Transaction Costs and Competition among Audit Firms in Local Markets[*]

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Abstract

We develop measurements for client-specific competition in local audit markets based on the transaction costs of changing auditors included in DeAngelo's (1981) multi-period audit pricing model. Our first competition measure is the number of suppliers (i.e., potentially efficient audit firms) in a local market, given a client's demand for audit services. We find that audit fees paid by clients to their incumbent audit firm increase monotonically as the number of suppliers to a client in a local market decreases. Our second competition measure is the relative size difference between the largest audit firm in a market and the other audit firms. We find that audit fees decrease as the size difference between the largest firm and the incumbent firm increases. The evidence suggests that these two measures capture distinctive aspects of client-specific competition in a local market, and that larger audit firms have a significant competitive advantage over smaller audit firms. This study advances our understanding on audit market competition and it provides an alternative explanation on the excess audit fees earned by the largest audit firm(s) in a market, in contrast to the existing quality differentiation view.

Keywords: Audit pricing, competition, transactions cost

[*] We appreciate the helpful comments from participants in accounting research workshops at the University of British Columbia, University of Pittsburgh, the University of Toronto, and Lehigh University, and conference participants at the 2014 Auditing Section Midyear Meeting, the 2014 European Accounting Association Conference, and the 2014 Canadian Academic Accounting Association Conference. Dan Simunic thanks the Social Sciences and Humanities Research Council of Canada for financial support. Ling Chu and Ping Zhang also thank the Social Sciences and Humanities Research Council of Canada for financial support.

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1. Introduction

The nature of competition among audit firms has been of concern to regulators (e.g. Subcommittee on Reports, Accounting and Management of the Commission on Government Operations U.S. Senate 1977; Government Accountability Office (GAO) 2003, 2008) and of interest to researchers (e.g. Dopuch and Simunic 1980) for many years. These concerns center around the possibility that a lack of competition among audit firms will lead to higher audit prices, lower audit quality, and hence a lower quality of financial reporting by companies. Auditor competition is therefore an important issue. Unfortunately, competition is a dynamic process that is difficult (impossible) for regulators or researchers to observe directly. As a result, the nature of competition in a market has typically been examined using the *structure →conduct → performance* paradigm of industrial organization. The observable *structure* of an industry is normally measured by the degree of supplier concentration (e.g. the market share of the largest k firms, where k = 1, 2, 3, or 4, etc. or the Herfindahl index). *Conduct*, on the other hand is not observed but is inferred from *performance*, using measures such as prices, gross margins, or profitability. The empirical correlation between variations in structure and measures of performance across markets is then used to make inferences about the degree of competition in an industry. For example, if the market for audit services is dominated by a few suppliers relative to, say, markets for legal services or consulting services, and the dominant audit suppliers are found to be more profitable than, say, the average law firm or management consulting firm, a regulator or researcher might conclude that the market for audit services was lacking in competition. Audit markets in the U.S. and elsewhere have clearly become more concentrated since late 1980's after several rounds of consolidation among the large public accounting firms.

The increased level of auditor market concentration is therefore a concern to regulators and market participants.

While supplier concentration is conceptually linked to market power in the industrial organization literature, the view of supplier concentration in the economics of auditing literature is more ambiguous. For example, using market concentration (i.e., the Herfindahl index) as a proxy for the level of competition, Pearson and Trompeter (1994) find that higher industry concentration *negatively* affects audit fees, and Bandyopadhyay and Kao (2004) do not find that audit fees are higher in more concentrated markets. However, Feldman (2006) documents that audit fees have increased with increased market concentration after the demise of Arthur Anderson. Such mixed results lead to questions concerning the adequacy of using overall market concentration as a proxy for auditor competition. Numan and Willekens (2012) argue that it is not often the case that all firms in an industry face the same level of competition, and one large firm within an industry may face less competitive pressure than its smaller competitors. Based on spatial competition theory of oligopolistic pricing with differentiated products, Numan and Willekens (2012) predict and find that the audit fee increases in industry specialization and in the "distance" between the incumbent auditor office and that auditor's closest competitor, where distance is measured by the relative size of industry market shares. They find that competitive pressure from a "nearby" competitor has a negative effect on audit fees, even for industry specialists. Numan and Willekens (2012) make progress in the measurement of market competition by demonstrating that price competition is indeed "local", being both auditor-specific and client-specific. In this paper, we extend the analysis of local competition in auditing by considering both the characteristics of the client and the characteristics of potential suppliers – that is, auditors. Specifically we consider the effect of the size of clients and audit firms on the

level of competition. Since the audit service to a client consists of integrated professional activities purchased from a single supplier who signs the audit report, client size (however measured) is a fundamental determinant of the level of auditor effort demanded and supplied in servicing a client. When the size of a client increases, some small audit firms in the market may not be potentially efficient suppliers to the client due to the high transaction costs associated with their limited production capacity. As a result, competition for the client is dampened due to fewer efficient potential suppliers. This implies that the relationship between supply and demand in an audit market is client specific, and in this study we develop and test such client-specific measurements of local competition.

Recognizing the dynamic nature of market competition, we argue that the competitive pressure on an incumbent auditor's fees basically depends upon the ease with which the auditor's clients can switch to a competing audit firm. If the transaction costs of auditor change are low, the ability of the incumbent auditor to extract economic rents from clients is limited; conversely, high costs of changing auditors give an incumbent auditor greater pricing power. We first conjecture that transaction costs are associated with the size of a client relative to the size of audit firms in a market. Specifically, the transaction costs of a large client switching to another audit firm are higher than those of a smaller client switching to the same audit firm. Also, the transaction costs of a client switching to a smaller audit firm are higher than if switching to a larger audit firm. Furthermore, there are likely to be only a few audit firms in a market that are large enough to take on large new clients, while there are likely to be many potential suppliers in a market for small clients. Moreover, we conjecture that transaction costs are associated with the relative size differences of competing audit firms and the incumbent firm in a market. That is, the larger the size difference between the largest available supplier and the incumbent supplier, the

lower the transaction cost for a client to switch to the largest supplier. We combine these arguments with the simple multi-period audit pricing model in DeAngelo (1981) that includes transaction costs in the form of both auditor learning and client-incurred switching costs, to develop empirical predictions concerning audit fees as a function of the size of the conjectured costs of auditor change. Our arguments essentially predict that, *ceteris paribus*, audit fees increase as the number of suppliers in a market who are large enough to efficiently service a client of a given size decreases (H1) because price increases when supply decreases holding demand constant. Furthermore, audit fees increase as the size difference between dominant firm in a market and the incumbent audit firm increases (variable termed *DIFFERENCE*) because dominant firms are able to extract more rents (H2). We test these hypotheses using U.S. public company audit fee data for local audit markets (Standard Metropolitan Area by client 2-digit SIC industries) from 2000-2011 and find evidence that is strongly consistent with these hypotheses.

The tests of H1 and H2 provide an alternative explanation as to the underlying cause of higher audit fees paid to city-level dominant audit firms, who are typically considered to be "industry specialists". That is, a market leader (i.e., usually considered a "city-level client-industry specialist") is able to charge a price premium due to its market power, and this fee premium is a continuous function of market power - not dichotomous as would be the case if there was a quality difference between specialist and non-specialist auditors.

We contribute to the audit market competition literature by developing a client specific competition measure: the "number of suppliers". Simunic (1980) explains that the effect of monopoly pricing on observable audit fees depends on the price elasticity of demand implicit in the client's cost minimization problem. We are able to test this argument by considering the

competitive effect of client size, its effect on the number of potential suppliers, and thereby on audit fees *within the context of a specific audit market*.

Our measurements of competition contrast with those of Numan and Willekens (2012). They find audit fees increase as the absolute difference (termed ”distance”) between the incumbent auditor’s market share and the closest non-incumbent’s market share increases, whether the non-incumbent’s share is smaller or larger than the incumbent’s share. We argue that the price pressure in a market comes from the number of potential suppliers for a specific client and the greatest pressure comes from the largest audit firm in the market – rather than from firms of similar size. We find that the pricing effect of “distance” goes away after controlling for the number of suppliers to each client in a local market, and the competitive advantage of the dominant firm. Our results demonstrate the importance of considering client specific competition measures, and distinguishing between competitive effects facing large versus small audit firms due to the differences in transaction costs of auditor change.

Furthermore, a large stream of auditing literature has used the market shares of auditors in servicing clients within specific industries in a country (e.g. banking, insurance, etc. in Australia) or clients within industries in geographic areas (e.g. metropolitan areas in Australia, U.S., etc.) not as a measure of concentration and possible market power, but rather as a measure of *auditor specialization* (Craswell, Francis and Taylor 1995, Ferguson and Stokes 2002, Ferguson, Francis, and Stokes 2003, Francis, Reichelt, and Wang 2005, Fung, Gul, and Krishnan 2012, etc.). Our evidence suggests that the high fees charged by audit firms with high market shares in a client industry are evidence of market power, and the classification between specialist and non-specialists is not dichotomous, if indeed there are any client-industry related quality differences among audit firms. Based on our findings, further research to explore potential explanations for

the existing findings that city level industry specialists (as measured by market shares) provide higher audit quality would be useful.

The remainder of the paper is organized as follows. In section II, we develop our economic arguments concerning the crucial role of transaction costs in audit market competition. Section III lays out the empirical test design, including definitions of key variables. Data are described and results of the hypothesis tests as well as various additional (sensitivity) tests are reported in Section IV. Section V summarizes and concludes the paper.

2. Transaction costs and audit pricing

DeAngelo (1981) develops a simple multi-period (perpetuity) audit pricing model that incorporates the effects of the various determinants of an audit firm's fee, including start-up costs of auditor learning and client incurred switching costs. In this paper, we consider both the start-up costs and the switching costs that are incurred if a client changes auditors to be the transaction costs of audit firm change. The model describes an audit firm's net present value or profit (π) from a client engagement as a function of the initial year's audit fee (F_1), normal annual production costs (A), first period start-up costs (K), a recurring audit fee in the second and subsequent year (F), and a discount rate (r), where:

$$\pi = (F_1 - A - K) + \frac{F - A}{r}$$

In addition, the recurring audit fee, F, is limited by a client's ability to change audit firms in order to secure a lower fee while incurring the costs of changing audit firms, denoted CS, such that:

$$F + \frac{F}{r} \leq A + K + A/r + CS$$

This implies that the entry deterring (audit firm change deterring) audit fee in the second and subsequent years can be written as:

$$F = A + \frac{r(CS + K)}{1 + r}$$

DeAngelo (1981) uses these pricing relations to examine the phenomenon termed "low-balling" and argues that competition among audit firms will drive an audit firm's economic profit (π) to zero, yielding an audit fee in the first period (F_1) that is less than first period costs ($A + K$), because quasi-rents ($F > A$) can be earned in the second and subsequent periods so long as the transaction costs of audit firm change are non-zero ($CS + K > 0$). However, the pricing model is still relevant if one does not assume that audits are competitively priced. If competition in a market is weak such that $\pi > 0$ and the audit firm earns monopoly rents, the entry deterring annual audit fee in the second and subsequent periods (F) still depends on the transaction costs of auditor change ($CS + K$). Moreover, by inspection of the fee function (the third equation above), F increases monotonically in the value of these transaction costs. The important conclusion from this pricing model is that positive transaction costs give an audit firm pricing power, that is, the ability to raise audit fees over the avoidable costs incurred in a period (A) and thus earn quasi-rents and perhaps monopoly rents. Moreover, an incumbent audit firm's ability to raise audit fees increases as the size of transaction costs increases. Note that the pricing power exists even if all audit firms are the same with respect to the quality of audits performed and/or the recurring costs of performing audits, which is an assumption in DeAngelo (1981) and which we also assume. Specifically, there is no auditor-client industry specialization assumed to exist. The only distinction among audit firms is between the incumbent audit firm and that audit firm's potential competitors.

It is useful to note that *formally* in DeAngelo's pricing model, a lack of sufficient competition only affects the value of F_1 which would be "too high" and yield $\pi > 0$, since bidding for the client only occurs at the beginning of the engagement. Once an incumbent auditor is in place, audit fees only depend on the value of *A* and the transaction costs of auditor change, with the incumbent auditor pricing the audit so as to deter entry. More generally, however, weak competition among auditors in the real world may allow the incumbent firm to earn monopoly rents in all periods – not just in the first period – and this notion underlies hypothesis H1, that audit fees are expected to increase as the number of suppliers decreases.

2.1 Nature of the transaction costs of auditor change

In the pricing model, start-up costs (*K*) are incurred by the audit firm in the first period of an engagement and are related to the audit firm learning about the characteristics of a new audit client, while the costs of changing auditors (*CS*) are potential costs borne by the client only if it chooses to switch to a new audit firm. In an empirical test using recurring (second and subsequent period) audit fees, the distinction between *K* and *CS* is not important as both components have the same effect on *F*. These two costs are conceptually very broad and for a potential audit firm may include various costs of learning about a new audit client's business, transaction flows, accounting, and internal control systems; assessing the abilities and integrity of key client personnel; assessing the risks of various kinds of material financial statement misstatements, and so forth. For the client who changes audit firms these costs could include the time needed to assess competing audit firm bids; adjustment costs of learning to work with and "training" a new audit team in the details of the company's operations and systems; and so forth.

To our knowledge, no prior research has measured these transaction costs directly and we do not attempt to do so in this paper. Rather, our main argument is that those costs are associated with the size of a client relative to the size of audit firms in a market that are large enough to service the client. That is, these costs will be *positively related* to the client size and *inversely related* to the size of competing audit firms. Specifically, the transaction costs of a large client switching to another audit firm are higher than those of a smaller client switching to the same audit firm. The transaction costs of a client switching to a smaller audit firm are higher than if switching to a larger audit firm. The following paragraph explains the rationale for our argument.

The production of audit services is highly labor intensive (O'Keefe, Simunic and Stein 1994) with labor-embodied human capital (e.g. knowledge) playing an important role in audit production. In a given auditor-client market (e.g. a specific industry in a metropolitan area), if a client decides to switch from an incumbent to a competitor, then the competitor needs to have the capacity, such as appropriate personnel, to staff the new engagement. For a profit maximizing audit firm in a steady state, a local audit office's existing personnel will mainly be employed to service current engagements and *the slack in staff is likely to be minimal*. Given the new demand, the office may have to hire additional personnel to staff its now larger portfolio of engagements, and in addition to sheer number of staff, the potential competitor audit firm will have to obtain (i.e. hire or re-assign) staff with the appropriate knowledge to serve a new client, including the knowledge of the industry in which the new client operates. It is reasonable to argue that larger auditor offices have greater elasticity in resources to deal with a new demand when the slacks are minimal. As a result, larger auditor offices in a local market are more efficient and have lower cost than smaller competitors with respect to the transaction costs of auditor change. In sum, we assume that these transaction costs are a monotonically decreasing function of the size of auditor

offices in a local audit market. Note that other than differences in transaction costs, we assume that the recurring costs of performing an audit are the same across all audit firms.

Turning to the clients' switching cost, another component of the total transaction costs, we argue that clients may incur higher adjustment costs of learning to work with and "training" a new audit team in the details of the company's operations and systems when dealing with smaller auditor offices due to larger proportion of inexperienced staff members in the audit team relative to larger offices. For a given auditor office size, the increase in client size also increases the transaction costs because the greater demand reduces the auditor office's efficiency to absorb the new engagement. That is, the auditor office has to stretch to a greater extent in its resources to manage a larger new engagement.

Therefore, the total transaction costs are a decreasing function of the auditor office size and an increasing function of the client size. There are likely to be only a few auditor offices in a market that are large enough to provide efficient audit service to large new clients, while there are likely to be many potential suppliers in a market for small clients.

2.2 *The incumbent auditor office's pricing of audit services*

When an incumbent auditor office prices the audit service to a client, the office needs to consider the potential bids from competitors. One of the important factors that affect bids from competitors is the number of potential competitors in the market. The number of competitors for a client represents the "size of supply", which directly affects the audit fee. Auditors can potentially earn monopolistic or oligopolistic rents when the supply is low. Otherwise, the audit market is perfectly competitive and such rents are zero.

As we argue in the previous sections, transaction costs are one of the determinants of the audit fee and the transaction costs are a function of both individual client size and auditor office size. For a given client, the transaction costs increase as the auditor office size decreases. When an auditor office's size relative to a potential client reaches a certain critical low level, the transaction costs would be too high such that this auditor office cannot efficiently take on the client and is essentially "not in the market" for that client. The number of efficient suppliers in a market who are large enough to service a client of a given size is termed as "the number of suppliers" to the client. This number will typically be smaller than the total number of auditor offices in the market. Therefore, the incumbent auditor office can determine the number of potential suppliers for a client and the incumbent auditor office will charge a higher fee when there are fewer suppliers. When the number of suppliers increases, the audit fee will decrease, *ceteris paribus*. Our first hypothesis concerns this relationship:

Hypothesis 1 (H1): *The audit fee charged by the incumbent auditor office increases as the number of auditors who can efficiently provide service to the client decreases.*

The number of suppliers mainly captures the effect of the relationship between supply and demand on audit fees. This measurement, however, considers all suppliers as equals and ignores the relative size differences of these suppliers. The incumbent auditor office may receive differential competitive pressures from various potential suppliers. As per the pricing model, the incumbent auditor office has to price its continuing audits correctly (limit pricing) such that its clients will not switch to any of its competitors. Consequently, an incumbent auditor office's fees have to reflect the *lowest* transaction costs of changing auditors by its clients, which are most likely the transaction costs of changing to the largest audit firm (office) in the market. Therefore, although auditors in a market may have many competitors, the highest competitive pressure

comes from the largest supplier who has the lowest transaction costs. In other words, the largest auditor office is a reference point for the level of competitive pressure faced by all other auditors in the same market.

To illustrate, suppose there are three auditor offices in a market, say Big, Middle, and Small. Then both the Middle and Small offices must price their continuing engagements so as to deter client switching to Big and their audit fees will be:

$$F = A + f\,(CS_B + K_B)$$

where the subscript B denotes the costs associated with switching to the Big audit firm. The larger is the office, Big, the lower the audit fees of its smaller competitors. What about the fees charged by the Big office? By our assumption that the transaction costs of switching to Big are the lowest of the firm offices currently in the market, the audit fees of Big will be constrained by possible client switching to Middle and Small and Big's fees will be greater than the fees charged by both Middle and Small. Also, the greater the size difference between Big and the next largest office in the market, the greater will be the fee difference.[2]

Taking the argument one step further, it is reasonable to assume the smaller is an auditor office, the easier (cheaper) it would be for the largest auditor office in the market to accommodate any client of the small auditor. Therefore, the competitive pressure on an auditor office would be an increasing function of the *size difference* between that office and the largest audit office in the market. As a result, the pricing of the existing client by an incumbent auditor office would depend not only on the size of the biggest competitor but the difference in office size between the incumbent and the largest competitor. Returning to the example, if it is cheaper

[2] One could argue that competitive pressure on the Big audit office comes from potential new entry outside the current market structure. However, a new audit firm entrant to a client industry will likely incur additional start-up costs. This new entry effect is outside the scope of this paper.

for Big to absorb a client of Small than it is to absorb a client of similar size of Middle, this client's audit fee would be:

$$F_S = A + f\,(CS_{S\text{-}B} + K_{S\text{-}B})$$

for the Small office and

$$F_M = A + f\,(CS_{M\text{-}B} + K_{M\text{-}B})$$

for the Middle office where $F_M > F_S$, and finally $F_B > F_M > F_S$. These arguments lead directly to the following hypotheses:

Hypothesis 2 (H2): *Audit fees increase as the size difference between dominant firms in a market and incumbent audit firm increases.*

The tests of H1 and H2 provide an alternative explanation as to the underlying cause of higher audit fees for "city industry specialists", which are the dominant auditor offices in audit markets. We argue that the intensity of competitive pressure is inversely related to the size of the client and the incumbent auditor office. The bigger the client, the lower the number of suppliers in the market, because the client specific transaction cost is higher. Moreover, the bigger the dominant auditor office in the market, the lower is the transaction cost for a client to switch to this office and the larger the transaction cost for its client to switch to a smaller auditor office. Therefore, a market leader (i.e., city industry specialist) is able to charge a price premium due to its market power, and this fee premium is a continuous function of market power. Additionally, our hypotheses suggest the classification between specialists and non-specialists is not dichotomous if, indeed, there is any quality difference between these auditors.

3. Definition of variables and design of our tests

3.1 Empirical model

Building on prior audit fee research (Simunic 1980; Francis et al. 2005; Hay, Knechel, and Wong 2006; Numan and Willekens 2012), we develop the following model to test our two hypotheses.

$$LAF=\beta_0 + \beta_1 LTA + \beta_2 LBSEG + \beta_3 LGSEG + \beta_4 CATA + \beta_5 QUICK + \beta_6 LEV + \beta_7 ROI + \beta_8 FOREIGN + \beta_9 OPINION + \beta_{10} YE + \beta_{11} LOSS + \beta_{12} BIG + \beta_c COMPETITION + FIXED\_EFFECTS + \varepsilon,$$

where:

LAF = natural log of audit fees;

LTA = natural log of total assets;

LBSEG = natural log of the number of unique business segments;

LGSEG = natural log of the number of unique geographic segments;

CATA = ratio of current assets to total assets;

QUICK = ratio of current assets excluding inventory to current liabilities;

LEV = ratio of long-term debt to total assets;

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

FOREIGN = an indicator variable that equals 1 if revenue from foreign operation is reported, 0 otherwise;

OPINION = an indicator variable coded 1 for modified audit report, and zero otherwise;

YE = an indicator variable that equals 1 for December 31 year-end and 0 otherwise;

LOSS = an indicator variable that equals 1 if loss in current year, and 0 otherwise;

BIG = an indicator variable that equals 1 for Big N auditors and 0 otherwise;

COMPETITION: there are two measurements for competition in an audit market which is defined as a two-digit client SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition):

(1) S1, S2, …..S7 = Seven indicator (dummy) variables that take a value of 1 if a client has 1, 2, up to 7 potential suppliers, and 0 otherwise. An auditor is defined as a potential supplier to a client in a market if the auditor's total audit fees earned in that market are not lower than the client's audit fees paid to its current auditor; ***or / and***

(2) DIFFERENCE = [(The sum of the largest auditor's audit fees in a market – The sum of this auditor's audit fees in a market) ÷ Total audit fees in a market].

FIXED_EFFECTS = year and industry indicator variables; and

ε = random-error term

3.2 Test variables

We test H1 by constructing indicator (dummy) variables to measure the number of potential suppliers who currently operate in the specific local client-industry market who are sufficiently large to be deemed potentially efficient suppliers of audit services to a client, i.e., the number of suppliers. As noted above, the markets we study in this paper are defined as companies and auditors operating in two-digit SIC industries in U.S. Metropolitan Statistical Areas as defined by the U.S. Census Bureau. We use this definition which is the same as prior U.S. based research in this area since our basic objective is to test a market power interpretation of audit firm client-industry local market shares. We define an audit firm as a potential supplier if the firm's total audit service revenue in that market is not lower than the audit fee the client is currently paying the incumbent audit firm. Thus every client will have at least one supplier, the

incumbent audit firm. We use the variables S1, S2, S3,…, and S7 to indicate that a client has one, two, three,…and seven suppliers. If a client has eight or more suppliers, the effect is included in the value of the intercept. For example, if a client has four suppliers, S4 equals 1 and all other indicator variables equal zero; if a client has ten suppliers, all of the indicator variables equal zero.[3] Note that a supplier is an auditor office that can efficiently provide audit service to a particular client. It is not clear how large an auditor office should be relative to a client to become a supplier. Practically, the cut-off point is not that important to our study if the following two conditions are satisfied. First, any auditor office whose operational size (measured by its total audit fees) equals the demand of a client (measured by the audit fees paid by the client to its incumbent audit firm) is a supplier to the client. This condition is important since some auditor offices only have one client and their sizes equal their respective client demand sizes. If we define an auditor office whose operational size is higher than the size of a client's demand as a supplier, a real supplier to the client may be misclassified as a non-supplier. The second condition is that an auditor office's operation should not be *too* small relative to the size of a client's demand for audit services. Since the transaction costs increase in client size and decrease in the auditor office size, if an auditor office is small relative to the client, it will not be able to conduct an efficient audit due to the high transaction costs. Therefore, if we set the auditor-client relative size cut-off *too* low, many non-suppliers will be misclassified as suppliers. When these two conditions are satisfied, our measure is robust, since the relative ranking of number of suppliers to a client in an auditor market is basically the same. To illustrate this, assume there are three clients in the market with various size (C1>C2>C3, where Ck is the demand, that is the current audit fees paid by client k). Assume the numbers of suppliers for

[3] We obtain similar results changing S1 through S7 to S1 through S8, or S1 through S6, or S1 through S9, since the market is competitive if the number of suppliers is greater than 6.

these three clients are a, b and c respectively if the cut-off point for an auditor office to be a supplier to a client is the demand size of the client, then $a \leq b \leq c$. If we change the cut-off point to be 50% of the demand of the client, the numbers of suppliers for these three clients are changed to x, y and z respectively. As a result, the following relations hold: $a \leq x$, $b \leq y$, $c \leq z$ and $x \leq y \leq z$. This means that the relative positions of these clients with respect to the number of suppliers are similar in both situations: $a \leq b \leq c$ vs. $x \leq y \leq z$. However, if the cut-off point is *too* low, the number of suppliers becomes the number of auditor offices in the market, which eliminates the structure differentiating the competition for a specific client. When the number of the auditor offices in the auditor market is used as number of suppliers to a client, all firms in the market have the same number of suppliers and the number of auditor offices is not client specific in the market. We conduct tests to see whether the number of auditor offices captures the competition for clients and do not find supporting evidence (see footnote 5), which confirms that the second condition is important. In our analysis, we use two cut-off points to determine the number of suppliers, the client demand size and seventy five percent of client demand size, to show that our measurement is not sensitive to cut-off points within a reasonable range.

Under H1, we expect the estimated coefficients of S1 through S7 to be positive and decreasing (i.e. $\beta_{S1} \geq \beta_{S2} \geq \ldots \geq \beta_{S7}$). Since smaller clients naturally have more suppliers, there is a potential concern that the indicator variables S1 through S7 are capturing the residual client size effects on audit fees not captured by *LTA* and other control variables in the model that are correlated with client size. To address this concern, we divide the full sample into 50 groups according to client size and create 50 indicator variables that equal one if the observations are in that group and zero otherwise. We include these variables in the regression to provide further control for the pure client size fixed effect.

We use DIFFERENCE to test H2. DIFFERENCE is the difference in market share between the largest auditor and any other incumbent auditor and measures an audit firm's relative size in the market. Since the variable DIFFERENCE captures the competitive disadvantage of other auditors relative to the largest auditor who is always a supplier to any client in a specific market, the variable DIFFERENCE can capture these variations and we expect $\beta_{13} < 0$.

3.3 Control variables

The control variables included in the audit fee model are based on numerous previous studies such as Dao, Raghunandan, and Rama (2012), Francis and Yu (2009), Fung et al. (2012), Hay et al. (2006), Numan and Willekens (2012), and Simunic (1980). We control for client size (LTA), complexity (LBSEG, LGSEG, FOREIGN), and risk (CATA, QUICK, LEV, ROI, LOSS). The coefficients of LTA, LBSEG, LGSEG, FOREIGN, CATA, DE, and LOSS are expected to be positive. We expect the coefficients of QUICK and ROI to be negative. Following Francis et al. (2005) and Fung et al. (2012), we include audit opinion (OPINION) which is a client risk measure and may also measure the need for additional work, and a variable indicating a December fiscal year-end (YE), which may also capture a difference in audit costs, hence fees. Extant literature has shown that Big audit firms earn fee premiums (Hay et al. 2006) and thus we also control for Big audit firms (BIG) in the regression. We expect positive coefficients for OPINION, YE, and BIG. Finally, indicators for year and industry effects are included in all tests.

4. Data and results

4.1 Sample and data

The sample is selected from two sources: the Audit Analytics database and the Compustat data base. Panel A of Table 1 presents the sample screening procedures. We start with a total number of observations of 99,800 with audit fee and MSA data for 2000-2011 on Audit Analytics, and use this data to calculate the number of suppliers and values of DIFFERENCE. We then merge the data with the Compustat variables. We lose 37,304 observations in the merging process. We then exclude companies in the financial sector. Furthermore, 5,166 observations do not have values for all control variables. To focus on the issues of interest in this study, we exclude audit markets that have only one active audit firm.[4] Recall that the transaction costs and resulting rents and quasi-rents in the pricing model describe continuing audit engagements, so we exclude 5,223 observations with one or two year auditor tenure. The final sample consists of 26,876 firm-year observations. Descriptive statistics for all variables are reported in panel B of Table 1, and the correlations between variables are reported in Panel C of Table 1. The data presented in these tables are comparable to those reported in previous studies (e.g., Fung et al. 2012). Four ratio variables (QUICK, CATA, LEV and ROI) are winsorized in both extreme ends to 0.5 percentile level. [5]

4.2 Results of tests of H1 and H2

Results for the test of H1 are shown in Table 2 Panel A. The estimated coefficients of the seven dummy variables, S1 through S7, are all positive and statistically significant. Moreover, their values arrayed from the coefficients of S1 through S7 are as follows:

[4] Similar results are obtained when audit markets with only two or fewer auditors are excluded.
[5] The main results are not changed if the data are not winsorized.

0.393, 0.211, 0.229, 0.203, 0.162, 0.127, and 0.039

That is, the relative values are as hypothesized (i.e., decreasing), except for the step between the coefficients of S2 and S3. The statistical differences between these coefficients are presented in Table 2 Panel B. Though the coefficient of S2 is less than the coefficient of S3 (contrary to hypothesis 1) this anomalous difference is only marginally significant.

Overall, we believe that this is a powerful result which demonstrates that incumbent audit firms' audit fees decline virtually monotonically as the number of suppliers in a market who can efficiently service a client of a given size increases.[6] This is consistent with classical findings in the industrial organization literature that prices decline as the number of competitors in a market increases, until the perfectly competitive result is attained. It is also interesting that the estimated coefficient of S1 (which represents a monopolist supplier) is considerably larger than all of the other estimated coefficients. Note that this effect would be captured in an audit fee regression which included a dummy variable denoting a "specialist audit firm". We show the results of including specialist in the additional analysis section later in the paper.

The results for testing H2 are in column (1) of Table 2 Panel C. The coefficients of the variable DIFFERENCE is negative and statistically significant (-0.296, t=-20.88). This suggests that there is an "audit firm effect" such that small audit firms have limited pricing power relative to larger competitor firms. In other words, relative size difference between the incumbent auditor and the largest supplier affects the competitive position of the incumbent auditor. Column (2) of Table 2 Panel C presents the results from the model including both competition measurements. The coefficients of those variables (S1-S7, and DIFFERENCE) are very similar to those in Panel C column (1) and Panel A, suggesting these two set of variables capture very distinctive aspects

[6] Note that the number of potential suppliers is client specific. If we simply control for the total number of suppliers in a market, rather than potentially efficient suppliers for a specific client, we do not obtain this result. This implies that not all auditors in a market are relevant for all clients.

of auditor competition in an audit market. These results show that the number of suppliers and the relative size of the auditors in an audit market appear to be important, previously unrecognized determinants of audit fees.

All estimated coefficients of the control variables in the regression are statistically significant and have the expected sign. Moreover the estimated value of the coefficient of the natural log of total assets (LTA) is expected to be about 0.5 when U.S. data is used in estimating the audit fee model (Simunic, 1980), and its value is approximately 0.49. Also as expected, the regression model has high explanatory power ($R^2 \approx 0.86$).

4.3 Additional tests

4.3.1 Replication of auditor 'Location' test reported by Numan and Willekens (2012)

In a recent paper, Numan and Willekens report a test of auditor pricing as a function of an audit firm's location in space relative to its clients and its competitors. The test is motivated by the spatial competition model developed in Chan, Ferguson, Simunic and Stokes (2004). That paper models a non-cooperative oligopoly where clients and suppliers are located in a product-characteristics space (which could include physical space as in Hotelling 1929) and the supplier located "closest" to a client enjoys a cost advantage in supplying the audit service relative to competitors. Holding audit quality constant, a client is motivated to purchase an audit from the closest (cheapest) supplier. Moreover, that supplier's price is limited by how close the nearest *alternative* supplier is to the client. Thus the least-cost (closest) supplier becomes the incumbent audit firm but does not price the audit at its own marginal (avoidable) cost but rather will use a limit pricing strategy to deter entry and price the audit at the cost facing the next-closest supplier. As a result, the incumbent audit firm will earn rents (quasi-rents and possibly monopoly rents).

While the spatial model of auditor competition is conceptually quite appealing, operationalizing the notion of "space" to test the pricing implications of the model is a challenge. In their paper, Numan and Willekens define distance in space by the difference in market shares of suppliers, where markets are defined the same way as in our paper (i.e. client industries in U.S. MSAs), and market shares are also measured the same way (specific audit firm's audit fees relative to total audit fees in a market). They argue that the greatest pricing pressure comes from the supplier whose market share is "closest" (i.e. most similar value) to the incumbent audit firm. They hypothesize that audit fees increase as the difference or distance between the incumbent's market share and the closest non-incumbent's market share increases, *whether the non-incumbent's share is smaller or larger than the incumbent's share*. They use the absolute value of this difference to compute a variable called DISTANCE and find that it has a statistically significant positive coefficient. That is, the greater the DISTANCE the greater is the pricing power of the incumbent audit firm.

Since we argue that the greatest pricing pressure in a market comes from the largest audit firm in the market – not from smaller firms – we believe that the variable DISTANCE is not a good measure of competitive pressure on the incumbent audit firm. If the incumbent firm is a small firm, the greater the distance to its closest competitor (larger firm), the lower the fee it can charge. We believe that the reason a positive coefficient on DISTANCE was observed in Numan and Willekens is because it is an average effect, as most of the clients in their sample utilize Big audit firms.

Thus it is interesting to determine whether Numan and Willekens' reported findings are robust after controlling for our competition measures. The results of this test are shown in Table 3 where the variables DISTANCE, as well as Numan and Willekens' variable termed

PORTFOLIO (the proportion of revenues an audit firm generates from an SIC industry relative to its total client revenues earned in an MSA), and DISTANCE_PORTFOLIO (i.e., DISTANCE × PORTFOLIO) are included in the regression, along with our S1 to S7 measures. Column (1) replicates their results. Columns (2) and (3) show results after controlling our competition measures.

Column (1) shows that the coefficient of variable DISTANCE is positive and statistically significant as reported by Numan and Willekens. Once we include our measurements for competition, the coefficient of the variable DISTANCE becomes significant with *opposite* sign in columns (2) and (3), contrary to the Numan and Willekens' hypothesis. However, our test variables S1 to S7 and DIFFERENCE have consistent coefficient estimates as those shown in Table 2, suggesting these measurements are more reliable for capturing competition in an auditor market and support our argument that the most competitive pressure comes from the dominant auditor office in a market.[7]

4.3.2 Effect of 'Specialists' in markets

The tests of H1 and H2 provide a basis for distinguishing between two underlying conceptual reasons why audit fees in a local market are highest for the dominant audit firm. We argue that audit fees increase as the number of suppliers decreases and the fee differences are driven by differences in supplier pricing power. However, the auditor specialization, quality differentiation literature that originates with the paper by Craswell et al. (1995) would interpret the differences as a premium (discount) for higher (lower) audit quality. Our hypotheses propose an alternative explanation; that is, the fee premium charged by a city industry specialist is a continuous function of its pricing power. For the results of our tests of hypotheses to be

[7] Though smaller clients may not engage in large audit firms, they always have the option in doing so.

consistent with a "quality differentiation" story, there must be multiple levels of auditor specialization and industry expertise sold in local client-industry defined markets. That is the lower an audit firm's market share, the lower must be its level of audit quality. To our knowledge, no one has argued that this is the case. Rather, that literature has argued that there are some client industry specialist auditors, whose services command a pricing premium relative to non-specialist auditors; that is, client industry specific markets have two levels of audit quality available – specialist quality and non-specialist audit quality.

We conduct two tests to investigate whether the differential fees captured by our competition measurements reflect the fee premium of quality differentiated specialists relative to non-specialists, and whether the classification of specialists and non-specialists is dichotomous. In the first test, we exclude the dominant auditor (specialist) in each audit market. If the remaining auditors who are non-specialists have similar quality or competitive power, the number of suppliers and the variable DIFFERENCE should *not* be significant. The second test is to replace DIFFERENCE with an indicator variable, SPECIALIST, in our regression model. We expect that the variable will fully capture the effect of DIFFERENCE if there are only two types of auditors in a market (i.e., specialist vs non-specialists and the coefficient of SPECIALIST should be positive).

SPECIALIST = an indicator variable that equals 1 if an auditor has the highest market share in a local client industry market, 0 otherwise.

Column (1) of Table 4 reports results when SPECIALIST is included in the audit fee model along with the usual control variables. Note that the estimated coefficient of SPECIALIST is positive (as expected) and highly significant (t = 12.32). Column (2) presents the results of our main regression when all specialists are excluded from the analysis. Any client in the sub-sample

has at least two suppliers. The regression results using these non-specialist observations are very similar to those obtained using the full sample: all variables related to number of suppliers are significant and the size of coefficient in general decreases as the number of suppliers increases. Furthermore, the variable DIFFERENCE is significant (-0.373, t=-17.93). These results suggest that the two measurements capture the intensity of competition among auditors, rather the contrast between specialist and non-specialist auditors. When we include the SPECIALIST variable with our test variables (S1 to S7) in column (3) of Table 4, the "specialist effect" disappears as the estimated coefficient becomes essentially zero (0.003, t = 0.36), while the estimated coefficients of our test variables are essentially the same as those reported in column (1) of Table 2 Panel A.[8] These results suggest that the variable SPECIALIST is not a good measure of the relative market power of the dominant auditor office relative to every other auditor offices, after controlling for the number of suppliers to each client, and when used alone probably does not capture a quality differentiation price premium.

To provide further evidence on the ability of SPECIALIST versus DIFFERECE in measuring a dominant auditor office's market power or quality difference (if there is any), we perform two tests: (1) whether there are fee premiums earned by Specialists for clients who have more than one supplier by interacting SPECIALIST with S2…S7; and (2) whether there are fee premiums earned by dominant audit offices relative to the incumbent auditor office for clients who have more than one supplier, that is, we replace SPECIALIST in the first test by DIFFERENCE in the second test. Table 5 presents the results for the first test and Table 6 shows the results for the second test.

[8] Controlling DIFFERENCE generates similar results.

Table 5 column (1) compares the fees of clients who hire specialists with the fees of clients who hire non-specialists, for those clients who have more than one supplier.[9] We find no significant difference between the fees (i.e., the coefficients of interaction terms are mostly insignificant), confirming that there is no premium in the fees charged by specialists besides the premium derived from market power. $S8^+$ is the indicator variable that equals 1 if a client with 8 or more suppliers and zero otherwise and $S8^+$_SPECIALIST is the interaction term between this variable and SPECIALIST. SPECIALIST is dropped out because all Specialists are now client specific, including S1 which has the same value as S1_SPECIALIST since all clients who have only one supplier must have engaged the specialist.

The other three columns present the results of the same regression model using observations from local client-industry markets with 2-4 audit firm suppliers (column (2)); 5-7 audit firm suppliers (column (3)); and 8 or more audit firm suppliers (column (4)). Note that column (2) (markets with 2-4 audit firms) includes only the test variables S1, S2 and S3, since the case of four suppliers is in the intercept; column (3) (markets with 5-7 audit firms) includes S1 through S6; while column (4) (8 or more audit firms) includes S1 through S7. The results are similar to those presented in column (1) in that our competition measures stay significantly positive while the interaction terms are insignificant. As the market becomes larger, the coefficient of S1 increases. This is because the benchmarks are not the same in these settings. When audit markets increase in size, the intercept includes clients with relatively more suppliers, so that the difference in audit fees for these clients relative to clients with a limited choice of suppliers increases.

[9] Controlling DIFFERENCE provides similar results. We do not present it here, since DIFFERENCE and SPECIALIST are highly correlated. Regression without DIFFERENCE excludes the possibility that the insignificant coefficient of SPECIALIST is driven by the correlation between these two variables.

Table 6 column (1) replaces SPECIALISTS in Table 5 column (1) by DIFFERENCE to examine whether there is any incremental effect of DIFFERENCE on audit fees after controlling for the number of suppliers. Recall that the value of DIFFERENCE increases when the size of the engagement auditor office a client chooses among the suppliers decreases. We find the variable DIFFERENCE is significant for clients with various numbers of suppliers, suggesting that smaller auditor offices face competitive pressure from the largest auditor office, in other words, the largest auditor office is able to charge a fee premium relative to the engagement auditor office even after controlling client specific competition measures. This test suggests that DIFFERENCE measures the relative competitive position of auditor offices in a market. It is consistent with our conjecture that the fee premium is a continuous function of market power.

The other three columns present the results of the same regression using observations from local client-industry markets with 2-4 audit firm suppliers (column (2)); 5-7 audit firm suppliers (column (3)); and 8 or more audit firm suppliers (column (4)). The results are similar to those presented in column (1) in that our both competition measures stay significant.

In summary, Tables 4, 5 and 6 suggest that SPECIALIST does not effectively capture fee premiums after client specific competition is controlled. In contrast, the variable DIFFERENCE captures the impact of auditor office size relative to the dominant auditor office size on audit fees. We attribute this result as the effect of market power of larger auditor offices on audit fees. This impact is a function of the auditor offices' operational size relative to largest auditor office in the audit market. Therefore, the fee premium earned by a market leader is a continuous increasing function of its market power and the dichotomous classification of specialist versus non-specialists is not supported by our evidence.

4.3.3 Alternative definitions of number of suppliers

In this subsection, we examine whether our competition measurement of the number of suppliers is sensitive to alternative definitions. First, rather than using S1 to S7 dummy variables, we replace S1 to S7 by a continuous variable, *RSupplier*, equal to the number of suppliers that a client has. The coefficient of *RSupplier* is -0.044 and significant at 1% level (not tabulated). That is, audit fees are lower for clients with more suppliers. The coefficient represents the decline in economic rents as competition increases.

Second, we define an audit firm as a supplier if the auditor's office total fees are more than 75%, in contrast to 100% as used in the main test, of the audit fees the client is currently paying the incumbent audit firm in a year. Column (1) of Table 7 repeats our test of H1. The coefficients of the number of suppliers for the seven dummies are similar to those reported in Column (1) Table 2. Column (2) includes the variable DIFFERENCE. Column (3) replaces the dummies by the continuous measure of the number of suppliers and the results remain the same.. Column (4) includes the interaction terms of SPECIALIST and the number of suppliers. The coefficients on the number of suppliers are significantly positive and the interaction terms are mostly insignificant except for S75_2_SPECIALIST. The most likely explanation for the positive coefficient of S75_2_SPECIALIST is that the calculated number of suppliers is higher than actual number of supplier. In other words, the clients who have two suppliers may actually have only one supplier and S75_2_SPECIALIST capture the monopoly rent. In other words, a size of 75% of a client demands may not be big enough to serve a client efficiently. In essence, our results in general suggest that the number of suppliers is robust to alternative definitions.

5. Summary and Conclusions

In this paper, we develop two complementary measures to capture the degree of client-specific competition in local auditor markets based on a theory of transaction costs associated with auditor change. We argue that the transaction costs of changing auditors are a function of both audit firm local office size and client size. For a given client, the lowest transaction costs occur when the client switches to the largest auditor office in the market. For a given auditor office, the transaction costs for a client to switch to this office increase, as client size increases. We argue that the competitive pressure on an incumbent auditor office's fees basically depends upon the ease with which the auditor office's clients can switch to a competing auditor office. If the transaction costs of switching auditor offices are low, the ability of the incumbent auditor office to extract economic rents from clients is limited; conversely, high costs to change auditor offices give an incumbent auditor office greater pricing power. We conjecture that transaction costs can affect audit fees in two ways. First, the transaction costs will make some auditor offices in a market unable to efficiently take on some clients. If an auditor office is relatively small in comparison to client size, the auditor office would not be able to provide audit service efficiently, since the transaction costs would be too high. Therefore, the transaction costs directly determine the number of auditor offices that can be viable potential suppliers to a client, which in turn determines the level of competition for the client. In the limit, the market for a client is monopolistic if there is only one auditor office that can serve the client. The market becomes oligopolistic when the number of suppliers increases from one to several. Eventually the market for the client is competitive if the number of suppliers is large. Therefore, our transaction cost argument distinguishes between the sheer number of auditor offices in a market, from the

number of suppliers to a client. That is, in a local audit market, the nature of competition for each client is unique since the number of suppliers is client specific.

We then develop a method to identify the number of viable suppliers and then test whether audit fees are a decreasing function of the number of suppliers. Our evidence shows that audit fees are indeed a decreasing function of the number of viable suppliers, and not simply the sheer number of auditor offices operating in a local market, supporting our argument that some auditor offices in a market are not suppliers for some clients, and cannot be competitors to the incumbent auditor office.

The second impact of transaction costs is on the relative competitive position of suppliers. We posit that the larger is an auditor office, the lower are its transaction costs. As a result, the largest auditor offices can put the greatest competitive pressure on all other auditor offices in a market, and the pressure is a function of the size difference between the largest auditor office and the incumbent office. The transaction costs of a large client switching to another auditor office are higher than those of a smaller client switching to the same auditor office. Also, the transaction costs of a given client switching to a smaller auditor office are higher than if switching to a larger auditor office. As a result, there are likely to be only a few auditor offices in a market that are large enough to take on large new clients, while there are likely to be many potential suppliers in a market for small clients. Moreover, we conjecture that transaction costs are associated with the relative sizes of competing audit firms in a market. That is, the larger the size difference between the largest available supplier and incumbent supplier, the less the transaction cost it is for a client to switch to the largest supplier.

Based on these arguments, we develop two complementary measures for competition in local audit markets: the number of suppliers and DIFFERENCE. The number of suppliers is the

number of viable suppliers in a market who are large enough to efficiently take on a client of a given size. DIFFERENCE is the size difference between dominant auditor office in a market and incumbent auditor office. We predict audit fees increase as the number of suppliers decreases, and that audit fees decrease as the size difference between dominant auditor office in a market and incumbent auditor office increases.

We test our hypotheses using U.S. data for the years 2000-2011 classified by 2-digit Standard Industrial Classification client industries for Metropolitan Statistical Areas. Using the standard audit fee model that has been well calibrated in previous research, we find strong support for our predictions. These findings are robust across various sensitivity tests. These results are consistent with classic findings in the industrial organization literature that prices decrease as the number of competitors in a market increases until a market becomes perfectly competitive. Moreover, if we include the usual measure of auditor specialization (i.e. the market share of the dominant local audit firm) with our test variables, our results are unchanged while the specialist measure does not have a statistically significant positive coefficient. These results indicate the competitive pressure is a continuous function of the auditor's relative size, and that the traditional dichotomous variable (SPECIALIST) cannot accurately capture this continuous effect.

In conclusion, variations in the transaction costs of changing auditors for the clients of incumbent audit firms appear to be an important, hitherto unrecognized determinant of the pricing of audit services. This is not too surprising since these transaction costs of changing auditors are an important element of DeAngelo (1981) multi-period audit pricing model. While the implications of that model have been used to investigate the phenomenon of "lowball" pricing in the first (early) period(s) of an audit engagement, to our knowledge, the implications

of the model for the pricing of continuing audit engagements where the level of transaction costs determine the level of quasi-rents an auditor can incorporate into audit fees and the number of viable competitors determines the potential level of monopoly rents, has not been investigated.

Finally, our arguments and evidence challenge the usual view that client industry market shares are appropriate measures of quality differentiated auditors, a perspective that has dominated the literature for the last 18 years.[10] Whether or not there are systematic industry specific audit quality differences across audit firms remains to us an open question. One possibility is that all audit firms who operate in a client market are quality differentiated, relative to audit firms that do not operate in the market and only a certain audit firm who is also a market leader has the ability to audit a particular client. Another possibility is that audit firms that have market power in a particular context may also perform a higher quality audit *in that context,* since a client's threat to terminate an audit relationship if the auditor "looks too hard" or fails to report as the client wishes is less credible (not credible) if the client has few (no) alternative supplier choices. In other words, these audit firms have bargaining power over the clients. Thus higher market power could be correlated with both a higher audit fee and a higher quality audit. However, such higher audit quality and higher audit fee would be *client specific* and depend on the competitive context. We leave the further investigation of this interesting possibility to future research.

[10] An exception is Minutti-Meza (2013). He does not find audit-quality improvements from auditor industry specializations after matching client characteristics. His study supports our argument from audit quality perspective, but our focus is to provide reasons for specialist fee premiums.

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Table 1
Description of Data

Panel A: Sample Selection

Observations in USA with audit fee and MSA data for 2000-2011 on Audit Analytics	99,800
Less:	
Observations not on Compustat	(37,304)
Financial Sector (SIC 6000-6999)	(17,637)
Missing control variables	(5,166)
Audit market with only one auditor	(7,594)
Audit engagements in the first or second year	(5,223)
Final Sample (sample for regression analysis)	26,876

Panel B: Descriptive Statistics (N=26,876)

Variable	Mean	Median	Standard Deviation	P25	P75
Audit_Fees ($)	1,468,094	553,125	3,112,548	195,619	1,424,495
Total Assets ($mil)	2,870	286	11,499	63	1,400
LAF	13.221	13.223	1.392	12.184	14.169
LTA	5.695	5.657	2.213	4.149	7.244
LBSEG	0.445	0.000	0.628	0.000	1.099
LGSEG	0.606	0.000	0.704	0.000	1.099
CATA	0.510	0.512	0.263	0.295	0.722
QUICK	2.673	1.523	3.732	0.932	2.836
LEV	0.259	0.178	0.279	0.035	0.407
ROI	-0.010	0.054	0.222	-0.053	0.108
FOREIGN	0.413	0.000	0.492	0.000	1.000
OPINION	0.056	0.000	0.229	0.000	0.000
YE	0.706	1.000	0.456	0.000	1.000
LOSS	0.406	0.000	0.491	0.000	1.000
BIG	0.770	1.000	0.421	1.000	1.000
DIFFERENCE	0.233	0.127	0.265	0.000	0.426
SPECIALIST	0.411	0.000	0.492	0.000	1.000
DISTANCE	0.239	0.100	0.282	0.024	0.386
PORTFOLIO	0.178	0.107	0.203	0.038	0.237

Panel C: Spearman Correlation (bold fonts denote significant at 5% or higher)

		LAF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	LTA	**0.82**	1.00														
2	LBSEG	**0.31**	**0.33**	1.00													
3	LGSEG	**0.43**	**0.32**	**0.18**	1.00												
4	CATA	**-0.26**	**-0.45**	**-0.19**	**0.09**	1.00											
5	QUICK	**-0.15**	**-0.20**	**-0.14**	**0.09**	**0.52**	1.00										
6	LEV	**0.37**	**0.49**	**0.19**	**-0.03**	**-0.57**	**-0.43**	1.00									
7	ROI	**0.33**	**0.43**	**0.20**	**0.19**	**-0.18**	**-0.10**	**0.15**	1.00								
8	FOREIGN	**0.46**	**0.35**	**0.14**	**0.60**	**0.04**	**0.04**	**0.04**	**0.21**	1.00							
9	OPINION	**-0.20**	**-0.27**	**-0.11**	**-0.14**	**-0.04**	**-0.22**	**-0.03**	**-0.26**	**-0.13**	1.00						
10	YE	**0.06**	**0.07**	**0.01**	**-0.05**	**-0.13**	0.00	**0.12**	**-0.06**	**-0.06**	0.00	1.00					
11	LOSS	**-0.28**	**-0.38**	**-0.19**	**-0.14**	**0.16**	**0.06**	**-0.10**	**-0.74**	**-0.16**	**0.24**	**0.04**	1.00				
12	BIG	**0.46**	**0.52**	**0.13**	**0.24**	**-0.09**	**0.06**	**0.19**	**0.17**	**0.22**	**-0.23**	**0.07**	**-0.15**	1.00			
13	DIFFERENCE	**-0.41**	**-0.41**	**-0.11**	**-0.17**	**0.12**	**0.03**	**-0.18**	**-0.12**	**-0.17**	**0.13**	**-0.05**	**0.11**	**-0.45**	1.00		
14	SPECIALIST	**0.33**	**0.34**	**0.10**	**0.12**	**-0.10**	**-0.05**	**0.17**	**0.11**	**0.12**	**-0.09**	**0.05**	**-0.10**	**0.36**	**-0.88**	1.00	
15	DISTANCE	**0.30**	**0.34**	**0.13**	**0.08**	**-0.12**	**-0.09**	**0.22**	**0.14**	**0.09**	**-0.12**	**0.05**	**-0.13**	**0.38**	**-0.53**	**0.61**	1.00
16	PORTFOLIO	**0.09**	**0.04**	**-0.03**	**0.11**	**-0.04**	0.01	-0.01	**-0.08**	**0.08**	**0.03**	**0.05**	**0.05**	**-0.23**	**-0.19**	**0.16**	**0.05**

Variable Definitions:

LAF = natural log of audit fees;

LTA = natural log of total assets;

LBSEG = natural log of the number of unique business segments;

LGSEG = natural log of the number of unique geographic segments;

CATA = ratio of current assets to total assets;

QUICK = ratio of current assets excluding inventory to current liabilities;

LEV = ratio of long-term debt to total assets;

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

FOREIGN = an indicator variable that equals 1 if revenue from foreign operation is reported, 0 otherwise;

OPINION = an indicator variable coded 1 for modified audit report, and zero otherwise;

YE = an indicator variable that equals 1 for December 31 year-end and 0 otherwise;

LOSS = an indicator variable that equals 1 if loss in current year, and 0 otherwise;

BIG = an indicator variable that equals 1 for Big N auditors and 0 otherwise;

DIFFERENCE = [(The sum of the largest auditor's audit fees in a market – The sum of this auditor's audit fees in a market)/Total audit fees in a market]. An audit market is defined as a two-digit SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition);

SPECIALIST = an indicator variable that equals 1 if the auditor is the largest in the MAS-Industry market, and 0 otherwise;

DISTANCE = smallest absolute fee market share difference between the incumbent auditor and his closest competitor in an audit market. An audit market is defined as a two-digit SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition);

S1-S7 = Indicator variables that equal one if the number of suppliers to a client equals the value of the number after S. For instance, S2 equals one if the number of suppliers to a client is two, and zero otherwise. An auditor is a supplier to a client in a year if the auditor's office total fees from the client's industry are at least as high as the audit fees paid by the client in that year;

Portfolio= the relative revenue share an audit firm generates in a 2-digit SIC industry relative to the total revenue generated by an audit firm in an MSA.

Table 2
Relationship between Audit Fees and Competition

Panel A: The Impact of Number of Suppliers on Audit Fees [a]

VARIABLES[b]	(1) LAF
LTA	0.494***
	(17.32)
LBSEG	0.092***
	(16.40)
LGSEG	0.136***
	(21.54)
CATA	0.490***
	(23.77)
QUICK	-0.033***
	(-27.45)
LEV	0.081***
	(5.37)
ROI	-0.323***
	(-14.58)
FOREIGN	0.249***
	(28.26)
OPINION	0.145***
	(8.19)
YE	0.112***
	(14.76)
LOSS	0.097***
	(10.69)
BIG	0.313***
	(28.52)
S1	0.393***
	(20.82)
S2	0.211***
	(12.04)
S3	0.229***
	(12.93)
S4	0.203***
	(11.54)
S5	0.162***
	(9.27)
S6	0.124***
	(6.35)
S7	0.039*
	(1.77)
Constant	8.859***
	(102.28)
Observations	26,876
R-squared	0.858
Industry FE	YES
Year FE	YES
Size FE[c]	YES

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[a] This panel presents results of the impact of number of suppliers to a client on audit fees when audit markets are defined using 2-digit SIC industries in U.S. MSA.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1.

[c] Indicator variables for 50 groups of clients created based on their sizes.

Panel B Statistical difference among the coefficients of S1 to S7[a]

	F-TEST	P-value
S1-S2	315.80	0.000
S2-S3	2.85	0.091
S3-S4	4.36	0.037
S4-S5	9.38	0.002
S5-S6	5.12	0.024
S6-S7	15.49	0.000

[a] This panel shows the result of testing the differences between the coefficients of indicator variables for number of suppliers.

Panel C: The Impact of Auditor Relative Size (DIFFERENCE) on Audit Fees[a]

VARIABLES[b]	(1) LAF	(2) LAF
LTA	0.490***	0.485***
	(17.14)	(16.95)
LBSEG	0.100***	0.094***
	(17.78)	(16.73)
LGSEG	0.131***	0.133***
	(20.70)	(21.16)
CATA	0.482***	0.483***
	(23.28)	(23.47)
QUICK	-0.035***	-0.033***
	(-28.38)	(-27.47)
LEV	0.084***	0.080***
	(5.57)	(5.32)
ROI	-0.307***	-0.310***
	(-13.80)	(-14.03)
FOREIGN	0.259***	0.250***
	(29.30)	(28.50)
OPINION	0.147***	0.146***
	(8.27)	(8.25)
YE	0.112***	0.111***
	(14.77)	(14.71)
LOSS	0.095***	0.096***
	(10.34)	(10.56)
BIG	0.293***	0.269***
	(26.54)	(23.75)
S1		0.343***
		(17.91)
S2		0.219***
		(12.50)
S3		0.238***
		(13.46)
S4		0.208***
		(11.86)
S5		0.165***
		(9.43)
S6		0.127***
		(6.49)
S7		0.041*
		(1.90)
DIFFERENCE	-0.296***	-0.223***
	(-20.88)	(-14.57)
Constant	9.273***	9.030***
	(109.10)	(105.99)
Observations	26,876	26,876
R-squared	0.856	0.859
Industry FE	YES	YES
Year FE	YES	YES
Size FE[c]	YES	YES

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This panel presents results of the impact of number of suppliers to a client and DIFFERENCE on audit fees when audit markets are defined using 2-digit SIC industries in U.S. MSA.
[b] Sample selection and descriptions, and variable descriptions are presented in Table 1.
[c] Indicator variables for 50 groups of clients created based on their sizes.

Table 3
Audit Fees and Competition, Considering the Impact of Auditor Location[a]

VARIABLES[b]	(1) LAF	(2) LAF	(3) LAF
LTA	0.504***	0.494***	0.486***
	(17.75)	(17.34)	(16.99)
LBSEG	0.101***	0.092***	0.093***
	(17.91)	(16.46)	(16.65)
LGSEG	0.132***	0.131***	0.130***
	(20.61)	(20.86)	(20.63)
CATA	0.489***	0.491***	0.486***
	(23.49)	(23.86)	(23.64)
QUICK	-0.035***	-0.033***	-0.033***
	(-28.25)	(-27.04)	(-27.11)
LEV	0.086***	0.082***	0.081***
	(5.64)	(5.46)	(5.45)
ROI	-0.319***	-0.323***	-0.312***
	(-14.33)	(-14.66)	(-14.22)
FOREIGN	0.259***	0.247***	0.248***
	(29.04)	(28.15)	(28.34)
OPINION	0.149***	0.144***	0.144***
	(8.38)	(8.14)	(8.17)
YE	0.112***	0.111***	0.111***
	(14.64)	(14.75)	(14.74)
LOSS	0.096***	0.095***	0.093***
	(10.41)	(10.43)	(10.33)
BIG	0.382***	0.366***	0.319***
	(33.50)	(31.94)	(26.70)
DISTANCE	0.058***	-0.165***	-0.178***
	(3.35)	(-8.54)	(-9.24)
PORTFOLIO	0.231***	0.281***	0.234***
	(8.90)	(10.78)	(9.01)
DISTANCE_PORTFOLIO	-0.133**	-0.13**	-0.123**
	(-2.22)	(-2.36)	(-2.11)
S1		0.491***	0.450***
		(23.76)	(21.60)
S2		0.266***	0.275***
		(14.72)	(15.22)
S3		0.253***	0.261***
		(14.17)	(14.69)
S4		0.220***	0.225***
		(12.51)	(12.80)
S5		0.174***	0.176***
		(9.93)	(10.10)
S6		0.131***	0.133***
		(6.69)	(6.82)
S7		0.044**	0.046**
		(2.01)	(2.12)
DIFFERENCE			-0.206***
			(-13.26)
Constant	9.008***	8.845***	9.013***
	(100.02)	(100.46)	(103.41)
Observations	26,876	26,876	26,876

R-squared	0.855	0.859	0.860
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Size FE[c]	YES	YES	YES

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This table presents results on the impact of variable DISTANCE as measured in Numan and Willekens (2012) after controlling for competition.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1.

[c] Indicator variables for 50 groups of clients created based on their sizes.

Table 4
The Impact of Specialists on Audit Fee before and after Considering Competition[a]

VARIABLES[b]	(1) LAF	(2) LAF	(3) LAF
LTA	0.499***	0.412***	0.494***
	(17.47)	(8.53)	(17.31)
LBSEG	0.100***	0.087***	0.092***
	(17.63)	(11.40)	(16.40)
LGSEG	0.134***	0.126***	0.136***
	(21.05)	(15.42)	(21.53)
CATA	0.486***	0.470***	0.490***
	(23.37)	(18.52)	(23.75)
QUICK	-0.035***	-0.033***	-0.033***
	(-28.41)	(-22.96)	(-27.44)
LEV	0.085***	0.053***	0.081***
	(5.58)	(2.83)	(5.37)
ROI	-0.319***	-0.292***	-0.322***
	(-14.32)	(-11.08)	(-14.57)
FOREIGN	0.258***	0.227***	0.249***
	(29.03)	(20.31)	(28.27)
OPINION	0.147***	0.134***	0.145***
	(8.24)	(6.65)	(8.19)
YE	0.112***	0.094***	0.112***
	(14.62)	(9.98)	(14.75)
LOSS	0.097***	0.086***	0.097***
	(10.52)	(7.61)	(10.69)
BIG	0.326***	0.252***	0.312***
	(29.76)	(20.00)	(27.98)
S1			0.390***
			(19.41)
S2		0.256***	0.211***
		(12.69)	(11.99)
S3		0.288***	0.229***
		(14.53)	(12.90)
S4		0.238***	0.203***
		(12.26)	(11.53)
S5		0.193***	0.162***
		(10.12)	(9.26)
S6		0.151***	0.124***
		(7.20)	(6.34)
S7		0.050**	0.039*
		(2.14)	(1.77)
DIFFERENCE		-0.373***	
		(-17.93)	
SPECIALIST	0.090***		0.003
	(12.32)		(0.36)
Constant	9.062***	9.170***	8.860***
	(103.25)	(67.65)	(102.27)
Observations	26,876	15,828	26,876
R-squared	0.855	0.840	0.858
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Size FE[c]	YES	YES	YES

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This table presents results of the impact of number of suppliers to a client, DIFFERENCE and SPECIALIST on audit fees when audit markets are defined using 2-digit SIC industries in U.S. MSA.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1. Test presented in column 2 does not include observations of SPECIALISTS.

[c] Indicator variables for 50 groups of clients created based on their sizes.

Table 5
The Impact of Specialist on Audit Fee for Clients with Various Number of Suppliers[a]

VARIABLES[b]	(1) LAF	(2) LAF	(3) LAF	(4) LAF
LTA	0.494***	0.434***	0.473***	0.526***
	(17.29)	(8.76)	(8.05)	(12.35)
LBSEG	0.093***	0.087***	0.063***	0.105***
	(16.50)	(10.91)	(5.80)	(9.51)
LGSEG	0.137***	0.152***	0.124***	0.112***
	(21.62)	(14.78)	(11.19)	(10.20)
CATA	0.490***	0.514***	0.422***	0.507***
	(23.77)	(15.30)	(11.60)	(14.36)
QUICK	-0.033***	-0.034***	-0.032***	-0.031***
	(-27.40)	(-13.94)	(-16.76)	(-16.83)
LEV	0.080***	0.078***	0.112***	0.070***
	(5.30)	(3.25)	(4.13)	(2.70)
ROI	-0.323***	-0.362***	-0.246***	-0.316***
	(-14.63)	(-8.99)	(-6.73)	(-8.74)
FOREIGN	0.250***	0.261***	0.227***	0.208***
	(28.32)	(19.36)	(14.52)	(13.00)
OPINION	0.146***	0.150***	0.103***	0.145***
	(8.21)	(5.01)	(3.17)	(5.01)
YE	0.112***	0.123***	0.077***	0.111***
	(14.74)	(10.41)	(5.65)	(8.30)
LOSS	0.097***	0.120***	0.062***	0.079***
	(10.63)	(8.49)	(3.88)	(4.74)
BIG	0.315***	0.337***	0.426***	0.224***
	(28.02)	(18.26)	(19.89)	(11.91)
S1	0.387***	0.296***	0.748***	0.746***
	(19.81)	(11.25)	(14.32)	(20.09)
S2	0.189***	0.082***	0.518***	0.620***
	(10.03)	(3.21)	(10.27)	(16.77)
S3	0.233***	0.098***	0.455***	0.514***
	(12.28)	(3.61)	(9.37)	(16.78)
S4	0.199***		0.379***	0.371***
	(10.49)		(8.04)	(13.51)
S5	0.168***		0.269***	0.290***
	(8.86)		(5.85)	(11.85)
S6	0.131***		0.149***	0.219***
	(6.20)		(2.93)	(9.08)
S7	0.031			0.095***
	(1.33)			(3.83)
S2_SPECIALIST	0.053***	0.028	0.009	0.028
	(3.75)	(1.62)	(0.34)	(0.69)
S3_SPECIALIST	-0.033*	-0.068**	-0.040	-0.028
	(-1.82)	(-2.50)	(-1.39)	(-0.75)
S4_SPECIALIST	-0.000	-0.075	0.017	-0.000
	(-0.01)	(-1.13)	(0.65)	(-0.01)
S5_SPECIALIST	-0.035*		-0.008	0.003
	(-1.67)		(-0.31)	(0.09)
S6_SPECIALIST	-0.050		-0.029	-0.023
	(-1.49)		(-0.58)	(-0.56)
S7_SPECIALIST	0.024		0.118	0.027

	(0.52)		(1.28)	(0.50)
$S8^{+}$_SPECIALIST	-0.029			0.034
	(-0.58)			(0.66)
Constant	8.868***	9.992***	9.534***	9.105***
	(102.42)	(91.81)	(98.71)	(77.59)
Observations	26,876	11,352	7,356	8,168
R-squared	0.858	0.857	0.869	0.875
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Size FE[c]	YES	YES	YES	YES
Sample	Full	2-4 auditors	5-7 auditors	>7 auditors

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This table presents results on the impact of SPECIALISTS on audit fees for clients have various number of suppliers. The first regression uses the observations from the full sample, the second use observations from auditor markets with 2 to 4 auditors, the third regression uses observations from auditor markets with 5 to 7 auditors, and the fourth regression uses observations from auditor markets with 8 or more auditors.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1.

[c] Indicator variables for 50 groups of clients created based on their sizes.

Table 6
The Impact of Relative Auditor Size on Audit Fee for Clients with Various Number of Suppliers[a]

VARIABLES[b]		(1) LAF	(2) LAF	(3) LAF
LTA	0.484***	0.428***	0.461***	0.508***
	(16.90)	(8.58)	(7.84)	(11.99)
LBSEG	0.094***	0.089***	0.064***	0.105***
	(16.77)	(11.19)	(5.91)	(9.57)
LGSEG	0.134***	0.152***	0.121***	0.109***
	(21.19)	(14.78)	(10.91)	(9.99)
CATA	0.484***	0.507***	0.415***	0.507***
	(23.57)	(15.16)	(11.39)	(14.49)
QUICK	-0.033***	-0.034***	-0.032***	-0.031***
	(-27.47)	(-14.01)	(-16.78)	(-16.84)
LEV	0.079***	0.072***	0.112***	0.074***
	(5.28)	(3.01)	(4.13)	(2.90)
ROI	-0.311***	-0.349***	-0.238***	-0.302***
	(-14.11)	(-8.70)	(-6.48)	(-8.42)
FOREIGN	0.250***	0.261***	0.228***	0.207***
	(28.46)	(19.39)	(14.60)	(12.95)
OPINION	0.146***	0.151***	0.103***	0.144***
	(8.23)	(5.09)	(3.17)	(4.98)
YE	0.110***	0.124***	0.076***	0.110***
	(14.67)	(10.52)	(5.64)	(8.21)
LOSS	0.096***	0.120***	0.062***	0.076***
	(10.53)	(8.54)	(3.86)	(4.54)
BIG	0.270***	0.301***	0.402***	0.153***
	(23.59)	(16.32)	(18.29)	(7.91)
S1	0.292***	0.257***	0.657***	0.630***
	(8.95)	(6.06)	(10.02)	(14.32)
S2	0.182***	0.118***	0.446***	0.573***
	(5.59)	(2.75)	(7.00)	(13.59)
S3	0.176***	0.078*	0.354***	0.451***
	(5.27)	(1.72)	(5.52)	(11.07)
S4	0.157***		0.347***	0.287***
	(4.68)		(5.53)	(7.25)
S5	0.078**		0.201***	0.201***
	(2.31)		(3.30)	(5.33)
S6	0.053		0.026	0.159***
	(1.45)		(0.39)	(3.99)
S7	0.009			0.065
	(0.23)			(1.52)
S2_DIFFERENCE	-0.271***	-0.224***	-0.087	-0.320***
	(-12.17)	(-8.78)	(-1.57)	(-3.76)
S3_DIFFERENCE	-0.186***	-0.126***	-0.030	-0.326***
	(-6.16)	(-3.00)	(-0.58)	(-4.55)
S4_DIFFERENCE	-0.223***	-0.180**	-0.224***	-0.174**
	(-6.13)	(-2.13)	(-4.37)	(-2.55)
S5_DIFFERENCE	-0.082*		-0.119**	-0.178***
	(-1.95)		(-2.18)	(-2.74)
S6_DIFFERENCE	-0.145**		0.060	-0.328***
	(-2.40)		(0.59)	(-4.45)

S7_DIFFERENCE	-0.282***		-0.262*	-0.389***
	(-4.28)		(-1.74)	(-5.28)
S8+_DIFFERENCE	-0.353***			-0.482***
	(-4.86)			(-6.42)
Constant	9.085***	10.121***	9.679***	9.348***
	(100.88)	(87.05)	(90.76)	(80.10)
Observations	26,876	11,352	7,356	8,168
R-squared	0.859	0.858	0.870	0.876
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Size FE[c]	YES	YES	YES	YES
Sample		2-4	5-7	>7

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This table presents results on the impact of DIFFERENCE on audit fees for clients have various number of suppliers. The first regression uses the observations from the full sample, the second use observations from auditor markets with 2 to 4 auditors, the third regression uses observations from auditor markets with 5 to 7 auditors, and the fourth regression uses observations from auditor markets with 8 or more auditors.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1.

[c] Indicator variables for 50 groups of clients created based on their sizes.

Table 7

An Alternative Cut Off Used To Define A Supplier[a]

VARIABLES[b]	(1) LAF	(2) LAF	(3) LAF	
LTA	0.505***	0.493***	0.499***	0.500***
	(17.59)	(17.13)	(17.46)	(17.46)
LBSEG	0.093***	0.094***	0.092***	0.094***
	(16.49)	(16.80)	(16.38)	(16.68)
LGSEG	0.136***	0.133***	0.138***	0.137***
	(21.49)	(21.11)	(21.68)	(21.55)
CATA	0.491***	0.483***	0.495***	0.490***
	(23.75)	(23.45)	(23.93)	(23.73)
QUICK	-0.033***	-0.033***	-0.033***	-0.033***
	(-27.49)	(-27.50)	(-27.38)	(-27.44)
LEV	0.083***	0.082***	0.082***	0.082***
	(5.50)	(5.42)	(5.39)	(5.43)
ROI	-0.323***	-0.309***	-0.327***	-0.323***
	(-14.59)	(-14.00)	(-14.76)	(-14.64)
FOREIGN	0.249***	0.250***	0.250***	0.249***
	(28.18)	(28.43)	(28.16)	(28.25)
OPINION	0.145***	0.146***	0.149***	0.145***
	(8.17)	(8.23)	(8.39)	(8.16)
YE	0.111***	0.110***	0.111***	0.111***
	(14.71)	(14.68)	(14.60)	(14.66)
LOSS	0.098***	0.096***	0.100***	0.097***
	(10.71)	(10.56)	(10.87)	(10.62)
BIG	0.316***	0.270***	0.313***	0.316***
	(28.74)	(23.87)	(28.63)	(28.09)
RSupplier75			-0.040***	
			(-19.42)	
S75_1	0.384***	0.334***		0.382***
	(21.50)	(18.48)		(20.58)
S75_2	0.198***	0.200***		0.161***
	(12.22)	(12.45)		(9.09)
S75_3	0.206***	0.214***		0.214***
	(12.54)	(13.03)		(11.93)
S75_4	0.193***	0.198***		0.183***
	(11.78)	(12.13)		(10.28)
S75_5	0.167***	0.170***		0.174***
	(10.24)	(10.46)		(9.68)
S75_6	0.111***	0.114***		0.124***
	(6.40)	(6.60)		(6.57)
S75_7	0.056***	0.057***		0.046**
	(2.83)	(2.88)		(2.10)
DIFFERENCE		-0.232***		
		(-15.49)		
S75_2_SPECIALIST				0.085***
				(6.38)
S75_3_SPECIALIST				-0.034*
				(-1.94)
S75_4_SPECIALIST				0.026
				(1.28)

S75_5_SPECIALIST				-0.029
				(-1.39)
S75_6_SPECIALIST				-0.065**
				(-2.37)
S75_7_SPECIALIST				0.039
				(1.05)
S75_8_SPECIALIST				-0.022
				(-0.53)
Constant	8.855***	9.036***	9.215***	8.873***
	(102.87)	(106.82)	(101.76)	(103.46)
Observations	26,876	26,876	26,876	26,876
R-squared	0.858	0.859	0.856	0.858
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Size FE[c]	YES	YES	YES	YES

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

[a] This table examines whether our competition measurement of the number of suppliers is sensitive to alternative definitions. We define an audit firm as a supplier if the auditor's office total fees are more than 75%, in contrast to 100% as used in the main test, of the audit fees the client is currently paying the incumbent audit firm in a year.

[b] Sample selection and descriptions, and variable descriptions are presented in Table 1. Additionally, *S75_i* is an indicator variable equal to one if the client has *i* number of suppliers using the 75% cut-off rather than 100% cut-off, where *i*=1, 2, …8. S75_*i_SPECIALIST*= S75_*i***SPECIALIST*.RSupplier75 is a continuous variable equal to the number of suppliers that a client has, using the 75% cut-off.

[c] Indicator variables for 50 groups of clients created based on their sizes.