is likely due to omitted client characteristics that have not been fully captured by the control variables. The sign of the coefficients on the control variables is generally similar to the finding in previous tables.

Overall, the findings so far can be summarized as follows: (1) ISA tend to charge higher audit fees than do non-ISA, (2) they, however, also spend more audit effort relative to non-ISA and (3) therefore, when both audit fees and audit effort are considered together in one analysis using propensity-score matching, the unit audit price of ISA is indistinguishable from that of non-ISA.

Additional analyses

Industry specialist auditors and client firm accounting quality

To the extent that audit fees and audit effort proxy for the level of service provided and the physical flow of knowledge (Whisenant et al. 2003), higher audit fees and audit hours associated with ISA are likely to translate to higher audit quality, and thus higher accounting quality. What researchers have found (Gramling et al. 2001; Balsam et al. 2003; Krishnan 2003; Carcello and Nagy 2002) is consistent with this prediction. In order to validate the finding in previous studies that relate accounting quality to ISA, we examine the accounting quality of client firms of ISA relative to that of client firms of non-ISA. Accounting quality is measured as the absolute value of residuals from the Dechow and Dichev (2002) and the McNichols (2002) model. Specifically, we regress accounting quality on *ISA* and control variables.[26] Abnormal audit fees, included among the control variables, are the actual audit fees minus normal audit fees divided by actual audit fees, where normal audit fees are estimated from an audit fee model.[27] Abnormal audit hours are similarly calculated. Other control variables are as follows: the natural log of total assets (*Log (TA)*); total liabilities divided by total assets (*Leverage*); ownership of the largest shareholder and its related parties

[26] Additional control variables over the audit fee model (1) above are as follows: *Stddev (cash flows)* = standard deviation of cash flows from operations past 5 years; *Stddev (sales)* = standard deviation of sales past 5 years; and *Cycle* = operating cycle.

[27] Abnormal audit fees and abnormal audit hours are calculated as the residuals from the conventional audit fee and audit hour models. Specifically, abnormal audit fees and abnormal audit hours are defined as the difference between the expected audit fees and audit hours calculated by using the following model and the actual audit fees and the actual audit hours. The expectation model employed is as follows:

$$\begin{aligned} Log\ (Fees)\ (or\ Log\ (Hours))_{it} = {} & \delta_0 + \delta_1 Log(TA)_{it} + \delta_2 Sub_{it} + \delta_3 Complex_{it} + \delta_4 Export_{it} + \delta_5 Liquidity_{it} + \delta_6 Leverage_{it} \\ & + \delta_7 ROA_{it} + \delta_8 Loss_{it} + \delta_9 Growth_{it} + \delta_{10} Opinion_{it} + \delta_{11} BigN_{it} + \delta_{12} Holdings_{it} \\ & + \delta_{13} Foreign_{it} + Year + Industry + \mu_{it}, \end{aligned}$$

where *Log (TA)* is the natural log of total assets; *Sub* is the natural log of one plus subsidiaries; *Complex* is receivables and inventory divided by total assets; *Export* is sales outside the country divided by total sales; *Liquidity* is current assets divided by current liabilities; *Leverage* is total liabilities divided by total assets; *ROA* is net income divided by total assets; Loss is 1 if the firm reported a loss during the previous year, 0 otherwise; *Growth* is the growth rate of total assets; *Opinion* is 1 if firm receives a modified audit opinion, 0 otherwise; *Big N* is 1 if the auditor is one of the Big 4, 0 otherwise; *Holdings* is ownership of the largest shareholder and its related parties; *Foreign* is foreign ownership; *Year* is the fixed year dummy; *Industry* is the industry dummy; and μ_{it} is the error term.

(*Holdings*); net income divided by total assets (*ROA*); a dummy variable that takes 1 if the firm reported a loss during previous year (*Loss*); receivables and inventory divided by total assets (*Complexity*); foreign ownership (*Foreign*); a dummy variable that takes 1 if the firm receives a modified audit opinion (*Opinion*); a dummy variable that takes 1 if the auditor is a Big N auditor (*Big N*); the length of the auditor-client relationship in years (*Tenure*); a dummy variable that takes 1 if the audit is an initial audit engagement (*Initial Audit*); standard deviation of cash flows from operations past 5 years (*Stddev (cash flows)*); standard deviation of sales past 5 years (*Stddev (sales)*); operating cycle (*Cycle*); year dummies (*Year*); and industry dummies (*Industry*).

Table 6 reports the finding. The coefficient on *ISA* is generally significantly negative across the different definitions of ISA, suggesting that client firms with ISA tend to have higher audit quality relative to their counterparts with non-ISA. The result is unaffected by the differences in model specification, including audit fees and audit hours in the model. Interestingly, the coefficient on *Fees* is negative and significant in both models. One interpretation of this finding is that higher audit fees lead to higher audit quality, and thus higher accounting quality.

Client size effects

Casterella et al. (2004) find that ISA charge higher audit fees, but only for smaller clients who lack bargaining power with the auditor. More specifically, they find no premium for larger clients, but an average 10 percent premium for smaller clients. Similarly, Huang et al. (2007) also report that clients with more bargaining power measured by sales show less fee premium. Both studies suggest that client size is a significant determinant of audit fee premiums. However, it is not clear whether their finding extends to audit hours and the unit audit price. Hence, we investigate the client size effect on audit hours and unit audit price in

our sample. For this, we split the sample into two subsamples using the sample median of size. Table 7 provides the results.

A complex picture emerges. As reported in models (1) and (2) in panel A, ISA charge higher audit fees and spend more audit effort for larger client firms. The result in model (3) indicates that ISA are significantly negatively associated with the unit audit price. This is different from what is reported in Casterella et al. (2004) and Huang et al. (2007). ISA still charge more than do non-ISA for smaller firms, as reported in panel B; the coefficient on *ISA* in model (6) is 0.363 with a t-value of 3.22. However, although the coefficient on *ISA*, when the dependent variable is audit hours in model (7), is positive, it is insignificant, revealing that ISA do not increase audit effort despite the higher fees they charge to smaller client firms. The coefficient estimate of *ISA* in model (8), where the dependent variable is the unit audit price, is also insignificant, indicating that the unit price that ISA charge their smaller clients is indistinguishable from what non-ISA charge their smaller clients.

Market dominance and audit effort

Previous research finds that audit fees of ISA tend to earn a fee premium as their market share becomes more dominant (Mayhew and Wilkins 2003; Numan and Willekens 2012). Mayhew and Wilkins (2003) interpret their finding as suggesting that auditors with a dominant market share retain a stronger bargaining position with their clients, which translates to a fee premium. Drawing on their finding, we examine the effect of market dominance on audit effort and unit audit price. If ISA are confident enough of their bargaining position with their clients, then it is possible that they charge higher fees, but not increase their audit effort commensurably, thus essentially extracting rents.

Table 8 presents the results. Specifically, panel A (B) reports the results using ISA with a market share of 30% (40%) or higher. Panel A indicates that the coefficient on *ISA* is

significantly positive when the dependent variable is audit fees and audit hours, but is significantly negative when the dependent variable is the unit audit price. This finding is qualitatively similar to that obtained from the analysis with no restrictions in the market share of ISA. When ISA are defined as auditors with a 40% or more market share, the coefficient on *ISA* is still significantly positive when the dependent variable is audit fees and audit hours. However, the coefficient on *ISA*, when the dependent variable is the unit audit price, is no longer significant. If ISA exploit their dominant market position in order to extract economic rents, more dominant market shares are likely to relate to a higher unit price. The results, however, suggest otherwise. This finding is not supportive of the interpretation of the source of the fee premium of ISA proposed in some previous studies. Yet, it is supportive of our main finding that the higher audit fees that ISA charge are likely to be a result of ISA's proportionately higher audit effort.

Competition in client firm industry

Extending Danos and Eichenseher (1982), Kwon (1996) posits that the degree of competition in the client industry relates to audit firm dominance. In particular, he argues that the emergence of a dominant industry specialist is less likely in an industry with high concentration (that is, low competition) because firms in such an oligopolistic industry are likely to hire a different auditor from the auditors which their competitors have in this section. We examine the effect of competition in the client firm industry on audit fees, audit effort and unit audit price in the ISA context.

The level of competition is commonly proxied by the Herfindahl-Hirschman index (HHI) in extant literature (Harris, 1998; Engel et al., 2003). More recent studies, however, argue that HHI has a limitation in measuring the level of competition (Ali et al. 2010; Karuna 2007; Robinson et al. 2011). Hence, although we employ HHI measured by sales revenues as

a proxy that captures the level of competition, following Karuna (2007) and Robinson et al. (2011), we add three more proxies in the analysis:[28] (1) the industry product substitutability (*DIFF)*; (2) the level of entry costs in industry (*ENTCOST)*; and (3) the level of market size in industry (*MKTSIZE*). We define industry using the two-digit industry code by the classification of the Korean Standard Industrial Classification (KSIC), which is consistent with the international industry classification. Specifically, we measure HHI using sales revenues. *DIFF* is calculated by client sales divided by operating costs, where operating costs include cost of goods sold, selling, general and administrative expense, and depreciation, depletion and amortization and takes a value of 1 if it is less than the median, and 0 otherwise. *ENTCOST* is calculated by the natural log of the weighted average of the cost of property, plant and equipment of firms in industry, weighted by each firm's market share in industry, and equals 1 if it is less than the median, and 0 otherwise. Finally, *MKTSIZE* is calculated by the natural log of industry sales, and equals 1 if it is greater than the median, and 0 otherwise.

Table 9 reports the results. While there is some evidence that ISA charge lower fees for client firms in less concentrated (i.e., highly competitive) industries, as measured by *HHI* in model (1) and *ENTCOST* in model (3), audit effort and unit audit price are generally unrelated to the level of competition in the client industry.

Client firm governance levels

To the extent that the internationally reputed Big N auditors can play a significant governance role, especially in less-developed economies (Fan and Wong 2005), the demand for ISA might be systematically associated with the level of the client firm's governance, which in turn might affect audit fees, audit hours and unit audit price of ISA. In order to examine this possibility, we use governance scores obtained from the Korean Corporate

[28] See Karuna (2007 p. 281-283) for further details.

Governance Service[29] for the period of 2004 – 2009, and divide our sample into two groups using the median governance scores. We then examine the relation between ISA and audit fees, audit hours and unit price, separately, for each subgroup.

Table 10 presents the results. The results demonstrate that ISA charge higher audit fees and spend more audit hours irrespective of the level of client firm governance. Unit audit price, however, is significantly negative only in the subsample with higher governance, but is insignificant in the subsample with lower governance. Since one interpretation of this is that client firms with low governance are more willing to pay a relatively higher unit audit price than do client firms with high governance, this finding is consistent with the finding in Fan and Wong (2005) in that high quality audit can substitute the weak governance of the firm.

5. Conclusion

Cross-sectional differences in audit fees can represent either the effect of quantity differences in audit effort or unit price differences. Although there exists considerable research on whether ISA charge higher audit fees, little has been known as to the source of higher audit fees associated with ISA. Our research exploits a field setting in Korea where audit effort information is required to be disclosed in the firms' annual reports. Specifically, we ask: Do ISA spend more audit effort than do non-ISA? Do ISA charge higher audit fees because they spend more effort to audit the financial statements of clients or do they charge higher audit fees because they charge a higher unit price for their effort? Or is it both?

We find that while ISA charge higher *total* audit fees, they also spend more audit effort relative to non-ISA. Consequently, when audit fees and audit hours are considered

[29] The Korean Corporate Governance Service constructs a governance score every year for listed firms in the Korean Stock Exchange and the KOSDAQ exchange based on: (1) investor protection (74 items), (2) board of directors (44 items), (3) disclosure (47 items), (4) audits (21 items) and (5) management and distribution (10 items). The total maximum score is 196.

together in one analysis, the results reveal that the unit price per audit effort of ISA is not different from that of non-ISA when selection bias is controlled for by a score matching method. This indicates that although ISA, on average, charge higher *total* audit fees than do non-ISA, they also increase audit effort commensurably, not yielding a higher unit price. The results are robust to several sensitivity checks. Our finding provides compelling evidence that the source of high total audit fees associated with ISA is more audit effort but not economic rents.

References

Ahmed, A., S. J. Rasmussen, and S. Tse. 2008. Audit quality, alternative monitoring mechanisms, and cost of capital: an empirical analysis. *Working paper*.

Ali, Ashiq, Klasa, Sandy and Yeung. 2010. P. Eric. Industry Concentration and Corporate Disclosure Policy. Available at SSRN: http://ssrn.com/abstract=1231465 or http://dx.doi.org/10.2139/ssrn.123146.5.

Armstrong, C., A. Jagolinzer, and D. Larcker. 2010. Chief executive officer equity incentives and accounting irregularities. *Journal of Accounting Research* 48 (2): 225-271.

Balsam, S., J. Krishnan, and J.S. Yang. 2003. Auditor industry specialization and earnings quality. *Auditing: A Journal of Practice and Theory* 22 (2): 71-97.

Beck, P.J., T.J. Frecka, and I. Solomon. 1988. A model of the market for MAS and audit services: Knowledge spillovers and auditor-auditee bonding. *Journal of Accounting Literature* 7: 50-64.

Cahan, S., D. Jeter., and V. Naiker. 2011. Are all industry specialist auditors the same? *Auditing: A Journal of Practice & Theory* 30 (4): 191-222.

Carcello, J.V., and A.L. Nagy. 2004. Client size, auditor specialization and fraudulent financial reporting. *Managerial Auditing Journal* 19: 651-668.

Carcello, J.V., D. Hermanson, T. Neal, and R. Riley. 2002. Board characteristics and audit fees. *Contemporary Accounting Research* 19 (3): 365–384.

Casterella, J.R., J.R. Francis, B.L. Lewis, and P. L. Walker. 2004. Auditor industry specialization, client bargaining power, and audit pricing. *Auditing: A Journal of Practice & Theory* 23 (March): 123-141.

Chaney Paul K., Debra C. Jeter, and Lakshmanan Shivakumar. 2004 Self-Selection of Auditors and Audit Pricing in Private Firms. *The Accounting Review*: 79(January): 51-72.

Clatworthy Mark A., Gerald H. Makepeace, Michael J. Peel. 2009. Selection bias and the Big Four premium: New evidence using Heckman and matching models. Accounting and Business Research 39(2): 139-166.

Craswell, A. T, J.R. Francis, and S.L. Taylor. 1995. Auditor brand name reputations and industry specializations. *Journal of Accounting and Economics* 20: 297-322.

Danos Paul and John W. Eichenseher. 1982. Audit Industry Dynamics: Factors Affecting Changes in Client-Industry Market Shares *Journal of Accounting Research* 20(Autumn): 604-616.

Davis, L., D. Ricchiute, and G. Trompeter. 1993. Audit effort, audit fees, and the provision of nonaudit services to audit clients. *The Accounting Review* 68 (1): 135-150.

Dechow, P., and I. D. Dichev. 2002. The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77 (Supplement): 35-59.

DeFond, M.L. 1992. The association between changes in client firm agency costs and auditor switching. *Auditing: A Journal of Practice & Theory* 11: 16-31.

DeFond, M.L., T.J. Wong, and S.H. Li. 2000. The impact of improved auditor independence on auditor market concentration in China. *Journal of Accounting and Economics* 28: 269-305.

Deis, D.R., and G. Giroux. 1996. The effect of auditor changes on audit fees, audit hours, and audit quality. *Journal of Accounting and Public Policy* 15: 55-76.

Dunn, K., and B.W. Mayhew. 2004. Audit firm industry specialization and client disclosure quality. *Review of Accounting Studies* 9: 35-58.

Engel, E., Hayes, R., Wang, X., 2003. CEO turnover and properties of accounting information. Journal of Accounting and Economics 36 (1–3): 136-154.

Fan, J., and T. J. Wong. 2005. Do external auditors perform a corporate governance role in emerging markets? Evidence from East Asia. *Journal of Accounting Research* 43 (1): 35-72.

Feltham, G.A., J.S. Hughes, and D.A. Simunic. 1991. Empirical assessment of the impact of auditor quality on the valuation of new issues. *Journal of Accounting and Economics* 14: 375-399.

Fernando, G. D., R. J. Elder, and A. M. Abdel-Meguid. 2008. Audit quality attributes, client size and cost of capital. *Working paper*.

Francis, J.R. 1984. The effect of audit firm size on audit prices: A study of the Australian Market. *Journal of Accounting and Economics* 6(2): 133-151.

Francis, J.R. 2004. What do we know about audit quality? *The British Accounting Review* 36(4): 345-368.

Francis, J.R., C. Lennox, and Z. Wang. 2010. Selection models in accounting research. *Working paper*.

Francis, J.R., K. Reichelt, and D. Wang. 2005. The pricing of national and city-specific reputations for industry expertise in the US audit market. *The Accounting Review* 80 (1): 113-136.

Francis J. R., Donald J. Stokes. 1986. Audit Prices, Product Differentiation, and Scale Economies: Further Evidence from the Australian Market. *Journal of Accounting Research* 24(Autumn): 383-393.

Francis, J.R., and E. Wilson. 1988. Auditor changes: a joint test of theories relating to agency costs and auditor differentiation. *The Accounting Review* 63: 663-682.
Ferguson, A., J. Francis, and D. Stokes. 2003. The effects of firm-wide and office-level industry expertise on audit pricing. *The Accounting Review* 78: 429-448.
Grambling, A.A., and D.N. Stone. 2001. Audit firm industry expertise: A review and synthesis of the archival literature. *Journal of Accounting Literature* 20: 1-29.
Harris, M., 1998. The association between competition and managers' business segment reporting decisions. *Journal of Accounting Research* 36, 111–128.
Heckman, J.J. (1979). Sample selection bias as a specification error. *Econometrica*47: 153–161.
Huang, H.-W., L.-L. Liu, K. Raghunandan, and D.V. Rama. 2007. Auditor industry specialization, client bargaining power, and audit fees: Further evidence. *Auditing: A Journal of Practice & Theory* 26: 147-158.
Karuna, C. 2007. Industry product market competition and managerial incentives. Journal of Accounting and Economics 43: 275-297.
Kwon, S. 1996. The impact of competition within the client's industry on the auditor selection decision. *Auditing: A Journal of Practice & Theory* 15 (1): 53-70.
Krishnan, G.V. 2003. Does Big 6 Auditor industry expertise constrain earnings management? *Accounting Horizons* 17: 1-17.
Lawrence, A., M. Minutti-Meza, and P. Zhang. 2011. Can Big 4 versus non-Big 4 differences in audit-quality proxies be attributed to client characteristics? *The Accounting Review* 86 (1): 259-286.
Lee, L.-F. (1979). Identification and estimation in binary choice models with limited (censored) dependent variables. *Econometrica* 47(4), 977–996.
Li, C., Y. Xie, and J. Zhou. 2010. National level, city level auditor industry specialization and cost of debt. *Working paper*.
Lim, C-Y. and H-T. Tan, 2008. Non-audit service fees and audit quality: the impact of auditor specialization. *Journal of Accounting Research* 46 (March): 199-246.
Louis, H. 2005. Acquirers' abnormal returns and the non-Big 4 auditor clientele effect. *Journal of Accounting and Economics* 40 (1-3): 75-99.
McNichols. M.F. 2002. Discussion of The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77 (Supplement): 61-69.
Mayhew, B.W., and M.S. Wilkins. 2003. Audit firm industry specialization as a differentiation strategy: Evidence from fees charged to firms going public. *Auditing: A Journal of Practice & Theory* 22 (2): 33-52.
Neal, T., and R. Riley. 2004. Auditor industry specialist research design. *Auditing: A Journal of Practice & Theory* 23: 169-177.
Numan, W., and M. Willenkens. 2012. An empirical test of spatial competition in the audit market. *Journal of Accounting and Economics* 53: 450-465.
O'Keefe, T., D. Simunic, and M. Stein. 1994. The production of audit services: evidence from a major public accounting firm. *Journal of Accounting Research* 32 (1): 241-261.
Palmrose, Z-V. 1986. Audit fees and auditor size: further evidence. *Journal of Accounting Research* 24: 97-110.
Pearson, T., and G. Trompeter. 1994. Competition in the market for audit services: the effect of supplier concentration on audit fees. *Contemporary Accounting Research* 11(Summer): 115-135.
Robinson, J.R., Y. Xue, and Y. Yu. 2011. Determinants of Disclosure Noncompliance and the Effect of the SEC Review: Evidence from the 2006 Mandated Compensation Disclosure Regulations. *The Accounting Review* 86 (4): 1415-1444.
Rosebbaym, P., and D. Rubin. 1983. The central role of the propensity score in observational studies for causal effects. *Biometrika* 70 (1): 41-55.
Simunic, D. 1980. The pricing of audit services: theory and evidence. *Journal of Accounting Research* 18 (1): 161-190.
Simunic, D. 1984. Auditing, consulting, and auditor independence. *Journal of Accounting Research* 22 (2): 679-702.
Solomon, I., M.D. Shields, and O.R. Whittington. 1999. What do industry-specialist auditors know. *Journal of Accounting Research* 37 (1): 191-208.
Stein, M.T., and B.D. Cadman. 2007. Industry specialization and auditor quality in U.S. markets. *SSRN eLibrary*. http://ssrn.com/paper=722203.
Whisenant, S., R. Sankaragurswamy, and K. Raghunandan. 2003. Evidence on the joint determinant of audit and non-audit fees. *Journal of Accounting Research* 41 (4): 721-744.

World Bank. 2004. *Report on the Observance of Standards and Codes--Republic of Korea: Accounting and Auditing*. Available at: http://www.worldbank.org/ifa/rosc_aa.html

FIGURE 1

Firms audited by industry specialist auditors (%)

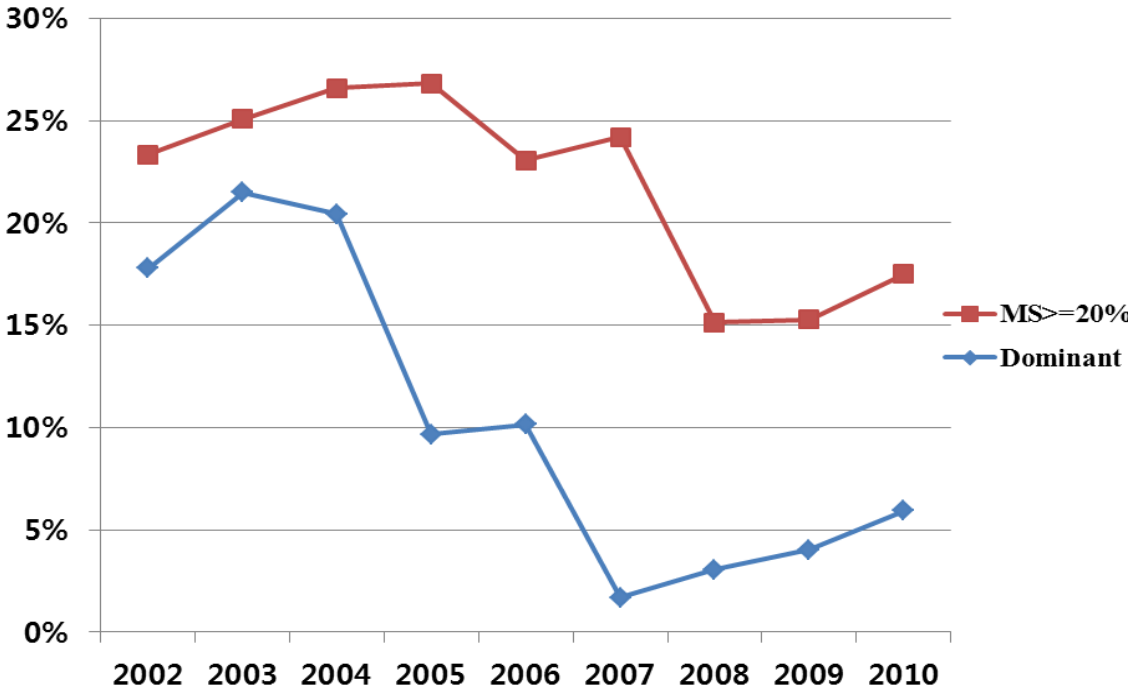

TABLE 1
Sample selection and distribution of the sample

Panel A: Sample selection	
TS2000 observations without financial industries	11,776
Less:	
Missing and unavailable financial data to measure variables	(4,440)
Missing audit fee, audit hour, auditor data	(951)
Less than 20 observations per two digit industry-year observations	(2,129)
Final data sample(fiscal year 2002-2010)	4,256

Panel B: Distribution by year									
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
N	197	335	421	455	512	529	555	595	657

Panel C: Distribution by industry		
Two-digit code	**Description**	**N**
10	Manufacture of food products	202
20	Manufacture of chemicals and chemical products except parmaceuticals and medicinal chemicals	396
21	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	215
22	Manufacture of rubber and plastic products	22
24	Manufacture of basic metal products	278
25	Manufacture of fabricated metal products, except machinery and furniture	42
26	Manufacture of electronic components, computer, radio, television and communication equipment and apparatuses	1,021
27	Manufacture of medical, precision and optical instruments, watches and clocks	110
28	Manufacture of electrical equipment	163
29	Manufacture of other machinery and equipment	451
30	Manufacture of motor vehicles, trailers and semitrailers	251
41	General construction	187
46	Wholesale trade and commission trade, except of motor vehicles and motorcycles	472
58	Publishing activities	242
71	Professional services	204
Total		4,256

TABLE 2
Description of the sample

Panel A: Mean and (median) for sample

Variable	(1) Total	(2) ISA	(3) Non-ISA	Test of the difference (2)-(3): t[z]-value
Log (Fees)	17.84 (17.73)	18.19 (18.06)	17.74 (17.70)	17.72*** [17.75]***
Log (Hours)	6.33 (6.33)	6.79 (6.80)	6.21 (6.25)	17.88*** [20.69]***
Log(Fees per hour)	11.50 (11.42)	11.41 (11.31)	11.53 (11.44)	5.58*** [7.50]***
Abnormal fees	-0.00 (0.00)	0.00 (-0.00)	-0.00 (0.00)	0.97 [0.44]
Abnormal hours	-0.01 (0.00)	-0.00 (0.01)	-0.01 (0.00)	1.98** [1.97]**
Audit quality 1	0.08 (0.06)	0.06 (0.04)	0.08 (0.06)	8.04*** [7.57]***
Audit quality 2	0.08 (0.06)	0.06 (0.04)	0.08 (0.06)	7.96*** [7.33]***
Log(TA)	18.38 (18.14)	19.22 (19.11)	18.15 (18.02)	19.64*** [19.61]***
Lev	0.41 (0.41)	0.43 (0.43)	0.41 (0.40)	3.90*** [3.98]***
Holdings	0.09 (0.02)	0.10 (0.02)	0.09 (0.03)	1.06 [2.91]***
ROA	-0.00 (0.03)	0.03 (0.04)	-0.01 (0.03)	8.32*** [5.92]***
Loss	0.26 (0.00)	0.16 (0.00)	0.29 (0.00)	8.37*** [7.42]***
Complexity	0.32 (0.30)	0.31 (0.30)	0.32 (0.31)	1.46 [1.21]
Foreign	0.05 (0.01)	0.09 (0.02)	0.04 (0.00)	10.15*** [11.06]***
Opinion	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.10** [1.46]*
Big N	0.48 (0.00)	0.95 (1.00)	0.36 (0.00)	55.39*** [31.90]***
Stddev(CF)	0.08 (0.07)	0.07 (0.06)	0.08 (0.07)	5.59*** [5.66]***
Stddev(sales)	0.21 (0.17)	0.20 (0.16)	0.22 (0.17)	2.96*** [3.15]***
Operating cycle	4.85 (4.90)	4.74 (4.70)	4.87 (4.88)	6.53*** [6.48]***
Tenure	2.40 (2.00)	2.38 (2.00)	2.40 (2.00)	0.35 [0.01]
Initial Audit	0.35 (0.00)	0.34 (0.00)	0.35 (0.00)	0.38 [0.38]

Panel B: Correlation matrix

	(1) *ISA*	(2) *Log (Fees)*	(3) *Log (Hours)*	(4) *Log (Fees per hour)*	(5) *Abn. fees*	(6) *Abn. hours*	(7) *Audit quality 1*	(8) *Audit quality 2*	(9) *Log (TA)*	(10) *Lev*	(11) *Holdings*	(12) *ROA*	(13) *Loss*	(14) *Complexity*	(15) *Foreign*	(16) *Opinion*	(17) *Big N*	(18) *Std (CF)*	(19) *Std (sales)*
(2)	**.40**	**1**																	
(3)	**.36**	**.64**	**1**																
(4)	**-.09**	**.10**	**-.07**	**1**															
(5)	.02	**.44**	**.15**	**.21**	**1**														
(6)	.02	**.12**	**.60**	**-.65**	**.26**	1													
(7)	**-.14**	**-.15**	**-.12**	.01	-.01	.01	**1**												
(8)	**-.14**	**-.14**	**-.12**	.02	-.01	.01	**.95**	**1**											
(9)	**.42**	**.78**	**.56**	.00	-.02	-.00	**-.22**	**-.21**	**1**										
(10)	**.06**	**.21**	**.10**	**.07**	-.01	-.01	.01	.02	**.19**	**1**									
(11)	.02	.00	.00	.00	.00	.00	.02	.01	.01	.01	**1**								
(12)	**.14**	**.10**	**.11**	**-.06**	.01	.00	**-.28**	**-.29**	**.29**	**-.27**	.02	**1**							
(13)	**-.15**	**-.11**	**-.09**	**.01**	-.00	.02	**.21**	**.22**	**-.26**	**.17**	-.02	**-.43**	**1**						
(14)	-.02	**-.13**	**-.09**	.00	-.01	-.01	**-.08**	**-.08**	**-.12**	**.22**	-.01	.02	**-.06**	**1**					
(15)	**.22**	**.37**	**.28**	-.01	-.01	.00	**-.09**	**-.09**	**.44**	**-.08**	.03	**.16**	**-.17**	**-.10**	**1**				
(16)	**-.04**	-.04	**-.10**	**.09**	.00	-.00	**.06**	**.06**	**-.08**	**.10**	.00	**-.21**	**.07**	.01	-.02	1			
(17)	**.72**	**.35**	**.36**	**-.14**	-.01	-.00	**-.11**	**-.11**	**.33**	.03	.01	**.14**	**-.13**	-.01	**.15**	-.04	1		
(18)	**-.10**	**-.18**	**-.12**	.01	.02	.02	**.24**	**.24**	**-.28**	.02	.01	**-.23**	**.18**	**.07**	**-.12**	**.08**	**-.06**	**1**	
(19)	**-.04**	**-.11**	**-.06**	**-.02**	.03	.03	**.20**	**.20**	**-.19**	**.07**	**-.02**	**-.16**	**.14**	.03	**-.10**	**.07**	-.02	**.48**	**1**

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees*; Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *Abnormal audit fees (Abn fees)* = (actual audit fee-normal audit fee)/actual audit fee, normal audit fee is estimated from audit fee model; *Abnormal audit hours (Abn hours)* = (actual audit hour-normal audit hour)/actual audit hour, normal audit hour is estimated from audit hour model; *Audit quality 1*= absolute value of residuals from the Dechow and Dichev (2002) model; *Audit quality 2* = absolute value of residuals from the McNichols (2002) model; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Stddev (CF)* = standard deviation of cash flow from operations past 5 years; *Stddev (sales)* = standard deviation of sales past 5 years. Bold denotes significance at the 0.01 or higher level.

TABLE 3
Parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables

Variable	Panel A: Log (Fees)			Panel B: Log (Hours)			Panel C: Log (Fees per hour)		
	Industry specialist auditors defined by			Industry specialist auditors defined by			Industry specialist auditors defined by		
	(1) Market share	(2) 20 percent or larger market share	(3) Largest and dominant market share	(4) Market share	(5) 20 percent or larger market share	(6) Largest and dominant market share	(7) Market share	(8) 20 percent or larger market share	(9) Largest and dominant market share
Intercept	11.369***	11.329***	11.326***	0.210	0.165	0.138	11.210***	11.215***	11.236***
	(98.61)	(98.46)	(98.72)	(1.10)	(0.87)	(0.73)	(60.42)	(60.73)	(60.92)
ISA	**0.380*** **	**0.052*** **	**0.098*** **	**0.686*** **	**0.147*** **	**0.205*** **	**-0.288** **	**-0.091*** **	**-0.106*** **
	(5.21)	**(3.36)**	**(4.94)**	**(5.59)**	**(5.78)**	**(6.27)**	**(2.46)**	**(3.66)**	**(3.33)**
Log(TA)	0.344***	0.348***	0.348***	0.322***	0.326***	0.328***	0.018*	0.018*	0.016*
	(58.32)	(59.20)	(59.55)	(32.94)	(33.59)	(33.95)	(1.94)	(1.90)	(1.73)
Lev	0.172***	0.171***	0.174***	0.053	0.053	0.058	0.117**	0.117**	0.115**
	(5.56)	(5.53)	(5.62)	(1.04)	(1.03)	(1.13)	(2.36)	(2.36)	(2.31)
Holdings	-0.009	-0.007	-0.007	-0.022	-0.017	-0.018	0.024	0.021	0.022
	(0.26)	(0.20)	(0.20)	(0.36)	(0.29)	(0.20)	(0.40)	(0.36)	(0.37)
ROA	-0.329***	-0.331**	-0.332***	-0.228***	-0.229***	-0.233***	-0.107*	-0.108*	-0.105*
	(9.07)	(9.09)	(9.14)	(3.80)	(3.81)	(3.88)	(1.83)	(1.85)	(1.80)
Loss	0.060***	0.060***	0.060***	0.098***	0.097***	0.097***	-0.040*	-0.039*	-0.040*
	(4.49)	(4.48)	(4.47)	(4.41)	(4.38)	(4.39)	(1.85)	(1.82)	(1.83)
Complexity	-0.094**	-0.093**	-0.098***	0.018	0.026	0.011	-0.114*	-0.121**	-0.112*
	(2.58)	(2.54)	(2.69)	(0.30)	(0.43)	(0.18)	(1.95)	(2.06)	(1.90)
Foreign	0.199***	0.207***	0.200***	0.208**	0.215**	0.206**	-0.005	-0.003	-0.001
	(3.56)	(3.71)	(3.58)	(2.25)	(2.32)	(2.23)	(0.05)	(0.03)	(0.01)
Opinion	0.007	-0.001	0.006	-0.515***	-0.531***	-0.515***	0.498***	0.505***	0.497***
	(0.08)	(0.01)	(0.07)	(3.65)	(3.75)	(3.65)	(3.63)	(3.68)	(3.62)
Big N	0.061***	0.099***	0.101***	0.185***	0.235***	0.252***	-0.122***	-0.133***	-0.147***
	(4.00)	(8.11)	(8.78)	(7.29)	(11.63)	(13.26)	(4.93)	(6.76)	(7.94)
Tenure	0.016***	0.016***	0.016***	0.031***	0.032***	0.032***	-0.014*	-0.014*	-0.014*
	(2.94)	(3.04)	(3.00)	(3.55)	(3.65)	(3.60)	(1.66)	(1.69)	(1.67)

Initial Audit	-0.005	-0.004	-0.003	0.030	0.032	0.034	-0.034	-0.034	-0.035
	(0.33)	(0.27)	(0.20)	(1.15)	(1.20)	(1.30)	(1.31)	(1.33)	(1.39)
Year	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.6634	0.6621	0.6631	0.5168	0.5170	0.5176	0.2100	0.2113	0.2109
F-value	247.60	246.22	247.37	134.87	134.94	135.30	34.26	34.54	34.45
Observations	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256

"Dominant" = 1 if the difference in market share between the largest and the second largest auditors is equal to or more than 10 percent, and 0 otherwise; *ISA* = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audi*t=1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 4
Probit regression of industry specialist auditors selection model and parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables

Variable	First-stage probit regression	Second-stage OLS regression		
	Industry specialist auditors	(1) Log (Fees)	(2) Log (Hours)	(3) Log (Fees per hour)
Intercept	-4.316***	11.388***	0.281	11.159***
	[40.60]	(97.22)	(1.45)	(59.34)
ISA		**0.175*** **	**0.390*** **	**-0.207*** **
		(3.56)	**(4.81)**	**(2.62)**
ATO	0.069			
	[2.70]			
Export	0.350			
	[0.43]			
Liquidity	-0.024*			
	[2.94]			
Sub	-0.008			
	[0.04]			
Growth	-0.010			
	[0.02]			
Log(TA)	0.121***	0.343***	0.318***	0.0022**
	[11.36]	(56.57)	(31.69)	(2.24)
Lev	-0.105*	0.173***	0.056	0.116**
	[3.68]	(5.58)	(1.10)	(2.33)
Holdings	-0.084	-0.005	-0.014	0.020
	[0.19]	(0.15)	(0.22)	(0.33)
ROA	-0.021	-0.325***	-0.218***	-0.113*
	[0.01]	(8.93)	(3.62)	(1.94)
Loss	0.050	0.059***	0.094***	-0.038*
	[0.38]	(4.36)	(4.23)	(1.75)
Complexity	-0.734***	-0.079**	0.052	-0.133**
	[10.45]	(2.15)	(0.86)	(2.26)
Foreign	0.608**	0.187***	0.175*	0.016
	[5.03]	(3.32)	(1.88)	(0.18)
Opinion	-0.146	-0.002	-0.532***	0.505***
	[0.04]	(0.02)	(3.77)	(3.68)
Big N	2.201***	0.057***	0.151***	-0.093***
	[535.78]	(2.79)	(4.50)	(2.84)
Tenure		0.016***	0.032***	-0.014*
		(3.05)	(3.66)	(1.69)
Initial Audit		-0.004	0.033	-0.035
		(0.23)	(1.25)	(1.36)

Lambda		-0.079***	-0.156***	0.074
		(2.63)	(3.15)	(1.55)
Year	Included	Included	Included	Included
Industry	Included	Included	Included	Included
Likelihood Ratio	1822.38			
Score	1483.93			
Wald	823.87			
Percent Concordant	90.9			
Discordant	9.1			
Adj. (Pusedo) R-Sq.	0.3483	0.6626	0.5180	0.2116
F-value		239.72	131.64	33.63
Observations		4,256	4,256	4,256

ISA =1 for auditors with 20 percent or larger market share, and 0 otherwise (industry specialization is calculated by square root of client sales); *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *ATO* = sales divided by total assets; *Export* = sales outside country divided by total sales; *Liquidity* = current assets divided by current liabilities; *Sub* = natural log of one plus subsidiaries; *Growth* = growth rate of total assets; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audi*t=1 for the initial years of audit engagement, and 0 otherwise; Lambda = the inverse Mills ratio from the probit model for choosing industry specialist auditors; *Year* = year dummy; *Industry* = industry dummy. t (Wald Chi-square)-values are in parenthesis (bracket). *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 5
Descriptive comparison of pre- and post-propensity-score matching and parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables after propensity-score matching

Panel A: Descriptive statistics of full and propensity-score matched samples

Variable	Full sample				Propensity-score matched sample		
	All Obs. (Std. Dev.)	ISA (Std. Dev.)	Non-ISA (Std. Dev.)	Difference in Means (t-statistic)	ISA (Std. Dev.)	Non-ISA (Std. Dev.)	Difference in Means (t-statistic)
Lev	0.412	0.434	0.406	0.028***	0.422	0.435	-0.013
	(0.20)	(0.19)	(0.20)	(3.90)	(0.01)	(0.19)	(1.05)
Log(TA)	18.378	19.224	18.151	1.07***	18.686	18.709	-0.023
	(1.26)	(1.54)	(1.07)	(19.64)	(1.24)	(1.26)	(0.29)
ATO	0.998	1.091	0.973	0.118***	1.069	1.047	0.021
	(0.69)	(0.80)	(0.66)	(4.08)	(0.71)	(0.69)	(0.47)
Liquidity	2.670	2.197	2.796	-0.599***	2.359	2.340	0.019
	(3.05)	(2.40)	(3.19)	(6.17)	(2.58)	(2.53)	(0.11)
QUICK	2.310	1.777	2.453	-0.676***	1.949	2.057	-0.108
	(4.54)	(2.71)	(4.91)	(5.46)	(3.21)	(5.96)	(0.35)
ROA	-0.002	0.031	-0.011	0.041***	0.022	0.015	0.007
	(0.17)	(0.12)	(0.18)	(8.32)	(0.12)	(0.13)	(0.84)
Loss	0.260	0.163	0.286	-0.122***	0.188	0.225	-0.036
	(0.44)	(0.37)	(0.45)	(8.37)	(0.39)	(0.42)	(1.37)
N	4,256	900	3,356		467	467	

Panel B: Univaraite and multivariate regressions of propensity-score matching observations

	Difference in means (t-statistic)			Multivariate estimate (t-statistic)		
	(1) Log (Fees)	(2) Log (Hours)	(3) Log (Fees per hour)	(4) Log (Fees)	(5) Log (Hours)	(6) Log (Fees per hour)
Intercept				11.262***	-0.694	12.034***
				(38.53)	(1.42	(25.64)
ISA	**0.087****	**0.266*****	**-0.186*****	**0.053***	**0.117****	**-0.075**
	(2.31)	**(5.06)**	**(4.49)**	**(1.73)**	**(2.31)**	**(1.53)**
Log (TA)				0.354***	0.375***	-0.026
				(24.66)	(15.65)	(1.15)
Lev				0.239***	-0.050	0.28**
				(3.25)	(0.40)	(2.26)
Holdings				-0.006	-0.251**	0.261**
				(0.08)	(1.97)	(2.13)
ROA				-0.230**	-0.192	-0.023
				(2.15)	(1.070	(0.13)
Loss				0.021	0.066	-0.043
				(0.65)	(1.21)	(0.82)
Complexity				-0.060	0.324**	-0.374***
				(0.70)	(2.27)	(2.73)

Foreign	0.114 (1.04)	-0.113 (0.620	0.238 (1.35)
Opinion	0.073 (0.21)	0.168 (0.28)	-0.090 (0.16)
Big N	0.078** (2.34)	0.262*** (4.72)	-0.178*** (3.35)
Tenure	0.006 (0.43)	0.021 (1.00)	-0.011 (0.55)
Initial Audit	-0.023 (0.63)	-0.067 (1.10)	0.046 (0.79)
Year	Included	Included	Included
Industry	Included	Included	Included
Adj. R-Sq.	0.6351	0.4869	0.2287
Psedo R-Sq.		0.1735	
%Correctly Classified		81.25%	
F-value	51.75	28.67	9.64
N	934	934	934

ISA =1 for auditors with 20 percent or larger market share, and 0 otherwise (industry specialization is calculated by square root of client sales); *Lev* = total liabilities divided b total assets; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *ATO* = sales divided by total assets; *Liquidity* = current assets divided by current liabilities; *Quick* = current assets divided by current liabilities; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Holdings* = ownership of largest shareholder and related parties; *Complexity* = receivables and inventory divided by total assets; *Foreign* = Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure* = length of the auditor-client relationship in years; *Initial Audit* = 1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. The pseudo R^2 is for the propensity-score logistic regression. The percentage correctly classified refers to the percentage of audit clients that are correctly classified as industry specialist auditor or non-industry specialist auditors, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model. We match non-specialist auditor client with a specialist auditor client that has the closest predicted value from propensity-score logistic regression within a maximum distance of 3 percent (Lawrence et al. 2011). t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 6
Parameter estimates for OLS regressions accounting quality of client firm on industry specialist auditors and control variables

Variable	Dependent variable = audit quality measured by absolute residual using the Dechow and Dichev (2002) model						Dependent variable = audit quality measured by absolute residual using the McNichols (2002) model					
	Industry specialist auditors defined by						Industry specialist auditors defined by					
	(1) Market share		(2) 20 percent or larger market share		(3) Largest and dominant market share		(4) Market share		(5) 20 percent or larger market share		(6) Largest and dominant market share	
Intercept	0.166***	0.099***	0.170**	0.100***	0.169***	0.101**	0.146***	0.090***	0.151***	0.093***	0.149***	0.093***
	(3.76)	(3.80)	(3.85)	(3.88)	(3.82)	(3.89)	(3.30)	(3.47)	(3.43)	(3.59)	(3.38)	(3.60)
ISA	**-0.023***	**-0.026***	**-0.005**	**-0.005***	**-0.007***	**-0.007***	**-0.030****	**-0.033****	**-0.005***	**-0.005***	**-0.008****	**-0.008****
	(1.65)	**(1.84)**	**(1.54)**	**(1.70)**	**(1.73)**	**(1.93)**	**(2.15)**	**(2.35)**	**(1.66)**	**(1.84)**	**(1.97)**	**(2.18)**
Log(Fees)	-0.006**		-0.006*		-0.006*		-0.005		-0.005		-0.005*	
	(1.90)		(1.96)		(1.91)		(1.55)		(1.63)		(1.57)	
Log(Hours)	-0.001		-0.000		-0.005		-0.002		-0.002		-0.002	
	(0.27)		(0.26)		(0.25)		(0.88)		(0.89)		(0.87)	
Abnormal fees		-0.086		-0.089		-0.087		-0.065		-0.068		-0.066
		(1.20)		(1.24)		(1.21)		(0.90)		(0.95)		(0.92)
Abnormal hours		0.015		0.015		0.015		0.008		0.008		0.008
		(1.15)		(1.16)		(1.16)		(0.62)		(0.62)		(0.62)
Log(TA)	-0.002	-0.004***	-0.002	-0.004***	-0.002	-0.004***	-0.001	-0.003***	-0.001	-0.004***	-0.002	-0.004***
	(1.24)	(3.63)	(1.30)	(3.80)	(1.38)	(3.88)	(0.80)	(3.01)	(0.88)	(3.25)	(0.97)	(3.32)
Lev	0.004	0.003	0.004	0.003	0.004	0.003	0.005	0.004	0.005	0.005	0.005	0.004
	(0.64)	(0.50)	(0.66)	(0.51)	(0.63)	(0.49)	(0.85)	(0.73)	(0.88)	(0.75)	(0.85)	(0.72)
Holdings	0.011	0.011	0.011	0.011	0.011	0.011	0.010	0.011	0.010	0.010	0.010	0.010
	(1.59)	(1.60)	(1.57)	(1.57)	(1.57)	(1.58)	(1.48)	(1.49)	(1.46)	(1.47)	(1.46)	(1.47)
ROA	-0.068***	-0.066***	-0.067***	-0.066***	-0.068***	-0.066***	-0.071***	-0.070***	-0.072***	-0.069***	-0.071***	-0.069***
	(9.28)	(9.05)	(9.27)	(9.04)	(9.24)	(9.02)	(9.76)	(9.56)	(9.76)	(9.54)	(9.72)	(9.51)
Loss	0.010***	0.009***	0.010***	0.009***	0.010***	0.009***	0.011***	0.010***	0.011***	0.010***	0.011***	0.010***
	(3.66)	(3.50)	(3.67)	(3.50)	(3.66)	(3.50)	(4.01)	(3.83)	(4.01)	(3.83)	(4.00)	(3.83)
Complexity	-0.052**	-0.052***	-0.052***	-0.052***	-0.052***	-0.052***	-0.051**	-0.051***	-0.052***	-0.052***	-0.051***	-0.051***
	(6.74)	(6.73)	(6.78)	(6.77)	(6.74)	(6.72)	(6.67)	(6.66)	(6.70)	(6.70)	(6.66)	(6.65)
Foreign	0.019*	0.017	0.019*	0.017	0.019*	0.018	0.019*	0.017	0.018*	0.017	0.019*	0.017
	(1.74)	(1.61)	(1.72)	(1.58)	(1.75)	(1.62)	(1.74)	(1.61)	(1.69)	(1.56)	(1.73)	(1.61)

Opinion	-0.006	-0.006	-0.005	-0.005	-0.006	-0.006	-0.009	-0.008	-0.008	-0.007	-0.009	-0.008
	(0.36)	(0.35)	(0.33)	(0.31)	(0.36)	(0.34)	(0.53)	(0.48)	(0.49)	(0.44)	(0.53)	(0.47)
Big N	-0.001	-0.001	-0.003	-0.003	-0.003	-0.004*	0.000	-0.000	-0.002	-0.003	-0.003	-0.004*
	(0.34)	(0.48)	(1.18)	(1.48)	(1.47)	(1.80)	(0.09)	(0.11)	(1.02)	(1.40)	(1.29)	(1.71)
Stddev(CF)	0.158***	0.158***	0.158***	0.158***	0.158***	0.157***	0.163***	0.163***	0.163***	0.162***	0.162***	0.162***
	(6.18)	(6.15)	(6.17)	(6.15)	(6.15)	(6.13)	(6.36)	(6.34)	(6.35)	(6.33)	(6.33)	(6.30)
Stddev(sales)	0.047***	0.047***	0.046***	0.047***	0.047***	0.047***	0.045***	0.045***	0.044***	0.045***	0.045***	0.045***
	(5.60)	(5.61)	(5.58)	(5.59)	(5.61)	(5.63)	(5.38)	(5.40)	(5.34)	(5.36)	(5.38)	(5.40)
Operating cycle	0.008***	0.009***	0.008***	0.009***	0.009***	0.009***	0.007***	0.007***	0.007***	0.008***	0.007***	0.008***
	(3.51)	(3.59)	(3.53)	(3.62)	(3.57)	(3.67)	(3.01)	(3.10)	(3.05)	(3.14)	(3.09)	(3.19)
Tenure	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.001	0.001	0.001	0.000	0.001	0.001
	(0.08)	(0.03)	(0.05)	(0.07)	(0.06)	(0.05)	(0.64)	(0.52)	(0.60)	(0.48)	(0.62)	(0.50)
Initial Audit	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	(3.05)	(3.01)	(3.03)	(3.00)	(3.01)	(2.97)	(3.07)	(3.04)	(3.05)	(3.02)	(3.02)	(2.99)
Year	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.1553	0.1549	0.1552	0.1548	0.1554	0.1549	0.1605	0.1598	0.1601	0.1594	0.1603	0.1596
F-value	21.06	20.99	21.05	20.98	21.07	21.00	21.86	21.75	21.80	21.68	21.83	21.73
Observations	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256	4,256

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *Abnormal fees* = (actual audit fee-normal audit fee)/actual audit fee, normal audit fee is estimated from audit fee model; *Abnormal hours* = (actual audit hour-normal audit hour)/actual audit hour, normal audit hour is estimated from audit hour model; *Audit quality 1* = absolute value of residuals from the Dechow and Dichev (2002) model; *Audit quality 2* = absolute value of residuals from the McNichols (2002) model; *Log (TA)* = natural log of total assets; *Lev* = total liabilities divided b total assets; *Holdings* = ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign* = Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Stddev (CF)* = standard deviation of cash flow from operations past 5 years; *Stddev (sales)* = standard deviation of sales past 5 years; *Tenure* = length of the auditor-client relationship in years; *Initial Audit* = 1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 7
Parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables for client firms with different size

Variable	Large firms			Small firms		
	(1) Log (Fees)	(2) Log (Hours)	(3) Log (Fees per hour)	(4) Log (Fees)	(5) Log (Hours)	(6) Log (Fees per hour)
Intercept	10.068***	-1.888***	12.002***	13.841***	3.591***	10.268***
	(52.98)	(6.11)	(41.45)	(51.06)	(7.71)	(21.19)
ISA	**0.243****	**0.785*****	**-0.508*****	**0.363*****	**0.208**	**0.150**
	(2.55)	**(5.06)**	**(3.49)**	**(3.22)**	**(1.08)**	**(0.74)**
Log (TA)	0.405***	0.425***	-0.023	0.207***	0.138***	0.068**
	(42.02)	(27.09)	(1.60)	(13.85)	(5.36)	(2.54)
Lev	0.252***	0.078	0.231***	0.187***	0.168**	0.019
	(5.21)	(0.23)	(3.14)	(4.80)	(2.51)	(0.28)
Holdings	-0.007	-0.036	0.058	0.015	0.100	-0.082
	(0.14)	(0.44)	(0.76)	(0.28)	(1.10)	(0.86)
ROA	-0.047	-0.105	0.047	-0.228***	-0.052	-0.181**
	(0.49)	(0.66)	(0.32)	(5.91)	(0.79)	(2.63)
Loss	0.025	0.073**	-0.051	0.070***	0.097***	-0.030
	(1.13)	(2.00)	(1.47)	(4.44)	(3.60)	(1.07)
Complexity	-0.082	0.171*	-0.262***	-0.051	-0.028	-0.024
	(1.41)	(1.80)	(2.94)	(1.14)	(0.36)	(0.30)
Foreign	0.138**	0.032	0.106	-0.084	-0.039	-0.046
	(2.01)	(0.29)	(1.01)	(0.76)	(0.21)	(0.23)
Opinion	0.096	-0.114	0.210	-0.061	-0.633***	0.540***
	(0.28)	(0.20)	(0.40)	(0.75)	(4.56)	(3.73)
Big N	0.094***	0.163***	-0.068**	0.045**	0.250***	-0.200***
	(4.38)	(4.66)	(2.08)	(2.06)	(6.61)	(5.09)
Tenure	0.020***	0.036***	-0.013	0.016**	0.033***	-0.018
	(2.68)	(3.00)	(1.18)	(2.17)	(2.65)	(1.36)
Initial Audit	-0.026	0.031	-0.050	0.001	0.018	-0.021
	(1.11)	(0.80)	(1.38)	(0.05)	(0.52)	(0.58)
Year	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.6517	0.5298	0.2167	0.2276	0.3393	0.2163
F-value	118.12	71.53	18.32	19.42	33.11	18.26
Observations	2,129	2,129	2,129	2,127	2,127	2,127

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audit*=1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 8
Parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables for industry auditors with a dominant market share

Variable	Dominant specialist defined by market share more than 30%			Dominant specialist defined by market share more than 40%		
	(1) Log (Fees)	(2) Log (Hours)	(3) Log (Fees per hour)	(4) Log (Fees)	(5) Log (Hours)	(6) Log (Fees per hour)
Intercept	11.323***	0.124	11.247***	11.300***	0.086	11.262***
	(98.63)	(0.65)	(60.92)	(98.45)	(0.45)	(61.04)
ISA	**0.086*** **	**0.142*** **	**-0.056***	**0.149*** **	**0.233*** **	**-0.090**
	(4.36)	**(4.34)**	**(1.77)**	**(3.82)**	**(3.61)**	**(1.43)**
Log (TA)	0.347***	0.328***	0.016*	0.349***	0.330***	0.015
	(59.32)	(33.78)	(1.70)	(59.62)	(34.03)	(1.62)
Lev	0.174***	0.057	0.116**	0.171***	0.052	0.118**
	(5.64)	(1.12)	(2.33)	(5.54)	(1.02)	(2.37)
Holdings	-0.007	-0.018	0.022	-0.011	-0.024	0.024
	(0.19)	(0.29)	(0.37)	(0.30)	(0.39)	(0.41)
ROA	-0.330***	-0.230***	-0.106*	-0.334***	-0.236***	-0.104*
	(9.08)	(3.83)	(1.81)	(9.18)	(3.93)	(1.77)
Loss	0.060***	0.098**	-0.040*	0.060***	0.097***	-0.040*
	(4.48)	(4.41)	(1.85)	(4.43)	(4.36)	(1.84)
Complexity	-0.096***	0.014	-0.113*	-0.100***	0.007	-0.110*
	(2.63)	(0.23)	(1.92)	(2.74)	(0.12)	(1.88)
Foreign	0.209***	0.227**	-0.013	0.208***	0.227**	-0.013
	(3.74)	(2.46)	(0.14)	(3.72)	(2.45)	(0.14)
Opinion	0.002	-0.526***	0.503***	-0.000	-0.529***	0.504***
	(0.02)	(3.71)	(3.66)	(0.00)	(3.73)	(3.67)
Big N	0.104***	0.265***	-0.156***	0.114***	0.280***	-0.162***
	(9.17)	(14.05)	(8.51)	(10.27)	(15.31)	(9.12)
Tenure	0.016***	0.032***	-0.014*	0.016***	0.032***	-0.015*
	(3.00)	(3.62)	(1.69)	(3.04)	(3.66)	(1.70)
Initial Audit	-0.003	0.034	-0.035	-0.005	0.031	-0.034
	(0.19)	(1.30)	(1.38)	(0.30)	(1.19)	(1.33)
Year	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.6527	0.5153	0.2094	0.6624	0.5146	0.2092
F-value	246.89	134.05	34.15	246.51	133.70	34.11
Observations	4,256	4,256	4,256	4,256	4,256	4,256

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audi*t=1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 9
Parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and the level of competition in the client firm industry and control variables

Variable	Panel A: Dependent variable = Log (Fees)				Panel B: Dependent variable = Log (Hours)				Panel C: Dependent variable = Log (Fees per hour)			
	Industry competition defined by				Industry competition defined by				Industry competition defined by			
	(1) HHI	(2) DIFF	(3) ENTCOST	(4) MKTSIZE	(5) HHI	(6) DIFF	(7) ENTCOST	(8) MKTSIZE	(9) HHI	(10) DIFF	(11) ENTCOST	(12) MKTSIZE
Intercept	11.341***	11.360***	11.339***	11.386***	0.147	0.196	0.192	0.200	11.239***	11.219***	11.204***	11.240***
	(96.98)	(98.07)	(98.00)	(97.61)	(0.76)	(1.02)	(1.00)	(1.04)	(59.77)	(60.24)	(60.18)	(59.96)
ISA	0.449***	0.432***	0.525***	0.335***	0.841***	0.706***	0.710***	0.768***	-0.365***	-0.285**	-0.200	-0.418***
	(5.18)	(5.20)	(5.90)	(3.98)	(5.89)	(5.14)	(4.82)	(5.52)	(2.63)	(2.14)	(1.40)	(3.09)
ISA*Competition	**-0.164***	**-0.153**	**-0.292*****	**0.080**	**-0.283***	**-0.004**	**0.008**	**-0.146**	**0.100**	**-0.077**	**-0.234**	**-0.233**
	(1.68)	**(1.59)**	**(2.97)**	**(0.83)**	**(1.76)**	**(0.02)**	**(0.05)**	**(0.91)**	**(0.64)**	**(0.49)**	**(1.48)**	**(1.49)**
Competition	0.048	0.003	-0.018	-0.015	0.093	-0.025	-0.104**	0.017	-0.029	0.020	0.076*	-0.036
	(1.42)	(0.18)	(0.62)	(0.55)	(1.64)	(0.79)	(2.22)	(0.40)	(0.53)	(0.65)	(1.68)	(0.85)
Log (TA)	0.344***	0.343***	0.343***	0.343***	0.323***	0.322***	0.322***	0.322***	0.018*	0.018*	0.018*	0.018*
	(58.07)	(58.06)	(58.17)	(58.07)	(32.95)	(32.91)	(32.94)	(32.92)	(1.84)	(1.87)	(1.87)	(1.86)
Lev	0.188***	0.188***	0.188***	0.188***	0.073	0.073	0.072	0.073	0.114**	0.114**	0.115**	0.114**
	(6.04)	(6.06)	(6.06)	(6.04)	(1.42)	(1.42)	(1.40)	(1.43)	(2.28)	(2.29)	(2.31)	(2.27)
Holdings	-0.009	-0.010	-0.011	-0.008	-0.029	-0.029	-0.034	-0.031	0.031	0.031	0.034	0.035
	(0.24)	(0.26)	(0.29)	(0.21)	(0.48)	(0.47)	(0.56)	(0.52)	(0.53)	(0.52)	(0.58)	(0.59)
ROA	-0.323***	-0.323***	-0.322***	-0.323***	-0.225***	-0.228***	-0.223***	-0.224***	-0.104*	-0.102*	-0.105*	-0.106*
	(8.79)	(8.77)	(8.77)	(8.79)	(3.71)	(3.75)	(3.68)	(3.69)	(1.76)	(1.73)	(1.78)	(1.79)
Loss	0.056***	0.055***	0.056***	0.055***	0.097***	0.097***	0.097***	0.096***	-0.044**	-0.044**	-0.044**	-0.043**
	(4.13)	(4.09)	(4.13)	(4.11)	(4.35)	(4.33)	(4.36)	(4.31)	(2.00)	(2.01)	(2.02)	(1.99)
Complexity	-0.092**	-0.093**	-0.090**	-0.093**	0.052	0.048	-0.049	0.046	-0.145**	-0.144**	-0.142**	-0.141**
	(2.49)	(2.51)	(2.44)	(2.52)	(0.84)	(0.79)	(0.80)	(0.75)	(2.45)	(2.43)	(2.39)	(2.38)
Foreign	0.218***	0.218***	0.213***	0.220***	0.219**	0.224**	0.216**	0.224**	0.003	0.000	0.002	0.001
	(3.88)	(3.88)	(3.80)	(3.91)	(2.36)	(2.41)	(2.33)	(2.41)	(0.04)	(0.01)	(0.03)	(0.01)
Opinion	0.010	0.007	0.004	0.007	-0.550***	-0.556***	-0.545***	-0.551***	0.533***	0.535***	0.524***	0.530***
	(0.11)	(0.08)	(0.05)	(0.08)	(3.67)	(3.70)	(3.63)	(3.67)	(3.65)	(3.66)	(3.58)	(3.63)
Big N	0.064***	0.066***	0.063***	0.063***	0.181***	0.181***	0.181***	0.182***	-0.115***	-0.114***	-0.116***	-0.117***
	(4.15)	(4.27)	(4.08)	(4.05)	(7.10)	(7.07)	(7.11)	(7.12)	(4.63)	(4.57)	(4.68)	(4.72)

Tenure	0.017***	0.017***	0.017***	0.017***	0.031***	0.031***	0.031***	0.031***	-0.013	-0.013	-0.013	-0.013
	(3.14)	(3.11)	(3.21)	(3.12)	(3.51)	(3.49)	(3.55)	(3.49)	(1.48)	(1.48)	(1.49)	(1.48)
Initial Audit	-0.002	-0.003	-0.003	-0.002	0.031	0.031	0.030	0.026	-0.032	-0.032	-0.031	-0.031
	(0.14)	(0.19)	(0.18)	(0.15)	(1.19)	(1.16)	(1.14)	(1.17)	(1.23)	(1.23)	(1.21)	(1.21)
Year	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.6675	0.6674	0.6682	0.6672	0.5223	0.5219	0.5225	0.5219	0.2147	0.2147	0.2152	0.2150
F-value	234.39	234.37	235.19	234.15	128.14	127.95	128.24	127.95	32.78	32.78	32.89	32.85
Observations	4,187	4,187	4,187	4,187	4,187	4,187	4,187	4,187	4,187	4,187	4,187	4,187

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *HHI* = industry Herfindahl-Hirschman index calculated by client sales and equals 1 if the index is less than the median, and 0 otherwise; *DIFF* = industry product substitutability calculated by client sales divided by operating costs where operating costs include cost of goods sold, selling, general, and administrative expense, and depreciation, depletion, and amortization and equals 1 if the variable is less than the median, and 0 otherwise; *ENTCOST* = level of entry costs in industry calculated by natural log of weighted average of cost of property, plant, and equipment of firms in industry, weighted by each firm's market share in industry and equals 1 if the variable is less than the median, and 0 otherwise; *MKTSIZE* = level of market size in industry calculated by natural log of industry sales and equals 1 if the variable is greater than the median, and 0 otherwise; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audi*t=1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.

TABLE 10
Parameter estimates for OLS regressions of Log (Fees), Log (Hours), and Log (Fees per hour) on industry specialist auditors and control variables for client firms with different governance scores

Variable	High governance score			Low governance score		
	(1) Log (Fees)	(2) Log (Hours)	(3) Log (Fees per hour)	(4) Log (Fees)	(5) Log (Hours)	(6) Log (Fees per hour)
Intercept	10.960***	-0.519*	11.477***	12.155***	1.603***	10.572***
	(50.986)	(1.82)	(41.54)	(53.67)	(4.20)	(28.85)
ISA	**0.374****	**0.874*****	**-0.495****	**0.343****	**0.596*****	**-0.257**
	(2.48)	**(4.35)**	**(2.55)**	**(2.55)**	**(2.62)**	**(1.18)**
Log (TA)	0.369***	0.364***	0.004	0.305***	0.256***	0.049***
	(32.56)	(24.15)	(0.29)	(26.52)	(13.17)	(2.65)
Lev	0.209***	0.108	0.103	0.167***	-0.046	0.205**
	(3.36)	(1.30)	(1.29)	(3.22)	(0.53)	(2.44)
Holdings	-0.052	0.010	-0.063	0.021	0.039	-0.012
	(0.71)	(0.10)	(0.67)	(0.32)	(0.36)	(0.11)
ROA	-0.28***	-0.126	-0.151	-0.264***	-0.117	-0.151*
	(3.33)	(1.10)	(1.36)	(5.17)	(1.35)	(1.83)
Loss	0.071**	0.106***	-0.036	0.054**	0.101***	-0.047
	(2.41)	(2.73)	(0.96)	(2.35)	(2.61)	(1.28)
Complexity	-0.198***	0.016	-0.199**	-0.072	0.294***	-0.359***
	(2.75)	(0.17)	(2.15)	(1.17)	(2.84)	(3.60)
Foreign	0.196**	0.237*	-0.073	0.166	0.091	0.073
	(1.99)	(1.81)	(0.57)	(1.62)	(0.53)	(0.44)
Big N	0.053*	0.159***	-0.102**	0.072***	0.232***	-0.153***
	(1.66)	(3.73)	(2.48)	(2.61)	(4.94)	(3.40)
Tenure	0.010	0.018	-0.006	0.005	0.057***	-0.051***
	(0.99)	(1.31)	(0.44)	(0.51)	(3.17)	(2.93)
Initial Audit	-0.045	0.018	-0.057	-0.125	0.047	-0.050
	(1.46)	(0.42)	(1.41)	(0.43)	(0.95)	(1.28)
Year	Included	Included	Included	Included	Included	Included
Industry	Included	Included	Included	Included	Included	Included
Adj. R-Sq.	0.7115	0.6178	0.0606	0.5433	0.3127	0.0670
F-value	116.63	76.79	4.02	54.04	21.29	4.20
Observations	1,267	1,267	1,267	1,205	1,205	1,205

ISA = industry specialist auditor calculated by square root of client sales; *Log (Fees)* = natural logarithm of audit fees; *Log (Hours)* = natural logarithm of audit hours; *Log (Fees per hour)* = natural logarithm of audit fees divided by audit hours; *High (Low) Governance score* = if the sum of scores consists of five governance subindices from Korea Corporate Governance Service is greater (less) than the median score where subindices are shareholder rights, board structure, disclosure, audit systems, and compensation; *Log (TA*) = natural log of total assets; *Lev* = total liabilities divided by total assets; *Holdings*= ownership of largest shareholder and related parties; *ROA* = net income divided by total assets; *Loss* = 1 if the firm reported a loss during previous year, and 0 otherwise; *Complexity* = receivables and inventory divided by total assets; *Foreign*= Foreign ownership; *Opinion* = 1 if firm receives a modified audit opinion, and 0 otherwise; *Big N* = 1 for the Big N auditors, and 0 otherwise; *Tenure*=length of the auditor-client relationship in years; *Initial Audi*t=1 for the initial years of audit engagement, and 0 otherwise; *Year* = year dummy; *Industry* = industry dummy. t-values are in parenthesis. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 level, respectively.