

**INDUSTRY SPECIALIZATION AND AUDIT FEES:
THE EFFECT OF INDUSTRY TYPE AND MARKET DEFINITION**

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**Industry Specialization and Audit Fees:
The Effect of Industry Type and Market Definition**

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ABSTRACT: This study investigates whether the effect of industry specialization on audit fees depends on industry regulation and use of narrower market definitions. Two regulated industries (SIC 131 and SIC 602) and two non-regulated industries (SIC 357 and SIC 581) were selected for testing. Specialists in non-regulated industries are expected to charge higher fees than specialists in regulated industries, because scale economies are more likely in regulated industries. The results are consistent with specialists in non-regulated industries being able to charge higher audit fees. Specialist fee effects were not greater using narrower state and regional market share measures of specialization.

Key Words: *Industry Specialization, Audit Fees.*

Data Availability: *Data used in this study are available upon request.*

INTRODUCTION

Specialization in the audit market is critical for the future survival of the audit firms, and specialization is one of the five top issues impacting the CPA profession in the 21st century (AICPA 1998, Elicker III, 1998). The audit market has experienced significant changes since the 1980s, and recently, large audit firms have restructured along industry lines to address the increasing importance of the role of industry specialization in the audit market (see Gramling and Stone [2000] for a literature review). These ongoing changes have likely affected the pricing of audit services. Further, regulators may be concerned about the impact of higher auditor concentration on competition, since it may lead to auditors' monopolistic or market power in audit pricing. The purpose of this study is to investigate the effect of auditor industry specialization on the pricing of audit services in the U.S. audit market, and to examine whether specialist pricing depends upon industry regulation and auditor market shares in local/regional markets.

Prior empirical evidence on the relationship between industry specialization and audit fees is mixed. Two countervailing theories can be used to explain the mixed results. One is related to audit quality, and the other is associated with scale economies. This setting of both regulated and non-regulated industries is chosen to examine whether industry specialization affects audit pricing. Prior studies argue that increases in industry regulation imposed on clients enhance the need for industry specialization for audit firms (Arnett and Danos [1979]; Wallace [1980]), and lead to economies of scale because of auditor's fixed investment in industry expertise (Danos and Eichenseher 1982). Further, Hogan and Jeter (1999) found that audit market leaders continue to increase market shares in non-regulated industries, which suggests returns to industry specialists in non-regulated industries. Therefore, the effect of industry

specialization on audit fees in regulated versus non-regulated industries appears to be an interesting research question.

The motivation of examining the effects of industry specialization on audit fees using narrower market share measures is based on Palmrose's (1986) finding no significant specialist fee premium in the overall U.S. audit market.¹ One possible explanation for the lack of a specialist premium in the overall U.S. market is that specialization is based on using national market share measures. Studies that later found specialist premiums have generally been in narrower markets such as Australia (Craswell et al. 1995) or Michigan municipalities (Ward et al. 1994). Therefore, this study uses a narrower market share measure to examine specialization fee effects to gain additional insight into pricing behavior in the U.S. audit market.

To facilitate the focus on regulated versus non-regulated industries and local/regional market share, this study examines two regulated industries (SIC 131 and SIC 602), and two non-regulated industries (SIC357 and SIC 581) selected based on industry size.² In summary, this study examines the effect of industry specialization on the pricing of audit services in U.S. audit market, and whether specialist pricing depends on industry regulation and auditor market share in narrower market segments. The research questions is important as the findings will help capital market participants further understand the behavior of audit fees and the structure of the audit market.

¹ Palmrose (1986) found that Price Waterhouse charges a fee premium to clients in the Office Equipment industry. PW had the largest market share (54%) in this industry, which is consistent with Simunic' (1980) argument that PW is a quality-differentiated specialist in Office Equipment industry.

² SIC code 131 represents the Crude Petroleum and Natural Gas industry, and SIC code 602 is the Commercial Banks industry. The two non-regulated industries are Computer and Office Equipment (SIC code 357), and Eating and Drinking Places (SIC code 581).

Knowledge of the behavior of audit fees should be of direct interest to auditors and auditees. For *audit firms*, knowledge of specialization effects in different regulatory settings will help them assess marketing strategies and pricing decisions for clients in different industries. Knowledge of fee behavior will help *clients* choose an optimal auditor, because there is a trade-off between higher quality audit services and lower cost audit services. For *regulators*, the findings will provide additional evidence of the effect of industry regulation on audit pricing.

The remainder of this paper is organized as follows. The next section presents a discussion of the theoretical framework and related research on the effect of specialization on audit fees. The third section describes the development of the hypotheses, research design, and sample description. The fourth section discusses the empirical test results. The final section provides a summary of the study, including its contributions, implications, and limitations, and suggests avenues for future research.

Theoretical Framework

There are two countervailing theories associated with the relationship between industry specialization and audit fees. One is related to audit quality, which explains the existence of fee premiums based on quality-differentiated services provided by auditors (Craswell et al. 1995; Ward et al. 1994).³ DeAngelo (1981) suggests that audit quality is related to firm size and argues that large audit firms are more likely to be independent because they receive a smaller percentage of total firm revenues from a given client.⁴ This implies that large audit firms could be quality-differentiated. In contrast, Titman and Trueman (1986) define a non-size related

³ Oligopoly theory suggests that firms with higher concentration may have monopolistic power to raise price because of lack of price competition (Weiss 1989). However, this study assumes the audit market is competitive, unlike Doogar and Easley (1998), who assume the audit market is purely price competitive, and thus no price differentiation exists.

quality measure for auditors.⁵ They suggest that auditors with expertise in information processing and with knowledge of industry conditions are more likely to provide quality-differentiated services to reduce information risk. This suggests that industry specialists may be able to charge a fee premium, particularly in non-regulated industries where the fee premium may be less likely to be offset by scale economies.

The other theory of the effect of industry specialization on audit pricing is based on economies of scale, which explains the existence of audit fee discounts from auditors' operating efficiencies (Chase 1999; DeFond et al. 2000).⁶ The prevalent source of scale economies is fixed costs. Scale economies occur at the range of output where lowest average costs are attained. Eichenseher and Danos (1981) examined the association of auditor concentration level and two indicators of opportunities for scale economies (e.g., regulation), and found that scale economies can be obtained by auditors through specialization in regulated industries. Danos and Eichenseher (1982) support their previous results by showing that auditors with higher market share (i.e., >15%) gain market share in regulated industries, as opposed to losing market share in the non-regulated industries. The implications of their studies are that lower audit fees may exist for industry specialists in regulated industries due to the prevalence of large fixed costs associated with investment in industry-specific knowledge related to the regulatory environment. However, in non-regulated industries, scale economies may be less likely to dominate as auditors

⁴ DeAngelo (1981) defined audit quality as: "the market based joint probability that a given auditor will both (a) discover a breach in the client's accounting system, and (b) report the breach" (p. 186).

⁵ Titman and Trueman (1986) defined auditor quality as: "the accuracy of information auditor supplied to investors; the information provided by a higher-quality auditor allows investors to make a more precise estimate of the firm's value" (p.160)

⁶ There are two types of scale economies discussed in Benston (1985). The first type results from the size and geographic dispersion of auditees. When audit firms have more offices in different locations, it is more likely for them to reach economies of scale. The second type is related to development and support of staff specialization. Large audit firms with more investment in developing expertise, employee training, and maintaining expertise will be more likely to have scale economies.

invest in client-specific industry knowledge, and specialists recover their investment by charging higher audit fees.

Prior studies on audit fees use broad market share measures to examine the effect of industry specialization (e.g., Craswell et al. [1995]; Palmrose [1986]). However, Francis et al. (1999) demonstrate that Big 6 market shares vary across city-specific markets, which suggests that a specialist fee premium may be more likely to exist in narrower market segments, compared to the insignificant fee premiums found by Palmrose (1986) using national market share measures.

Review of Related Research

Prior research on the effect of industry specialization on audit fees finds mixed results, not only in the private and public sectors, but also in the Big 6 and Non-Big 6 market segments. In the private sector, Palmrose (1986) did not find that industry specialists earn a fee premium in regulated or non-regulated industries, which may be due to the use of a broad national sample. However, Craswell et al. (1995) find that Big 8 industry specialists charge a fee premium over nonspecialist Big 8 auditors in the Australian audit market. A recent study by Beasley and Petroni (2001) investigates the relations between board composition and audit firm-type for property-liability insurance companies. They find that outside directors on the board are more likely to choose a specialist Big 6 auditor in the property-liability insurance industry, which implies a positive association between Big 6 industry specialists and audit quality.⁷ In the public sector, Ward et al. (1994) found that a non-Big 6 specialist charges a fee premium for clients in

⁷ Beasley and Petroni (2001) argue that outside (independent) board members, in their request to more closely monitor management, will influence the board to hire the highest quality auditors.

Michigan municipalities, but Chase (1999) found that a non-Big 6 specialist charges significantly lower fees for clients in Virginia counties.

For the non-Big 6 market segment, DeFond et al. (2000) demonstrate that KWTF, a non-Big 6 market leader in the property industry in Hong Kong, charges lower audit fees for clients. This could indicate that KWTF must cut prices to draw clients or indicate client's preference for the lower-priced audit services available from a non-Big 6 industry specialist. However, Cullinan (1998) demonstrates that non-Big 6 audit firms with greater industry expertise (i.e., market share) charge higher audit fees than those of nonspecialist audit firms in the benefit plan audit market.

The research on the relation of auditor industry specialization and audit fees in the U.S. audit market has been limited. Palmrose (1986) did not find a fee premium for industry specialists in the U.S. market. However, she found that audit fees are higher in non-regulated industries compared to regulated industries. This study examines the specialist fee effect in non-regulated industries and expects a fee premium for specialists in non-regulated industries, because without industry regulation auditor specialists may be more likely to charge higher audit fees for quality-differentiated services provided. Except for Pearson and Trompeter (1994), specialization fee effects have not been investigated in a regulated industry. This study examines the auditor specialist fee effect in different regulated industries, and compares the specialist fee effect between regulated and non-regulated industries. The current study further examines the specialist fee effects by using narrower market share measures.

Development of Research Hypotheses

Industry specialization can be thought of as a dimension of audit quality (DeAngelo 1981, Craswell et al. 1995). Audit firms can invest in developing industry expertise, establish

reputation, and differentiate themselves from other industry nonspecialists by providing quality-differentiated services. As a result, they may then charge a fee premium reflecting return to investment in industry expertise, which is consistent with economic theory of product differentiation (Shapiro 1983).

Danos and Eichenseher (1982) found that Big 8 with higher industry involvement lose market share in non-regulated industries, which they interpreted as indicating scale economies are not important in non-regulated industries. Palmrose (1986) reports that the coefficients for the industry indicator variables are positive for the unregulated industries and negative for regulated industries, which indicates that fees are higher in non-regulated industries compared to regulated industries. Hogan and Jeter (1999) demonstrate that companies in non-regulated industries appear to be switching from low-involvement auditors to specialist auditors, and market leaders continue to increase their market shares in both regulated industries and non-regulated industries. This indicates that there are returns to investing in specialization in non-regulated industries, which may be in the form of higher audit fees. Therefore, it is argued that a specialist fee premium is more likely to be present in non-regulated industries. Hypothesis H1 predicts that the regression coefficient of the industry specialist indicator variable for the non-regulated industries is expected to be positive. (Hypotheses are all in alternative form)

H1: There is a specialist fee premium in non-regulated industries.

Given industry regulation, audit firms claiming to be specialists have incentives to become familiar with the requirements of regulations and utilize this knowledge to attract more clients within the industry. Arnet and Danos (1979, pp. 10-11) argued that economies of scale can exist for the larger CPA firms whose clients are large and complex, geographically dispersed, or highly regulated. Wallace (1980) argues that the growth in industry regulation

would increase the need for auditor industry specialization. Eichenseher and Danos (1981) found a significant relationship between auditor industry concentration and client-industry regulation that is an indicator of opportunities for scale economies. Further, auditors with higher level of industry involvement in regulated industries gain market share. Danos and Eichenseher (1982) interpreted these results as scale economies in regulated industries, because those companies gaining market share are more cost effective than companies losing market share. Hypothesis H2 predicts that the regression coefficient for the industry specialist indicator variable in regulated industries is expected to be negative.

H2: Auditor industry specialists charge lower audit fees for clients in regulated industries.

The coefficient for the industry specialization indicator variable might be negative but insignificant for regulated industries, and positive but insignificant for non-regulated industries. However, the difference between these two coefficients may be significant. Hypothesis H3 implies that the regression coefficient of the difference between non-regulated and regulated industries for the industry specialist indicator variable should be significantly greater than zero.

H3: Specialists charge higher fees in non-regulated industries, compared to regulated industries.

This study provides a more powerful test of industry specialization by focusing on the differences in specialization for specific regulated and non-regulated industries. However, the lack of a significant fee premium in Palmrose (1986) may also reflect that specialization should be based on market share in specific markets, rather than the entire U.S. market. Further, premiums for industry specialization have been found in the Australian market (Craswell et al. 1995) and local governmental markets (Ward et al. 1994). This implies that a specialist fee premium may be more likely to be found at the local or regional level. Francis et al. (1999) argue that the use of national market share to measure industry specialization disguises the variation in

the Big 5 market share at the city level. This implies that using narrower market share measures could be more likely to capture auditor specialization fee effects, and may yield different results than a national measure. Therefore, this study will use a local/regional measure of industry specialization to further investigate auditor specialization effects on audit fees. The results are expected to shed light on the role of narrower market share measures on specialization audit fee effects. Hypothesis H4 predicts that the regression coefficient for the regional specialist indicator variable is expected to be positive.

H4: Auditor specialists in narrower geographic market segments will charge higher audit fees compared to nonspecialists.

Research Design

Prior studies usually use information about an auditor's clients to infer information about the audit market structure, such as industry market share (e.g., Zeff and Fossum 1967) and auditor concentration (e.g., Eichenseher and Danos 1981).⁸ This study uses industry market share as a measure of industry specialization, and auditor industry specialization is defined as market leaders with market share greater than 20% of audit services within a client specific industry. This 20% cutoff for Big 5 audit firms is based on modification of the Craswell et al. (1995) 10% rule applied to Big 8 audit firms, given the mergers that have reduced the Big 8 to the Big 5. A market share greater than 25% is used to identify local/regional specialists and examine the effect of industry specialization on audit fees.

The definition of audit fee is limited to the costs paid to the external auditor by client, and does not include salaries paid to internal auditors as in Simunic (1980). Three-digit Standard Industry Classification (SIC) codes are used to define industry. Two regulated and non-regulated

⁸ Zeff and Fossum (1967) first proposed using revenues and assets to measure audit firm's industry market share.

industries, including one service industry and one manufacturing industry, are selected to examine the effect of industry specialization on audit fees. More specifically, the two regulated industries are *Crude Petroleum and Natural Gas* (SIC 131), and *Commercial Bank* (SIC 602). The two non-regulated industries are *Computer and Office Equipment* (SIC 357), and *Eating and Drinking Places* (SIC 581). These industries are selected based on industry size to increase the potential number of observations.

Following Hogan and Jeter (1999), the asset-based market share (MS) of industry k audited by auditor i can be calculated as follows.

$$MS_{ik} = \frac{\sum_{j=1}^{J_{ik}} \sqrt{A_{ijk}}}{\sum_{i=1}^{I_k} \sum_{j=1}^{J_{ik}} \sqrt{A_{ijk}}}$$

where

A_{ijk} = total assets of client firm j in industry k audited by auditor i

i = 1,2,...,I = an index for audit firms

j = 1,2,...,J = an index for client firms

k = 1,2,...,K = an index for client industries

I_k = the number of audit firms i in industry k

J_{ik} = the number of clients served by audit firm i in industry k

Audit Fee Regression Models

Cross-sectional audit fee regression models similar to Simunic (1980) and Craswell et al. (1995) are used to examine the effect of industry specialization on audit fees in both regulated and non-regulated industries.

Audit fee regression model 1⁹

$$\begin{aligned} \text{Ln (FEE)} = & a_0 + a_1 \text{Ln(ASSET)} + a_2 \text{SUB} + a_3 \text{DE} + a_4 \text{ROI} + a_5 \text{Foreign} + a_6 \text{Opin} \\ & + a_7 \text{YE} + a_8 \text{Loss} + a_9 \text{REGSPEC} + a_{10} \text{REGNSPEC} + a_{11} \text{NREGSPEC} + u \end{aligned}$$

⁹ The pooled cross-sectional regression model 1 is used to test all four industries in a pooled sample. For the commercial bank industry, the data for control variables (i.e., Current, and Quick) are not available on the Compustat database. Thus, the two control variables are excluded in audit fee regression model 1 to examine the specialist fee effects on a pooled industry basis.

Where (with predict sign inside parenthesis):

Ln (FEE) = natural logarithm of total audit fees,

Ln (ASSET) = natural logarithm of assets, (+)

SUB = square root of the number of subsidiaries, (+)

DE = ratio of long-term debt to total assets, (+)

ROI = ratio of earnings before interest and tax to total assets, (-)

Foreign = proportion of subsidiaries that represent foreign operations, (+)

Opin = indicator variable, 1 = qualified audit report, (+)

YE = indicator variable, 1 = December 31st year-end, (+)

Loss = indicator variable, 1 = loss in the past three years, (+)

REGSPEC = indicator variable, 1= auditor with market share **greater** than 20%
for firm in **regulated** industry, 0= otherwise. (-)

REGNSPEC = indicator variable, 1= auditor with market share **less** than 20%
for firm in **regulated** industry, 0= otherwise. (+/-)

NREGSPEC = indicator variable, 1= auditor with market share **greater** than 20%
for firm in **non-regulated** industry, 0= otherwise. (+)

The error term u is assumed to have normal OLS regression properties.

The experimental variables REGSPEC, and NREGSPEC, are used to capture the fee effects of industry specialization in regulated, and non-regulated industries. The coefficient of REGSPEC in *SIC 131* and *SIC 602* is expected to be negative, since specialists are more likely to have economies of scale through industry specialization in regulated industries. The coefficient of NREGSPEC in *SIC 357* and *SIC 581* is expected to be positive, since industry specialists in non-regulated industries are expected to be more likely to provide quality-differentiated audit services that could lead to higher audit fees.

The natural logarithm of audit fees is used as the dependent variable to improve the linear fit of the data, and is consistent with prior research (e.g., Francis 1984, Palmrose 1986, Craswell et al. 1995). The control variables in the audit fee regression model are intended to control for cross-sectional differences in factors that affect audit fees such as auditee size, audit complexity, and audit risk (Simunic 1980; Craswell et al. 1995). Ln (ASSET), natural logarithm of assets, is used to control for client size, and is expected to be positively related to audit fees (e.g., Palmrose 1986; Francis and Simon 1987).

SUB, the square root of the number of subsidiaries, is used to measure the decentralization of the client firm, and Foreign, the proportion of subsidiaries representing foreign operation, are used to measure the diversification of the client and to control for audit complexity. Audit fees are expected to be positively related to these measures of audit complexity. DE (long term debt to total assets) is used to control for audit risk.¹⁰ Following Francis (1984), a high DE should be associated with higher financial and audit risk, and its coefficient is expected to be negative.

Measures of auditor-auditee risk-sharing are represented by auditee profitability (ROI), loss in the previous three years (Loss), and qualified opinion (Opin). When auditee's ROI increases, the audit fees are expected to decrease. However, when auditees suffer a loss in the prior three years, audit firms are expected to charge higher audit fees. When a qualified opinion is given, audit fees are expected to increase, because there is higher a possibility of future loss for clients. YE is used to control for off-peaking pricing of audit services, and is expected to be positively associated with audit fees.

Audit fee regression model 1 is modified in fee regression model 2 to test the difference of the specialist coefficient between specialists in non-regulated industries and specialists in regulated industries. The research variables REGSPEC and NREGSPEC are replaced with the variable DIFF.¹¹ The coefficient of the experimental variable DIFF is expected to be positive, which indicates that auditor specialists in non-regulated industries charge a higher fee than auditor specialists in regulated industries.

¹⁰ Current and Quick are omitted in a pooled industry analysis, but included in an industry-specific analysis. Current assets such as receivables and inventories are risky assets, and specific auditing procedures are needed for these accounts, and therefore are positively related to audit fees. In contrast, a small quick ratio should be associated with higher financial and audit risk (Francis 1984).

¹¹ DIFF =1 if auditor is a specialist in non-regulated industries, =0 if auditor is a specialist in regulated industries.

Audit fee regression model 3 (for *SIC 131, 357, and 581*) and model 4 (for *SIC 602*) are used to examine the specialization fee effect for industry specific specialists. Prior audit fee studies (e.g., Simunic [1980]) exclude the banking or financial service industry for their sample selection, because some control variables (e.g., current or quick ratio) are not available for those industries. This study selects the commercial bank industry, excluding those control variables, to analyze specialization effect on audit fees because of the industry size and to allow comparison of a service industry with a manufacturing industry. Therefore, the fourth audit fee regression model is used specifically for the commercial bank industry.

The variable of interest, SPEC, in audit fee model 3 and 4 is used to test the specialist fee effect in specific industry. The coefficient of SPEC is expected to be negative for *SIC 131 and SIC 602*, and positive for *SIC 357 and SIC 581*. The control variables chosen in the third and fourth audit fee model share similar characteristics as the control variables in audit fee regression model 1, except GLR and LDR.

GLR, LDR, and DE are used to control for auditors' loss exposure in commercial bank industry. GLR is the ratio of gross loans to total assets. LDR is the ratio of gross loans to total deposits. Both GLR and LDR are used to represent the short-term liquidity of a bank. GLR, similar to Current, is a risky asset account, and thus is positively related to audit fees. However, LDR, similar to Quick, measures auditee financial risk and should be negatively associated with audit fees.

Sample Selection and Market Share Measures

The sample includes firms on Compustat with auditor and total assets data available for 1999. Since the data accessed through Compustat for the banking industry has missing data for

auditor, the Compact Disclosure database from Disclosure Inc. is used to identify the auditor as well as the company name and address for the fee survey.¹² Client firms are included in the sample if they have non-zero total assets and net sales. The number of sample firms for the mail survey is in Table 1.¹³ The initial sample for SIC 131, 357, 581, and 602 is 179, 247, 104, 403. However, the reduced qualified sample firms for the fee survey is 137 for SIC 131, 201 for SIC 357, 96 for SIC 581, and 344 for SIC 602. The total number of sample firms used for the audit fee survey is 778.

[Insert Table 1 here]

Prior studies have used different market share measures to measure industry specialists. Palmrose (1986) used sales-based measure to identify industry specialists. Hogan and Jeter (1999) use assets to measure market share and identify industry specialists. Since asset-based measure is available for all four industries, the empirical test is mainly based on an asset-based measure.¹⁴ A client-based measure is also used for identifying regional specialists and is reported in Panel A, Table 2.^{15,16}

¹² The version of Compact Disclosure CD-ROM used is April 2000.

¹³ The questionnaires were addressed to the individual named as chief financial officer (CFO), treasurer, or controller. The name of those individuals was identified primarily through the company website, www.yahoo.com, or www.hoovers.com.

¹⁴ For the four selected industries, there is little difference in market share between the asset-based and sales-based measures, and no difference in the firms identified as specialists.

¹⁵ The audit firm share of the market for that industry segment based on number of clients audited is defined as:

$$CBMS_{ik} = \frac{\sum_k C_{ik}}{\sum_i \sum_k C_{ik}}$$

Where

$CBMS_{ik}$ = Client-based market share for audit firm i in industry k .

C_{ik} = Number of clients for audit firm i in industry k .

¹⁶ Several previous studies use a client-based measure to measure industry expertise, industry experience, and industry concentration (e.g., Deis and Giroux [1992], Eichenseher and Danos [1981], Elder [1993]). Elder (1993) argues that a client-based measure best captures an auditor's industry experience. In the *Crude Petroleum & Natural Gas* industry, the *Computer & Office Equipment* industry, and the *Commercial Bank* industry, audit firms with the highest market share (AA, PWC, and KPMG) are the same using either asset-based or client-based measures. In the *Eating and Drinking Places* industry, KPMG has the highest market share (18.8%) using a client-based measure,

[Insert Table 2 here]

National versus State Market Share Measure¹⁷

Panel B of Table 2 reports the industry specialists at the national and state level using an asset-based measure. At the *national* level, there is an interesting feature in non-regulated industries. In *SIC 357*, PWC has a significantly higher market share, which is consistent with the results of Palmrose (1986).¹⁸ In contrast, although *SIC 581* also has 2 industry specialists, EY (24.6%), and KPMG (24.5%), the auditor with the third, fourth and fifth higher market share has a 16.9%, 14.5% and 14.1% market share, respectively. This indicates that the *Eating and Drinking Places* industry is very competitive. At the *state* level, the specialists are similar to those identified at the national level.

In the regulated industries, based on the 20% market share rule, EY, KPMG, and PWC are audit specialists in the *Commercial Bank* industry. At the *national* level, the distribution of the industry specialists for the *Commercial Bank* industry is similar to the *Eating and Drinking Place* industry. At the *state* level, there is only one specialist in each qualified state. In the *Crude Petroleum and Natural Gas* industry, AA is the dominant audit specialist at both the *national* and *state* level.

Sample Representiveness

The questionnaire was mailed in mid-January 2001 followed by second requests to non-respondents in mid-March 2001.¹⁹ The questionnaire format was changed to a briefer one with

while EY has the highest market share (24.7%) using an asset-based measure.

¹⁷ At the national level, a 20% cutoff is used to identify specialists. However, a higher specialist criteria (market share greater than 25%) is used at the state level.

¹⁸ Palmrose (1986) found that Price Waterhouse had the highest market share in the *Computer and Office Equipment* industry, and Price Waterhouse charged an audit fee premium to clients in this industry.

¹⁹ Revised SEC Auditor Independence Rules passed in November 2000 require public companies to disclose the aggregate fees billed by the accounting firm to the registrant for the most recent fiscal year in the proxy/information

anonymity of respondents' title and company for the second survey. The overall 156 useable responses, including initial responses, and response rate are reported in Panel C of Table 2.

To test the representativeness of the sample, late responses and early responses are compared to see whether nonresponse bias is a major concern to the validity of this study, given the assumption that late responses are similar to nonresponses (see Kanuk and Berenson [1975]).²⁰ A t-test (a nonparametric Wilcoxon rank-sum test) is applied to examine whether there is any significant difference between the mean (median) scores of the variables in the four pooled industries. The overall results indicate that nonresponse bias is not a significant concern.

RESULTS

Table 3 reports sample descriptive statistics on a pooled and industry basis. The average audit fee for the 156 observations is approximately \$178,950 and is comparable to \$206,600 in Simunic (1980) or \$179,700 in Palmrose (1986).²¹ However, the average size of the firms is larger than those sampled by Simunic (1980) and by Palmrose (1986). For example, the average total assets in the current study is \$2,564 million as compared to \$555 million in Simunic (1980) and \$1,260 million in Palmrose (1986). Descriptive statistics also indicate that 55.1% (54 of 98 observations) of the regulated companies and 36.2% (21 of 58 observations) of non-regulated companies used a specialist auditor. The percentages are broadly consistent with the client-based market share held by specialist auditors. The higher specialist percentage in regulated industries primarily reflects the presence of three specialist audit firms in the *Commercial Bank* industry.

[Insert Table 3 here]

statements filed with the SEC after February 5, 2001. However, this data was not available at the time this study was conducted.

²⁰ Late responses (i.e., 106 observations) are defined as the questionnaires returned for the second request, and early responses (i.e., 50 observations) are defined as the questionnaires returned for the first request.

²¹ Simunic report average fees of \$77,100 for the small auditees that are comparable to the sample companies in the

Table 4 contains a matrix of correlation coefficients among the variables used for the pooled industry regression in this study. As expected, the highest correlation is between LnFee and LnTA (proxy for firm size), and is significant at the 0.01 level. The significant and high correlation between LnFee and SUB indicates the positive relationship between audit fees and the square root of the number of subsidiaries (proxy for audit complexity). The significant correlation coefficient between SUB and LnTA indicates that larger companies tend to have more subsidiaries.

[Insert Table 4 here]

Pooled Industry Results

The pooled industry results are reported in Table 5. The test of hypothesis H1 is reported by the regression coefficient of the experimental variable, NREGSPEC. As expected, the sign of the coefficient of NREGSPEC is positive and statistically significant at $p < 0.02$ in audit fee model 1, which indicates that industry specialists in non-regulated industries charge higher fees, consistent with quality-differentiated services. This result contributes to the audit fee literature in that it provides evidence that industry specialists (in non-regulated industries) provide quality-differentiated services in the United States audit market. In contrast, Palmrose (1986) did not find an audit fee premium for industry specialists in the U.S. This result is consistent with Craswell et al. (1995), who find that specialists charge a premium in the Australian market.

[Insert Table 5 here]

The test of hypothesis H2 is reported by the regression coefficient of the experimental variable, REGSPEC, and, as expected, the sign of the coefficient of REGSPEC is negative in the audit fee model 1. However, the t-statistic is -0.941 , which is not statistically significant and

current study.

indicates that there is no significant relationship between auditor specialists in regulated industries and audit fee discounts.²² Thus, this study does not find evidence that significant scale economies exist for auditor specialists in regulated industries.²³ This result might indicate that audit quality and scale economies offset in the regulated industries because auditor specialists in regulated industries likely provide higher quality services.

The sample used in testing hypothesis H3 is reduced to 75, and the new experimental variable of interest is DIFF, which directly captures the difference of fee charged between industry specialists in non-regulated and regulated industries. As predicted, the coefficient of DIFF is positive and statistically significant at $p < 0.01$, which indicates that audit fees charged by auditor specialists in non-regulated industries are significantly higher than those charged by auditor specialists in regulated industries. Therefore, the hypothesis H3 is supported. Furthermore, the t-test of whether the coefficients of REGSPEC and NREGSPEC are significantly different for the full sample indicates that F value is 8.620, which is statistically significant at 0.01 level. The results further confirm that auditor specialists in non-regulated industries charge higher fees than those charged by auditor specialists in regulated industries.

The explanatory power of the audit fee regression model in this study is lower, when compared to the F-statistic (18.28 vs. 164.68) and the adjusted r-square (0.55 vs. 0.89) in Palmrose (1986). Although the control variables used in this study are different from those in Palmrose (1986), there are two other possible reasons for the difference in model explanatory

²² Pearson and Trompeter (1994) did not find significant relationship between industry specialization and audit fees in one regulated insurance industry.

²³ The test results in Simunic' (1980) partitioned samples also indicate weak evidence on the existence of scale economies in the U.S. audit market. However, Pearson and Trompeter (1994), using level of concentration (CR3) as a surrogate for competition, found that the relationship between CR3 and audit fees is negative, which suggests scale economies exist in the regulated insurance industry.

power. One is that her sample companies are bigger. The other could be due to the inclusion of commercial banks in the pooled regression model, resulting in a less homogeneous sample.

The mean total asset of the overall (U.S.) sample is \$198.9 million, which is comparable with \$176 million for the partitioned small sample in Simunic (1980). This may indicate that the sample responses are mostly from the smaller firms in those industries, although the sample firms selected for mail survey are from Compustat database and are those companies listed in major stock exchanges in the U.S.

As expected, LnTA is significantly and positively related to LnFee and indicates that auditee size is a major variable in explaining the variation in (ln) audit fees, which is consistent with previous studies such as Simunic (1980), Palmrose (1986). The control variable SUB is statistically significant at $p < 0.04$ in audit fee model 1, but insignificant in audit fee model 2, which indicates that the number of subsidiaries may not be a significant factor in explaining the specialist fee difference between specialists in non-regulated and regulated industries. Another control variable, Foreign, is also statistically significant at $p < 0.01$. The control variable Loss, a proxy for audit risk, is statistically significant at $p < 0.001$. However, the control variables DE and ROI have the opposite sign, and are not significant in audit fee model 1 and model 2. Control variables Opin and YE have the expected sign but are not statistically significant. The insignificant results for these variables may reflect the limited number of observations with qualified opinions and year-ends other than December 31st.

Industry-Specific Results

Sample descriptive statistics, reported in Table 3, indicate that *SIC 602*, on average, has the highest audit fees, total asset level, and current ratio, compared to other three industries. One interesting characteristic in *SIC 602* is that none of the respondents suffered a loss in the last

three years including fiscal year 1999, which contrasts with 73% (68%) of the companies in *SIC 131 (SIC 357)*. The highest average ROI was in *SIC 581*, while the lowest was in *SIC 357*. For the number of subsidiaries, *SIC 581* has the highest number, while the highest percentage of foreign subsidiaries is in the *SIC 357*.

The industry-specific correlation matrixes (not reported) share similar characteristics as the pooled industry data. For example, the correlation between LnFee and LnTA is high and significant in all four industries, respectively. The correlation between SPEC and LnFEE and LnTA is positive for all industries. It might indicate that large firms are more likely to choose specialists, or SPEC by construction is measured based on size. Specifically, the correlation between LnFee and SPEC is high and statistically significant at the 0.01 level in *SIC 357*, which is consistent with the significant coefficient for SPEC in the fee model in Table 6.

[Insert Table 6 here]

The results of the industry regressions are reported in Table 6. As expected, the coefficients for the industry specialist test variable, SPEC, are negative in regulated industries (*SIC 131 and 602*) and positive in non-regulated industries (*SIC 357 and 581*). The industry specialist (SPEC) coefficient in *SIC 357* is statistically significant at the 0.05 level, which is supported by the significant correlation between LnFee and SPEC, and is consistent with Palmrose (1986).²⁴ However, the SPEC coefficient is not statistically significant in the other three industries, which is also consistent with the industry regression results in Palmrose (1982).²⁵

²⁴ According to Palmrose (1986), the coefficient of the industry specialists in office equipment industry is statistically significant at 0.10 level. Further test using a dummy variable (PWC=1, other auditors =0) examines whether the specialist fee premium is attributed to PWC, but the result (not reported) indicates the coefficient of PWC is not statistically significant.

²⁵ The dependent variable of the industry regression model in Palmrose (1982) is either Fees/square root of sales or

Overall, the adjusted r-square is 0.68, 0.718, 0.293, and 0.585 in SIC 131, 357, 581, and 602, respectively. The lower adjusted r-square for SIC 581 may be due to the small industry sample size (n=21). The F-value reflects the similar condition as the adjusted r-square.

Narrower Market Segment Results

An asset-based measure may be too sensitive to one or two large clients in a smaller geographical area. Therefore, a client-based market share measure is used to investigate whether state specialists charge higher fees than state non-specialists. Since the sample respondents are small based on narrower geographic market segments, the empirical test for hypothesis H4 is limited to the state level. Using the state specialists identified in Panel C of Table 2, the empirical test for hypothesis H4 is conducted on a pooled industry and an industry-specific basis. The test results of the fee effects for the regional specialists are reported in Table 7.

[Insert Table 7 here]

The experimental variable of interest RSPEC, defined as regional specialists, is positive and nearly significant at 0.10 level, which provides limited evidence that regional specialists charge a higher fee than regional nonspecialists on a pooled industry basis. However, when a lower 15% market share measure is used, the RSPEC changes to marginally significant at $p < 0.07$ level, which indicates that the results are sensitive to different cutoff of market share measure.

The results for regional specialists in the specific industry, compared to Table 5, indicate that the sign of the variable of interest RSPEC is negative (positive) as predicted in SIC 131 (SIC 357). However, the sign of the coefficient of RSPEC is not as expected in SIC 581 and SIC 602. One possible explanation is the state specialists are defined based on the states with more than 20

Fees/square root of assets, instead of natural log of audit fees in the current study.

companies in that specific state and few states met the requirement, which might not fully capture the specialist fee effect. In SIC 602, the opposite sign of RSPEC might be due to the positive effects of specialization at the local level. Further, the coefficient of RSPEC is significantly negative for SIC 131, indicating economies of scale may exist for state specialists in SIC 131. The results for the control variables are similar compared to the results of audit fee model 1 and 2 in Table 5.

Additional Analyses²⁶

An additional test is conducted to investigate whether Big 5 industry specialist charge higher fees than Big 5 industry non-specialists, since Craswell et al. (1995) found that specialist Big 8 fees are significantly higher than Big 8 nonspecialists. The results for the within Big 5 sample are reported in Table 8. The model is significant at $p < 0.01$ level, and the adjusted r-square is 0.47 (0.41) for audit fee model 1 (2). As predicted, the variable of DIFF (see audit fee model 2) is statistically positive at $p < 0.01$ level, indicating that Big 5 industry specialists charge higher fees than Big 5 industry non-specialists. Further, the coefficient of NREGSPEC is statistically significant at $p < 0.01$, which indicates that Big 5 industry specialists charge significantly higher fees than Big 5 industry non-specialists in non-regulated industries. For regulated industries, the current study finds an evidence of (marginally) significantly negative

²⁶ Potential specification problems are evaluated through checking the multicollinearity, heteroscedasticity, and outliers. Multicollinearity does not appear to be a problem in the audit fee regression models. The White test results indicate heteroscedasticity is not a concern for the audit fee model used in this study. As to the concern of outliers, none of the industries have residuals greater than three standard errors of estimation from zero, except for one in *SIC 357* and one in *SIC 602*. These two extreme observations were deleted from the regression model. The results did change for the experimental variable REGSPEC. That is, the coefficient of the REGSPEC changed from insignificant to marginally significant. The coefficient for NREGSPEC remained significantly positive at the 0.05 level. In a specific industry analysis, the insignificance of coefficient of SPEC for SIC 131 changed to the 0.03 significance level, when 3 outliers are deleted.

relationship between audit fees and industry specialists after excluding outlier observations, which provides only weak evidence of scale economies in the regulated industries.

[Insert Table 8 here]

Sensitivity analyses for testing the effect of industry specialization are conducted by using a higher (i.e., 25%) market share measure at the national level, and by using a lower (i.e., 15%) market share measure in the narrower geographic market segment (i.e., state level), as well as different bases (i.e., assets-based vs. client-based). An asset-based continuous market share measure is also used to examine the specialist fee effects. One significant finding is that specialist fee premium using an asset-based continuous market share measure is higher than using an asset-based dichotomous measure on a pooled industry basis, because coefficient of regional specialists is significantly positive at 0.05 level.

SUMMARY

The pooled industry results indicated that auditor specialists charge higher audit fees for quality-differentiated services in non-regulated industries, which implies auditor industry specialization as a dimension of audit quality. This is consistent with the results of Craswell et al. (1995). For the non-regulated industry-specific results, auditor specialists charge significantly higher audit fees for clients in the *Computer and Office Equipment* industry, but not in *Eating and Drinking Places* industry, which may be due to the smaller sample size used for the latter industry.

The pooled industry results indicate that no significant negative relationship between auditor specialists and audit fees was found in regulated industries. However, excluding 2 outliers from the pooled industry samples, the regression coefficient of the experimental variable REGSPEC changes from insignificantly negative to (marginally) significantly negative, which

weakly supports H2 and indicates that auditor specialists charge lower fees to their clients in regulated industries. For the industry-specific results, there is also no significant negative relationship found. However, excluding 3 outliers in the *Crude Petroleum and Natural Gas* industry, the regression coefficient of the experimental variable SPEC changes from insignificant to significant, which indicates auditor specialists in the *Crude Petroleum and Natural Gas* industry charge lower audit fees. The results suggest that scale economies may exist in the regulated *Crude and Petroleum and Natural Gas* industry.

Hypothesis H3 predicted that auditor specialists charge higher audit fees in non-regulated industries, compared to auditor specialists in regulated industries. The test results support H3, which suggests that auditor specialists in non-regulated industries charge higher audit fees than those charged by auditor specialists in regulated industries. Using the higher market share (i.e., 25%) cutoff, the test results still support H3.

Hypothesis H4 predicted that auditor specialists in narrower geographic market segments would charge higher audit fees than nonspecialists. Using a client-based market share rule to define a regional (state) specialist, hypothesis H4 is supported only in a specific industry (*SIC 131*) rather than the other three specific industries or on a pooled industry basis. One possible explanation is that the number of industry specialists at a state level is reduced because of data limitations. Francis et al (1999) suggest that market share measures should be examined in narrower geographic market segments, instead of just the national level. Since the data for the empirical test of the hypothesis H4 is limited, more data is needed for future research.

Contributions

This study contributes to the audit fee literature in a number of ways. First, it provides additional evidence of industry specialization as a dimension of audit quality by examining the

effect of auditor industry specialization on audit pricing in regulated versus non-regulated industries in the U.S. and finds significant difference for audit fees between specialists in non-regulated and regulated industries. This study also confirms the argument of the increasing importance of industry specialists in non-regulated industries (Hogan and Jeter 1999) by showing the existence of a fee premium for quality-differentiated services by auditor specialists in non-regulated industries.

Second, this study increases our understanding of the effect of specialization on audit quality and audit pricing by documenting auditor specialist measures in narrower geographic market segments. Prior studies usually use national market share measures to assess specialization fee effects (e.g., Palmrose, 1986). However, Palmrose (1986) did not find a relation between industry specialization and audit fee premiums, which this study suggests may be due to her national measure disguising the significant fee premium in narrower geographic settings. Although Francis et al. (1999) use a firm level industry market share measure to infer market leadership and industry expertise, they did not examine the specialization fee effects at the firm level. Therefore, this study contributes to the audit fee literature by using a narrower market share measure to investigate the specialist fee effects in both regulated and non-regulated.

Limitations and Suggestions for Future Research

The limitations of this research relate to data constraints and the measurement of industry specialization. Concerning data limitations, this study selected sample firms from the Compustat database based on industry size, because a low response rate is reasonably expected when using surveys to obtain audit fee related data. The time period for the current study is limited to the year 1999, the most current year available for an audit fee survey. The useable responses for the empirical tests are only 156 and the survey response rate is at a moderate level (20%), which

may potentially affect the empirical test for the hypotheses. A follow-up study should directly investigate the same issues by gathering recent audit fee data from company proxy statements or similar sources, because audit fee disclosures are now required for all publicly-held companies in the U.S. Further, the sample obtained is not random, and all qualified industry specialists under different market share measures in both regulated and non-regulated industries are Big 5 firms, although non-Big 5 industry specialists could be expected to exist in the audit market.

When using market share to measure industry specialization, small audit firms may make significant investments in their focus industries and develop a reputation for industry expertise. However, they have a small market share in that industry, and do not qualify as industry specialists (Gramling and Stone, 2000). Since only 2 regulated and non-regulated industries are selected in this study, future research needs to look at more industries in both settings.

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Table 1
Sample Firms for Mail Survey and Sample Responses

	SIC 131	SIC 357	SIC 581	SIC 602
Compustat Firms	179	247	104	403
State 99*	(38)	(25)	(2)	(22)
Missing Auditor	0	(4)	(1)	(34)
Cusip not matched**	(4)	(8)	(3)	(3)
Repeated Cusip***	0	(9)	(2)	0
Sample firms	137	201	96	344
Sample Responses	33	37	21	65
Response Rate	24.1%	18.4%	21.9%	18.9%
Overall (n=778)	Responses =156		Response rate =20.1%	

* State 99 indicates the company's principal location is in a country other than the United States.

** indicates that no Cusip number is found in Compact Disclosure database.

*** indicates that same Cusip number is shown in Compustat database.

SIC 131 indicates *Crude Petroleum and Natural Gas* industry, **SIC 357** indicates *Computer and Office Equipment* industry, **SIC 581** indicates *Eating and Drinking Places* industry, and **SIC 602** indicates *Commercial Bank* industry.

Table 2

Panel A - Asset-based and Client-based Specialists-National Level

	SIC 131		SIC 357		SIC 581		SIC 602	
Auditor Specialist	<u>Asset-based (MS)</u>	<u>Client-based (MS)</u>	<u>Asset-based (MS)</u>	<u>Client-based (MS)</u>	<u>Asset-based (MS)</u>	<u>Client-based (MS)</u>	<u>Asset-based (MS)</u>	<u>Client-based (MS)</u>
AA	43.2%	27.7%	7.0%	12.9%	14.5%	13.5%	16.3%	13.7%
EY	11.6%	11.0%	20.0%	16.9%	24.7%	14.6%	23.3%	14.8%
DT	5.7%	5.8%	11.6%	11.4%	16.9%	17.7%	7.8%	9.9%
KPMG	14.2%	15.3%	18.5%	13.9%	24.5%	18.8%	21.6%	23.8%
PWC	20.2%	13.9%	39.0%	27.4%	14.1%	14.6%	20.1%	11.6%
Others*	5.1%	26.3%	3.9%	17.5%	5.3%	0.8%	10.9%	26.2%

Note: Asset-based and client-based market share measures are described in the section on sample description and market share measures. MS denotes market share.

Others* indicate non-Big 5 auditors, and their individual market share is less than specialist cutoff. **SIC 131** indicates Crude Petroleum and Natural Gas industry, **SIC 357** indicates Computer and Office Equipment industry, **SIC 581** indicates Eating and Drinking Places industry, and **SIC 602** indicates Commercial Bank industry.

Panel B - Asset-based Specialists-National versus State Level

Asset-based Specialists	National Market Share	State Market Share			
SIC131 (Reg)	AA (43.2%) PWC (20.2%)	<u>Colorado (29)</u> AA (47.6%)		<u>Texas (64)</u> AA (38.5%) PW (24.1%)	
SIC602 (Reg)	EY (23.3%) KPMG (21.6%) PWC (20.1%)	<u>California (36)</u> KPMG (48.6%)	<u>New York (23)</u> PW(60.7%)	<u>Ohio (27)</u> EY (42.3%)	<u>Pennsylvania (30)</u> DT(34.0 %)
SIC357 (NReg)	EY (20.0%) PWC (39.0%)	<u>California (80)</u> EY (35.6%) PW (29.0%)			
SIC581 (NReg)	EY (24.7%) KPMG (24.5%)	<u>California (15)*</u> KPMG (51.0%)			

Note: National market share cutoff is **20%** and state market share cutoff is 25% with the number of observations in selected state is greater than 20.

Reg indicates regulated industry, and **Nreg** indicates non-regulated industry.

* Only for identifying purpose.

Panel C- *Client-based Specialists-State Level*

Industry	SIC 131		SIC 357		SIC581	SIC 602			
State / Auditor Code	(n=29) CO (MS)	(n=64) TX (MS)	(n=80) CA (MS)	(n=15) NY (MS)	(n=15) CA (MS)	(n=36) CA (MS)	(n=23) NY (MS)	(n=27) OH (MS)	(n=30) PA (MS)
1 (AA)	0.276	0.266	0.125	<u>0.200</u>	0.066	<u>0.167</u>	0.087	0.037	0.100
4 (EY)		<u>0.156</u>	0.250	0.133		0.028	0.044	0.296	<u>0.200</u>
5 (DT)	0.069	0.094	0.125	0.133	<u>0.200</u>	0.306	<u>0.174</u>	0.074	0.100
6 (KPMG)	<u>0.207</u>	<u>0.203</u>	0.113	0.067	0.267	0.306	0.391	0.037	0.033
7 (PWC)	0.103	<u>0.156</u>	0.288	<u>0.200</u>	0.267	0.056	<u>0.217</u>	0.074	<u>0.167</u>
9	0.345	0.125	0.099	0.267	0.200	0.137	0.087	0.223	0.400
16								0.259	

Note:

Auditor code of 16 represents Crowe Chizek. Auditor code 9 indicates the state non-specialists. The market share number bolded indicates a state specialist (MS \geq 25%) in a specific industry. The market share number underlined indicates a state specialist (for sensitivity analysis) using lower (MS \geq 15%) market share measure.

Table 3
Sample Descriptive Statistics-Pooled vs. Specific Industry

Variables	Four Industries (n=156)	SIC 131 (n=33)	SIC357 (n=37)	SIC581 (n=21)	SIC602 (n=65)
Audit Fees (Thousands)	178.95	112.16	227.34	88.03	214.70
Total Assets (Millions)	2564.8	281.20	525.54	218.93	5642.88
LnFee-Mean (Std. Dev)	4.605 (0.970)	4.245 (0.964)	4.664 (1.035)	4.291 (0.634)	4.855 (0.959)
LnTA	5.293 (2.465)	3.820 (1.956)	3.527 (2.067)	4.369 (1.452)	7.345 (1.507)
SUB	2.052 (1.600)	1.450 (1.180)	1.947 (1.845)	2.355 (2.116)	2.319 (1.376)
Current (GLR)		0.159 (0.177)	0.380 (0.297)	0.054 (0.072)	0.625 (0.125)
Quick (LDR)		2.059 (4.443)	2.293 (1.831)	0.777 (0.882)	0.818 (0.179)
DE	0.114 (0.195)	0.241 (0.267)	0.094 (0.161)	0.237 (0.247)	0.022 (0.031)
ROI	-0.022 (0.412)	0.015 (0.2210)	-0.233 (0.711)	0.068 (0.082)	0.049 (0.262)
Foreign	0.148 (0.299)	0.123 (0.263)	0.478 (0.402)	0.046 (0.108)	0.007 (0.036)
Opin	1.3%	3.0%	2.7%	0	0
YE	81.4%	84.8%	59.4%	57.1%	1
Loss	37.2%	72.7%	67.5%	42.8%	0
REGSPEC	55.1%				
NREGSPEC	36.2%				
SPEC		39.3%	32.4%	42.8%	63.0%

Ln (FEE) = natural logarithm of total audit fees,
 Ln (ASSET) = natural logarithm of assets,
 SUB = square root of the number of subsidiaries,
 Current = ratio of current assets to total assets,
 Quick = ratio of current assets, less inventories, to current liabilities,
 GLR = ratio of gross loans to total assets,
 LDR = ratio of gross loans to total deposits,
 DE = ratio of long-term debt to total assets,
 ROI = ratio of earnings before interest and tax to total assets,
 Foreign = proportion of subsidiaries that represent foreign operations,
 Opin = indicator variable, 1 = qualified audit report,
 YE = indicator variable, 1 = December 31st year-end,
 Loss = indicator variable, 1 = loss in the past three years,
 REGSPEC = indicator variable, 1= auditor with market share *greater* than 20%
 for firm in *regulated* industry, 0= otherwise.
 NREGSPEC= indicator variable, 1= auditor with market share *greater* than 20%
 for firm in *non-regulated* industry, 0= otherwise.
 SPEC = indicator variable, 1= auditor with market share *greater* than 20%
 for firm in *specific* industry, 0= otherwise.

Table 4
Matrix of Correlation Coefficients (p-value) Among Variables
(n=156)

	LnFee	LnTA	SUB	DE	ROI	Foreign
LnFee	1.000					
LnTA	0.652***	1.000				
SUB	0.484***	0.450***	1.000			
DE	0.056	-0.097	0.026	1.000		
ROI	0.141*	0.224***	0.148*	-0.008	1.000	
Foreign	0.143*	-0.151*	0.228***	-0.005	-0.002	1.000

Ln (FEE) = natural logarithm of total audit fees,
Ln (ASSET) = natural logarithm of assets,
SUB = square root of the number of subsidiaries,
DE = ratio of long-term debt to total assets,
ROI = ratio of earnings before interest and tax to total assets,
Foreign = proportion of subsidiaries that represent foreign operations,

Table 5
Empirical Test-Pooled Industry
(Dependent variable: LnFee)

Independent Variables	Predicted Sign	Audit Fee Model 1 (n=156)		Fee Model 2 (n=75)	
		Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
Intercept		2.584 (12.07)***	2.604 (12.50)***	2.58 (12.37)***	2.033 (3.54)***
LnTA	+	0.309 (9.26)***	0.277 (8.57)***	0.292 (9.50)***	0.345 (6.03)***
SUB	+	0.070 (1.76)**	0.095 (2.37)***	0.099 (2.45)***	0.047 (0.73)
DE	+	-0.060 (-0.19)	0.066 (0.21)	0.096 (0.30)	-0.188 (-0.32)
ROI	-	0.092 (0.67)	0.068 (0.49)	0.059 (0.42)	0.492 (0.86)
Foreign	+	0.396 (1.97)**	0.573 (2.92)***	0.556 (2.82)***	0.492 (1.11)
Opin	+	0.145 (0.30)	0.069 (0.14)	0.103 (0.214)	0.599 (0.71)
YE	+	0.063 (0.41)	-0.034 (-0.22)	-0.013 (-0.09)	0.241 (0.66)
Loss	+	0.519 (3.35)***	0.491 (3.10)***	0.492 (3.09)***	0.514 (1.64)*
REGSPEC	-	-0.160 (-0.94)			
NREGSPEC	+	0.410 (2.27)**			
SPEC	+		0.186 (1.53)*		
DIFF					0.726 (2.42)***
Adj. R ²		0.551	0.527	0.522	0.409
F-value		18.277***	20.197***	22.225***	6.699***

*(**) (***) Significant at the 0.10 (0.05) (0.01) level, *one-tail* tests where appropriate.

Ln (FEE) = natural logarithm of total audit fees,

Ln (ASSET) = natural logarithm of assets,

SUB = square root of the number of subsidiaries,

DE = ratio of long-term debt to total assets,

ROI = ratio of earnings before interest and tax to total assets,

Foreign = proportion of subsidiaries that represent foreign operations,

Opin = indicator variable, 1 = qualified audit report,

YE = indicator variable, 1 = December 31st year-end,

Loss = indicator variable, 1 = loss in the past three years,

REGSPEC = indicator variable, 1= auditor with market share *greater* than 20% for firm in *regulated* industry, 0= otherwise.

NREGSPEC= indicator variable, 1= auditor with market share *greater* than 20% for firm in *non-regulated* industry, 0= otherwise.

SPEC =indicator variable, 1=specialists in either regulated or non-regulated industries, using 20% rule.

DIFF = indicator variable, 1=auditor specialists in non-regulated industries, 0=auditor specialists in regulated industries.

The error term u is assumed to have normal OLS regression properties.

Table 6
Industry Regressions-Specialist Fee Effect
(Dependent Variable = LnFee; Independent Variables with predicted sign in parenthesis)

Independent Variables	SIC 131 (n=33)	SIC357 (n=37)	SIC581 (n=21)	SIC602 (n=65)
Intercept-Coefficients	2.462	3.615	1.980	1.211
(t-statistic)	(6.304)	(9.446)	(2.727)	(1.825)
LnTA (+)	0.462 (6.351)***	0.169 (2.045)***	0.208 (1.324)	0.500 (7.026)***
SUB (+)	-0.102 (-0.941)	0.251 (3.248)***	0.102 (1.523)	0.023 (0.312)
Current (+) (GLR for SIC 602)	0.571 (0.790)	-0.336 (-0.814)	5.959 (1.857)**	-0.667 (-0.476)
Quick (-) (LDR for SIC 602)	-0.069 (-2.592)***	-0.067 (-1.087)	-0.020 (-0.114)	0.516 (0.501)
DE (+)	-0.232 (-0.472)	0.257 (0.404)	-0.444 (-0.613)	1.357 (0.480)
ROI (-)	0.218 (0.433)	0.145 (0.940)	4.786 (2.022)**	0.340 (1.082)
Foreign (+)	0.423 (0.937)	-0.166 (-0.505)	-1.272 (-0.841)	
Opin (+)	0.541 (0.863)	-0.479 (-0.802)		
YE (+)	-0.147 (-0.439)	0.214 (0.935)	0.323 (0.966)	
Loss (+)	0.524 (1.970)**	0.071 (0.292)	0.813 (2.026)**	
SPEC (-) - SIC 131, 602 (+) - SIC 357, 581	-0.143 (-0.580)	0.521 (1.774)**	0.357 (0.844)	-0.152 (-0.852)
Adj R-Square	0.680	0.718	0.293	0.585
F-statistic	7.190***	9.334***	1.832*	12.288***

Note: * (**) (***) Significant at the 0.10 (0.05) (0.01) level, one-tail tests where appropriate.

Ln (FEE) = natural logarithm of total audit fees,

Ln (ASSET) = natural logarithm of assets,

SUB = square root of the number of subsidiaries,

Current = ratio of current assets to total assets,

Quick = ratio of current assets, less inventories, to current liabilities,

DE = ratio of long-term debt to total assets,

ROI = ratio of earnings before interest and tax to total assets,

Foreign = proportion of subsidiaries that represent foreign operations,

Opin = indicator variable, 1 = qualified audit report,

YE = indicator variable, 1 = December 31st year-end,

Loss = indicator variable, 1 = loss in the past three years,

SPEC = indicator variable, 1= auditor with market share *greater* than 20%
for firm in *specific* industry, 0= otherwise.

The error term u is assumed to have normal OLS regression properties.

Table 7
Regional Specialist Fee Effect: Pooled vs. Specific Industry
(25% rule; Dependent Variable: LnFee)

Audit Fee Model	Model 1	Model 3	Model 3	Model 3	Model 4
Independent Variables	4 industries (n=156)	SIC 131 (n=33)	SIC357 (n=37)	SIC581 (n=21)	SIC602 (n=65)
# of state specialist	25	6	6	2	11
Intercept-Coefficients (t-statistic)	2.624 (12.44)	2.325 (6.24)	3.585 (8.63)	1.533 (1.95)	1.021 (1.53)
LnTA (+)	0.286 (9.16)***	0.496 (7.39)***	0.221 (2.72)***	0.298 (2.55)**	0.494 (7.33)***
SUB (+)	0.099 (2.46)***	-0.118 (-1.16)	0.269 (3.28)***	0.120 (1.78)*	0.008 (0.11)
Current (+) (GLR for SIC 602)		0.628 (0.97)	0.014 (0.03)	6.401 (2.03)**	-0.386 (-0.28)
Quick (-) (LDR for SIC 602)		-0.070 (-2.82)***	-0.099 (-1.59)*	-0.052 (-0.32)	0.434 (0.43)
DE (+)	0.088 (0.28)	-0.339 (-0.73)	0.270 (0.40)	-0.326 (-0.45)	1.418 (0.51)
ROI (-)	0.058 (0.42)	0.262 (0.56)	0.163 (1.00)	6.133 (2.41)**	0.394 (1.27)
Foreign (+)	0.550 (2.80)***	0.407 (0.96)	-0.396 (-1.26)*	-2.020 (-1.24)	
Opin (+)	0.130 (0.27)	0.382 (0.66)	-0.533 (-0.84)		
YE (+)	-0.039 (-0.26)	-0.103 (-0.33)	0.375 (1.72)**	0.390 (1.15)	
Loss (+)	0.464 (2.86)***	0.596 (2.37)**	-0.059 (-0.22)	0.908 (2.26)	
RSPEC [#] (+) (-)-SIC 131, 602 (+)-SIC 357, 581	0.187 (1.23)	-0.499 (-1.89)**	0.208 (0.64)	-0.300 (-0.66)	0.342 (1.65)*
Adj R-Square	0.52	0.72	0.68	0.33	0.59
F-statistic	19.99***	8.57***	8.20***	1.98*	12.97***

* (**) (***) Significant at the 0.10 (0.05) (0.01) level, one-tail tests where appropriate.

indicates that SPEC in audit fee model 3 and 4 is changed to RSPEC, an indicator variable representing auditor with client-based market share greater than 25% at the state level.

The remaining variables are defined in Table 5 and 6.

Table 8
Within-Big 5 Specialist Fee Effect

Independent Variables	Predicted Sign	Audit Fee Model 1 (n=127)			Audit Fee Model 2 (n=75)		
		Coefficient	t-statistic	p-value	Coefficient	t-statistic	p-value
Intercept		2.665	9.767	0.000***	2.033	3.547	0.000***
LnTA	+	0.309	8.059	0.000***	0.345	6.039	0.000***
SUB	+	0.063	1.479	0.070*	0.047	0.737	0.231
DE	+	-0.062	-0.184	0.427	-0.188	-0.324	0.373
ROI	-	0.229	0.904	0.183	0.492	0.862	0.196
Foreign	+	0.422	1.743	0.041**	0.492	1.119	0.133
Opin	+	0.492	0.715	0.238	0.599	0.713	0.239
YE	+	-0.074	-0.394	0.347	0.241	0.663	0.254
Loss	+	0.464	2.476	0.007***	0.514	1.646	0.052*
REGSPEC	-	-0.093	-0.492	0.311			
REGNSPEC		0.072	0.357	0.360			
NREGSPEC	+	0.466	2.370	0.009***			
DIFF	+				0.726	2.429	0.008***
Adj. R ²			0.471			0.409	
F-value			11.184**			6.699***	

*(**) (***) Significant at the 0.10 (0.05) (0.01) level, *one-tail* tests where appropriate.

Ln (FEE) = natural logarithm of total audit fees,

Ln (ASSET) = natural logarithm of assets,

SUB = square root of the number of subsidiaries,

DE = ratio of long-term debt to total assets,

ROI = ratio of earnings before interest and tax to total assets,

Foreign = proportion of subsidiaries that represent foreign operations,

Opin = indicator variable, 1 = qualified audit report,

YE = indicator variable, 1 = December 31st year-end,

Loss = indicator variable, 1 = loss in the past three years,

REGSPEC = indicator variable, 1= auditor with market share *greater* than 20% for firm in *regulated* industry, 0= otherwise.

REGNSPEC = indicator variable, 1= auditor with market share *less* than 20% for firm in *regulated* industry, 0= otherwise.

NREGSPEC= indicator variable, 1= auditor with market share *greater* than 20% for firm in *non-regulated* industry, 0= otherwise.

DIFF = indicator variable, 1=auditor specialists in non-regulated industries, 0=auditor specialists in regulated industries.

The error term u is assumed to have normal OLS regression properties.