The Association between Client and Industry Investment Opportunities, Auditor Industry Specialization, and Audit Fees

Abstract

Audit clients' investment opportunity sets (IOS) include two related, but unique components: an industry-level set and a firm-specific set. We argue that these sets of opportunities play distinct roles in the pricing of audit services, including the ability of an industry specialist auditor to earn a fee premium. Our finding that specialist premiums are positively related to industry IOS and negatively related to firm-specific IOS is consistent with this argument. Our study extends prior research examining the relation between industry-level IOS and audit fees aggregated by industry by explaining variation in audit fees within industries and according to firm-specific IOS. Further, our study complements recent research on industry specialists which examines the influencing role (rather than direct effects) of industry specialist auditors.

1. Introduction

Recent research provides an increasingly comprehensive understanding of the role of industry specialist auditors. For example, Lim and Tan (2008) find that audit quality increases with the level of non-audit services provided by an industry specialist auditor, while this relation is negative or not significant for non-specialists. Gul et al. (2009) find that the negative relation between auditor tenure and audit quality is less negative for clients of industry specialists, suggesting that specialists are able to use their industry-specific knowledge to provide a higher quality audit in the first few years of a new engagement than can non-specialists. Mascarenhas et al. (2010) find that specialist auditors are more likely to allow income smoothing when it is informative. Along with prior research (e.g., Balsam et al. 2003, Krishnan 2005), these studies suggest that specialist auditors offer a higher quality, differentiated product.

If specialists offer a superior product, in a competitive market they should be able to charge higher audit fees, i.e., earn a fee premium for their service. However, prior research on the pricing of specialists (e.g., Palmrose 1986, Pearson and Trompeter 1994, Craswell et al. 1995, DeFond et al. 2000, Ferguson and Stokes 2002, Mayhew and Wilkins 2003, Casterella et al. 2004, Francis et al. 2005, Carson 2009) has provides mixed evidence with some studies finding specialist premiums while others do not. One issue with these studies is that they test for the existence of a specialist fee premium without considering cross-industry differences in the attractiveness of an industry for specialization. More specifically, auditors should be attracted to industries where industry-specific knowledge requirements are high and where firms are relatively

homogeneous (Cairney and Young 2006, Cahan et al. 2008). In such cases, auditors can build stronger barriers to entry and can reduce their production costs by spreading the cost of acquiring industry-specific knowledge across a wider set of clients. These barriers to entry, which suggest less price competition, together with lower production costs can lead to higher audit fees and higher profit margins for the specialist. On the other hand, where industry-related knowledge requirements are lower and where clients in an industry are more heterogeneous, barriers to entry are less formidable and even those auditors with a large market share are likely to face stiff competition, leaving them with little or no fee premium.

Smith and Watts (1992) and Christie (2002) contend that a firm's investment opportunity set (IOS) will affect fundamental elements of a firm's organizational structure including its financing, dividend, and compensation policies as well as its production technologies and accounting system. Using industry-level data, Cahan et al. (2008) find that industries with higher IOS that is less variable across firms within the industry (i.e., more homogeneous) are more likely to attract specialist auditors. They also find that aggregate audit fees are generally higher in these industries. However, while their theory suggests that specialist premiums will be a function of industry IOS, since they use industry-level data, they are unable to examine specialists' premiums specifically.

In this study, we examine the audit pricing of specialists in a setting similar to Cahan et al. (2008) except we use client-level, rather than industry-level, data. This allows us to examine whether specialists earn premiums and, more importantly, whether

the premiums are related to the level and/or homogeneity of industry IOS. Further, we extend Cahan et al.'s (2008) investigation of the role of IOS to the firm level. We separate a firm's IOS into industry and firm-level components and examine the association between specialist premiums and firm-specific IOS. On the one hand, some of the specialist's industry expertise may be transferrable to audits of firms within the industry, suggesting a positive relation between specialist premiums and firms' IOS. On the other hand, greater firm-specific IOS means more differences in IOS compared to the firm's industry counterparts, which reduces the specialist's competitive advantage and ability to charge higher fees.

We model fee premiums for industry specialists after controlling for industry IOS and firm-specific IOS. To do so, we use data from 2000-2008 and compute IOS as in Baber et al. (1996). We find that premiums increase (decrease) with the level (homogeneity) of industry IOS and decrease with firm-specific IOS. Our study contributes to the literature by showing that industry specialist premiums are related to industry IOS, suggesting that prior tests of specialist premiums may have suffered from an omitted variables problem by not including industry factors. Our findings also show that even though firm-specific IOS is priced, firm-specific IOS actually reduces the ability of the specialist to charge a premium. Further, our study extends the recent research on industry specialization which focuses on the indirect, rather than direct, effects of industry specialization (e.g., Lim and Tan 2008, Gul et al. 2010, Mascarenhas et al. 2010).

A 2003 study by the General Accounting Office (GAO) indicates that 80 percent

of clients view industry specialist knowledge as an important factor when choosing an auditor. Our results indicate that the size of the specialist premium varies across industries, with higher premiums in industries with greater IOS. Thus, one implication of our study is that firms in industries with high growth potential may be at a disadvantage in choosing an auditor with appropriate expertise; i.e., young or struggling firms may be forced to choose between settling for a lower quality auditor, which could adversely affect their cost of capital, or paying high fee premiums to hire a specialist

The remainder of this paper is organized as follows. Section 2 provides background information and develops our hypotheses. Section 3 describes our research method, while Section 4 describes and analyses our results. Section 5 summarizes and concludes.

2. Background and hypotheses

Craswell et al. (1995) find that industry specialist auditors receive fee premiums in excess of their brand name premiums. They argue that the fee premiums could compensate the specialist for the cost of acquiring industry-specific knowledge or for providing a higher quality audit (i.e., a differentiated product). However, while Craswell et al. (1995) define an industry specialist as an auditor having a market share of at least 10 percent of an industry, Ferguson and Stokes (2002) using different definitions of specialists find limited evidence of specialist premiums.

Mayhew and Wilkins (2003) argue that a market share that is significantly higher than competitors' provides evidence that an industry specialist auditor offers a differentiated product. They also argue that an increasing market share in an industry

gives rise to production economies that should lead to lower fees. Using IPO data, they find that audit fees decrease as the auditor's industry market share grows; however, they also find that an auditor with a dominant share (defined as a market share that is at least 10 percent larger than the next largest auditor in the industry) earns a fee premium. Further evidence of the complexity of the association between premiums and specialisation is provided by Casterella et al. (2004), who find that small clients pay a specialist premium while large clients do not. They interpret this as evidence that large clients have sufficient bargaining power to negotiate any specialist premium away.

Thus, the findings for specialist premiums are mixed. We suggest that one potential reason for this is that prior tests do not control for cross-industry factors that affect the likelihood that the industry will be targeted by a specialist in the first place.

Addressing this issue, Cahan et al. (2008) examine why some industries attract specialist auditors while others do not. They argue that an industry's attractiveness for specialization relates directly to the level of industry-specific knowledge required to complete the audit. Greater levels of industry-specific knowledge allow the specialist to build stronger barriers to entry and to charge higher audit fees. They further argue that IOS is a primary and fundamental source of variation in the level of industry-specific knowledge that is required of an auditor in different industries.

IOS affects the underlying nature of the firm (e.g., Smith and Watts 1992, Gaver and Gaver 1993, Christie 2002) and can impact audit risk in several ways. Since IOS is associated with greater managerial discretion and information asymmetry, the potential for managerial opportunism increases with IOS, leading to greater inherent risk. Control

risk increases because growth options are harder to monitor,[1] and detection risk increases because growth options add complexity and uncertainty to the audit process. This increase in audit risk occurs even though many costs related to growth options (e.g., R&D) are expensed since investors still need assurance that the client is investing in positive net present value projects, that disclosures are credible, and that abandonment options are reflected at appropriate values (Godfrey and Hamilton 2005).

Cahan et al. (2008) also explore the relation between industry IOS and aggregate audit fees in an industry. They find that audit fees are increasing in the level and homogeneity of industry IOS. While they indicate that their results suggest that higher fees are charged by specialists, their results are also consistent with an alternative explanation, i.e., audit fees are higher for all auditors (specialist and non-specialists) in these industries. Because Cahan et al. (2008) use data aggregated at the industry level, they are unable to examine specialist premiums specifically, since to do so requires a one-on-one matching of specialists to specific clients. In this study, we use firm-level data to examine the relation between specialist premiums and IOS directly.

Our first hypothesis is developed to re-examine whether specialists earn fee premiums, but more importantly, to also examine whether specialization premiums are paid by individual firms after controlling for industry IOS. Prior studies examining specialist premiums do not control for industry IOS, although some studies control for general industry fixed effects using industry dummy variables. Unlike these studies, we

[1] In high IOS firms, it is harder to evaluate whether discretionary spending is appropriate, not only because of the contingent nature of growth options but also because the payoffs from growth options will not be realized immediately.

control for industry IOS because industries with greater IOS are more likely to attract a specialist auditor. Thus, we hypothesize:

H1 *Audit fees of clients of industry specialists are higher than audit fees of non-industry specialists, after controlling for industry IOS.*

DeAngelo (1981) suggests that an investment in industry-specific knowledge can be regarded as a start-up cost that can lead to higher audit fees. Thus, one way to view a premium related to industry IOS is as a quasi-rent that arises from having acquired industry-specific knowledge in the past. However, higher audit fees for the specialist may also reflect a higher quality, differentiated product. Following DeAngelo (1981), industry specialists can be expected to provide a higher quality audit because the specialist's other clients in the same industry serve as collateral constraining the specialist from opportunistic behavior, i.e., compromising independence. If the specialist is caught 'cheating', the specialist stands to lose some or all of its other clients in the industry. Since the specialist has more to lose in terms of clients and revenues, this collateral will bind the specialist to a higher audit quality, analogous to 'large' auditors in DeAngelo's (1981) analysis. Moreover, as high IOS industries are more conducive to specialization, we expect that the level of industry IOS will affect specialists' audit quality and premiums:

H2 *The association between audit fees and specialization is more positive for clients in industries with high industry IOS than in industries with low industry IOS.*

Clearly, not all firms in an industry face identical investment opportunities. These investment opportunities will be more similar (homogeneous) in some industries than in

others. Theoretically, the role of homogeneity on audit fees is ambiguous. On one hand, the homogeneity of industry IOS may lead to larger specialist premiums since specialists can more easily develop a differentiated product (i.e., higher quality audit) when there are many similar firms in an industry because specific knowledge can be applied to more firms and the specialist can learn through repetition. Also, as the homogeneity of industry IOS increases, proprietary costs become more of a concern, and clients may seek to avoid using the same auditor as their closest competitors (Kwon 1996). This reduces the client's flexibility and leads to greater bargaining power for the incumbent specialist. Together, these factors suggest higher audit fees for clients of specialists. On the other hand, greater homogeneity allows specialist auditors to spread the cost of knowledge acquisition over a larger number of clients, i.e., greater homogeneity implies greater economies of scale. We are unable to predict which of these opposing forces is stronger. Thus, our third hypothesis is non-directional:

H3 *The association between audit fees and specialization is different for clients in industries with greater homogeneity in industry IOS than in industries with less homogeneity in industry IOS.*

Cahan et al. (2008) present evidence suggesting that industries with high industry IOS *and* more homogenous industry IOS are the most attractive for specialization by auditors. They also find that the interaction between the level and homogeneity of IOS is positively related to aggregate audit fees in an industry. Their use of industry-level data prohibits them from examining whether this finding applies to the fees of individual firms

within the industries studied. We extend this earlier research to the firm level and hypothesize:

H4 *The association between audit fees and specialization is more positive for individual clients in industries with higher and more homogeneous industry IOS than for individual clients in industries with lower and less homogeneous industry IOS.*

Since we use firm-level data, we are also able to consider the role of firm-specific IOS on audit fees and specialist premiums where firm-specific IOS is the unique part of IOS above and beyond industry IOS. As O'Keefe et al. (1994) explain, auditors need to invest in client-specific knowledge as well as general knowledge and industry-specific knowledge. The more differentiated a firm is from others in its industry, the greater is its firm-specific IOS and the greater is the nature and extent of the necessary client-specific knowledge investment by the auditor. Since this investment is firm-specific, its cost is likely to be passed on to only the relevant client. Commensurate with arguments relating to industry IOS, the higher the client's unique growth opportunities, the more difficult and risky the audit task, and the greater the cost of the audit and the required rate of return to the auditor. With no other client for the auditor to spread this cost across, we expect that the full cost of acquiring knowledge about client-specific IOS will be borne by the client.

However, our interest is in the role of firm-specific IOS on the fee premiums that an industry specialist can charge. On the one hand, the greater the level of firm-specific IOS within a given industry, the more unique (and dissimilar) the opportunities facing the

firm are compared to its peers. Thus, the specialist is less able to rely on industry-specific knowledge, implying that the specialist premium would be decreasing in firm-specific IOS. On the other hand, it could be argued that the industry specialist auditor is adept at assessing unique opportunities and their accounting ramifications as well as more general (i.e., industry related) ones. As with Hypothesis 3, our final hypothesis is non-directional because we are unable to predict which opposing force dominates:

H5 *The association between audit fees and specialization is different for clients with high firm-specific IOS than for clients with low firm-specific IOS.*

It is important to note that firm-specific IOS and the homogeneity of industry IOS are different notions. Homogeneity of industry IOS is an industry-level measure that will be the same for all firms in the same industry. Each firm in an industry will have a unique level of firm-specific IOS.

3. Research method

We test H1-H4 using the following multivariate model, adapted from the standard audit fee model developed by Simunic (1980) and extended by Cahan et al (2008) to accommodate industry levels and homogeneity of IOS:

$$LNFEES_{it} = \varphi_0 + \varphi_1 IIOS_{kt} + \varphi_2 HIOS_{kt} + \varphi_3 SPEC_{it} + \varphi_4 SPEC_{it}*IIOS_{kt} + \varphi_5 SPEC_{it}*HIOS_{kt} + \varphi_6 SPEC_{it}* IIOS_{kt}*HIOS_{kt} + \varphi_7 LNASSETS_{it} + \varphi_8 CATA_{it} + \varphi_9 DE_{it} + \varphi_{10} ROA_{it} + \varphi_{11} QUICK_{it} + \varphi_{12} LNSUB_{it} + \varphi_{13} FOREIGN_{it} + \varphi_{14} LOSS_{it} + \varphi_{15} OPINION_{it} + \varphi_{16} YREND_{it} + \varphi_{17} BIG_{it} + \varphi_{18} YR2001_{it} + \varphi_{19} YR2002_{it} + \varphi_{20} YR2003_{it} + \varphi_{21} YR2004_{it} + \varphi_{22} YR2005_{it} + \varphi_{23} YR2006_{it} + \varphi_{24} YR2007_{it} + \varphi_{25} YR2008_{it}$$ (Model 1)

where $LNFEES_{it}$ is the natural log of audit fees for firm *i* at time *t.*

We use Baber et al.'s (1996) definition for IOS. At the firm level, we compute the following four variables: (a) prior investment intensity for years *t*-2 through *t*, (b) the geometric growth in the market value of assets from years *t*-2 through *t*, (c) the ratio of the market value to book value of assets at the end of year *t*, and (d) the ratio of research and development expenditure to book value of assets at the end of year *t*.We then conduct a factor analysis using these variables. Next, for each industry, we determine the median value of all of the firm-level IOS factor scores in a given industry. The median is our measure of industry-specific IOS (*IIOS*) where higher values indicate greater industry IOS. We then compute the standard deviation of the firm-level IOS factor scores for each industry. We multiply the standard deviation by -1, and this is our measure of the homogeneity of industry IOS (*HIOS*). We interpret high values of *HIOS* (i.e., less variation) as greater homogeneity of IOS within an industry. When IOS is extremely variable, this suggests that a large component of IOS is firm-specific.

Following Neal and Riley (2004), our measure of specialization, *SPEC*, reflects both the auditor's market share and the importance of an industry in the auditor's portfolio. *SPEC* is equal to 1 if firm *i* is audited by the industry specialist auditor, and zero otherwise. An auditor is deemed an industry specialist when its audit fee-based weighted market share exceeds a weighted market share cut-off equal to the market share cut-off multiplied by a portfolio share cut-off. Following Neal and Riley (2004), our weighted market share cut-off equals $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$, where industries are identified using 3-digit SIC codes.

The appendix contains definitions for the remaining variables in Model 1. Based on H1, we expect φ_3 to be positive and significant. To test H2-H4, we interact *SPEC* with our industry IOS measure. H2 and H4 predict positive coefficients for φ_4 and φ_6, respectively. H3 is non-directional but predicts a significant coefficient for φ_5.

To examine H5, we modify Model 1 and estimate the following model:

$$\begin{aligned} LNFEES_{it} = {} & \omega_0 + \omega_1 FIOS_{it} + \omega_2 SPEC_{it}*FIOS_{it} + \omega_3 IIOS_{it} + \omega_4 HIOS_{kt} + \omega_5 SPEC_{kt} + \\ & \omega_6 SPEC_{kt}*IIOS_{kt} + \omega_7 SPEC_{kt}*HIOS_{kt} + \omega_8 SPEC_{kt}*IIOS_{kt}*HIOS_{kt} + \\ & \omega_9 LNASSETS_{it} + \omega_{10} CATA_{it} + \omega_{11} DE_{it} + \omega_{12} ROA_{it} + \omega_{13} QUICK_{it} + \\ & \omega_{14} LNSUB_{it} + \omega_{15} FOREIGN_{it} + \omega_{16} LOSS_{it} + \omega_{17} OPINION_{it} + \omega_{18} YREND_{kt} \\ & + \omega_{19} BIG_{it} + \omega_{20} YR2001_{it} + \omega_{21} YR2002_{it} + \omega_{22} YR2003_{it} + \omega_{23} YR2004_{it} + \\ & \omega_{24} YR2005_{it} + \omega_{25} YR2006_{it} + \omega_{26} YR2007_{it} + \omega_{27} YR2008_{it} \end{aligned} \quad \text{(Model 2)}$$

All variables except *FIOS* are the same as in Model 1. We define *FIOS* as the firm-specific factor scores from the factor analysis of the Baber et al. (1996) variables described previously. Since we control for industry IOS, *FIOS* represents the unique portion of a firm's IOS above and beyond what is captured by the industry component. H5 is non-directional; however, we predict a significant coefficient for ω_2.

Data

Our test period is 2000-2008, but because IOS calculation requires lagged data we collect data for 1999-2008. To construct our IOS variables we identify industry membership using 3-digit SIC codes and include all firms on COMPUSTAT at the end of

2008.[2] We compute the four measures used in the IOS factor analysis (i.e., prior investment intensity, geometric growth in market value of assets, ratio of market value to book value of assets, ratio of R&D expenditure to book value of assets) for all firm-years with sufficient data. We then run a factor analysis on these four firm-level variables using all available firm-year observations.[3] For each industry-year with at least five firms with factor scores, we compute *IIOS* and *HIOS*.

To calculate audit firm market shares based on 3-digit SIC codes for the years 2000-2008, we use audit fee data from Audit Analytics.[4] We identify the audit firms with audit fee based weighted market shares exceeding the weighted market share cut-off in each industry. Clients in those industries and using these auditors are coded with a value of 1 for *SPEC*.[5] We then match data from COMPUSTAT to both Audit Analytics data and the factor scores based on Baber et al. (1996). We obtain 32,365 firm-year observations that have factor scores, are from industry-years with at least five observations with factor scores, and have all required data for the control variables in our audit fee regressions.

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[2] Alternative industry classifications are used for robustness purposes, with results that are qualitatively similar to those presented.

[3] We use the maximum number of firms to compute our measures to obtain the most comprehensive measure of industry structure.

[4] Market shares and portfolio shares are calculated using all US company observations in the Audit Analytics database with positive sales and valid data for audit fees, auditor identity and control variables in the fee regression. Industries with fewer than five valid firm observations are dropped from the calculation of auditor specialization. The number of industries used to calculate auditor specialization varies from a minimum of 179 industries in 2000 to a maximum of 231 in 2002. The number of big audit firms varies across our sample period from five (in 2000 and 2001) to four (for other years).

[5] If we compute *SPEC* using only those firms with IOS data, we ignore a large part of the market. Thus, our tests assume that the IOS for the firms with the data to compute the IOS measures is representative of the IOS for all firms in the same industry. This is supported by Smith and Watts (1992) who argue that there is a significant industry component in individual firms' IOS.

4. Findings

Table 1 provides data on the maximum number of firms in each year of analysis, plus the number of industry-years used in our tests. We use 1,702 industry-years to calculate our industry IOS variables. Table 1 also provides the median number of firms within each industry by year. In an untabulated ranking of the industries in our sample, the top ten industries based on industry IOS include several high tech and medical related industries. Drugs (3-digit SIC 283) is the highest ranked industry in all years. The industries ranked in the bottom ten based on *IIOS* include financial services, insurance, and natural resources (such as lumber and paperboard). The top 10 industries based on *HIOS* appear to be mature, stable industries, e.g., paper and fabric mills, bakery products, heavy construction, and commercial banks. Overall, the classifications appear to be quite stable across years.[6]

Insert Table 1

Descriptive statistics

Table 2 provides descriptive statistics for the variables used in the regressions. The mean for *IIOS*, which is the median factor score from the factor analysis of Baber et al. (1996), is -0.063. Since *IIOS* is derived from a factor analysis, its values reflect relative, rather than absolute, values of investment opportunities. The mean for *FIOS*, which is the firm-specific factor score from the factor analysis of Baber et al. (1996), is 0.147. Since the mean for *FIOS* is greater than the mean for *IIOS*, this suggests that

[6] Communication equipment; computer and office equipment; drugs; measuring and controlling devices; medical instruments and supplies; computer and data processing services; research and testing services; appear in the top 10 in at least 7 out of the nine years.

industries with high industry IOS tend to include more firms than industries with low industry IOS. The mean audit fee is $1.148 million (mean *LNFEES* = 12.837) with a median of $0.342 million (median *LNFEES* = 12.744). Around 49% of client firm-year observations are audited by a specialist auditor, and around 72% are audited by a Big auditor.

Insert Table 2

Table 3 provides the correlations between the industry-level IOS variables and client-level IOS variables of interest and the control variables for a sample of 32,365 firm-year observations. *IIOS*, *HIOS*, and *FIOS* are significantly correlated with almost all other variables, although apart from the correlations between these three measures, the absolute values of the correlation coefficients do not exceed 0.430. On average, firms from industries with high IOS levels are more likely to use a specialist auditor, are smaller, and have more current assets, less debt, lower profitability, greater quick assets, fewer subsidiaries, and more involvement in foreign operations. They are also more likely to experience losses and to warrant going concern audit opinions, but less likely to be audited by Big auditors.

FIOS is negatively correlated with *HIOS, LNASSETS, DE, ROA, LNSUB, FOREIGN, BIG*, and positively correlated with the other variables. This suggests that firms with greater firm-specific IOS have greater current assets but lower profitability, are less likely to use a Big auditor but more likely to use a specialist auditor, and have less complexity and debt in their financial structures.

Insert Table 3

Main results

Table 4 contains the results for Model 1 tests of the association between industry IOS and client audit fees (H1-H4). The R^2 is 84 percent which is consistent with, or better than, the explanatory power of prior studies. All the control variables are significant, and all of them, except for *DE* and *OPINION*, are signed as expected.

IIOS is significant and positive, indicating that audit fees are higher when industry IOS is high. This is consistent with Cahan et al.'s (2008) industry-level results. However, the coefficient on *HIOS* is negatively signed (and statistically significant), contrary to expectation. This result indicates that when industry IOS is more homogeneous, auditors discount their fees, suggesting that economies of scale are passed on to clients. This finding is in direct contrast to Cahan et al. (2008), who find a positive relation between industry IOS homogeneity and the aggregate audit fees of an industry. A major difference between their analysis and our analysis is that they include only one observation for every industry-year observation while we include multiple firm-year observations for each industry in each year. To the extent that scale economies are more prevalent in industries with more members, as theory would suggest, it becomes easier to detect scale economies at the firm level than at the industry level.

Insert Table 4

The coefficient on *SPEC* is positively signed and highly significant. This indicates that, controlling for *IIOS*, *HIOS*, and other factors, clients of industry specialist auditors pay higher fees, consistent with H1. This finding supports studies such as Craswell et al. (1995) and Carson (2009) that provide evidence of a specialist premium.

Moreover, we find that *SPEC* has an impact on the association between industry IOS and audit fees. There are three key observations in relation to the variables of interest. First, the coefficient for *SPEC*IIOS* is positive and significant, which supports H2. This suggests that specialists are able to charge high fees in industries with higher industry IOS and is consistent with specialists recouping their industry-specific investments in knowledge and providing a higher quality audit when industry-specific knowledge requirements are high.

Second, the coefficient for *SPEC*HIOS* is negative and significant. This indicates that the incentives to increase fees using market power or to reflect product differentiation are dominated by the fee decreasing effects of specialists passing on economies of scale. The fact that this result is less significant than others ($p<0.10$) may reflect the dilutive effect of competing influences. This result supports H3 and together with the *HIOS* main effect indicates that greater homogeneity of IOS gives rise to scale economies and particularly so when the auditor is an industry specialist. We explore this relation further in Table 5 where we subdivide our sample based on client size.

Third, the coefficient for *SPEC*IIOS*HIOS* is significant and positive. Cahan et al. (2008) find evidence that industries with high IOS and homogenous IOS are the most conducive for specialization by auditors, but they do not examine whether specialists in these industries earn fee premiums. As seen in Table 4, our results indicate that specialist premiums are higher in those industries which are most likely to attract the interest of specialists. This supports H4.

Overall and individually,[7] Table 4 results suggest that specialists can more successfully develop a differentiated audit product and charge higher fees when the barriers to entry are high. However, the results are also consistent with specialist auditors having greater bargaining power (e.g., Mayhew and Wilkins 2003). Kwon (1996) suggests that client firms avoid engaging the same auditor as their competitors in order to reduce proprietary costs. This could limit competition because the client has fewer options available, and can put the incumbent specialist in a superior bargaining position.

To distinguish between these explanations (product differentiation *versus* bargaining power), we re-estimate Model 1 for large and small clients. Simunic (1980) suggests that higher fees for both large and small clients is likely to be a sign of a differentiated, higher quality, product. Higher fees for large clients only would indicate superior bargaining power for specialist auditors in that subsample. This is because large clients have few options available in terms of auditor choice since not all auditors are capable of auditing large firms.. Alternatively, higher fees for small clients only would suggest that it is the client rather than the auditor that possesses superior bargaining power. Because of the audit fees they generate, larger clients are able to negotiate away the fee premium whereas smaller clients are not.

We divide our sample into large and small client subsamples and re-estimate Model 1, focusing on the three interactions, *SPEC*IIOS, SPEC*HIOS,* and *SPEC*IIOS*HIOS.* As observed in Table 5, almost all of our variables of interest are qualitatively identical across the two subsamples, consistent with the product

[7] The only exception to this statement is the *SPEC*HIOS* positive coefficient.

differentiation explanation. One exception is noteworthy, however. The *SPEC*HIOS* interaction is significant only in the small client segment. This result suggests that the negative effect reported in Table 4 for the interaction is driven by the smaller clients. Specialist auditor fee premiums charged to large clients are not significantly affected by industry IOS homogeneity except when also interacting with *IIOS*. Recall that we interpret the negative coefficient for *SPEC*HIOS* in Table 4 as evidence of economies of scale. Thus, it appears that small clients are more likely to benefit from specialists' scale economies. This is perhaps because specialist auditors have to pass the cost savings to small clients because of the greater competition for these clients. The benefits to auditors of this course of action would be enhanced if the auditor gains goodwill in the industry or among investors or regulators for not being seen to exploit potential market power over small clients. Given the similarity of the large and small firm subsample results for the other variables of interest (i.e., *SPEC*, *SPEC*IIOS* and *SPEC*IIOS*HIOS*), we conclude that the evidence is generally more consistent with specialist auditor fee premiums being charged for differentiated products than with a differential bargaining power explanation of specialist premiums.

Insert Table 5

We next examine H5 using Model 2. Table 6 reports the results. While Model 2 focuses on the interaction *SPEC*FIOS*, the results also show that client-specific IOS levels (*FIOS*) are positively associated with the fees that the clients pay, as expected. This indicates that auditors (specialists and non-specialists) pass along the costs of

acquiring knowledge about client-specific investment opportunities to the client, resulting in higher fees.

*SPEC*FIOS* is negative and significant, consistent with the argument that greater firm-specific IOS inhibits the ability of the industry specialist to charge a premium for its industry-differentiated audit product. This supports the H5 prediction that *FIOS* will affect the size of the specialist premium. For example, an increase in *FIOS* across the interquartile range decreases *SPEC* by -0.31 or 19.7%.

The coefficients for *SPEC*, *SPEC*IIOS*, *SPEC*HIOS*, and *SPEC*IIOS*HIOS* remain significant and signed as in Table 4, providing additional support for the H1-H4 predictions that industry IOS attributes affect auditor industry specialization premiums.

Insert Table 6

Similar to our approach to investigating industry IOS-related specialist audit fee premiums (Table 5), we investigate the impact of firm-specific IOS on the association between industry specialization and audit fees separately for large and small clients. Underpinning this approach is recognition that there may be another explanation for the negative coefficient for *SPEC*FIOS* in Table 6 that is related to client firm size and auditor/client bargaining power.

Table 7 provides the results of this analysis. We find the results for *SPEC*FIOS* hold for both the large firm and small firm subsamples, which supports the view that specialists are less able to capitalize on their industry-related auditing expertise as the uniqueness of a client's IOS increases. Our results for the large and small client samples for H1, H2, and H4 are similar across Tables 5 and 7. Also, similar to Table 5, we find

*SPEC*HIOS* is negative and significant for the small client sample and insignificant for the large client sample, consistent with our economies of scale argument.

Insert Table 7

Sensitivity Tests

In order to assess the robustness of our results to alternative specifications of *SPEC*, we fit our models with auditors classified as industry specialists if they have the first or second greatest market share of audits within a given industry. The results (untabulated) are qualitatively consistent with our main results for Models 1 and 2. We do, however, find that the coefficient on the interaction between auditor specialization and the homogeneity of industry IOS (*HIOS*) is no longer statistically significant in Model 1.

Next, we use decile measures of *IIOS*, *HIOS* and *FIOS* rather than raw values. Using decile measures in the models reported in Tables 6 and 7 does not alter the results (untabulated) qualitatively. However, using deciles creates multicollinearity issues, particularly for *SPEC* and the interaction variables.

5. Conclusion

We examine the role that industry-level and client firm-level investment opportunities play in determining audit fees, including auditor industry specialization premiums. In doing so, we link three separate strands of literature: one examining industry specialization by auditors, one examining the determinants of audit pricing, and the other examining the effects of investment opportunities. We argue that both the level

and homogeneity of industry IOS will affect the size of the premium that specialists can charge. Further, we expect firm-specific IOS will also be associated with the specialist's fee premium.

Our results show that specialist audit fees are higher for clients in industries with high IOS and in industries that are particularly attractive for specialization (where industry IOS is both high and homogeneous). There is also evidence that specialist auditors pass on economies of scale to small firms via lower specialist premiums as the industry IOS becomes more homogeneous. Finally, the client firm's level of IOS is positively related to its audit fees, consistent with firm-specific IOS increasing audit production costs. However, we find that the level of firm-specific IOS reduces the specialist fee premiums, consistent with our argument that unique or firm-specific opportunities prohibit the specialist from developing a valuable transferable differentiated product.

Our findings advance the literature on audit pricing by specialists, which has produced somewhat conflicting findings to date.[8] We contribute to the academic literature by showing that (1) specialist premiums are affected by both the level and homogeneity of industry IOS, (2) firm-specific IOS is priced, and (3) specialist premiums are decreasing in the level of firm-specific IOS. More broadly, our results suggest that IOS, both at the firm and industry level, is an important element of audit pricing that has been overlooked in the prior research on specialist fee premiums.

[8] See, for example, Palmrose 1986, Pearson and Trompeter 1994, Craswell et al. 1995, DeFond et al. 2000, Ferguson and Stokes 2002, Mayhew and Wilkins 2003, Casterella et al. 2004, Francis et al. 2005, Carson 2009.

Appendix

Control Variables:
LNASSETS = the natural log of total assets for firm *i*,
CATA = ratio of current assets to total assets for firm *i*,
DE = ratio of long term debt to common equity for firm *i*,
ROA = return on assets for firm *i*,
QUICK = ratio of current assets to current liabilities for firm *i*,
LNSUB = the natural log of number of business and operating segments for firm *i*,
FOREIGN = the natural log of the number of geographical segments for firm *i*,
LOSS = 1 if firm *i* reports a net loss, 0 otherwise,
OPINION = 1 if firm *i* reports a going concern opinion, 0 otherwise,
YREND = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise,
BIG = 1 if firm *i* is audited by a Big N auditor, 0 otherwise,
YR2001,... , YR2008 = year indicator variables.

DE, ROA, and QUICK are winsorized at the 1st and 99th percentiles.

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TABLE 1
Number of firm observations by year and firms per industry by year

	Audit Fee Data[a]	Data used to calculate industry IOS measures[b]	
Year	Number of firms	# of industries with 5 or more firms	Median # of firms per industry
2000	2961	208	15.5
2001	3866	206	15
2002	4223	204	14.5
2003	4297	196	14
2004	4198	193	14
2005	3965	192	13
2006	3180	170	12.5
2007	3006	169	12
2008	2669	164	12
All years	32365	1702	

[a] All available firm observations with data required for audit fee regression.

[b] IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in a factor analysis based on Baber et al. (1996). We omit industries with less than five firms in an industry-year from the factor analysis.

TABLE 2
Descriptive statistics

Variable	Mean	Std.Dev.	Quartile 1	Median	Quartile 3
LNFEES	12.837	1.471	11.745	12.744	13.864
IIOS	-0.063	0.458	-0.401	-0.264	0.194
HIOS	-0.768	0.522	-1.115	-0.733	-0.270
FIOS	0.147	1.074	-0.434	-0.222	0.274
SPEC	0.490	0.500	0.000	0.000	1.000
LNASSETS	5.159	2.470	3.494	5.202	6.844
CATA	0.516	0.256	0.313	0.519	0.720
DE	0.440	1.963	0.000	0.095	0.588
ROA	-0.242	1.816	-0.135	0.019	0.068
QUICK	2.234	2.679	0.829	1.371	2.499
LNSUB	0.630	0.702	0.000	0.000	1.386
FOREIGN	0.542	0.665	0.000	0.000	1.099
LOSS	0.430	0.494	0.000	0.000	1.000
OPINION	0.100	0.300	0.000	0.000	1.000
YREND	0.680	0.466	0.000	1.000	1.000
BIG	0.720	0.451	0.000	1.000	1.000

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
FIOS = factor score for firm *i* from the factor analysis of the Baber et al. (1996) measures; *LNFEES* = the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share that is greater than the weighted market share cut-off, $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the

natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1st and 99th percentiles.

The sample period is 2000-2008. Sample size is 32,365 firm years. Industries are based on 3-digit SIC codes.

TABLE 3
Pairwise correlations

	IIOS	*HIOS*	*FIOS*	*SPEC*	*LNASSETS*	*CATA*	*DE*
HIOS	-0.796						
FIOS	0.523	-0.487					
SPEC	0.220	-0.172	0.071				
LNASSETS	-0.228	0.287	-0.369	0.293			
CATA	0.342	-0.312	0.306	-0.040	-0.387		
DE	-0.099	0.102	-0.086	0.019	0.144	-0.158	
ROA	-0.092	0.121	-0.334	0.053	0.260	-0.049	0.036
QUICK	0.326	-0.285	0.207	0.100	-0.092	0.380	-0.065
LNSUB	-0.201	0.206	-0.236	0.067	0.404	-0.221	0.061
FOREIGN	0.077	-0.079	-0.070	0.182	0.302	0.074	-0.014
LOSS	0.250	-0.261	0.295	*-0.009*	-0.397	0.133	-0.034
OPINION	0.071	-0.124	0.266	-0.139	-0.430	0.011	-0.066
YREND	0.039	-0.033	0.058	0.061	0.080	-0.121	0.033
BIG	-0.030	0.089	-0.118	0.363	0.586	-0.127	0.071

	ROA	*QUICK*	*LNSUB*	*FOREIGN*	*LOSS*	*OPINION*	*YREND*
QUICK	0.053						
LNSUB	0.076	-0.160					
FOREIGN	0.073	*-0.007*	0.231				
LOSS	-0.205	0.071	-0.191	-0.098			
OPINION	-0.289	-0.161	-0.137	-0.140	0.330		
YREND	-0.018	0.014	0.040	*0.004*	0.042	0.012	
BIG	0.140	0.029	0.174	0.215	-0.199	-0.302	0.060

Correlations are Pearson correlations. All correlation are significant at the 0.05 level expect those shown in italics.

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
FIOS = factor score for firm *i* from the factor analysis of the Baber et al. (1996) measures; *LNFEES* = the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share that is greater than the weighted market share cut-off, $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1^{st} and 99^{th} percentiles.

The sample period is 2000-2008. Sample size is 32,365 firm years. Industries are based on 3-digit SIC codes.

TABLE 4
Regression of audit fees on industry IOS, within-industry IOS homogeneity, auditor specialization, and control variables

		Coefficient	t-statistic
Constant		8.871	384.419***
IIOS	+	0.075	4.114***
HIOS	+	-0.073	-5.226***
SPEC (H1)	+	0.171	7.880***
*SPEC*IIOS (H2)*	+	0.177	4.135***
*SPEC*HIOS (H3)*	+/-	-0.038	-1.703*
*SPEC*IIOS*HIOS (H4)*	+	0.246	11.522***
LNASSETS	+	0.469	208.673***
CATA	+	0.572	35.754***
DE	+	-0.004	-2.233**
ROA	-	-0.024	-12.691***
QUICK	-	-0.059	-41.793***
LNSUB	+	0.156	28.802***
FOREIGN	+	0.202	35.904***
LOSS	+	0.187	24.620***
OPINION	-	0.259	19.916***
YREND	+	0.098	13.720***
BIG	+	0.318	32.006***
Year indicators			Included
Adj. R^2			0.840
F-statistic			6802.161
No. of obs.			32365

Model:

$$LNFEES_{it} = \varphi_0 + \varphi_1 IIOS_{kt} + \varphi_2 HIOS_{kt} + \varphi_3 SPEC_{it} + \varphi_4 SPEC_{it}*IIOS_{kt} + \varphi_5 SPEC_{it}*HIOS_{kt} + \varphi_6 SPEC_{it}* IIOS_{kt}*HIOS_{kt} + \varphi_7 LNASSETS_{it} + \varphi_8 CATA_{it} + \varphi_9 DE_{it} + \varphi_{10} ROA_{it} + \varphi_{11} QUICK_{it} + \varphi_{12} LNSUB_{it} + \varphi_{13} FOREIGN_{it} + \varphi_{14} LOSS_{it} + \varphi_{15} OPINION_{it} + \varphi_{16} YREND_{it} + \varphi_{17} BIG_{it} + \varphi_{18} YR2001_{it} + \varphi_{19} YR2002_{it} + \varphi_{20} YR2003_{it} + \varphi_{21} YR2004_{it} + \varphi_{22} YR2005_{it} + \varphi_{23} YR2006_{it} + \varphi_{24} YR2007_{it} + \varphi_{25} YR2008_{it} \quad \text{(Model 1)}$$

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
LNFEES = the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share

that is greater than the weighted market share cut-off, [$(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})$]; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1^{st} and 99^{th} percentiles.

The sample period is 2000-2008. Sample size is 32,365 firm years. Industries are based on 3-digit SIC codes. Coefficients for the year indicator variables are not reported. The sample period is 2000-2008. Industries are based on 3-digit SIC codes. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 level, respectively. Tests are two-tailed.

TABLE 5
Regression of audit fees on industry IOS, within-industry IOS homogeneity, auditor specialization, and control variables for large and small client subsamples

		Large Clients		Small Clients	
		Coefficient	t-statistic	Coefficient	t-statistic
Constant		8.454	200.788***	9.289	295.920***
IIOS	+	0.144	3.844***	0.066	3.089***
HIOS	+	-0.110	-5.155***	-0.040	-2.222***
SPEC (H1)	+	0.155	5.219***	0.132	3.901***
*SPEC*IIOS (H2)*	+	0.192	3.120***	0.179	2.849***
*SPEC*HIOS (H3)*	+/-	0.021	0.705	-0.102	-2.926***
*SPEC*IIOS*HIOS (H4)*	+	0.306	10.619***	0.245	7.833***
LNASSETS	+	0.516	137.444***	0.412	97.913***
CATA	+	0.827	34.566***	0.407	19.523***
DE	+	0.000	0.242	-0.008	-2.616**
ROA	-	-0.157	-5.971***	-0.017	-8.598***
QUICK	-	-0.079	-32.294***	-0.045	-26.420***
LNSUB	+	0.189	28.264***	0.074	8.629***
FOREIGN	+	0.218	30.691***	0.175	20.099***
LOSS	+	0.154	12.757***	0.205	19.811***
OPINION	-	0.175	5.099***	0.180	12.171***
YREND	+	0.118	11.728***	0.085	8.610***
BIG	+	0.216	10.788***	0.332	27.019***
Year indicators		included		included	
Adj. R^2		0.764		0.641	
F-statistic		2100.072		1158.278	
No. of obs.		16183		16182	

Model:

$$LNFEES_{it} = \varphi_0 + \varphi_1 IIOS_{kt} + \varphi_2 HIOS_{kt} + \varphi_3 SPEC_{it} + \varphi_4 SPEC_{it}*IIOS_{kt} + \varphi_5 SPEC_{it}*HIOS_{kt} + \varphi_6 SPEC_{it}* IIOS_{kt}*HIOS_{kt} + \varphi_7 LNASSETS_{it} + \varphi_8 CATA_{it} + \varphi_9 DE_{it} + \varphi_{10} ROA_{it} + \varphi_{11} QUICK_{it} + \varphi_{12} LNSUB_{it} + \varphi_{13} FOREIGN_{it} + \varphi_{14} LOSS_{it} + \varphi_{15} OPINION_{it} + \varphi_{16} YREND_{it} + \varphi_{17} BIG_{it} + \varphi_{18} YR2001_{it} + \varphi_{19} YR2002_{it} + \varphi_{20} YR2003_{it} + \varphi_{21} YR2004_{it} + \varphi_{22} YR2005_{it} + \varphi_{23} YR2006_{it} + \varphi_{24} YR2007_{it} + \varphi_{25} YR2008_{it}$$ (Model 1)

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
LNFEES = the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share that is greater than the weighted market share cut-off, $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1st and 99th percentiles.

The sample period is 2000-2008. Sample size is 16,183 (16,182) firm years for the large (small) client subsample. Industries are based on 3-digit SIC codes. Coefficients for the year indicator variables are not reported. The sample period is 2000-2008. Industries are based on 3-digit SIC codes. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 level, respectively. Tests are two-tailed.

TABLE 6
Regression of audit fees on firm-level IOS, auditor specialization, and industry-level IOS and control variables

		Coefficient	t-statistic
Constant		8.912	391.749***
FIOS	+	0.039	7.850***
SPEC FIOS (H5)*	+/-	-0.044	-6.628***
IIOS	+	0.261	9.273***
HIOS	+	-0.055	-4.631***
SPEC (H1)	+	0.158	21.291***
*SPEC*IIOS (H2)*	+	0.207	4.821***
*SPEC*HIOS (H3)*	+/-	-0.057	-2.511***
*SPEC*IIOS*HIOS (H4)*	+	0.246	11.477***
LNASSETS	+	0.471	208.078***
CATA	+	0.567	35.285***
DE	+	-0.004	-2.282**
ROA	-	-0.020	-10.123***
QUICK	-	-0.059	-41.715***
LNSUB	+	0.157	28.848***
FOREIGN	+	0.202	35.851***
LOSS	+	0.187	24.637***
OPINION	-	0.245	18.618***
YREND	+	0.096	13.426***
BIG	+	0.317	31.814***
Year indicators			Included
Adj. R^2			0.840
F-statistic			6312.604
No. of obs.			32365

Model:

$$LNFEES_{it} = \omega_0 + \omega_1 FIOS_{it} + \omega_2 FIOS_{it}*SPEC_{it} + \omega_3 SPEC_{it} + \omega_4 IIOS_{kt} + \omega_5 HIOS_{kt} + \omega_6 IIOS_{kt}*SPEC_{kt} + \omega_7 HIOS_{kt}*SPEC_{kt} + \omega_8 IIOS_{kt}*HIOS_{kt}*SPEC_{kt} + \omega_9 LNASSETS_{it} + \omega_{10} CATA_{it} + \omega_{11} DE_{it} + \omega_{12} ROA_{it} + \omega_{13} QUICK_{it} + \omega_{14} LNSUB_{it} + \omega_{15} FOREIGN_{it} + \omega_{16} LOSS_{it} + \omega_{17} OPINION_{it} + \omega_{18} YREND_{kt} + \omega_{19} BIG_{it} + \omega_{20} YR2001_{it} + \omega_{21} YR2002_{it} + \omega_{22} YR2003_{it} + \omega_{23} YR2004_{it} + \omega_{24} YR2005_{it} + \omega_{25} YR2006_{it} + \omega_{26} YR2007_{it} + \omega_{27} YR2008_{it} \quad \text{(Model 2)}$$

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
FIOS = factor score for firm *i* from the factor analysis of the Baber et al. (1996) measures; *LNFEES* =

the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share that is greater than the weighted market share cut-off, $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1^{st} and 99^{th} percentiles.

The sample period is 2000-2008. Sample size is 32,365 firm years. Industries are based on 3-digit SIC codes. Coefficients for the year indicator variables are not reported. The sample period is 2000-2008. Industries are based on 3-digit SIC codes. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 level, respectively. Tests are two-tailed.

TABLE 7
Regression of audit fees on firm-level IOS, auditor specialization, and industry-level IOS and control variables

		Large Clients		Small Clients	
		Coefficient	t-statistic	Coefficient	t-statistic
Constant		8.445	200.680***	9.291	295.955***
FIOS	+	-0.023	-1.020	0.037	6.750***
*SPEC*FIOS (H5)*	+/-	-0.064	-2.487**	-0.029	-3.461***
IIOS	+	0.150	3.779***	0.048	2.236**
HIOS	+	-0.110	-5.138***	-0.022	-1.195
SPEC (H1)	+	0.153	5.129***	0.120	3.552***
*SPEC*IIOS (H2)*	+	0.235	3.708***	0.195	3.105***
*SPEC*HIOS (H3)*	+/-	0.016	0.528	-0.122	-3.447***
*SPEC*IIOS*HIOS (H4)*	+	0.297	10.292***	0.249	7.915***
LNASSETS	+	0.515	137.516***	0.419	96.787***
CATA	+	0.841	35.075***	0.396	18.859***
DE	+	0.000	0.231	-0.008	-2.602***
ROA	-	-0.164	-6.263***	-0.014	-6.747***
QUICK	-	-0.076	-30.444***	-0.045	-26.561***
LNSUB	+	0.185	27.655***	0.076	8.846***
FOREIGN	+	0.216	30.428***	0.175	20.088***
LOSS	+	0.157	12.936***	0.202	19.478***
OPINION	-	0.168	4.891***	0.172	11.622***
YREND	+	0.122	12.098***	0.081	8.273***
BIG	+	0.220	10.997***	0.326	26.448***
Year indicators			included		included
Adj. R^2			0.765		0.642
F-statistic			1952.106		1077.087
No. of obs.			16183		16182

Model:

$$LNFEES_{it} = \omega_0 + \omega_1 FIOS_{it} + \omega_2 FIOS_{it}*SPEC_{it} + \omega_3 SPEC_{it} + \omega_4 IIOS_{kt} + \omega_5 HIOS_{kt} + \omega_6 IIOS_{kt}*HIOS_{kt} + \omega_7 IIOS_{kt}*SPEC_{kt} + \omega_8 HIOS_{kt}*SPEC_{kt} + \omega_9\, IIOS_{kt}*HIOS_{kt}*SPEC_{kt} + \omega_{10} LNASSETS_{it} + \omega_{11} CATA_{it} + \omega_{12} DE_{it} + \omega_{13} ROA_{it} + \omega_{14} QUICK_{it} + \omega_{15} LNSUB_{it} + \omega_{16} FOREIGN_{it} + \omega_{17} LOSS_{it} + \omega_{18} OPINION_{it} + \omega_{19} YREND_{kt} + \omega_{20} BIG_{it} + \omega_{21} YR2001_{it} + \omega_{22} YR2002_{it} + \omega_{23} YR2003_{it} + \omega_{24} YR2004_{it} + \omega_{25} YR2005_{it} + \omega_{26} YR2006_{it} + \omega_{27} YR2007_{it} + \omega_{28} YR2008_{it} \quad \text{(Model 2)}$$

IOS measures are calculated using firm level data grouped into 3-digit SIC industries. All firms with data for variables required to calculate the factor scores are included in the factor analysis. For each industry-year with at least five firms with factor scores, we compute *IIOS*, *HIOS*, and *FIOS*.

Industry-level variable definitions:
IIOS = median value of IOS in industry *k* where IOS is measured using a factor score based on Baber et al. (1996); *HIOS* = -1 x (standard deviation of IOS in industry *k*) where IOS is measured using a factor score based on Baber et al. (1996).

Firm-level variable definitions:
FIOS = factor score for firm *i* from the factor analysis of the Baber et al. (1996) measures; *LNFEES* = the natural log of audit fees for firm *i*; *SPEC* = 1 if firm *i* is audited by an industry specialist auditor, where industry specialist auditors have an audit fee based weighted market share that is greater than the weighted market share cut-off, $[(1/N_{(\text{big audit firms})} \times 1.2) \times (1/N_{(\text{industries})})]$; *LNASSETS* = the natural log of total assets for firm *i*; *CATA* = ratio of current assets to total assets for firm *i*; *DE* = ratio of long term debt to common equity for firm *i*; *ROA* = return on assets for firm *i*; *QUICK* = ratio of current assets less inventories to current liabilities for firm *i*; *LNSUB* = the natural log of number of business and operating segments for firm *i*; *FOREIGN* = the natural log of the number of geographical segments for firm *i; LOSS* = 1 if firm *i* reports a net loss, 0 otherwise; *OPINION* = 1 if firm *i* reports a going concern opinion, 0 otherwise; *YREND* = 1 if firm *i* has a 12/31 fiscal year end, 0 otherwise; *BIG* = 1 if firm *i* is audited by a Big N auditor, 0 otherwise. DE, ROA, and QUICK are winsorized at the 1^{st} and 99^{th} percentiles.

The sample period is 2000-2008. Sample size is 16,183 (16,182) firm years for the large (small) client subsample. Industries are based on 3-digit SIC codes. Coefficients for the year indicator variables are not reported. The sample period is 2000-2008. Industries are based on 3-digit SIC codes. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 level, respectively. Tests are two-tailed.