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Industry Specialization and Auditor Quality in U.S. Markets

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Abstract

This study investigates the relation between audit quality, auditor industry market share, and audit fees. Prior literature has asserted that audit providers with high market shares can be designated as industry specialists and that the fee premiums that sometimes attach to these auditors is evidence of a quality differentiated audit product. Using data from the U.S. audit market for the fiscal year 2003 we extend this literature by investigating the relationships among audit fee premiums, auditor market shares, and two dimensions of audit quality: external reporting and economies of scope in providing joint audit and non-audit services. We find little evidence to support the conjecture that high market share auditors provide increased audit quality. Further, we find that most auditors with high market shares do not seem to charge a fee premium. To the contrary, we report that the high market share fee premiums found in pooled (across industry) tests are primarily attributable to a small set of industries in which the high market share (specialist) auditor has a dominant position. This leads us to conclude that the available evidence is more supportive of the hypothesis that high-market share firms are extracting rents than the hypothesis that these auditors are providing a quality differentiated product.

Key words: Auditor specialization, audit fees, product differentiation, audit quality, monopoly pricing.

1. Introduction and Literature Review

This study investigates the relation between auditor industry specialization, audit fees, and quality differentiation using data from the U.S. audit market for the fiscal year 2003. We extend prior research on auditor specialization (Pearson and Trompeter 1994; Craswell Francis and Taylor 1995; Hogan and Jeter 1999; Gramling and Stone 2001; Fergusen and Stokes 2002; Casterella et al 2004; Francis, Reichelt, and Wang 2005; among others) by distinguishing the various industry specialization and pricing strategies available to auditors and the implications of those strategies. Further, we delve into the use of auditor market share as a proxy for specialization by considering the associations among market share, auditor pricing strategies, and audit quality.

Recent empirical literature has assumed that auditor market shares identify industry specialists and relies upon that identification to explore the association between audit fees and industry specialization.[1] This leads to a generic empirical model used to test for an industry specialist fee premium:

$$Fee = b_0 + \mathbf{b_k} \bullet controls + b_{k+1} \bullet I \qquad (1)$$

where, *Fee* is the natural log of audit fees, *controls* is a vector of various audit and client characteristics found to determine audit fees, and *I* is an indicator variable for the presence of an industry specialist auditor. In the literature *I* is often defined as:

$$I = 1 \text{ if industry market share} > x \text{ and } 0, \text{ otherwise} \qquad (2)$$

with x a fixed and usually ad hoc number such as 20% or 25%. Craswell, Francis, and Taylor (1995) (CFT hereafter), for instance, report a positive relation between audit fees and this

[1] We are using the term identification in the econometric sense whereby an observed proxy variable, market share, is used to represent an unobserved latent variable, specialization. If market share is highly correlated with the auditor specialization and uncorrelated with other factors then the estimated coefficient on market share identifies the effect of specialization on the response variable, typically audit fees.

market share based specialization proxy in Australia. Consistent with the theory of monopolistic competition a positive association (indicated by $b_{k+1} > 0$) was interpreted as evidence that industry specialist auditors provide higher quality audits than non-specialist auditors. Further, Balsam et al (2003) find evidence that clients of specialist auditors exhibit lower discretionary accruals, and higher earnings response coefficients.[2] However, other studies have questioned the generality of the CFT finding. For example, Ferguson and Stokes (2002) also using Australian data but for time periods subsequent to those in CFT do not find an association between specialization and audit fees.

Our paper contributes to this literature by investigating the identification of specialist auditors through the use of industry market shares. We also call into question the interpretation of the association between market share based measures of specialists and audit fee premiums as evidence of quality differentiation.

Guided by the structure-conduct-performance (SCP) paradigm in industrial organization (see Gramling and Stone 2001 for an overview of this approach in auditing), empirical auditing researchers have concerned themselves with how the structure of auditing markets influences the strategic conduct of auditing firms[3]. In this framework, structure refers to the micro-economic elements of accounting firms (such as their cost functions) and conduct refers to how firms compete in auditing markets. Within the present context the SCP framework naturally leads to two questions of particular interest to auditing researchers. The

[2] An important distinction between the tests in Balsam et al (2003) and our study is that we utilize audit fees and pricing models to distinguish auditor specialists. In contrast, Balsam et al rely on client characteristics as proxies for auditor industry specialization.

[3] Auditing firms are organized as partnerships or limited liability corporations. Consequently, information on audit firm profitability is not publicly available and the performance element of the SCP model has not been studied in the empirical auditing literature.

first question is: What is the form of auditor specialization (structure)? The second question is: How does the form of specialization affect competition in audit markets (conduct)?

CFT address these issues by arguing that in response to client demand, specialist auditors make investments in industry-specific auditing technologies. These investments allow specialist auditors to provide differentiated products and price their services accordingly. Continuing this line of reasoning a straightforward empirical test is to identify auditors with investments in industry-specific audit technology and compare their fees and audit quality with those of auditors not making industry-specific investments. Unfortunately, auditor investment decisions are not readily observable by researchers. Therefore, a less direct approach is required. CFT conjectured that auditors with high market shares within a given industry could be designated as specialists.[4] They then tested whether these designated specialists received a fee premium, i.e., $b_{k+1} > 0$, in equation (1) above. *A priori*, this test is valid under the maintained hypotheses that the function $I(\bullet)$ correctly identifies audit specialists and that specialists provide a quality differentiated product.

However, the interpretation of $b_{k+1} > 0$ as confirming evidence for the maintained hypotheses is weakened if the market share based specialist measure, $I(\bullet)$, is related to any other auditor characteristic that influences the audit fee. For example, a long established result in economic theory - going back to at least Lerner (1934) - relates a firm's market share to the extent of its monopoly power in a market. The market power explanation is consistent both with cases in which market power is due to product differentiation and also to cases where market power derives from other sources such as barriers to entry, non-industry specific economies of scale, switching costs, etc. Importantly, these alternative sources of

[4] Implicit in this conjecture is the assumption that there is greater demand for high quality audits than there is for lower quality audits. Of course, it is assumed that all audits supplied in the market meet minimum GAAS standards in expectation.

market power do not allow the coefficient of b_{k+1} to be uniquely interpreted as evidence of product differentiation and industry-specialization.

In this paper we refine the tests of the specialist product differentiation hypothesis by broadening the definition of audit quality and categorizing specialists, defined by *I*(market share $\geq$ x%), into those for whom $b_{k+1} > 0$, labeled product differentiators (premium auditors), and those for whom $b_{k+1} \leq 0$, labeled cost leaders. This labeling recognizes that two forms of specialization strategies are possible and that a price premium in conjunction with large market share is insufficient to identify an auditor as a product differentiator.

To further aid in identification we follow Balsam et al (2003) in applying direct evidence of audit quality to distinguish between the alternative explanations for finding a specialist auditor premium. Our proposed measures of audit quality build upon the insights of Hotelling (1929) and Schmalensee (1979) who note that products, in general, may be horizontally or vertically differentiated.[5] Simunic (1980) and Simunic and Stein (1987) state that audits may differ vertically on external audit and internal audit quality dimensions, and horizontally when auditors offer a variety of services such as tax and advisory services in addition to audits. We adopt their classification scheme in our empirical tests of audit quality across auditor types by including non audit fees as a measure of horizontal differentiation.

Consistent with economic theory we argue that specialization is characterized by the auditor's cost function. The cost function, if observed, would reveal the type of industry-specific investments made by the auditor. As suggested above, we follow along the lines proposed by Porter (1980) and conjecture that these investments could implement either a product differentiation strategy or take the form of process improvements. This latter type of

[5] A product is horizontally differentiated when it has multiple characteristics and consumers vary in their preferences over these characteristics. In contrast, vertical differentiation refers to a single product characteristic where, conditional on price, all consumers prefer more to less of that characteristic.

investment is directed at increasing audit efficiency and is consistent with a cost leadership strategy. Since auditor cost functions are not observed with the available data we look to economic theory and market conditions to infer individual auditor specialization strategies.

Having assembled the constituent elements of our research we now summarize the general empirical framework applied in this paper. As is typical of the existing literature, auditors with high industry market shares are conjectured to be industry specialists. But, contrary to the literature, we allow specialists to either differentiate their product or seek cost advantages. We then test whether specialist auditors that receive a fee premium provide higher quality audits measured on multiple quality dimensions. These tests provide direct evidence on a number of unresolved issues. First, is market share a valid proxy for industry specialization? For this to be true, the evidence should indicate an association between market share and product quality or market share and cost leadership. Second, do all specialist auditors adopt a product differentiation strategy? Here we are looking for evidence of a consistent across-industry association between specialization status and audit quality. Finally, do specialist related fee premia indicate higher audit quality or monopoly pricing?[6] The evidence related to this question looks at the association of market share driven fee premia with audit quality.

Briefly, our empirical findings are that in pooled (29 two-digit SIC industries) cross-sectional regressions there is some weak evidence that auditors with market shares in excess of 20% in a given industry earn a fee premium (about 14%) relative to a comprehensive set of other auditors. However, contrary to the industry specialization hypothesis, we do not find

[6] If specialist fee premia are correlated with higher quality audits then it can be argued that specialization benefits both the providers and consumers of audits. In contrast, if there is no correlation between fee premia and audit quality then it would appear that suppliers with high market shares are extracting rents from audit consumers.

evidence that these designated specialist auditors provide higher quality audits than other Big 4 auditors. Further, we find that the specialist fee premium is reduced to 7.1% when the sample is restricted to the clients of Big 4 auditors. A further reduction of the fee premium to 5.0% is found when two industries with dominant auditors are excluded from the sample.

In additional tests we separately include indicators for each Big 4 auditor and estimate industry-specific fee models. Consistent with our conjecture that different pricing and investment strategies are available to auditors we find cases in which auditors receive a statistically significant fee premium and cases where auditors have statistically significant fee discounts. However, we do not find consistent and convincing evidence of quality differentiation between these auditors and other Big 4 providers. Specifically, we examine whether auditor industry market share predicts accruals quality, absolute discretionary accruals, or restatements. Once again we find little evidence to support the conjecture that high market share auditors (specialists) provide higher quality audits within the Big 4. We do, however, find some evidence that auditors with high market shares earn greater non-audit service fees.

Taken together, our results do not support the use of market share as a proxy for industry specialization. Rather, we interpret our findings to be more consistent with the alternative hypothesis, and more traditional economic interpretation, of market share as a proxy for market power.

The remainder of the paper proceeds as follows. In Section 2 we develop the hypotheses. Section 3 provides a description of the data selection and variable measurement. We present the results in Section 4. In Section 5 we provide summary and concluding remarks.

2. Hypothesis Development

Economic theory predicts that demand for higher quality products results in a positive relation between quality and price. An extensive literature, starting with Simunic (1980) and DeAngelo (1981) finds evidence that Big N (larger) auditors provide higher quality audits than Non-Big N (smaller) auditors in national or international markets. Recent literature has applied this theory to the demand for quality, defining markets by industry (Craswell et al 1995) and by city (office) within industries (Defond et al 2000; Ferguson et al 2003; Francis, Reichelt, and Wang 2005). This narrowing of the definition of an audit market has allowed for the examination of audit quality heterogeneity across markets and the effects of auditor specialization within a given market.

Despite the narrowing definition of audit markets, auditor specialization and pricing strategies are not normally observable by researchers. As a consequence, researchers have relied on a combination of economic reasoning and *a priori* assumptions to overcome data limitations. Of relevance to this study is the identification of specialist auditors by the application of a minimum threshold level of market share within an industry as represented by equation (2) (see for example Craswell et al 1995; Ferguson and Stokes 2002; Balsam et al 2003). However, we argue that the use of a market share proxy for specialization is subject to significant limitations since economic arguments can be made for a supplier gaining market share either by providing a differentiated product or discounting the price of a non-differentiated product. Without imposing additional structure we do not believe that a positive association between market share and price can be uniquely attributed to a product differentiation strategy. CFT argue that client demand for industry specialization drives audit firm investments in industry-specific accounting technologies. However, it is not necessary

that all suppliers choose the same type of investment and subsequent dominant pricing strategy.

As suggested above, a primary motivation for this study is the concern that the current empirical research on auditor specialization cannot distinguish between the alternative explanations for the result that $b_{k+1} > 0$ in equation (1). The contending explanations are: a) the specialist provides a quality differentiated audit; or b) the high market share auditor exerts market power. The existence of these empirically indistinguishable alternatives is problematic since the social welfare and regulatory implications of these explanations lie in stark contrast to one another. Further, the conclusion that a fee premium validates the conjectured relationship between specialization and market share is true only if the set of auditor strategies is limited to providing either a differentiated or generic product. Once oligopolistic behavior is admitted as a strategy, as is at least plausible in markets with a limited number of suppliers, then the finding that $b_{k+1} > 0$ is insufficient to identify a high market share provider as a quality differentiated specialist. In logical terms, the model is under-specified since there are three possible auditor strategies (generic provider, quality differentiated provider, and oligopolistic provider) but only two outcomes of the experimental variable, $b_{k+1} > 0$ or $b_{k+1} \leq 0$.

In addition to this unresolved identification issue we believe the literature has neglected the fundamentals of strategic analysis as proposed by Porter (1980). Explanation a) above assumes that specialist auditors consistently choose to differentiate their product. However, another generic strategy is for auditors to pursue a cost leadership (efficiency) strategy. Since both strategies require an investment in knowledge capital we argue that auditors selecting either strategy are appropriately labeled as specialists. Importantly, we are

unaware of any theoretical considerations that suggest market share, per se, aligns more naturally with the product differentiation strategy than the cost leadership strategy. In turn, to the extent that market share does identify specialist auditors it seems to us to be equally likely that either generic strategy applies. Of course, we also know of no reason why either strategy could not result in a particular auditor in a given industry having a relatively small market share.

Recapping the preceding paragraphs we argued that the industry specialization model formulated in equations (1) and (2) suffers from several distinct identification deficiencies that impedes upon our ability to interpret the coefficient, b_{k+1}. They are:

i) The model cannot distinguish between quality differentiation and pure rent-seeking behavior by the use of the market share proxy alone;

ii) Specialist auditors with large market shares could be characterized by either a product differentiation or a cost leadership strategy. If the latter then the implication is that $b_{k+1} \leq 0$ rather than $b_{k+1} > 0$; and

iii) Specialist auditors using either strategy may not obtain a large market share, thereby introducing measurement error into the tests.

An obvious way to address these identification issues is to use audit quality measures in conjunction with the pricing model. Earlier we noted two types of non-exclusive differentiation strategies: horizontal and vertical differentiation. Simunic (1980) and Simunic and Stein (1987) provide an example of horizontal differentiation stating that audit quality may consist of three components: the level of assurance provided on financial reports (external reporting quality), the ability to contribute to the reliability of the client's internal control systems (internal reporting quality), and the joint production of audit and non-audit

services (economies of scope). Vertical differentiation can apply to each of these audit characteristics individually as auditors may vary the delivered quality of any of these characteristics relative to their competitors.

With a set of quality measures in hand we provide the following hypotheses suggested by i) and ii), above.

H1: If high market share is indicative of auditor specialization and specialist auditors choose to provide high levels of assurance then: $b_{k+1} > 0$ in equation 1) and *I* is positively correlated with *ex post* measures of audit quality.

H1A: If high market share is indicative of market power then: $b_{k+1} > 0$ in equation 1) and *I* is not positively correlated with *ex post* measures of audit quality.

H2: If high market share is indicative of auditor specialization and specialist auditors choose a cost leadership strategy then: $b_{k+1} \leq 0$ in equation 1) and *I* is not positively correlated with *ex post* measures of audit quality.

We can partially address iii), above, by dropping the *a priori* alignment of market share with specialization. To explore iii) first test whether auditor brand name is associated with a fee premium within industry and then test whether these designated specialists (labeled *I*) are associated with *ex post* measures of audit quality. This leads to our next hypothesis.

H3: If $b_{k+1} > 0$ for an auditor in a given industry and if that auditor specializes in providing high levels of assurance then *I* is correlated with ex post measures of audit quality.

H3 would also be useful in assessing the validity of our quality measures. One side benefit of the test proposed for H3 is that it suggests an associated hypothesis on the relationship between the product differentiation strategy and market share:

This hypothesis addresses the implicit assumption in the literature that the demand for high quality audits is larger than the demand for lower quality audits. While this association appears to be true in the market for publicly held companies when we consider Big 4 and non Big 4 auditors, it is unknown whether it is it true for Big 4 specialists relative to other Big 4 auditors.

H4: Auditors that specialize in providing higher levels of assurance attain larger market shares.

3. Data Selection and Variable Measurement

Audit fee disclosures in the U.S. market began with proxy statements filed after February 5, 2001. We limit the study to fiscal year 2003 in order to obtain the largest cross-section of firms while avoiding confounding issues related to the failure of Arthur Anderson in 2002 and the increased regulations associated with the Sarbanes Oxley Act. We start with 6,535 client firms with audit fee data available from Standard and Poor's. We drop client firms from the sample that are missing financial data from Compustat necessary to estimate the models. Finally, in order to reliably estimate the audit fee model parameters by industry, we focus our study on 2-digit SIC industries with at least 30 observations.

One practical limitation on the assessment of auditor strategies is industry size. For small industries we believe it would be difficult if not impossible to reliably infer auditor strategy from market data. Shaked and Sutton (1982) use a duopoly model to demonstrate

conditions leading to a positive correlation between price competition and product differentiation. Specifically, they argue that firms in markets with intense price competition have greater incentives to differentiate their products than firms in markets facing less price competition. This suggests to us that industries with small numbers of client firms are unlikely to induce product differentiating investments by auditors[7]. As a consequence, we limit our tests to industries with large numbers of clients (at least 30 clients) where there is the potential for auditors to adopt either a product differentiation or cost leadership strategy. As an ancillary point we believe the question of market size and specialization needs further explication in the literature especially in those studies that define markets narrowly (such as a city[8] as opposed to nationally). The concern, of course, is that for small markets the economic incentives to differentiate are reduced and the potential for oligopolistic behavior are increased. Both conditions argue against the identification of a price premium as indicative of product differentiation.

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[7] We have started from the assumption that auditors, like other businesses, choose a profit maximizing strategy that could generically be characterized as either product differentiation or cost leadership. Either strategy requires investment by the auditor. Specialization is determined by the extent of that investment. The choice of strategy depends upon, among other things: the size of the market, the strategies of existing entrants, and the demand for product diversity. Ceteris paribus we would expect auditors in larger markets to make greater investments than auditors in smaller markets, that auditors will normally choose to locate in product space away from other auditors in that market, and that the range of audit quality provided in a market would reflect the intrinsic demand for differentiated services. The consequence of these factors is that we do not expect all industry markets to be characterized by a similar equilibrium with respect to specialization strategy by participant firms. For instance, it is easy to imagine that in large industries all participant auditors have made specialist investments of one kind or another. Similarly, in a very small industry there could be only one or two participants, neither of which has made a significant investment.

[8] We have reservations about the use of this type of data to explore the concept of office or city specialization. One concern is that local markets may only incidentally be "local". By this we mean that the tendency for industries to agglomerate in geographic locations could be responsible for apparent local specialization. The unifying concept is that either specialization strategy requires investment. It is difficult for us to see why auditors would invest in geographic specialization outside of the desire to serve specific client needs that would coincide with industry specialization. This critique has the most force applied to publicly traded firms in single jurisdiction (say firms subject to SEC compliance) and would obviously be weakened for clients such as municipalities where there is a correspondence between locality and regulatory requirements.

This results in a sample of 4,082 unique observations in 29 industries in our full sample and 3,450 observations for the sample that includes the more data-intensive measure of accrual quality and discretionary accruals. Table 2 describes the selection criteria and the industry distribution of our sample.

We measure auditor industry specialization using the audit firm's share of total audit fees within two-digit SIC code industries. We define specialists based on market share measures of the audit fees obtained by a given auditor. We classify an auditor as an industry specialist if the total audit fees obtained by the auditor are equal to, or greater than 20% of the total audit fees within an industry (*Special20*).[9]

3.1 External reporting quality

One common way to measure audit quality is to base it on the quality of the client's financial statements. We use two variables as proxies for the quality of a firm's financial statements. The first is the absolute discretionary accruals derived from the firm's financial statements. To determine discretionary accruals, we estimate the performance adjusted modified-Jones (1991) model as described by Kothari et al (2005). We use a cross-sectional sample to estimate the performance adjusted modified-Jones model using change in sales net of the change in accounts receivables [i.e., $\Delta SALES_{i,t} - \Delta AR_{i,t}$]. The regression model can be expressed in the following form (all variables are scaled by assets in $year_{t-1}$):

$$TACC_{i,t} = b_0 + b_1 1/ASSETS_{i,t-1} + b_2 (\Delta SALES_{i,t} - \Delta AR_{i,t}) + b_3 PPE_{i,t} + b_4 NI_{i,t} + e_{,t} \quad (3)$$

Where,

[9] Ferguson and Stokes (2002) also define industry specialists based on 10% of the market share. They also investigate a continuous measure of specialization based on the proportion of fees obtained by the auditor within the industry. We restrict our analysis to the more restrictive definition of industry specialists in order to more precisely identify specialists.

$TACC_{i,t}$ = ($\Delta CA_{i,t}$ - $\Delta CL_{i,t}$ - $\Delta Cash_{i,t}$ + $\Delta STDEBT_{i,t}$ – $DEPN_{i,t}$), firm i's total accruals in year t.[10]

$\Delta CA_{i,t}$ = firm i's change in current assets (Compustat item #4) between year t-1 and year t.

$\Delta CL_{i,t}$ = firm i's change in current liabilities (Compustat #5) between year t-1 and year t.

$\Delta Cash_{i,t}$ = firm i's change in cash (Compustat #1) between year t-1 and year t.

$\Delta STDEBT_{i,t}$ = firm i's change in debt in current liabilities (Compustat item #34) between year t-1 and year t.

$DEPN_{i,t}$ = firm i's depreciation and amortization expense (Compustat #14) in year t.

$ASSETS_{i,t-1}$ = The book value of the firm's assets in year (Compustat #6) t-1.

$\Delta SALES_{i,t}$ = firm i's change in revenues (Compustat item #12) between year t-1 and year t.

$\Delta AR_{i,t}$ = firm i's change in accounts receivable (Compustat item #2) between year t-1 and year t.

$PPE_{i,t}$ = firm i's gross value of PPE (Compustat #7) in year t.

$NI_{i,t}$ = firm i's net income (Compustat item #172) in year t.

We use the absolute value of the residuals from the estimate of cross-sectional industry regressions winsorized at the top and bottom 1% as our measure of discretionary accruals (*DACC*). Consistent with Balsam et al (2003), we conjecture that lower absolute discretionary accruals are consistent with higher quality financial reporting.

Our second measure of external financial reporting quality extends from the mapping of accruals into future cash flows. Francis, LaFond, Olsson, and Schipper (2005) find a significant relation between their measure of accruals quality and the cost of equity and debt in a manner that is consistent with a positive relation between accruals quality and the quality of external reporting. Following Dechow and Dichev (2002) and Francis, LaFond, Olsson, and Schipper (2005) we measure accruals quality (*Acc_Q*) as the standard deviation of the residuals from annual regressions relating current accruals to cash flows. Specifically, we estimate a model of working capital accruals on cash flow from operations in the prior

[10] We also estimate the model measuring total accruals with the cash-flow method (TACC = income before extraordinary items minus cash flow from operations) as suggested by Collins and Hribar (2002) and find similar results. We use the balance-sheet method in our primary tests to be consistent with prior research.

period, current period, and future period. We also augment the model with fundamental variables from the modified Jones (1991) model; property plant and equipment and change in revenues. This leads to the following regression model (all variables are scaled by average total assets):

$$TCA_{i,t} = d_0 + d_1 CFO_{i,t-1} + d_2 CFO_{i,t} + d_3 CFO_{i,t+1} + d_4 \Delta Rev_{i,t} + d_5 PPE_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where,

$TCA_{i,t}$ = $\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + STDEBT_{i,t}$, total current accruals in year t.
$CFO_{i,t}$ = $NIBE_{i,t} - TACC_{i,t}$, firm i's cash flow from operation in year t.
$NIBE_{i,t}$ = firm i's net income before extraordinary items (Compustat #18) in year t.
$\Delta Rev_{i,t}$ = firm i's change in revenues (Compustat item #12) between year t-1 and year t.
$PPE_{i,t}$ = firm i's gross value of PPE (Compusta #7) in year t.

Cross-sectional annual estimations of equation (4) by industry yield firm-year specific residuals. The standard deviation of firm i's residuals calculated over years t-4 through t represents the accruals quality (*Acc_Q*). Once again, in order to reduce the impact of outliers on the results we winsorize the accrual quality measures at the top and bottom 1%. The accrual quality model is predicated on the idea that accrual quality is affected by the measurement error in accruals. The unexplained portion of the variation in working capital accruals (the residual) is an inverse measure of accruals quality. Thereby larger standard deviations indicate poorer accruals quality. Similar to Francis, LaFond, Olsson, and Schipper (2005), we conjecture that poorer accrual quality (a higher value of *Acc_Q)* implies poorer quality financial reporting.

Table 3 provides *DACC* and *Acc_Q* summary statistics for the full sample, clients of Big 4 auditors, and clients of industry specialist auditors. The evidence is mixed as to the difference between the level of absolute discretionary accruals and the accrual quality for firms audited by specialist and Big 4 auditors. The sample of firms audited by specialists

exhibit lower absolute discretionary accruals and improved accrual quality (lower values of *DACC* and *Acc_Q*) than the full sample of firms. However, there is not a significant difference between the accrual quality and discretionary accruals of specialist and Big 4 clients.[11]

3.2 Market share and Auditor Fee Premiums

As noted earlier we identify auditors that obtain a 20% or greater industry market share as potential specialists. To test whether these auditors receive a fee premium we use an indicator variable, *Special20*, in various audit fee regressions. The audit fee model controls for client specific differences in factors that are likely to influence fees such as audit size, audit complexity, and auditor-auditee risk sharing (see for example Simunic 1980; Francis 1984; Francis and Stokes 1986; Craswell et al 1995; Ferguson and Stokes 2002). We estimate the following audit fee model by industry to determine the industry-specific specialist pricing effect:

$$\begin{aligned} \text{Ln}(\textit{fee}) = {} & \beta_0 + \beta_1 \textit{Ln}(\text{assets}) + \beta_2 \textit{CATA} + \beta_3 \textit{DE} + \beta_4 \textit{ROI} + \beta_5 \textit{Foreign} \\ & + \beta_6 \textit{Special Items} + \beta_7 \textit{YE} + \beta_8 \textit{Segments} + \beta_9 \textit{Special20} \\ & + \beta_{10} \textit{Big 4} + e \end{aligned} \tag{5}$$

See Table 1 for variable definitions.

We use a number of versions of this model specification. In addition to estimating the model by industry we also pool observations and estimate the model for the full sample, a sample restricted to Big 4 clients, and a sample in which two industries with dominant auditors as identified in the industry level regressions are excluded. A further variation on this model is estimated by industry with an auditor specific indicator variable. This latter model provides us with information on auditor-specific pricing strategies within an industry.

[11] Tests of differences in means (medians) across sample are based on t-tests (Wilcoxian rank-sum tests).

3.3 Tests of audit quality

External reporting quality is only one characteristic of an audit. We also use the provision of non-audit services (*NAS)* as a measure of economies of scope that may cause a client to choose a specialist or fee-premium specialist auditor without an increase in the quality of the external reports. We note that various studies have found a positive relation between audit fees and non-audit service fees (e.g., Simunic 1980; O'Keefe et al 1994).[12] In addition we include the occurrence of restatements, *If Restated,* as a measure of quality financial reports.[13] Because we wish to investigate the relation between auditor specialization and aggregate quality, we test our quality measures by using a logit model to predict if client firms are audited by specialists. This methodology allows us to include all four measures of audit quality in a single equation, which we believe to be a richer analysis.[14] To test these associations we estimate the following model:

$$Specialist = \gamma_0 + \gamma_1 DACC + \gamma_2 Acc\_Q + \gamma_3 If\ Restated + \gamma_4 Ln(NAS) + v \qquad (6)$$

4. Results

4.1 Hypotheses 1 and 1A

The auditor specialization hypothesis, H1, requires that auditors designated as high quality auditors receive a fee premium and provide a higher quality audit service. Since it has been conjectured in the literature that a high industry market share indicates a high quality audit specialist then H1 requires the following set of characteristics to occur together,

[12] Whisenant et al (2003) provide evidence that this finding could be due to failure to control for endogeneity.
[13] We recognize that restatements may occur for a variety of reasons of which poor accounting quality is only one cause. As such, if income is restated due to accounting changes, *If Restated* measures audit quality with error. However, because it is one of many measures of audit quality, we believe it is an important variable to include in the analysis.
[14] We also test the quality metrics independently as a function of specialization, market share, and fee premiums (see table 8) and an aggregate measure (Table 9). We find results that are qualitatively consistent with the results of the estimation presented in equation 6.

{*Special20* = 1, *∂Audit Fee/∂Special20* = $b_{Special20} > 0$, corr(*Special20*, audit quality) ≠ 0}. Tables 4 and 5 report on the fee premium obtained by *Special20* auditors. Table 4 indicates that a *Special20* auditor obtains a statistically significant fee premium in only 2 of our 29 industry-level regressions.

In Table 5 the data is pooled across industries and includes industry fixed effects. Interestingly, the extent of a fee premium in the pooled data depends upon the sample definition. In column 1 we use the full sample including the clients of non Big 4 auditors. In this sample, a *Special20* fee premium of 14% (t-value = 4.69) is reported. Since all of the *Special20* auditors in our sample are Big 4 firms we believe it is reasonable to argue that specialization, as measured by the *Special20* metric, is a property of Big 4 auditors. Therefore, it is appropriate to limit the pricing model to clients of the Big 4. Following up on this insight in column 2 we exclude non Big 4 clients from the sample. As can be seen the *Special20* fee premium falls to 7.1% (t-value = 2.32).[15] As noted in Table 4 only two industries exhibit significant *Special20* fee premiums. In column 3 we exclude these industries and, once again, the *Special20* fee premium falls, now to 5% and is only marginally significant (t-value = 1.71). This result is depicted in Figure 1 where a lowess (or loess) smooth of *Special20* against fees adjusted for the controls in equation (5) is presented for the various samples[16]. The lowess smooths plot *Special20* against the residual from a fee

[15] Note that we include an indicator variable in the pooled regression for clients of the Big 4 auditors. Interestingly, when we restrict the analysis to clients of Big 4 auditors and suppress the indicator, the coefficient on *Special20* declines in value and significance suggesting that the audit fee model is different for clients of Big 4 auditors, and this difference is not captured by the Big 4 indicator in the pooled sample.

[16] Lowess (or loess) smoothing is a method that relies upon locally weighted regressions, see Cleveland (1993), to graphically depict the relationship between two variables. Essentially, a series of regressions are run of the dependent variable on the independent variable in which a) a local subset of the independent variables are used and b) weightings are applied to the independent variables so as to highlight the effect of local values of the independent variable. From these regressions predicted values of the dependent value are plotted for each value of the independent variable. The benefit of this approach is that it does not impose linearity as would be the case

regression (equation 5) that excludes *Special20* for each of the three samples. As can be seen from both Table 4 and Figure 1 the relationship between fees and *Special20* firms is not a pervasive phenomenon in U.S. audit markets. This fact alone casts doubt on the reliability of using market share statistics to identify industry specialists.

In Table 7 we test the association of *Special20* with our measures of audit quality. In columns 1 and 2 we use the full sample and Big 4 only samples. We do not find evidence of strong associations between *Special20* and audit quality in either sample. Only one measure *Ln*(*NAS*) appears to be significantly associated with *Special20*. We conclude that H1 is not supported in our sample. Rather, to the extent that a *Special20* fee premium is supported by the pooled tests in Table 5 the evidence is consistent with H1A, i.e., auditors with high-market shares exert market power.

4.2 Hypothesis 2

An examination of Table 4 does not reveal any industries in which *Special20* is associated with fee discounting, on average. However, industry 49 (electric, gas, and sanitary services) is marginally significant (t-value = -1.70). Fee discounting could occur if specialist auditors adopted a cost leadership strategy. In Table 6 we report the results of individual auditor within industry regressions. This reveals that in a number of industries individual Big 4 auditors appear to be discounting relative to other Big 4 firms. We label these discounters *Neg Fee* firms and in Table 7 (column 4) check for an association of these firms with our measures of audit quality. Fee discounters provide more *NAS* (t-value = 5.69) and, surprisingly, marginally greater accruals quality (t-value = -1.76). However, we would view the evidence that they provide a quality differentiated product as relatively weak. In

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if we plotted the predicted value from a linear regression of the dependent variable against the independent variable.

aggregate, these results provide evidence that some auditors may be pursuing cost leadership strategies.

4.3 Hypothesis 3

Hypothesis 3 is related to Hypothesis 1, but differs in that we test the fees and audit quality of each auditor independently without restricting the analysis to specialists as identified by market share. Here we test for an association between a positive industry fee premium and evidence of higher audit quality by auditor. Since we do not use market share to identify potential specialists in this model, we refer to the individual auditor by industry. Table 6 presents results from estimations used to identify auditors with statistically significant (t-values > 1.9) industry fee premiums. These auditors are labeled as *Prem Fee* auditors. Using the audit quality tests presented in equation (6) we test for associations between *Prem Fee* and our measures of audit quality and present the results in column 6 of Table 7. We find mixed evidence on the relation between fee premiums and audit quality. The *Prem Fee* auditors are associated with lower accruals quality variance (t-value = -3.42) an indication of higher audit quality. At the same time, clients of auditors that earn fee premiums exhibit higher absolute discretionary accruals (t-value = 4.02) an indication of lower audit quality. This split decision suggests to us a similar conclusion as was drawn above, that the evidence for quality differentiated services as an explanation for fee premiums among the set of Big 4 auditors is not supported in our sample.

The results of estimation equation (6) allow us to test for the association between various measures of audit quality and auditor specialization in a single equation. However, our measures of quality are correlated as can be seen in Table 3 Panel B. To address this issue, we estimate the model in a more traditional framework in which the dependent

variable is the quality metric and the independent variable is the measure of auditor specialization. We restrict the sample to clients of Big 4 auditors to reduce the impact of Big 4 on the results and we include several controls to allow for the effect of size and possible financial distress on audit quality.[17]

$$Quality = \beta_0 + \beta_1 Ln(\text{assets}) + \beta_2 Ln(NAS) + \beta_3 Loss + \beta_4 DE + \beta_5 Quick + \beta_6 TACC + \beta_7 Auditor\text{-}type + e \quad (7)$$

The results, reported in Table 8, do not provide support for the hypothesis that specialist auditors provide higher quality audits across dimensions of discretionary accruals, accrual quality, or restatements. We find weak evidence (t-value = 1.80) that auditors holding at least 20% of the market share earn greater non-audit service fees. In unreported results, we also estimate equation (7) identifying auditors that earn fee premiums. Again, we do not find evidence that clients of premium auditors exhibit higher quality financial reporting. We repeat the analysis with the continuous measure of market share and find qualitatively similar results.

We recognize that our proxies for audit quality are measured with error. As such, testing our hypothesis on any single measure of audit quality may lead to incomplete conclusions because the test lacks power. This is particularly important if our measures of audit quality capture different dimensions of financial reporting quality. To address this issue, we focus on aggregate reporting quality and create a composite measure of reporting quality based on discretionary accruals, accrual quality, and restatements. To construct this composite measure of total quality *TQ* we rank-order *Acc_Q* and *DACC* from smallest to

[17] When we expand the sample to include all firms, and include a Big 4 indicator, the coefficients on *Special20* and *Mkt Share* are negative and significant, indicating that clients of Big 4 specialists auditors (high market-share auditors) exhibit better quality financial reporting than firms that are not clients of non-Big 4 auditors. While this is an interesting result, the focus of this study is on distinguishing audit quality of specialist auditors, which is generally limited to a peer group of Big 4 clients. In support of this conjecture, we illustrate in Table 5 that the specialist premium when restricting the analysis to clients of Big 4 auditors differs from the full sample.

largest. We then normalize the rankings on a scale of 0 (smallest) to 1 (largest) such that the median value has the scaled rank of 0.50. Since *If NI restated* is an indicator variable a value of .5 was assigned if a restatement occurred and 0 otherwise. We then aggregate the scaled ranks for each observation to generate an composite measure, *TQ*. Since high discretionary accruals, high values of *Acc_Q* and restatements indicate low quality financial reporting, low values of *TQ* indicate high quality auditing (earnings) and, conversely, high values of *TQ* indicate low quality auditing (earnings). We then used *TQ* as a dependent variable to test whether *Special20, Market Share, or Premium Auditors* have an effect on audit quality.

We report the results from this estimation in table 9. The results indicate that the proxy variables *Special20, Premium Auditors,* and *Mkt Share* are not associated with higher audit quality. Premium auditors do not appear to provide higher quality than other Big 4 auditors. Interestingly firms with lower quality auditing (earnings) are smaller, purchase more NAS from Big 4 clients, pay higher audit fees, are more likely to have a loss, have more debt, and fewer quick assets.

4.4 Hypothesis 4

Implicit in the auditor specialization hypothesis is the assumption that high quality auditors obtain larger market shares in each industry. In Table 8 we look cross-sectionally at the relationship between our audit quality measures and *Special20* and *Mkt Share*. We only find one significant association between *ACC_Q* and *Mkt Share*, however we do not find a similar association between *ACC_Q* and *Special20*. In all other cases we find no evidence that audit quality is associated with greater market shares, on average, a result inconsistent with the conjectured alignment between market share and increased audit quality.

5.0 Conclusions

The purpose of this study has been to investigate auditor market shares, pricing, and audit quality. Economic theory suggests that the demand for higher quality audits may lead specialist audit firms to provide higher quality audits at increased fees. In contrast, some specialist auditors may provide a non-differentiated product at discounted fees or provide higher quality audits at the "market rate". In our primary tests we compare the audit quality of auditors with large market shares to other auditors.

Our empirical results, based on U.S. companies in fiscal year 2003, are not consistent with the interpretation that high-market share auditors are specialists providing higher quality audits than non-specialists. Further, we find little evidence of differential audit quality within Big 4 auditors regardless of market share and/or pricing strategy. On balance our evidence is consistent with Big 4 auditors pursuing varying pricing strategies and, in some industries, using a dominant market share position to earn higher fees.

While our evidence argues against the use of industry market shares to proxy for industry specialization, we rely upon the use of various proxies for audit quality. These proxies provide the most serious limitations of this study. Other concerns could be raised regarding the definition of specialist as one with a minimum 20% market share and perhaps even our industry definitions. All researchers in this area face similar issues and each concern could be a study in itself, though, our choices in these matters are prevalent in both auditing and other areas of accounting literature.

In our opinion the questions of auditor specialization and auditor pricing remain open and likely will remain unresolved as long as researchers have limited access to cost data and

more precise quality data. Better models of auditor investment strategies would also contribute to our understanding of this important topic.

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Table 1: Variable Definitions

Variable	Units	Definition (*Source*)
Ln*(fee)*	Dollars	The natural log of the auditor fees identified to be related directly to audit services (*S&P*).
Ln*(assets)*	Dollars	The natural log of the book value of the firm's assets (*COMPUSTAT*).
CATA	Ratio	The current assets of the firm scaled by the total assets reported by the firm (*COMPUSTAT*).
DE	Ratio	Ratio of long-term liabilities to total assets (*COMPUSTAT*).
ROI	Ratio	The before tax income of the firms scaled by the total assets (*COMPUSTAT*).
YE	0,1	An indicator variable if the fiscal year-end is not 12/31, zero otherwise (*COMPUSTAT*).
Loss	0,1	An indicator variable equal to 1 if the firm has a net operating loss in any of the past three years, zero otherwise (*COMPUSTAT*).
Big	0,1	An indicator variable equal to 1 if the firm's auditor is one of Big 4, zero otherwise (*COMPUSTAT*).
Foreign	0,1	An indicator variable equal to one if the firm reports a foreign currency adjustment, zero otherwise (*COMPUSTAT*).
Special Items	0,1	An indicator variable equal to 1 if the firm reports special items, zero otherwise (*COMPUSTAT*).
If Restated	0,1	Indicator variable if net income was restated. *(COMPUSTAT)*
Ln(Nas)	Dollars	The non-audit fees scaled by the sum of the audit and non-audit fees (*S&P and CoreData*).
DACC	Continuous	Absolute value of the residual from the predicted accruals model (*COMPUSTAT*)
Acc_Q	Continuous	Accruals Quality as defined in Francis et al., (2005) (*COMPUSTAT*)
Mkt Share	Continuous	Auditor industry market share based on audit fees
Special20	0,1	An indicator variable equal to 1 if the firm's auditor holds at least 20% of the market share, zero otherwise (*S&P*).
Neg Fee	0,1	An indicator variable equal to 1 if the firm's auditor received a statistically significant (|t-val.| >1.9) negative fee in that industry
Prem Fee	0,1	An indicator variable equal to 1 if the firm's auditor received a statistically significant (t-val. >1.9) positive fee in that industry

Table 2: Selection and Distribution of the Sample

Panel A: Sample selection

S&P observations with audit fees (fiscal year 2003)	6,525
Less:	
Companies unavailable on Compustat	574
Missing Compustat data	1,495
Less than 30 observations per two-digit SIC industry code	384
Sample Size	4072
Less:	
Missing Compustat data required to measure *Accrual Quality**	625
Restricted Sample Size	3,447

Panel B: Distribution of observations by industry

SIC2	*Description (OSHA)*	*N-full sample*	*N-restricted sample*
10	Agricultural Products	39	25
13	Oil and Gas	158	130
20	Food and Kindred Products	103	93
23	Apparel and Finished Goods	47	41
26	Paper and Allied Products	38	35
27	Printing and Publishing	59	54
28	Chemicals and Allied Products	492	387
30	Rubber and Plastics	52	45
33	Primary Metal	59	50
34	Fabricated Metal	59	56
35	Commercial Machinery	298	264
36	Electrical Equipment	420	370
37	Transportation Equipment	94	79
38	Measurement Instruments	367	314
39	Manufacturing Industries	36	35
42	Freight/Transportation	33	27
45	Air Transportation	30	25
48	Communications	158	128
49	Electric, Gas, Sanitary Services	159	146
50	Durable Goods-Wholesale	120	104
51	Nondurable Goods-Wholesale	57	51
56	Apparel Retail Stores	52	45
58	Eating and Drinking Places	79	70
59	Miscellaneous Retail	97	75
67	Investment Offices	38	26
73	Business Services	670	553
79	Amusement and Recreation	52	42
80	Health Services	85	73
87	Engineering/Management Services	121	104
Total		4,072	3,447

Audit fees are obtained from the Standard and Poor's database for fiscal year 2003.
Firm-level characteristics are obtained from Compustat annual files.
*Measuring accrual quality (*Acc_Q)* requires 7 years of Compustat data.

Table 3 Summary Statistics

Panel A: Mean and Median Firm Characteristics by Sample

	Full Sample		*Big 4*		*Specialist*	
	Mean	Median	Mean	Median	Mean	Median
Ln(fee)	5.801	5.710	6.203	6.073	6.314	6.199
Ln(assets)	4.950	4.935	5.707	5.637	5.825	5.750
CATA	3.320	2.019	3.475	2.132	3.173	2.067
DE	0.295	0.082	0.185	0.103	0.182	0.104
ROI	-0.300	0.019	-0.059	0.030	-0.050	0.033
Loss	0.668	1.000	0.622	1.000	0.606	1.000
Foreign	0.195	0.000	0.223	0.000	0.233	0.000
Special Items	0.605	1.000	0.643	1.000	0.664	1.000
Segments	1.336	1.000	1.373	1.000	1.395	1.000
Special20	0.494	0.000	0.647	1.000	1.000	1.000
Ln(Nas)	3.864	4.032	4.371	4.566	4.518	4.732
DACC	0.139	0.001	0.014	0.001	0.013	0.001
Acc_Q	0.144	0.088	0.116	0.076	0.114	0.077

Full sample is 4,072, Big N sample is 3,119, Specialist sample is 2,018. Observations for *DACC and Acc_Q* are restricted to 3,447 observations due to data restrictions required to measure these variables.
Variables are as defined in Table 1.

Panel B: Correlation Matrix of the Full Sample

	Ln(fee)	*Ln(assets)*	*CATA*	*DE*	*ROI*	*Loss*	*Foreign*	*Special Items*	*Segments*	*Special20*	*Ln(Nas)*	*DACC*
Ln(fee)	1.000											
Ln(assets)	0.851	1.000										
CATA	-0.102	-0.065	1.000									
DE	-0.032	-0.081	-0.010	1.000								
ROI	0.097	0.188	0.013	-0.931	1.000							
Loss	-0.195	-0.357	0.041	0.015	-0.075	1.000						
Foreign	0.251	0.181	-0.025	0.034	-0.012	-0.008	1.000					
Special Items	0.334	0.260	-0.066	-0.019	0.028	0.134	0.147	1.000				
Segments	0.409	0.394	-0.082	-0.011	0.047	-0.167	0.098	0.122	1.000			
Special20	0.363	0.351	-0.019	-0.019	0.053	-0.127	0.100	0.121	0.128	1.000		
Ln(Nas)	0.687	0.636	-0.054	-0.032	0.091	-0.187	0.234	0.244	0.307	0.284	1.000	
DACC	-0.193	-0.262	-0.009	0.236	-0.348	0.084	-0.035	-0.048	-0.081	-0.110	-0.146	1.000
Acc_Q	-0.257	-0.421	-0.014	0.034	-0.156	0.244	-0.046	-0.024	-0.145	-0.162	-0.233	0.370

Full sample is 4,072. Observations for *DACC and Acc_Q* are restricted to 3,447 observations due to data restrictions required to measure these variables.
Variables are as defined in Table 1.

Table 4: Audit fee model by industry for fiscal year 2003

Ln*(fee)* = $\beta_0 + \beta_1$ *Ln*(assets) + β_2 *CATA* + β_3 *DE* + β_4 *ROI* + β_5 *Foreign* + β_6 *Special Items* + β_7 *YE* + β_8 *Segments* + β_9 *Special20* + β_{10} Big + *e*

Two-digit SIC	*Special20*	Robust SE	t-value	N	Adj. R2
10	-0.13	0.26	-0.49	39	0.89
13	**0.446**	**0.15**	**2.95**	**158**	**0.77**
20	0.405	0.38	1.08	103	0.72
23	**0.374**	**0.17**	**2.26**	**47**	**0.87**
26	-0.181	0.29	-0.62	38	0.83
27	0.308	0.19	1.63	59	0.81
28	0.09	0.06	1.45	492	0.80
30	0.018	0.42	0.04	52	0.38
33	-0.134	0.20	-0.67	59	0.84
34	0.101	0.11	0.89	59	0.89
35	0.006	0.08	0.08	298	0.79
36	-0.035	0.08	-0.45	420	0.71
37	0.076	0.26	0.30	94	0.89
38	0.025	0.06	0.40	367	0.81
39	0.209	0.30	0.69	36	0.88
42	0.002	0.21	0.01	33	0.68
45	-0.056	0.23	-0.24	30	0.78
48	0.311	0.24	1.31	158	0.67
49	-0.244	0.14	-1.70	159	0.84
50	-0.015	0.12	-0.12	120	0.84
51	0.08	0.16	0.50	57	0.84
56	0.03	0.15	0.20	52	0.78
58	-0.044	0.17	-0.27	79	0.66
59	-0.002	0.15	-0.01	97	0.73
67	0.025	0.47	0.05	38	0.68
73	0.09	0.07	1.25	670	0.74
79	0.147	0.21	0.69	52	0.75
80	0.501	0.32	1.58	85	0.49
87	-0.129	0.15	-0.86	121	0.74

Results are from industry-specific regressions based on two-digit SIC. For parsimony, we only report the coefficients and statistics related to the *Special20* variable, all variables are as defined in Table 1. Robust SE are are Huber-White robust standard errors on the *Special20* coefficient. N is the number of observations in the industry-level regression. Coefficients in **Bold** are significant at the 1% confidence interval.

Table 5: Pooled audit fee model for fiscal year 2003

Ln*(fee)* = $\beta_0 + \beta_1$ *Ln*(assets) + β_2 *CATA* + β_3 *DE* + β_4 *ROI* + β_5 *Foreign* + β_6 *Special Items* + β_7 *YE* + β_8 *Segments* + β_9 *Special20* + β_{10} Big + *e*

	(1) Full Sample	(2) Big 4	(3) Restricted
Special20	0.141 (4.69)	0.071 (2.32)	0.050 (1.71)
Adj. R2	0.762	0.699	0.696
N	4,072	3,119	2,914

Coefficients and (t-values) are provided. Industry fixed effects are included. For parsimony, we only report the coefficients and statistics related to the *Special20* variable, all variables are as defined in Table 1. Standard errors are Huber-White robust and cluster-adjusted by industry. Column (1) includes the full sample including Non-big 4 firms. Column (2) is restricted to Big 4 clients and restricts *Big* from the model. Column (3) is restricted to Big 4 clients and excludes industries 13 and 23.

Table 6: Audit fee model for individual Big 4 auditors by industry for fiscal year 2003

Ln*(fee)* = $\beta_0 + \beta_1$ *Ln*(assets) + β_2 *CATA* + β_3 *DE* + β_4 *ROI* + β_5 *Foreign* + β_6 *Special Items* + β_7 *YE* + β_8 *Segments* + β_9 *Auditor* + *e*

	DT		EY		KPMG		PW	
SIC 2	t-value	MKT SH	t-value	MKT SH	t-value	MKT SH	t-value	MKT SH
10	**1.83**	9%	0.52	22%	-1.02	15%	-0.35	49%
13*	**-1.98**	6%	-0.87	17%	-0.39	16%	**2.86**	56%
20	0.49	15%	1.49	32%	-1.34	18%	0.01	33%
23*	1.38	49%	0.02	16%	-0.70	6%	-1.30	17%
26	-0.05	28%	-0.56	24%	0.54	13%	0.17	35%
27	0.33	21%	-0.02	23%	1.42	42%	**-2.07**	12%
28	0.14	21%	0.45	19%	**-2.21**	16%	1.24	41%
30	0.78	11%	1.05	46%	-0.06	13%	-1.18	25%
33	0.41	12%	0.89	25%	0.09	9%	-1.38	53%
34	-1.02	19%	-0.27	17%	0.62	17%	0.70	44%
35	0.65	18%	-0.66	24%	-0.45	12%	0.72	42%
36	0.95	30%	-0.14	24%	0.47	20%	-0.92	23%
37	**-2.10**	34%	1.24	28%	-0.29	8%	1.35	30%
38	0.29	15%	-0.89	25%	-0.77	11%	1.18	44%
39	0.36	31%	0.00	15%	-0.32	20%	-0.06	27%
42	0.63	34%	0.19	7%	-0.35	33%	-0.72	24%
45	**-2.53**	21%	**2.02**	63%	0.24	17%	(no observations)	
48	-1.27	3%	1.09	82%	0.08	8%	0.16	6%
49	-0.20	46%	**2.17**	12%	0.12	9%	-1.27	33%
50	1.69	15%	-0.02	34%	-1.63	15%	-0.23	24%
51	-0.54	28%	0.82	45%	-1.45	14%	1.15	11%
56	0.25	38%	-0.03	25%	0.91	15%	-1.47	17%
58	1.39	15%	0.89	26%	-0.93	46%	-1.24	9%
59	-1.09	27%	0.21	16%	0.40	28%	0.71	24%
67	1.10	18%	-0.75	38%	0.59	22%	-0.40	20%
73	-1.15	16%	1.02	22%	1.22	24%	-1.42	33%
79	-1.28	37%	**2.45**	30%	-1.51	7%	-0.27	15%
80	-0.04	6%	**2.38**	50%	-0.04	26%	-1.29	14%
87	1.00	17%	-0.71	30%	-0.01	22%	-0.20	25%

* Industries in which a fee premium is identified on Special20 in Table 4.

Results are from industry-specific regressions including an auditor indicator variable, Auditor representing each of the Big 4 auditors (DT, EY. KPMG, and PW). For parsimony, we only report the coefficients and statistics related to the each auditor, all variables are as defined in Table 1. Standard errors are Huber-White robust. Coefficients in **Bold** are significant at the 1% confidence interval.

Table 7: Tobit Estimation of Auditor type on Audit Quality
Specialist $= \alpha_0 + \alpha_1 ACC\_Q + \alpha_2 DACC + \alpha_3 If\ Restated + \alpha_4 Ln(Nas) + \alpha_5 Ln(Assets) + e$

	(1)	(2)	(3)	(4)	(5)
Sample	Full	Big 4	SIC 13 & 23	Big 4	Big 4
Dependent Variable	*Special20*	*Special20*	*Special20*	*Neg Fee*	*Prem Fee*
Acc_Q	-0.132	0.168	-12.4	-9.649	-12.343
	(-0.281)	(0.237)	(-1.77)	(-1.76)	(-3.42)
DACC	-0.636	0.075	11.242	-118.331	1.091
	(-1.53)	(0.308)	(2.01)	(-0.684)	(4.02)
If NI restated	-0.014	0.084	0.917	0.33	0.318
	(-0.099)	(0.524)	(2.09)	(1.63)	(1.24)
Ln(Nas)	0.107	0.073	0.224	0.334	-0.048
	(3.25)	(1.84)	(1.97)	(5.61)	(-0.498)
Ln*(assets)*	0.26	0.051	-0.044	-0.025	0.169
	(4.8)	(0.778)	(-0.493)	(-0.282)	(0.952)
Intercept	-1.685	-0.027	-1.139	-5.452	-3.536
	(-7.83)	(-0.064)	(-0.981)	(-5.69)	(-3.35)
Chi-square	224.263	38.468	.	289.928	39.146
Pseudo R2	0.103	0.009	0.093	0.092	0.075
N	3,447	2,691	116	2,691	2,691

Coefficients and (t-values) are reported.
Variables are as defined in Table 1. The dependent variable in columns 1, 2, and 3 is *Special20.* The dependent variable in column 4 (column 5) is an indicator variable equal to one if the firm is a client of an auditor with a significantly negative (positive) coefficient in the pricing model reported in Table 6. The model is estimated on the full sample in column 1, restricted to clients of the Big 4 in columns 2, 4, and 5, and restricted to industries 13 and 23 in column 3. Independent variables are as defined in Table 1.

Table 8: Estimation of audit quality measures on market share variables

Audit Quality = $\beta_0 + \beta_1$ *Ln*(assets) + β_2 *Ln(NAS)* + β_3 *Loss* + β_4 *DE* + β_5 *Quick*+ β_6 *TACC* + β_7 *Auditor-type* + *e*

Dependent Variable	(1) *DACC*	(2) *Acc_Q*	(3) *If Restate*	(4) *Ln(NAS)*	(5) *DACC*	(6) *Acc_Q*	(7) *If Restate*	(8) *Ln(NAS)*
Ln(assets)	-0.013	-0.02	0.078	0.607	-0.013	-0.019	0.073	0.607
	(-2.02)	(-5.70)	(1.71)	(16.55)	(-2.03)	(-5.72)	(1.59)	(16.42)
Loss	0.001	0.038	-0.032	0.295	0.001	0.038	-0.029	0.294
	(0.26)	(4.23)	(-0.18)	(1.85)	(0.30)	(4.15)	(-0.16)	(1.83)
DE	0.005	0.012	0.029	-0.095	0.005	0.012	0.021	-0.106
	(0.84)	(1.04)	(0.20)	(-0.42)	(0.80)	(1.02)	(0.13)	(-0.46)
Quick	0.000	0.000	-0.108	-0.003	0.000	0.000	-0.107	-0.003
	(-1.08)	(-1.76)	(-1.51)	(-1.56)	(-1.10)	(-1.75)	(-1.51)	(-1.74)
TACC	0.014	0.054	0.063	-0.081	0.013	0.053	0.06	-0.098
	(0.47)	(3.34)	(0.21)	(-0.73)	(0.46)	(3.15)	(0.21)	(-0.83)
Special20	0.002	0.007	0.067	0.226				
	(0.72)	(0.67)	(0.46)	(1.80)				
Mkt Share					0.013	-0.039	0.562	0.356
					(1.52)	(-2.55)	(1.12)	(1.14)
Intercept	0.087	0.202	-1.964	0.652	0.086	0.214	-2.043	0.707
	(2.02)	(7.01)	(-4.07)	(3.11)	(2.01)	(6.63)	(-4.22)	(3.46)
N	2760	2691	2760	2760	2760	2691	2760	2760
Adj. R-square	0.033	0.141		0.324	0.033	0.141		0.322
Pseudo R-square			0.017				0.018	

Coefficients and (t-values) are reported.

Sample is restricted to Big 4 clients. T-statistics are based on industry clustered robust standard errors.

Table 9: Estimation of aggregate audit quality metric on measures of industry specialization, premium audit fees, and market share

$TQ = \beta_0 + \beta_1 Ln(\text{assets}) + \beta_2 Ln(NAS) + \beta_3 Loss + \beta_4 DE + \beta_5 Quick + \beta_6 TACC + \beta_7 Auditor\text{-}type + e$

	(1)	(2)	(3)
Ln(assets)	-0.153 (-22.72)	-0.152 (-23.40)	-0.152 (-24.17)
Ln(NAS)	0.022 (3.52)	0.022 (3.67)	0.022 (3.68)
Loss	0.156 (5.04)	0.153 (4.90)	0.154 (5.04)
DE	-0.051 (-1.30)	-0.049 (-1.27)	-0.05 (-1.26)
Quick	0.000 (0.06)	0.000 (-0.02)	0.000 (-0.02)
TACC	0.193 (7.30)	0.192 (6.88)	0.191 (6.82)
Special20	0.022 (0.83)		
Premium		-0.103 (-1.32)	
Mkt Share			-0.133 (-1.64)
Intercept	1.649 (30.87)	1.663 (29.26)	1.689 (27.81)
N	2691	2691	2691
Adj. R-square	0.462	0.463	0.463

The dependent variable is the *TQ* is a composite measure of accruals quality, absolute discretionary accruals and restatement based on the sum of the distributional ranking for each component within the sample. The variables *Acc_Q* and *DACC* are ordered from smallest to largest and then assigned a ranking. The rankings are then scaled from 0 (smallest) to 1.0 (largest). The median value has the scaled rank of .50. Since *If NI restated* is an indicator variable a value of .5 was assigned if a restatement occurred and 0 otherwise. The scaled ranks were summed for each observation to form *TQ*. Low values of *TQ* indicate high quality auditing (earnings) and, conversely, high values of *TQ* indicate low quality auditing (earnings).

Figure 1
***Special20* vs. Fees Adjusted for Controls**