

**The Effects of Industry Specialization on Audit Quality:  
An Examination Using Bid-ask Spreads**

**By**

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**SUMMARY**

One factor that affects the level of audit quality provided by an auditor is that auditor's industry knowledge. It can therefore be hypothesized that those auditors that specialize in a given industry (industry specialists) have more opportunity to gain industry knowledge and therefore may possess more industry knowledge than their non-specialist counterparts. This paper examines the association between bid-ask spreads, a proxy for audit quality, and auditors that maintain a specialization in their clients industry.

Prior research has shown that a portion of the bid-ask spread arises from differences in information asymmetry among stock market participants. The results of the regression analysis presented in this paper provide evidence that companies audited by an industry specialist have lower levels of information asymmetry measured by the bid-ask spread than those companies audited by non-specialists. This relationship is maintained for a number of different measures of industry specialization. Since the purpose of an audit is to reduce information risk, the reduction in information asymmetry associated with an industry specialist is attributed to a higher level of audit quality in this group of audit engagements.

## INTRODUCTION

Prior research has hypothesized that auditors provide different levels of audit quality in response to differences in the levels of audit quality demanded by their clients (DeAngelo 1981b). The differences in demand result from differences in client agency costs (Watts and Zimmerman, 1986). The differences in supply result from many factors. DeFond, Francis, and Wong (2000) contend one factor affecting the level of audit quality is industry specialization. They argue industry specialists provide a higher quality audit than do non-specialists. Empirical evidence, however, is mixed. Krishnan and Yang (1999) and Craswell, Francis, and Taylor (1995) provide evidence auditor specialization results in higher levels of audit quality, while Lys and Watts (1994) and Palmrose (1986) find no evidence to support this hypothesis.

This paper extends previous research in three significant ways. First, it provides additional evidence of a positive relationship between industry specialization and audit quality. Second, and more importantly, it provides evidence that audit quality increases as the industry market share of the auditor increases. This evidence is provided by using both a continuous variable for market share and by comparing discrete levels of market share. Finally, this paper examines the association between industry specialization and audit quality using a more direct measure of audit quality than used in prior research, the clients' bid-ask spreads. The bid-ask spread, defined as the difference between the ask price and the bid price for a company's stock, has been shown to be positively associated with the extent of information asymmetry about the firm (Stoll 1989). Because the role of an audit is the reduction of information risk (Boynton and Kell 1996, 36), higher quality

auditors mitigate information asymmetries (Firth and Liao-Tan, 1998). It is therefore argued the bid-ask spread is a measure of audit quality.

The remainder of this paper is organized as follows. The next section presents the motivation for the study. Subsequent sections describe the research method and provide the empirical results. The final section contains the conclusions of the study.

### **MOTIVATION FOR THE STUDY**

Audit quality is dependent on both the competence and independence of the auditor (DeAngelo 1981a). One factor affecting the competence of the auditor is their industry specific knowledge (DeFond, Francis, and Wong 2000). Section 311.08 of the Statements on Auditing Standards concludes that when planning the audit the auditor should consider the audit implications of matters affecting their client's industry including economic conditions, government regulations, and changes in technology (AICPA 1998). It is postulated that the auditor's ability to evaluate industry conditions and their effect on the client's business will be enhanced by the auditor's experience with clients in that industry. The more auditing performed in a given industry, the more knowledge gained about that industry, the higher the quality of the audit. Thus industry expertise may be one methodology for auditors to differentiate themselves from their competitors in the marketplace.

Prior research in this area has had mixed results. One approach to examining the impact of auditor specialization is audit fees. Because the auditor has made an investment in obtaining an industry specialization, they are expected to receive a fee premium. On the other hand, economies of scale may result in fee reductions. Craswell, Francis, and Taylor (1995) find industry specialists receive a significant fee premium. Palmrose

(1986) finds no evidence of a fee premium. Pearson and Trompeter (1994) find fee cutting is diminished in the insurance industry when a company changes auditors from a non-industry specialist to an industry specialist, but fee cutting is prevalent when a company changes from an industry specialist to another industry specialist. Ettredge and Greenberg (1990) find greater industry expertise results in lower fees for initial audits. DeFond, Francis, and Wong (2000) find that industry specialists receive a premium if they are part of the Big 6<sup>1</sup> but receive lower fees than average if they are not. The results of studies that use proxies for audit quality other than audit fees are more consistent. Krishnan and Yang (1999) find a positive relationship between industry specialists and the earnings response coefficient consistent with industry specialists providing a higher quality audit. Ward, Elder, and Kattelus (1994) and Deis and Groux (1992) in studies of government units find industry specialists provide a higher quality audit.

Most prior research that examines the relationship between audit quality and industry specialists has used proxies for audit quality that are indirect in nature. For instance, audit fees measure the perception of higher audit quality; clients are willing to pay higher audit fees because they believe the auditor provides a higher quality audit. Similarly, a greater earnings response coefficient for industry specialists (Krishnan and Yang, 1999) provides evidence of the public's perception of a higher level of audit quality for that group of audit firms. In both cases, the participants may have little knowledge of the actual level of audit quality provided by the auditor.

Bid-ask spreads provide a more direct measure of audit quality than these proxies.<sup>2</sup> Market makers stand ready at any time to buy or sell securities in which they trade. If they experience a level of trading they cannot explain based on the information

that they possess; they increase their bid-ask spread in order to counteract the information asymmetry between themselves and the market participant. The market maker does not know the source of the information asymmetry, he may never know, he merely knows there are market participants that hold information he does not possess and reacts to it.

The process of preparing financial statements is an art, not a science. Financial statement preparation requires the use of estimates, the interpretation of the “proper” treatment of transactions, and the “proper” application of accounting principles. Unintentional and intentional errors may also be present in financial statements. Accuracy in the presentation of financial statements is therefore a relative rather than an absolute term. Accurate financial statements are neither definable nor attainable. More accurate financial statements, ones that provide more information to the user of those financial statements, should be the goal of all financial statement preparers. A higher quality audit increases the probability that the financial statements more accurately reflect the financial position and results of operations of the entity being audited. Since the amount of information about a company at any given point in time is finite, information made public by a higher quality audit reduces the amount of private information available about that company thus reducing information asymmetry among market participants. A reduction in information asymmetry between investors and the market maker will result in lower bid-ask spreads. The bid-ask spread therefore provides a direct measure of the reduction in information asymmetry associated with a higher quality audit.<sup>3</sup>

## **RESEARCH METHOD**

My analysis regresses bid-ask spreads on a dummy variable indicating an industry specialist and on variables that proxy for other factors that have been shown in prior

research to affect bid-ask spreads. Cross sectional analysis of industry specialists and non-specialists is used to capture differences in bid-ask spreads for these two groups. Additional analysis replaces the auditor specialization dummy variable with a continuous variable representing the industry market share of the auditor.

### **Sample Description**

Bid-ask spread data was obtained from the 1997 Center for Research in Security Prices (CRSP). Other data was obtained from the 1997 Compustat annual and quarterly databases, the Disclosure database and the Securities and Exchange Commission EDGAR database. Merging the CRSP, Compustat, and Disclosure databases yielded 8,010 observations. Edits that identified companies without trading in 1997 or that lacked basic information eliminated 1,785 observations. An additional 516 observations were eliminated that did not have the date their 10k was received at the SEC leaving 5,709 observations.

The fifth trading day after the release of the fourth quarter earnings announcement or five days after the company's 10k was received at the Securities and Exchange Commission was selected as the observation date. My analysis is designed to measure the level of information asymmetry present after the release of earnings or the 10k rather than the change in information resulting from the release of this information. This is an important distinction for the intent was not to determine how the release of financial information reduced information asymmetry but rather to determine if there was a cross-sectional difference in the level of information asymmetry between one class of companies and another class of companies.

The day selected to measure differences in the level of information asymmetry was impacted by two factors. First prior research has shown an increase in the variation of the bid-ask spreads the four days prior to, the day of, and the day after the earnings announcement date (Yohn 1998). My first objective was to select a day far enough away from the information release so all market participants could assimilate the information. My second objective was to ensure the date was close enough to the information release for the information to have the most relevance in the valuation of the company. The fifth trading day after the information release was selected so that I was assured the first objective was met (market participants who have not assimilated the information at this point are in all probability not significant players in the market) while still meeting the second objective. Trading information from CRSP was selected for that day, or if not available, the day the next trade occurred. Two hundred and fifty six observations did not have trading data, 83 observations did not have corresponding financial data from Compustat and Disclosure, and 16 observations were eliminated as outliers for extremely large values (more than three standard deviations from the mean) of variance, volume, and price leaving 5,354 observations.

### **Variable Descriptions**

The dependent variable used in this paper is the percentage bid-ask spread computed as the difference between the high ask price for the day and the low bid for the day divided by the average of the high ask and the low bid.<sup>4</sup>

The motivations for this paper is to determine if there is a cross sectional difference in the level of information asymmetry between companies whose audit firms specialize in their industry and those who do not. The model is specified in two forms.

The first specification uses a dummy variable that has a value of one if the auditor audits at least ten clients and maintains at least a 25 percent market share for the industry and a value of zero otherwise<sup>5</sup>. The second form uses a continuous variable indicating the market share the auditor maintains in the industry.

Since this paper focuses on the information asymmetry component of the bid-ask spread, I must control the other two components of the bid-ask spread, the transaction cost and the inventory holding cost. The inventory holding cost results from the market maker maintaining an inventory in order to stand ready to trade at any time. The transaction costs are the costs associated with making a trade.

The larger the variance in returns for a stock, the lower the probability that the market makers can maintain an ask price consistent with the price they paid for their inventory or a bid price to purchase inventory that they believe they can earn a return. The market makers respond to return variances with higher bid-ask spreads in order to earn a profit from their trades. A large volume of trade may offset these effects for it allows the market maker to quickly reverse their market position, reduce their margins on individual transactions, and provide them the opportunity to recover their losses. Consistent with prior research a positive relationship is expected between variance of returns (VARIANCE) and bid-ask spreads (Yohn 1998; Chung et al 1995) and a negative relationship is expected between bid-ask spreads and volume of trade (VOLUME) (Coller and Yohn 1997; Hamilton 1991). Finally, the price of the stock (PRICE), a proxy for transaction cost, is expected to be negative consistent with Howe and Lin (1992) and Stoll (1978).

Market makers can manage asymmetric information risk by identifying informational trading. In the absence of informational trading, investors will hold well-diversified portfolios and will tend to trade in proportion to the number of shares outstanding. If investors hold information they believe others do not possess, they will trade in the stocks for which information is held (Stoll 1978). Turnover, defined as the number of shares traded divided by the number of shares outstanding, is included in the model to identify the impact of informational trading on the bid-ask spread.<sup>6</sup>

Differences in information asymmetry can result from factors other than auditor classification. To control for factors affecting information asymmetry found significant in prior research two additional variables are added to the model. A negative relationship is expected between the number of analysts (NOANAL) and bid-ask spreads (Yohn 1998; Shores 1990) and a positive relationship is expected between insider ownership (INSIDER) and bid-ask spreads (Benston and Hagerman 1974).

Larger entities generally release more information than smaller entities. Economies of scale allow larger companies to have public relations departments, more consumer and business advertising, and investor relations departments that would be cost prohibitive for smaller firms. The release of information would decrease information asymmetry and the bid-ask spread. However, larger companies generally have a more complex capital, organizational, and business structures. These complexities make it harder for the market maker to assimilate the effect of information about a company. Market makers respond to these complexities by increasing their bid-ask spreads. A size variable, the market value of equity (MARVALUE) was used to control for these

phenomenon. The relationship between market value of equity and bid-ask spread is uncertain so there is no basis for prediction of a sign.

The final two variables measure the difference in the stock exchanges since the characteristics of firms who trade on the New York Stock Exchange, the American Stock Exchange, and the National Association of Securities Dealers and the characteristics of the exchanges themselves are different (Affleck-Graves, Hegde, and Miller 1994). Dummy variables indicating that a stock is traded on the New York Stock exchange and the American Stock Exchange were added to the model. The differences in the exchanges may be caused by a variety of factors. Therefore, there is no basis for the prediction of the sign of the exchange variables, so none is provided.

## **EMPIRICAL RESULTS**

### **Descriptive Statistics**

Table 1 provides sample statistics for spreads and the control variables for industry specialists and non-specialists (specialists defined at a 25 percent market share). These statistics show that it is necessary to control for items other than industry specialization. SPREAD is lower for industry specialists. The variables VOLUME, PRICE, and NOANAL are larger for industry specialists and the variables VARIANCE and INSIDER are smaller consistent with the expected signs of these variables for the regression model. These relationships hold true for both the mean and the median.<sup>7</sup>

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Insert Table 1 about here

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Table 2 presents descriptive statistics of industry specialization by audit firm for firms that maintain a 25 percent market share. There are no industry specialists outside

the Big 6. Deloitte performs the most audits in my sample as an industry specialist with a total of 170 audits and Coopers performs the least at 34. Andersen maintains the most industry specializations with ten and Coopers maintains the least with two.

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Insert Table 2 about here

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Table 3 provides Spearman Correlation Coefficients for the independent and dependent variables. Significant correlations between a number of independent variables exist. MARVALUE, the proxy for size, is correlated with VARIANCE (-.67), VOLUME (.69), PRICE (.86), and NOANAL (.70). There are also a number of significant correlations between the variables correlated with MARVALUE. Since these high correlations indicate multicollinearity could be a problem, the model was tested for multicollinearity. No variance inflation factors were greater than three and the condition index was five both well below acceptable levels. The high values for the t-statistics also indicate that the effects of multicollinearity are not significant in the estimation of the model.

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Insert Table 3 about here

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### **Regression Analysis**

I test for differences in bid-ask spreads for companies audited by industry specialists and those audited by non-specialists using the following model:

$$\text{SPREAD} = \beta_0 + \beta_1 \text{SPECIALIST} + \beta_2 (\text{VARIANCE}) + \beta_3 (\text{VOLUME}) + \beta_4 (\text{PRICE}) + \beta_5 (\text{TURNOVER}) + \beta_6 (\text{NOANAL}) + \beta_7 (\text{INSIDER}) + \beta_8 (\text{MARVALUE}) + \beta_9 (\text{NYSE}) + \beta_{10} (\text{AMER}) + \varepsilon$$

Where

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$ ;

SPECIALIST is a dummy variable indicating industry specialization determined by market share based on sales and number of audits performed in an industry (-);

VARIANCE is the variance of returns for the current day and the 29 previous trading days (+);

VOLUME is the number of shares traded for the current day and 29 previous trading days (-);

PRICE is the price of the stock for the current day (-);

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding (+);

NOANAL is the number of year-end earnings estimates provided (-);

INSIDER is the percentage of shares held by insiders (+);

MARVALUE is the market value of equity (?);

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange (?);

AMERICAN is a dummy variable indicating the shares are traded on the American Stock Exchange (?);

Table 4 presents the results of the regression analysis<sup>8</sup> for industry specialist. All variables are significant at a .01 level except NOANAL which is significant at a .0127 level. SPECIALIST is negative and significant at a .0001 level. These results support the assumption that industry specialists reduce information asymmetry about their clients more than non-specialists. Thus based on the relationship described earlier between information asymmetry and audit quality, these results provide evidence that industry specialists provide a higher quality audit than those that do not.

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Insert Table 4 about here

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Table 5 presents the results of the regression analysis for a continuous variable MARSHARE. The model presented earlier was modified by replacing the SPECIALIST variable with a continuous variable MARSHARE which measures the percentage of the audit market the auditor maintains in a given industry based on their client's sales. All variables are significant at a .01 level except NOANAL which is significant at a .0227 level. MARSHARE is negative and significant at a .0001 level indicating an inverse relationship between an auditor's market share of companies in an industry and bid-ask spreads. Thus based on the relationship described earlier between information asymmetry and audit quality, these results provide evidence that the amount of an auditor's experience in an industry is positively related the quality of the audit they provide.

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Insert Table 5 about here

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To provide additional evidence that audit quality increases as the auditor's market share increases, further analysis was performed to determine if there were differences in the reduction of information asymmetry between the various levels of market share. The results of this analysis are presented in Table 6. The columns of the table identify the sample used in each regression. The samples for the regressions were limited to those observations where the audit firm audited at least ten companies in an industry and the auditor maintained the specified market share for that industry. Regression results are then presented for specification of the SPECIALIST variable for those market shares of 15, 20 and 25 percent that were greater than the minimum market share in the sample.

For the sample of observations where the auditor maintained at least a ten percent market share (Table 6, Panel A), the difference in information asymmetry was significant at a .05 level for SPECIALIST defined at a 15 percent market share and at a .01 level for SPECIALIST defined at a 20 and 25 percent market share. For the sample of observations where the auditor maintained at least a 15 percent market share (Table 6, Panel B), the SPECIALIST variable was significant at a .01 level for both the 20 and 25 percent market share. For the sample of observations where the auditor maintained at least a 20 percent market share (Table 6, Panel B), the SPECIALIST variable was not significant. These results provide evidence that as the industry market share of the auditor increases information asymmetry decreases. The only exception is that there is no appreciable difference identified between the 20 and 25 percent levels. These results are consistent with the results presented in Table 5 where market share was defined as a continuous variable. Based on the association between information asymmetry and audit quality presented earlier, these results provide additional evidence that as industry specialization increases, audit quality increases.

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Insert Table 6 about here

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This analysis also provides evidence that the results for auditor specialists are not the result of the size of the company being audited. In two of the above analyses where the SPECIALIST variable was significant, the market value of the companies audited by non-specialists was greater than the market value of the companies audited by specialists. This analysis also provides evidence that the significance of the SPECIALIST variable

does not result from brand name recognition for all observations in the samples are Big 6 auditors.

### **Sensitivity Analysis**

To determine if the results presented for SPECIALIST above are determined by the specification of the variable, alternative measures of industry auditor specialization were defined based on performing at least ten audits in an industry and market shares of zero, 10, 15, and 20 percent and by changing the ten audit restriction to five audits and removing it entirely. Table 7 presents the results of the analysis. Panel A, B, and C present the results for where SPECIALIST specification requires at least ten, five, and no required number of audits, respectively, at a no minimum, 10, 15, 20, and 25 percent market share. The coefficient of SPECIALIST is negative and significant at a .01 level for all cases but where the SPECIALIST variable requires no minimum percentage market share. In both of these cases SPECIALIST is not significant at any level. These results show that the results presented earlier are not significantly affected by the specification of the SPECIALIST variable if the auditor maintains at least a ten percent market share.

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Insert Table 7 about here

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To control for the effects of size on my results, a size variable the market value of the company was included in the primary and alternative models. The analysis of the results presented in Table 6 provides additional evidence that SPECIALIST is not a proxy for the size of the company being audited. The results presented for Table 8 provide further evidence that this is the case. For this regression, the sample was

examined and the largest companies whose auditors were classified as industry specialists were deleted until the mean market value of non-specialists was greater than the mean market value of industry specialists. Regression analysis for this limited sample provides a coefficient for SPECIALIST that is negative and significant at a .01 level. These results and the results presented earlier provide evidence that the SPECIALIST variable is not a proxy for size of the company being audited.

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Insert Table 8 about here

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Table 9 presents the results of a regression analysis for observations that are 30 trading days after the observations presented in the original sample used in Tables 1 through 8. These results are presented for two reasons. First, for the selection of the fifth trading day after the information release used in the original sample, I indicated that one reason the fifth day and not a later date was selected was to maximize the impact of the information release. The results presented in Table 9 provide evidence that within 30 trading days, the impact of the industry specialization has been negated (the coefficient of SPECIALIST is not significant at any level). The impact of the quality of the financial information release, as measured in the original sample, has become insignificant over time as new information about the company, either public or private, has become available.

The results in Table 9 also provide additional evidence that the SPECIALIST variable is not a proxy for size. The companies in the sample have not changed significantly in size in the 30 trading days since the original observation date but the coefficient of SPECIALIST is insignificant.

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Insert Table 9 about here

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## **CONCLUSIONS**

Using bid-ask spreads as a proxy for audit quality, this paper examines differences in audit quality resulting from differences in the level of the auditor's industry specialization as measured by the market share of audits they perform in a given industry. Using both a continuous variable for the level of industry specialization and a comparison of discrete levels of industry specialization the results of my analysis provide evidence that audit quality increases as the level of auditor specialization increases. Additional analysis provides evidence these results are robust for various specifications of industry specialization

## ENDNOTES

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<sup>1</sup> The Big 6 (previously known as the Big 8) became the Big 5 effective July 1, 1998 due to the merger of Price Waterhouse and Coopers and Lybrand. Since the data to be used in this paper predates this merger and follows the initial mergers within the Big 8, the term Big 6 will be used throughout this paper to designate this group of firms.

<sup>2</sup> The bid-ask spread, defined as the difference between the ask price and the bid price for a company's stock, has been shown to be positively associated with the extent of information asymmetry about the firm (Stoll 1989). Research in this area (Boone 1998; Greenstein and Sami 1994; Raman and Tripathy 1993) has shown reductions in information asymmetry are associated with reductions in bid-ask spreads.

<sup>3</sup> This argument can be summarized as follows: Higher audit quality, more public information, less private information, less informational trading, lower bid-ask spreads.

<sup>4</sup>  $(\text{Ask} - \text{bid}) / ((\text{ask} + \text{bid}) / 2)$

<sup>5</sup> Market share for determining auditor specialization was determined using all usable observations contained in Compustat for 1997 scaled by the client's net revenue. Two digit SIC codes were used to determine the industry classifications of the clients of each auditor. The dummy variable was specified based on the auditor auditing at least 10 clients in an industry and a 25 percent market share. Ten clients were selected for it was believed that industry expertise could not be obtained with only a limited number of clients regardless of market share. Sensitivity analysis was performed where industry specialization only require five clients and where this restriction was eliminated. Sensitivity analysis was also performed varying the percent market share for values of zero, ten, 15, and 20 percent.

<sup>6</sup> Informational trading will continue to exist regardless of whether a company is audited by an industry specialist or not for there are many factors that cause information asymmetry that is beyond the scope of an audit. The dummy variable for an auditor industry specialization measures the reduction in information risk associated with that type of auditor.

<sup>7</sup> The signs for the variables MARVALUE, NYSE, and AMER are not predicted so it is not possible to determine if they are consistent with a lower bid ask spread.

<sup>8</sup> Model specification tests rejected the hypothesis of homoskedasticity in the model so all t-statistics are calculated using White's consistent estimate of the covariance matrix. Industry specialist is defined here as auditors that audit at least ten companies in an industry and maintain at least a 25 percent market share of public audits in that industry.

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**Table 1**  
**Sample Statistics**  
**Industry Specialists\* (Spec) and Non-Specialists (Non)**

	Mean		Median		Minimum		Maximum	
	Spec	Non	Spec	Non	Spec	Non	Spec	Non
SPREAD	1.0609	1.3358	0.8065	0.9434	0.0300	0.0492	7.1429	9.3023
MARSHARE	0.3720	0.1193	0.3294	0.1219	0.2537	0.0000	0.8751	0.9537
VARIANCE	0.0022	0.0033	0.0009	0.0013	0.0000	0.0000	0.1189	0.3351
VOLUME <sup>+</sup>	7.3295	5.1854	1.7024	1.2357	0.0093	0.0009	164.1388	417.8803
PRICE	20.5525	17.7351	16.2500	12.0000	0.1880	0.1250	145.7500	337.6250
TURNOVER	0.0058	0.0057	0.0027	0.0026	0.0001	0.0001	0.1366	0.2882
INSIDER	14.8973	17.4135	4.3300	7.4500	0.0000	0.0000	99.9900	99.9900
NOANAL	5.8245	4.0856	3.0000	2.0000	0.0000	0.0000	41.0000	45.0000
MARVALUE <sup>#</sup>	2.1078	1.2918	0.2122	0.1199	0.0013	0.0003	171.4336	163.0959
NYSE	0.3974	0.2872	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000
AMER	0.0684	0.0880	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000
N	775	4,579						

\*Specialists are defined as audit firms that audit at least ten companies in the industry and maintain at least a 25 percent market share for that industry

<sup>+</sup> In millions

<sup>#</sup> In billions

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

MARSHARE is the percentage of the market the auditor maintains in a given industry based on their client's sales

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 2**  
**Auditor Specializations by Audit Firm\***

Auditor	Number Of Specializations	Number of Audits as		Total Audits
		Non-Specialists	Specialists	
Andersen	10	799	164	963
Coopers	2	646	34	680
Ernst	8	952	106	1,058
Deloitte	8	533	170	703
Peat	6	627	165	792
Price	4	419	136	555
Other	0	603		603
<b>Total</b>	<b>38</b>	<b>4,579</b>	<b>775</b>	<b>5,354</b>

\*Industry specialists are defined as audit firms that audit at least ten companies in the industry and maintain at least a 25 percent market share for that industry

**Table 3**  
**Spearman Correlation Analysis**

	SPREAD	MARSHARE	VARIANCE	VOLUME	PRICE
MARSHARE	-0.1776				
	0.0001				
VARIANCE	0.7020	-0.2157			
	0.0001	0.0001			
VOLUME	-0.0602	0.1283	-0.1774		
	0.0001	0.0001	0.0001		
PRICE	-0.5557	0.2223	-0.7236	0.4091	
	0.0001	0.0001	0.0001	0.0001	
TURNOVER	0.3071	-0.0251	0.1443	0.4935	0.0818
	0.0001	0.0683	0.0001	0.0001	0.0001
INSIDER	0.1507	-0.0669	0.2134	-0.1470	-0.1765
	0.0001	0.0001	0.0001	0.0001	0.0001
NOANAL	-0.2534	0.1894	-0.3871	0.5948	0.5892
	0.0001	0.0001	0.0001	0.0001	0.0001
MARVALUE	-0.4807	0.2410	-0.6656	0.6870	0.8573
	0.0001	0.0001	0.0001	0.0001	0.0001
NYSE	-0.4863	0.1778	-0.5639	0.2856	0.4883
	0.0001	0.0001	0.0001	0.0001	0.0001
AMER	-0.0649	-0.0407	-0.0249	-0.2350	-0.1209
	0.0001	0.0032	0.0688	0.0001	0.0001
	TURNOVER	INSIDER	NOANAL	MARVALUE	NYSE
INSIDER	-0.0250				
	0.0671				
NOANAL	0.1905	-0.0489			
	0.0001	0.0003			
MARVALUE	0.1165	-0.1967	0.7007		
	0.0001	0.0001	0.0001		
NYSE	-0.0793	-0.2147	0.3216	0.5665	
	0.0001	0.0001	0.0001	0.0001	
AMER	-0.1601	0.01056	-0.1974	-0.1646	-0.2012
	0.0001	0.2540	0.0001	0.0001	0.0001

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

MARSHARE is the percentage of the market the auditor maintains in a given industry based on their client's sales

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

**Table 3**  
**Spearman Correlation Analysis**  
**(Continued)**

TURNOVER is quotient obtained by dividing the number of shares traded for the current day  
by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 4**  
**Results of Regression Analysis**  
**Industry Specialists\***

Variable	Expected Sign	Parameter Estimate	Whites t-statistic	P-Value
INTERCEPT		1.4102	26.0485	0.0001
SPECIALIST	-	-0.1236	3.9810	0.0001
VARIANCE	+	48.8379	4.9910	0.0001
VOLUME	-	-0.0021	2.6574	0.0043
PRICE	-	-0.0130	8.0035	0.0001
TURNOVER	+	0.0024	8.8528	0.0001
INSIDER	+	0.0029	3.9551	0.0001
NOANAL	-	-0.0055	2.3022	0.0127
MARVALUE	?	0.0149	5.6587	0.0001
NYSE	?	-0.5101	17.3059	0.0001
AMER	?	-0.3886	8.4767	0.0001
N	5,354			
Adjusted R <sup>2</sup>	.3865			

\*Industry specialists are defined as audit firms that audit at least ten companies in the industry and maintain at least a 25 percent market share for that industry

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 5**  
**Results of Regression Analysis**  
**Industry Market Share as Continuous Variable**

Variable	Expected Sign	Parameter Estimate	Whites t-statistic	P-Value
INTERCEPT		1.4412	24.6284	.0001
MARSHARE	-	-0.3984	4.0121	.0001
VARIANCE	+	48.8334	4.8643	.0001
VOLUME	-	-0.0026	3.3506	.0004
PRICE	-	-0.0132	7.8911	.0001
TURNOVER	+	0.0026	10.6908	.0001
INSIDER	+	0.0029	3.9342	.0001
NOANAL	-	-0.0050	2.0013	.0227
MARVALUE	?	0.0159	5.9127	.0001
NYSE	?	-0.4950	16.9764	.0001
AMER	?	-0.3927	8.6518	.0001
N	5,354			
Adjusted R <sup>2</sup>	.3909			

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

MARSHARE is the percentage of the market the auditor maintains in a given industry based on their client's sales

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 6**  
**Results of Regression Analysis**  
**Comparison of the Effects of the Specification of Market Share Percentage on the**  
**Auditor Specialization Variable by Restricting the Sample Population**

<b>Panel A</b>						
	<b>Sample Limited to Observations Where the Auditor Performs at Least Ten Audits in an Industry and Maintains at Least a Ten Percent Market Share and the Percent Market Share for SPECIALIST Variable is</b>					
	<b>Fifteen Percent</b>		<b>Twenty Percent</b>		<b>Twenty Five Percent</b>	
	<b>Parameter Estimate</b>	<b>P-Value</b>	<b>Parameter Estimate</b>	<b>P-Value</b>	<b>Parameter Estimate</b>	<b>P-Value</b>
INTERCEPT	1.2466	.0001	1.2388	.0001	1.2316	.0001
SPECIALIST (-)	-0.0562	.0492	-0.0870	.0019	-0.0969	.0017
VARIANCE (+)	68.8385	.0001	68.8111	.0001	68.7805	.0001
VOLUME (-)	-0.0027	.0019	-0.0028	.0017	-0.0028	.0018
PRICE (-)	-0.0092	.0001	-0.0093	.0001	-0.0094	.0001
TURNOVER (+)	0.0026	.0001	0.0026	.0001	0.0026	.0471
INSIDER (+)	0.0028	.0022	0.0028	.0024	0.0028	.0022
NOANAL (-)	-0.0031	.1198	-0.0030	.1235	-0.0027	.1451
MARVALUE (?)	0.0114	.0001	0.0115	.0001	0.0116	.0001
NYSE (?)	-0.4745	.0001	-0.4685	.0001	-0.4716	.0001
AMER (?)	-0.3471	.0001	-0.3427	.0001	-0.3466	.0001
N	3,109		3,109		3,109	
Adjusted R <sup>2</sup>	.4011		.4020		.4020	

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 6**  
**Results of Regression Analysis**  
**Comparison of the Effects of the Specification of Market Share Percentage on the**  
**Auditor Specialization Variable by Restricting the Sample Population**  
(Continued)

<b>Panel B</b>						
	<b>Sample Limited to Observations Where the Auditor Performs at Least Ten Audits in an Industry and Maintains at Least a</b>					
	<b>Fifteen Percent</b>			<b>Twenty Percent</b>		
	<b>Market Share and the Percent Market Share for the SPECIALIST Variable is</b>					
	<b>Twenty Percent</b>		<b>Twenty Five Percent</b>		<b>Twenty Five Percent</b>	
	<b>Parameter Estimate</b>	<b>P-Value</b>	<b>Parameter Estimate</b>	<b>P-Value</b>	<b>Parameter Estimate</b>	<b>P-Value</b>
INTERCEPT	1.2498	.0001	1.2374	.0001	1.1212	.0001
SPECIALIST (-)	-0.0845	.0089	-0.0889	.0062	-0.0536	.1324
VARIANCE (+)	62.1253	.0001	62.0905	.0001	58.7228	.0089
VOLUME (-)	-0.0021	.0373	-0.0020	.0411	-0.0011	.0073
PRICE (-)	-0.0089	.0001	-0.0090	.0001	-0.0073	.0005
TURNOVER (+)	0.0026	.0001	0.0026	.0001	0.0026	.0001
INSIDER (+)	0.0027	.0125	0.0027	.0116	0.0052	.0016
NOANAL (-)	-0.0056	.0306	-0.0052	.0385	-0.0053	.0597
MARVALUE (?)	0.0141	.0001	0.0142	.0001	0.0112	.0042
NYSE (?)	-0.4605	.0001	-0.4648	.0001	-0.4316	.0001
AMER (?)	-0.0342	.0001	-0.3478	.0001	-0.3678	.0001
N	2,147		2,147		1,163	
Adjusted R <sup>2</sup>	.4057		.4058		.4125	

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 7**  
**Results of Regression Analysis**  
**Comparison of Alternative Definitions of Auditor Specialist**

<b>Panel A</b>										
Variable (Expected Sign)	At Least 10 Audits and									
	No Required Market Share		Ten Percent Market Share		Fifteen Percent Market Share		Twenty Percent Market Share		Twenty- Five Percent Market Share	
INTERCEPT	1.4217	**	1.4364	**	1.4238	**	1.4147	**	1.4102	**
SPECIALIST (-)	-0.0321		-0.0764	**	-0.0802	**	-0.1082	**	-0.1236	**
VARIANCE (+)	48.8930	**	48.6898	**	48.7695	**	48.8218	**	48.8379	**
VOLUME (-)	-0.0020	**	-0.0020	**	-0.0020	**	-0.0021	**	-0.0021	**
PRICE (-)	-0.0129	**	-0.0128	**	-0.0128	**	-0.0129	**	-0.0130	**
TURNOVER (+)	0.0024	**	0.0024	**	0.0024	**	0.0024	**	0.0024	**
INSIDER (+)	0.0029	**	0.0028	**	0.0028	**	0.0029	**	0.0029	**
NOANAL (-)	-0.0061	**	-0.0058	**	-0.0057	*	-0.0057	*	-0.0055	*
MARVALUE (?)	0.0148	**	0.0147	**	0.0146	**	0.0148	**	0.0149	**
NYSE (?)	-0.5161	**	-0.5123	**	-0.5113	**	-0.5074	**	-0.5101	**
AMER (?)	-0.3902	**	-0.3908	**	-0.3899	**	-0.3865	**	-0.3886	**
N	5,354		5,354		5,354		5,354		5,354	
Adjusted R <sup>2</sup>	.3853		.3862		.3863		.3866		.3865	
<b>Panel B</b>										
Variable (Expected Sign)	At Least 5 Audits and									
	No Required Market Share		Ten Percent Market Share		Fifteen Percent Market Share		Twenty Percent Market Share		Twenty- Five Percent Market Share	
INTERCEPT	1.6200	**	1.4464	**	1.4263	**	1.4164	**	1.4113	
SPECIALIST (-)	-0.2638		-0.0902	**	-0.0833	**	-0.1096	**	-0.1234	
VARIANCE (+)	47.6476	**	48.6121	**	48.7493	**	48.8159	**	48.8231	
VOLUME (-)	-0.0019	*	-0.0020	*	-0.0021	*	-0.0022	*	-0.0021	
PRICE (-)	-0.0127	**	-0.0128	**	-0.0128	**	-0.0129	**	-0.0130	
TURNOVER (+)	0.0024	**	0.0024	**	0.0024	**	0.0024	**	0.0024	
INSIDER (+)	0.0029	**	0.0028	**	0.0029	**	0.0029	**	0.0029	
NOANAL (-)	-0.0049	*	-0.0057	*	-0.0056	*	-0.0057	*	-0.0055	
MARVALUE (?)	0.0142	**	0.0148	**	0.0147	**	0.0149	**	0.0149	
NYSE (?)	-0.5062	**	-0.5087	**	-0.5098	**	-0.5060	**	-0.5086	
AMER (?)	-0.3932	**	-0.3891	**	-0.3880	**	-0.3861	**	-0.3888	
N	5,354		5,354		5,354		5,354		5,354	
Adjusted R <sup>2</sup>	.3900		.3865		.3864		.3867		.3866	

**Table 7**  
**Results of Regression Analysis**  
**Comparison of Alternative Definitions of Auditor Specialist**  
**(Continued)**

<b>Panel C</b>								
Variable (Expected Sign)	<b>No Minimum Number of Audits and</b>							
	<b>Ten Percent Market Share</b>		<b>Fifteen Percent Market Share</b>		<b>Twenty Percent Market Share</b>		<b>Twenty-Five Percent Market Share</b>	
INTERCEPT	1.4464	**	1.4263	**	1.4164	**	1.4113	**
SPECIALIST (-)	-0.0902	**	-0.0833	**	-0.1096	**	-0.1234	**
VARIANCE (+)	48.6121	**	48.7493	**	48.8159	**	48.8231	**
VOLUME (-)	-0.0020	*	-0.0021	*	-0.0022	*	-0.0021	*
PRICE (-)	-0.0128	**	-0.0128	**	-0.0129	**	-0.0130	**
TURNOVER (+)	0.0024	**	0.0024	**	0.0024	**	0.0024	**
INSIDER (+)	0.0028	**	0.0029	**	0.0029	**	0.0029	**
NOANAL (-)	-0.0057	*	-0.0056	*	-0.0057	*	-0.0055	*
MARVALUE (?)	0.0148	**	0.0147	**	0.0149	**	0.0149	**
NYSE (?)	-0.5087	**	-0.5098	**	-0.5060	**	-0.5086	**
AMER (?)	-0.3891	**	-0.3880	**	-0.3861	**	-0.3888	**
N	5,354		5,354		5,354		5,354	
Adjusted R <sup>2</sup>	.3863		.3862		.3865		.3865	

\*\* Significant at a .01 level of significance, one tailed test if sign is predicted, two tailed otherwise.

\* Significant at a .05 level of significance, one tailed test if sign is predicted, two tailed otherwise.

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 8**  
**Results of Regression Analysis**  
**Average Market Value of Companies Audited by Industry Specialists' and**  
**Non-Specialists' are Equal by Restricting Sample of Industry Specialists**

<b>Variable</b>	<b>Expected Sign</b>	<b>Parameter Estimate</b>	<b>Whites t-statistic</b>	<b>P-Value</b>
INTERCEPT		1.4159	26.2077	.0001
SPECIALIST	-	-0.1277	-4.1527	.0001
VARIANCE	+	48.7658	4.9084	.0001
VOLUME	-	-0.0022	-2.6028	.0046
PRICE	-	-0.0131	-8.0073	.0001
TURNOVER	+	0.0024	8.8283	.0001
INSIDER	+	0.0028	3.9047	.0001
NOANAL	-	-0.0060	-2.3747	.0088
MARVALUE	?	0.0152	4.9024	.0001
NYSE	?	-0.5088	-17.2953	.0001
AMER	?	-0.3987	-8.7269	.0001
N	5,335			
Adjusted R <sup>2</sup>	.3866			

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange

**Table 9**  
**Results of Regression Analysis**  
**Industry Specialists\***  
**Thirty Trading Days After Initial Sample**

Variable	Expected Sign	Parameter Estimate	Whites t-statistic	P-Value
INTERCEPT		1.2719	22.2343	.0001
SPECIALIST	-	-0.0140	-0.4068	.3421
VARIANCE	+	77.3630	6.6787	.0001
VOLUME	-	-0.0031	-3.2059	.0007
PRICE	-	-0.0115	-7.3038	.0001
TURNOVER	+	0.0022	9.1265	.0001
INSIDER	+	0.0011	1.6304	.0515
NOANAL	-	-0.0066	-2.2942	.0109
MARVALUE	?	0.0133	5.5654	.0001
NYSE	?	-0.3660	-11.6717	.0001
AMER	?	-0.3153	-5.0824	.0001
N	5,354			
Adjusted R <sup>2</sup>	.4020			

\*Industry specialists are defined as audit firms that audit at least ten companies in the industry and maintain at least a 25 percent market share for that industry. See Table 4 for results of original sample.

Variable Definitions:

SPREAD is the percentage bid-ask spread defined  $(Ask - Bid) / ((Ask + Bid) / 2)$

SPECIALIST is a dummy variable indicating industry specialization

VARIANCE is the variance of returns for the current day and the 29 previous trading days

VOLUME is the number of shares traded for the current day and 29 previous trading days

PRICE is the price of the stock for the current day

TURNOVER is quotient obtained by dividing the number of shares traded for the current day by the number of shares outstanding

INSIDER is the percentage of shares held by insiders

NOANAL is the number of year-end earnings estimates provided

MARVALUE is the market value of equity

NYSE is a dummy variable indicating the shares are traded on the New York Stock Exchange

AMER is a dummy variable indicating the shares are traded on the American Stock Exchange