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The effect of audit market concentration on audit pricing and audit quality : the role of the size of the audit market

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THE EFFECT OF AUDIT MARKET CONCENTRATION ON AUDIT PRICING AND AUDIT QUALITY: THE ROLE OF THE SIZE OF THE AUDIT MARKET

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I dedicate this dissertation to my wife. This is for you.

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ABSTRACT

The GAO has recently expressed concern that audit market concentration (i.e., not client concentration) could result in greater audit fees and lower audit quality. However, the extant literature finds that local audit markets with higher concentration have lower audit fees (Numan and Willekens 2012) and fewer accounting restatements (Newton et al. 2013). In this study, I show that the effect of audit market concentration on the level of audit fees depends on the size of the audit market (i.e., the size and/or number of clients in the local geographic area). When the audit market contains fewer clients and/or those clients are small in size, audit fees are increasing in audit market concentration. Conversely, in markets where there are a large number of clients and/or the clients are large in size, audit market concentration leads to lower audit fees. In additional tests, I examine whether the relationship between audit market concentration and audit quality also depends on the size of the audit market. The evidence suggests that audit quality is higher in markets where both audit market concentration and audit market size are high.

1. INTRODUCTION

Beginning in 1989, the largest eight accounting firms have undergone mergers, reducing the number of large international audit firms to just five. After Arthur Andersen collapsed following Enron in 2002, the number of choices for large public clients looking for an auditor was reduced to just four. There are at least two concerns with this consolidation of auditors. First, fewer competitors may lead to higher prices. Second, less competition may lead to a lower quality product. In the case of auditing, the higher concentration could lead to complacency, as auditors realize that clients have very few audit firms to choose from. This can lead to a less skeptical approach to auditing.[1] Regulators have recently expressed concerns over the effects of audit market concentration on both audit pricing and audit quality. For example, the Government Accountability Office (GAO) states:

> In addition to the potential for dominant competitors to use their market power to charge uncompetitive prices, highly concentrated markets also raise other competitive concerns. For example, firms with significant market power have the potential to reduce the quality of their products or to cut back on the services they provide because the lack of competitive alternatives would limit customers' ability to obtain services elsewhere (GAO 2008, 17).[2]

Although regulators are concerned about detrimental effects of increased audit market concentration on audit fees and audit quality, the empirical evidence on this issue is scant. Numan and Willekens (2012) provide evidence that firms located in more concentrated (i.e., less competitive) audit markets actually pay lower audit fees.[3] Thus, while regulators are concerned that audit market concentration will lead to higher audit fees, the existing empirical evidence suggests that the opposite is true. In addition, the empirical evidence of the effect of audit market concentration on audit quality is mixed. Boone et al. (2012) find that clients in more concentrated audit markets are more likely to use income-increasing discretionary accruals to meet or beat earnings benchmarks, suggesting a negative relation between concentration and audit quality (See also Francis et al. 2013). On the other hand, Newton et al. (2013) find that clients located in more concentrated audit markets have fewer accounting restatements, suggesting a positive relation between concentration and audit quality.

In this study I argue that, by focusing exclusively on audit market concentration, prior literature is ignoring an important aspect of audit markets: the size of those markets. Since market concentration is expected to be

[1] Note that higher audit market concentration could potentially increase audit quality (Newton et al. 2013). The rationale is that when clients have fewer choices, auditors will be less concerned with pleasing the client and will be able to take a *more* skeptical approach to the audit.
[2] See also GAO (2003), The American Assembly (2005), and U.S. Treasury (2008).
[3] See Table 6 of the study.

inversely related to market size, prior literature may be omitting an important variable.[4] Market size has two effects on audit pricing. First, larger markets create a greater demand for audit services, which should result in higher audit fees. This may explain why prior literature documents a negative association between audit market concentration and audit fees (e.g., Numan and Willekens 2012). Second, market size has an interactive effect with audit market concentration. If the audit market is sufficiently large and concentrated, auditors can achieve economies of scale and pass the savings onto their clients.

Using an audit fee model based on prior research, I find that firms headquartered in more concentrated local audit markets pay higher audit fees.[5] I also find that firms headquartered in larger audit markets pay higher audit fees. However, also consistent with my prediction, I find that firms headquartered in large and highly concentrated markets pay significantly lower audit fees. This result is consistent with audit firms in large, highly concentrated markets offering scale discounts. These results are robust to using alternate measures of audit market size. Unlike prior research, which finds an unconditional negative relation between concentration and audit fees, the evidence in this paper suggests that the relation between these two constructs is conditional upon the size of the market.

I next test whether the relationship between audit market concentration and audit quality also depends on the size of the market. To the extent that higher audit fees are indicative of greater audit effort, and hence, greater audit quality (see Blankley et al. 2012; Lobo and Zhao 2013; Eshleman and Guo 2013a), audit quality should be highest in markets where audit fees are highest. Conversely, it may be the case that audit quality is highest in large, concentrated markets, since auditors achieve economies of scale in those markets.[6] Using the incidence of accounting restatements as a proxy for audit quality, I find that, in general, firms headquartered in more concentrated audit markets are no more likely to issue accounting restatements than are firms in less concentrated markets. However, in large markets, concentration is negatively related to the incidence of restatements. This result is consistent with auditors in large concentrated markets achieving economies of scale which lead to higher quality audits.

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[4] In this paper, when referring to the size of the audit market, I intend to mean the number of clients and/or the size of those clients.

[5] Consistent with prior research, I study audit markets at the local Metropolitan Statistical Area (MSA) level (e.g., Francis et al. 2005; Numan and Willekens 2012; Boone et al. 2012; Newton et al. 2013).

[6] While it is clear that large concentrated markets foster economies of scale, which lead to more efficient audits, it is not clear that economies of scale lead to higher quality audits.

This study contributes to the literature on audit market concentration in an important way. While prior research has examined the effect of audit market concentration on both audit fees and audit quality, it has largely ignored the role of the size of the audit market in which the firms operate. I show that audit fees are determined by both the level of concentration in the audit market and the size of the market. To the extent that regulators are concerned with auditors in concentrated markets charging uncompetitive audit fees, the evidence in this paper suggests that this practice may be taking place only in small audit markets where auditors cannot achieve economies of scale. In addition, by demonstrating that the relationship between audit quality and audit market concentration is conditional on the size of the audit market, this study contributes to the literature on audit market concentration and audit quality (Boone et al. 2012; Francis et al. 2013; Newton et al. 2013).

The rest of this paper is organized as follows. Section 2 contains background information and the hypothesis, section 3 contains the research design, section 4 contains the sample selection and descriptive statistics, section 5 contains the empirical results, section 6 contains robustness tests, and section 7 contains a conclusion and a discussion of the limitations of the study.

2. BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Background

Highly concentrated or oligopolistic markets can lead to uncompetitive pricing and/or a lower quality product or service. This is particularly true in the audit market, where customers are large public firms because the Securities and Exchange Commission (SEC) requires public firms to receive an audit each year. With few competitors, the suppliers (i.e., audit firms) can charge higher prices and offer lower quality audits while the clients can do little to prevent this. The clients' only counter is to threaten to switch auditors. If the audit market is very concentrated, the client's threat to switch auditors is not credible.

Since 1989, a series of events has reduced the largest accounting firms from the Big-8 down to the Big-4, thereby increasing the concentration in the market. In recent years, regulators have expressed concern over the high concentration of the audit market. For example, the Secretary of the U.S. Treasury, Henry Paulson, states:

> The big four [accounting] firms dominate the industry in terms of revenues and professional staff. The remaining accounting firms face significant barriers to competing with the big four, at a time when auditors are in real demand. The current situation forces us to ask questions about the industry's sustainability and effectiveness: Given the importance of accounting to our financial system, is there enough competition? (United States Treasury 2006)[7].

Audit clients are also concerned about the effect of audit market concentration on the pricing of audit services. For example, Ken Lever, a CFO of one of the largest public companies in the U.K., states "if one [large auditing firm] disappeared, we'd really have no choice. We would need a regulatory body –God forbid –just to preserve pricing in the market" (Kersner 2008).

2.2 Literature on Audit Market Concentration and Audit Pricing

Although both regulators and audit clients are concerned that greater concentration in the audit market will lead to higher audit fees, there is very limited empirical evidence which supports this claim. Using a sample of 78 audit clients, Maher et al. (1992) examine whether audit fees declined over the period 1977 to 1981, a period of increasing competition (and hence, decreasing concentration) in the audit market. Maher et al. find that audit fees significantly declined over this period. Using a sample of 159 cities, Sanders et al. (1995) find that municipal audit

[7] In addition, SEC chairman Christopher Cox notes "within the accounting profession and within the SEC, we are forced to ask ourselves: Is this intense concentration in the market for large public company auditing good for America? If you believe as I do, that genuine competition is essential to the proper function of any market the answer is no" (AICPA 2005).

fees also declined during 1985-1989, a period of increased competition in the audit market.[8] While both of these studies find results consistent with audit fees declining in response to increased concentration, neither study directly measures concentration. Concentration is merely assumed to have decreased during the sample period.[9] Using a more recent sample of client-years during 2005-2006, Numan and Willekens (2012) find that firms headquartered in more concentrated local audit markets actually pay lower audit fees. This evidence is inconsistent with the concerns expressed by regulators. Taken together, the extant literature has not produced sufficient evidence to conclude that auditors in more concentrated markets are charging uncompetitive prices.

2.3 Concept of Audit Quality

I define audit quality as the joint probability that the auditor will both (i.) discover an error in the client's accounting system and (ii.) report the error (DeAngelo 1981). Audit quality can be viewed along two dimensions. The first dimension is auditor effort/ability. Prior research shows that firms paying higher audit fees and firms with a longer delay between the firm's fiscal year-end and the annual report filing date tend to exhibit higher audit quality (Blankley et al. 2012; Lambert et al. 2011). This higher audit quality is attributed to greater effort by the auditor, since higher fees and longer audits indicate greater effort. The second dimension of audit quality is auditor independence. If the auditor lacks independence, greater ability and effort will not result in higher audit quality. For example, auditor independence may be threatened if the auditor receives substantial nonaudit service fee revenue from the client (e.g., Blay and Geiger 2013; Causholli et al. 2013).

It is possible that audit market concentration affects audit quality through an effect on audit effort and an effect on auditor independence. First, lower audit market concentration may cause auditors to underbid on audits, resulting in lower audit fees. To the extent that lower audit fees prevent the auditor from conducting a thorough audit, audit quality will suffer. Second, lower audit market concentration may cause auditors to become less independent. This may occur because, in an audit market with low concentration, clients have more alternate audit firms to choose from. Therefore, when discussing audit quality, I intend to mean both audit effort and auditor independence.

[8] See also Copley, Gaver, and Gaver (1995).

[9] There is anecdotal evidence that the competition for audit clients increased during this time period. See Berton (1985) and Warren and Wilkerson (1988).

2.4 Literature on Audit Market Concentration and Audit Quality

The evidence on the relation between audit market concentration and audit quality is mixed. Boone et al. (2012) examine auditors' tolerance for earnings management in different audit markets. The authors find that clients of auditors located in more concentrated audit markets are more likely to use income-increasing discretionary accruals to achieve earnings benchmarks. This implies that higher audit market concentration leads to lower earnings quality; and hence, lower audit quality. In an international study, Francis et al. (2013) find that, in countries where the market share is concentrated by just one or two of the Big-4 audit firms, Big-4 clients have less conservative earnings, are less likely to report losses, and generally record higher accruals. Similar to the evidence in Boone et al. (2012), the evidence in Francis et al. (2013) suggests that audit market concentration leads to lower audit quality.

However, concentration need not lead to lower quality audits. In fact, the opposite may be true. Auditors in less concentrated (i.e., more competitive) markets may be forced to charge lower audit fees to attract clients. To the extent that audit fees are an indicator of audit quality (Blankley et al. 2012; Lobo and Zhou 2013; Eshleman and Guo 2013a), the lower fees charged by auditors in more competitive markets may mean lower audit quality in these markets. Newton et al. (2013) provide evidence consistent with this notion. The authors find that clients of auditors located in less concentrated audit markets are more likely to subsequently issue an accounting restatement.[10] To the extent that an accounting restatement is attributable to the auditor (Palmrose and Scholz 2004; Francis, Michas, and Yu 2013), the evidence suggests that market concentration, by preserving higher audit fees, may actually lead to higher audit quality.

2.5 Hypothesis Development

Prior literature on the relation between audit market concentration and audit fees does not consider the role of the size of the audit market. In other words, the literature assumes that all audit markets are of equal size. A market which is both large and highly concentrated allows auditors to achieve economies of scale in their operations, which allows the auditor to pass cost savings onto its clients. On the other hand, in a market which is highly concentrated and small, auditors are not able to achieve economies of scale, which may lead to higher prices being charged. This leads to the following hypothesis, stated in alternative form.

[10] In addition, Kallapur et al. (2010) find that audit market concentration is associated with a lower magnitude of discretionary accruals, implying that concentration is associated with higher audit quality.

Hypothesis 1: The effect of audit market concentration on audit pricing is mitigated by the size of the audit market.

In general, audit market concentration should have a positive effect on the level of audit fees charged, consistent with audit firms taking advantage of their clients' limited choice of auditor. However, in a market which is highly concentrated, but is large, auditors will achieve economies of scale and pass the savings onto their clients.

To the extent that audit fees are indicative of audit quality (Blankley et al. 2012; Lobo and Zhao 2013; Eshleman and Guo 2013a), audit quality should be higher in markets where audit fees are higher. In other words, the effect of audit market concentration on audit quality would be mitigated by the size of the market. A competing prediction is that economies of scale result in not only more efficient production of audit services, but in higher quality services. If this is the case, audit quality would be highest in large and highly concentrated markets. This leads to the second hypothesis, stated in null form.

Hypothesis 2: The effect of audit market concentration on audit quality depends on the size of the audit market.

3. RESEARCH DESIGN

3.1 Research Design for Audit Pricing

In order to test the first hypothesis, I estimate the following audit fee model:

$$
\begin{aligned}
LNFEE = {} & \alpha_0 + \alpha_1 AUDCONC + \alpha_2 MKTSIZE + \alpha_3 AUDCONC \times MKTSIZE + \alpha_4 LNASSETS + \alpha_5 EMP + \alpha_6 CR \\
& + \alpha_7 CA\_TA + \alpha_8 ARINV + \alpha_9 ROA + \alpha_{10} LEV + \alpha_{11} LOSS + \alpha_{12} GROWTH + \alpha_{13} GC + \alpha_{14} MW \\
& + \alpha_{15} MERGER + \alpha_{16} LNBUSSEG + \alpha_{17} LNGEOSEG + \alpha_{18} BUSY + \alpha_{19} DELAY \\
& + \alpha_{20} SHORT\_TEN + \alpha_{21} CITYLEADER + \alpha_{22} SCALE + \alpha_{23} CITYLEADER \times SCALE \\
& + \alpha_{24} POWER + \alpha_{25} BIGN + \alpha_{26} TIER2 + Indusry\ Fixed\ Effects \\
& + \varepsilon \qquad (1)
\end{aligned}
$$

Variable definitions are provided in Table 1.

TABLE 1 Variable Definitions
(in the order they appear)

Variables used in Audit Fee Analysis

Variable		Definition
$LNFEE$	=	The natural log of total audit fees ($Audit\_Fees$).
$AUDCONC$	=	The scaled quintile rank of audit market concentration, where audit market concentration is calculated as $\sum_{i=1}^{n} s_i^2$, where i is an audit office in an audit market and s is market share in an audit market based on audit fees. Audit markets are defined as MSA-years. MSAs are ranked each year, and the value of $AUDCONC$ takes on a value from 0 to 1, with 1 indicating the most concentrated audit markets.
$MKTSIZE$	=	The scaled quintile rank of the size of the audit market, where audit market size is calculated as $\sum_{i=1}^{n} a_i$, where i is a client in an audit market and a is the client's total assets. MSAs are ranked each year, and the value of $MKTSIZE$ ranges from 0 to 1, with 1 indicating the largest markets.
$LNASSETS$	=	The natural log of total assets (at).
EMP	=	The number of employees at the firm (emp) in thousands.
CR	=	The current ratio, defined as current assets (act) divided by current liabilities (lct).
CA_TA	=	The ratio of current assets (act) to total assets (at).
$ARINV$	=	The sum of accounts receivable ($rect$) and inventory ($invt$), all scaled by total assets.
ROA	=	Return on assets, calculated as income before extraordinary items (ib) scaled by average total assets.
LEV	=	Financial leverage, calculated as long-term debt ($dltt$) divided by total assets.
$LOSS$	=	1 if the firm reports negative net income (ni), zero otherwise.
$GROWTH$	=	1 if the firm reports positive operating cash flows ($oancf$), negative cash flows from investing activities ($ivncf$), and positive cash flows from financing activities ($fincf$), zero otherwise (Dickinson 2011).
GC	=	1 if client receives a going concern opinion ($going\_concern$), 0 otherwise.
MW	=	1 if the client receives a SOX 404 material weakness opinion in the current year, 0 otherwise. For years before material weakness data was available, this variable is set equal to 0.
$MERGER$	=	1 if the client engaged in a merger or acquisition during the year, 0 otherwise.
$LNBUSSEG$	=	The natural log of the number of business segments the client reports.
$LNGEOSEG$	=	The natural log of the number of geographic segments the client reports.

(Table 1 continued)

Variable		Definition
$BUSY$	=	1 if the month of the client's fiscal year-end is December, 0 otherwise.
$DELAY$	=	The number of days between the client's fiscal year-end and the filing date.
$SHORT\_TEN$	=	1 if the auditor is in the first year of tenure, zero otherwise.
$CITYLEADER$	=	1 if the audit office has the highest total audit fees in the firm's industry in a given city in a given year, 0 otherwise.
$SCALE$	=	The percentile rank of the number of clients an audit office has in a particular industry in a particular year (values range from 0.01 to 1).
$POWER$	=	Client sales scaled by the sales of all of the audit office's clients.
$BIGN$	=	1 if the auditor is a Big-N auditor, 0 otherwise. The Big-N include Deloitte and Touche, Ernst & Young, PricewaterhouseCoopers, and KPMG. During the years 2000-2001, the Big-N also includes Arthur Andersen.
$TIER2$	=	1 if the auditor is a Second-tier auditor, 0 otherwise. Second-tier auditors are Grant Thornton and BDO Seidman (Chang et al. 2010; Boone et al. 2010).
Variables used in Audit Quality Analysis (excluding variables included in Audit Fee Model		
$RESTATE$	=	1 if the client subsequently issues an accounting restatement, 0 otherwise.
$OFFICESIZE$	=	The natural logarithm of the total fees earned by the office during the year.
SEC_DIST	=	1 if the client is headquartered in the same city as one of the SEC's regional offices, 0 otherwise. The twelve regional offices are located in Washington D.C., New York, Philadelphia, Boston, Chicago, Atlanta, Miami, Dallas-Fort Worth, Denver, Salt Lake City, San Francisco, and Los Angeles. Before 2007, the regional offices include only Washington D.C., New York, Miami, Chicago, Denver, and Los Angeles.

This table contains variable definitions with Compustat and Audit Analytics mnemonics in parentheses.

Firm and time subscripts are omitted for ease of exposition. The model is estimated separately for each year using OLS. T-statistics are calculated as in Fama and MacBeth (1973). The variable of interest is audit market concentration ($AUDCONC$). To measure concentration, I follow prior literature and construct a herfindahl index for each city-year (Boone et al. 2012; Newton et al. 2013).[11] The herfindahl index is calculated as the sum of squared market shares of each audit office in a city. For example, if a city was dominated by two auditors, each having 50 percent of the market share of audit fees, the value of the herfindahl index would be 0.50 ((0.5^2)+(0.5^2)$= 0.50$). Conversely, if ten auditors each had 10 percent of the audit fees in a given city, the value of the herfindahl index would be 0.10. I then rank each MSA into quintiles by year based on the level of concentration in the local market. The resulting rank is scaled so that the values of $AUDCONC$ range from 0 to 1, with 1 being the most concentrated audit markets.[12] Although prior research (Numan and Willekens 2012) finds that firms in more concentrated markets pay lower audit fees, I expect to observe a positive coefficient on $AUDCONC$ after controlling for the size of the audit market. The size of the audit market is measured as the sum of all clients' assets in a given MSA-year.

[11] Following Francis et al. (2005) and Reichelt and Wang (2010), I define cities using metropolitan statistical areas (MSA). The MSA cross-map is provided by the U.S. Census Bureau and is available at: http://www.census.gov/population/www/metroareas/metroarea.html.

[12] Creating rank variables which range from 0 to 1 ease the interpretation of the results, particularly interaction terms. I use quintile ranks, consistent with Newton et al. (2013).

Each MSA is then ranked into quintiles by year based on the size of the audit market. The resulting rank is scaled so that the values of $MKTSIZE$ range from 0 to 1, with 1 being the largest audit markets. The coefficient on $MKTSIZE$ is expected to load positively, as larger markets have a greater demand for audit services, which should lead to higher prices, ceteris paribus. I expect that α_3 will be significantly negative; implying that concentration does result in lower audit fees, but only when the audit market is sufficiently large as to allow audit firms to achieve economies of scale.

The model attempts to control for four factors which influence the level of audit fees. The first factor which influences the audit fees charged on an engagement is client size (Simunic 1980). To control for the size of the client, I include the natural logarithm of total assets ($LNASSETS$) and the number of employees (EMP). I expect the coefficients on both variables to be significantly positive, consistent with larger clients being charged higher fees.

The second factor which affects the level of audit fees charged is the risk of the client. I expect riskier firms to be charged higher audit fees as additional compensation for the higher risk the auditor bears (Simunic and Stein 1996). To control for this, the model includes the firm's current ratio (CR) and the proportion of the firm's assets which are classified as current assets (CA_TA). The model also includes the relative amount of the firm's assets that are accounts receivable and inventory ($ARINV$). Both of these are considered risky accounts and it could be argued that they are two of the most difficult accounts to audit because of the estimation involved in estimating bad debt expense and writing down inventory. In addition, the model includes controls for firm performance (ROA and $LOSS$), leverage (LEV), and whether or not the firm is in the growth stage ($GROWTH$). Finally, I includes controls for whether or not the firm received a going concern opinion (GC) or an opinion that the firm's internal controls are ineffective (MW). I expect that firms receiving going concern opinions will be charged higher audit fees as compensation for the additional risk. Extant research has shown that firms with internal control weaknesses are charged higher audit fees (Hogan and Wilkins 2008; Blankley et al. 2012).

The third factor which affects audit fees is the complexity of the client. Simunic (1980) argues that firms with more complex operations are expected to be charged higher audit fees. I control for the complexity of the client by controlling for whether or not the client engaged in a merger or acquisition during the year ($MERGER$). In addition, the model also includes the number of geographic segments the firm has ($LNGEOSEG$) as well as the number of business segments the firm operates in ($LNBUSSEG$). I expect the coefficients on each of these variables to be significantly positive, reflecting the fact that more complex clients pay higher audit fees (Casterella et al. 2004; Hay et al. 2006; Hogan and Wilkins 2008).

Finally, a fourth factor which influences the audit fees charged on an audit is auditor and engagement attributes (Hay et al. 2006). For example, an engagement attribute is the fiscal year-end of the client. Clients with December fiscal year-ends are charged higher fees because auditors are busier during this time of year (Hay et al. 2006). I include an indicator for December fiscal year-end firms ($BUSY$) to control for this. An example an auditor attribute is whether or not the auditor is one of the Big-N auditors. Big-N auditors have brand name reputation which allows them to charge a fee premium (Ireland and Lennox 2002). I include the indicator variable $BIGN$ to control for this. I also expect Second-tier auditors (Grant Thornton and BDO Seidman) will earn a fee premium relative to smaller auditors. The model therefore includes an indicator variable for Second-tier auditors ($TIER2$).[13] I also include $DELAY$ because longer audits require more hours, and hence, result in higher audit fees. The model controls for auditors with short tenures ($SHORT\_TEN$) because I expect auditors will charge lower fees during the first few years it audits a client, a common practice known as 'low-balling'. I control for whether or not the audit office is an industry specialist at the office level ($CITYLEADER$). Francis et al. (2005) find that offices which are industry specialists at the city level earn fee premiums. The model also controls for the bargaining power the client has over the auditor via the variable $POWER$. Clients with greater bargaining power are expected to be charged lower audit fees (Fung et al. 2012). Finally, the model controls for the percentile rank of the number of audit clients a given audit office has in a city-industry for a given year ($SCALE$). Fung et al. (2012) find that offices with a larger scale offer discounts to their clients. The authors also find that this effect is mitigated when the office is an industry leader. Therefore, I include the interaction term $CITYLEADER \times SCALE$. The model includes industry fixed effects, where industries are defined using two-digit SIC codes.

3.2 Research Design for Audit Quality

To test the second hypothesis, I first need a suitable proxy for audit quality. I choose the likelihood of a firm issuing an accounting restatement to proxy for audit quality. Consistent with Newton et al. (2013), I only consider restatements attributable to a failure in the application of accounting rules.[14] Based on prior literature, I

[13] There is evidence that (i.) Second-tier auditors provide audit quality similar to Big-4 auditors (Boone et al. 2010) and (ii.) that the market perceives Second-tier auditors as having similar quality (Chang et al. 2010).
[14] The Audit Analytics Restatement database does include some restatements that are not attributable to failures in the application of accounting rules (GAAP). Of the 12,883 restatements available on Audit Analytics at the time of

consider a restatement of audited financial statements to be a strong indicator that the audit of the original financials was low quality (Palmrose and Scholz 2004; Kinnney, Palmrose, and Scholz 2004).[15] I estimate the following logistic regression:

$$\begin{aligned}\text{RESTATE} = {} & \beta_0 + \beta_1 AUDCONC + \beta_2 MKTSIZE + \beta_3 AUDCONC \times MKTSIZE + \beta_4 LNASSETS + \beta_5 LNASSETS^2 \\ & + \beta_6 ROA + \beta_7 GROWTH + \beta_8 LOSS + \beta_9 LEV + \beta_{10} MW + \beta_{11} LNBUSSEG + \beta_{12} LNGEOSEG \\ & + \beta_{13} MERGER + \beta_{14} BIGN + \beta_{15} TIER2 + \beta_{16} OFFICESIZE + \beta_{17} CITYLEADER \\ & + \beta_{18} SHORT\_TEN + \beta_{19} SEC\_DIST + Industry\ Fixed\ Effects \\ & + \varepsilon \qquad (2)\end{aligned}$$

Variable definitions are provided in Table 1. Firm and year subscripts are omitted for ease of exposition. Standard errors are clustered by firm and year (Peterson 2009; Gow et al. 2010). The dependent variable, $RESTATE$, takes on a value of 1 if the firm subsequently issues an accounting restatement attributable to a failure in the application of accounting rules (GAAP), otherwise it takes on a value of 0. The variable of interest is audit market concentration ($AUDCONC$). Although Newton et al. (2013) have shown that $AUDCONC$ is negatively associated with the likelihood of issuing an accounting restatement, the authors do not control for the size of the audit market. It is possible that after controlling for the size of the audit market via $MKTSIZE$, the coefficient on $AUDCONC$ will become insignificant or significantly positive. There are competing predictions for the coefficient α_3. A significantly positive coefficient would support the notion the audit quality is highest in markets where audit fees are highest. A significantly negative coefficient would support the notion that economies of scale lead to higher quality audits.

The model controls for other factors which are likely to influence the likelihood of an accounting restatement. I control for the size of the client via $LNASSETS$, with the expectation that larger clients are less likely to issue an accounting restatement. Following Newton et al. (2013), I include the squared version of size ($LNASSETS^2$) to allow for the possibility that the relationship between client size and audit quality is nonlinear.

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this study, only 543 were not due to GAAP failure. My results remain unchanged if I include these restatements in my analysis. Also, the results are similar if I restrict the analysis to restatements which resulted in a downward adjustment to net income, as in Blankley et al. 2012.

[15] Dechow et al. (2010) state that “a significant benefit of using the restatement sample to identify firms with earnings quality problems is a lower Type I error rate in the identification of misstatements.” – Dechow et al. (2010, 374).

The model controls for firm profitability via return on assets (ROA). The indicator variable $GROWTH$ is included because growth firms have stronger incentives to manipulate earnings, which may lead to accounting restatements (Skinner and Sloan 2002). The model controls for the financial distress of the firm by including an indicator variable for loss-years ($LOSS$) and financial leverage (LEV). I control for clients receiving ineffective internal control opinions (MW). Prior research has shown that clients with ineffective internal controls over financial reporting are more likely to subsequently restate their earnings (Ashbaugh-Skaife et al. 2007; Blankley et al. 2012).

The model also controls for the complexity of the audit. To this end, I include the number of business segments the client has ($LNBUSSEG$), the number of geographic segments the client has ($LNGEOSEG$), and whether or not the client engaged in a merger or acquisition during the year ($MERGER$). I anticipate that the coefficient on each of these variables will be significantly positive, indicating that clients with more complex operations have a higher likelihood of issuing an accounting restatement.[16]

Finally, the model includes controls for auditor characteristics. Since the purpose of the study is to investigate a single auditor characteristic, audit market concentration, I must control for other characteristics of the auditor. Therefore, the model controls for whether or not the auditor is a Big-N auditor ($BIGN$), as the Big-N have been shown to provide higher quality audits (Becker et al. 1998; Lennox and Pittman 2010; Eshleman and Guo 2013b). Similarly, the model controls for whether or not the auditor is a Second-tier auditor (Grant Thornton and BDO Seidman) via $TIER2$ since extant research has shown that Second-tier auditors provide audit quality similar to the Big-N (Boone et al. 2010). Office size ($OFFICESIZE$) is included since larger offices have been shown to deliver higher quality audits (Francis and Yu 2009; Francis, Michas, and Yu 2013). The model controls for industry specialization ($CITYLEADER$), since Reichelt and Wang (2010) provide evidence that industry specialists perform higher quality audits. The model controls for audit tenure ($SHORT\_TEN$). Short-tenure may impair audit quality (Johnson et al. 2002). Finally, the model controls for whether or not the firm is located in the same MSA as one of the SEC's regional offices (SEC_DIST). Kedia and Rajgopal (2011) find that firms located closer to one of the

[16] It is also possible that auditors may work harder on complicated transactions. If this is the case, the coefficient on $MERGER$ may be negative and significant.

SEC's regional offices exhibit higher earnings quality.[17] The model includes industry fixed effects to control for the possibility that certain industries are more prone to restatements.

[17] The twelve SEC Regional offices are located in Washington D.C., New York, Philadelphia, Boston, Chicago, Atlanta, Miami, Dallas-Fort Worth, Denver, Salt Lake City, San Francisco, and Los Angeles. Before 2007, the regional offices include only Washington D.C., New York, Miami, Chicago, Denver, and Los Angeles.

4. SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

Auditor data are obtained from Audit Analytics and financial data are obtained from the Compustat fundamentals annual file.[18] After ensuring that both the firm and its auditor have non-missing MSA data, I obtain 110,364 observations. I then exclude financial services firms (SIC codes 6000-6999) as these firms operate in regulated industries. Next, 469 observations are deleted because the firm hires an auditor in a different MSA than where the firm is headquartered. Finally, 54,511 observations are lost due to insufficient data to calculate the variables used in the audit fee analysis (Eq. 1). This leaves me with a final sample of 44,085 observations spanning 2000-2011 for the audit fee analysis. For the audit quality analysis, the sample is considerably smaller because I exclude firm-years after 2010. I choose to end the sample two years before the most recent year of data available when I began the study (2012) to allow for a sufficient amount of time for a firm to subsequently restate its earnings. I leave two years for the client to restate its earnings because Cheffers et al. (2010) find that the average time between an originally issued financial report and an accounting restatement is approximately 700 days, which is slightly less than two years. Because of this additional requirement, the audit quality analysis contains 45,446 firm-year observations spanning 2000-2010. In both samples, each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers on the regression results. Table 2 outlines the sample selection procedure for each sample.

TABLE 2 Sample Selection

Panel A: Audit Pricing Sample	
All Firm-years on Audit Analytics with non-missing MSA data:	110,364
Less: Financial Services Firms (SIC Codes 6000-6999):	(11,299)
Less: Firms headquartered in different MSA than auditor:	(469)
Less: Observations without necessary data to calculate variables used in Pricing Test	(54,511)
Audit Pricing Analysis Sample:	44,085
Panel B: Audit Quality Sample	
All Firm-years on Audit Analytics with non-missing MSA data:	110,364
Less: Financial Services Firms (SIC Codes 6000-6999):	(11,299)
Less: Firms headquartered in different MSA than auditor:	(469)
Less: Observations after 2010:	(9,337)
Less: Observations without necessary data to calculate variables used in Quality Test	(43,813)
Audit Quality Analysis Sample:	45,446

[18] Audit Analytics data is converted to the Compustat fiscal year convention. As an example, in Audit Analytics, when a firm's fiscal year-end is between January 1 and May 31 2010, the firm's fiscal year is considered to be 2010. In Compustat, the firm's fiscal year would be considered to be 2009.

Panel A of Table 3 reports the mean and median for each variable used in the audit pricing analysis (Eq. 1). Descriptive statistics are shown separately for each quintile of audit market concentration ($AUDCONC$). The mean and median values of audit market size ($MKTSIZE$) decrease monotonically with each quintile of $AUDCONC$, consistent with concentration being greatest in smaller markets. For example, in the least concentrated audit markets in quintile 1, the mean (median) value of $MKTSIZE$ is 0.937 (1.000). In contrast, the mean (median) value of $MKTSIZE$ is 0.344 (0.250) in the lowest quintile of audit market concentration, quintile 5. It is also worth noting that audit markets classified as being the most concentrated (quintile 5) have the lowest percentage of clients audited by one of the Big-N auditors. Finally, it is interesting that the relative bargaining power of clients is increasing in audit market concentration. Thus, while some studies have argued that the lack of auditor choice in a local market can allow auditors to take a more skeptical approach to auditing (e.g., Boone et al. 2012; Newton et al. 2013), this argument may not hold if the auditor also has few choices of clients to audit.

Panel B of Table 3 reports the mean and median for each variable used in the audit quality analysis (Eq. 2). Consistent with Newton et al. (2013), the frequency of accounting restatements is higher among the less concentrated quintiles. However, the size of the audit markets ($MKTSIZE$) is also increasing moving from quintile 5 to quintile 1. Therefore, I cannot draw any conclusions without controlling for audit market size. Note that firms in the least concentrated audit markets (quintile 1) are more likely to be headquartered in the same MSA as one of the SEC's regional offices, as indicated by the high value of SEC_DIST for quintile 1.

Panel A of Table 4 reports Pearson correlation coefficients for the audit pricing sample. Audit fees are significantly correlated with both $AUDCONC$ (-0.01) and $MKTSIZE$ (0.10), highlighting the need to consider each of these variables in the audit fee model. Audit fees are also positively correlated with firm size proxies such as $LNASSETS$ (0.84) and EMP (0.64). The negative coefficient on CR (-0.16) suggest that less risky firms appear to be charged lower fees. The correlation between audit market concentration and audit market size is significantly negative (-0.47), consistent with the notion that the smaller audit markets are the most concentrated ones.

Panel B of Table 4 contains Pearson correlation coefficients for the audit quality sample. Both $AUDCONC$ and $MKTSIZE$ exhibit a significant correlation with the likelihood of issuing an accounting restatement (-0.03 and 0.03, respectively). This highlights the importance of considering both variables jointly when performing a test of audit quality. The positive correlation between $RESTATE$ and MW (0.06) suggests that firms with material weakness opinions are more likely to subsequently restate their earnings, consistent with Blankley et al. (2012).

TABLE 3 Descriptive Statistics

Panel A: Audit Pricing Sample

	Quintile 1: Lowest Concentration (N = 33,558)		*Quintile 2 (N = 7,973)*		*Quintile 3 (N = 1,893)*		*Quintile 4 (N = 189)*		*Quintile 5: Highest Concentration (N = 472)*	
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
LNFEE	13.021	12.998	13.131	13.173	13.011	12.959	13.569	13.755	12.254	12.090
MKTSIZE	0.937	1.000	0.840	1.000	0.681	0.750	0.548	0.500	0.344	0.250
LNASSETS	5.291	5.333	5.809	5.980	5.689	5.883	6.455	6.382	4.685	4.850
EMP	1.560	0.814	1.894	1.241	1.867	1.174	2.819	1.679	1.264	0.805
CR	2.838	1.899	2.551	1.813	2.396	1.755	2.116	1.591	2.417	1.711
CA_TA	0.518	0.523	0.462	0.451	0.447	0.443	0.408	0.388	0.451	0.432
ARINV	0.245	0.204	0.259	0.233	0.266	0.234	0.276	0.257	0.287	0.285
ROA	-0.195	0.014	-0.088	0.029	-0.090	0.028	-0.042	0.036	-0.110	0.029
LEV	0.183	0.087	0.221	0.164	0.226	0.156	0.244	0.213	0.219	0.163
LOSS	0.449	0.000	0.348	0.000	0.329	0.000	0.196	0.000	0.303	0.000
GROWTH	0.252	0.000	0.275	0.000	0.268	0.000	0.280	0.000	0.239	0.000
GC	0.103	0.000	0.067	0.000	0.080	0.000	0.037	0.000	0.081	0.000
MW	0.030	0.000	0.030	0.000	0.026	0.000	0.042	0.000	0.028	0.000
MERGER	0.077	0.000	0.083	0.000	0.094	0.000	0.101	0.000	0.061	0.000
LNBUSSEG	1.025	0.693	1.117	0.693	1.114	0.693	1.091	0.693	1.098	0.693
LNGEOSEG	1.103	0.693	1.098	0.693	1.058	0.693	0.951	0.693	0.967	0.693
BUSY	0.685	1.000	0.670	1.000	0.654	1.000	0.603	1.000	0.646	1.000
DELAY	80.072	76.000	77.096	75.000	77.316	75.000	70.587	65.000	81.517	85.000
SHORT_TEN	0.090	0.000	0.081	0.000	0.086	0.000	0.069	0.000	0.093	0.000
CITYLEADER	0.424	0.000	0.645	1.000	0.832	1.000	0.979	1.000	1.000	1.000
SCALE	0.572	0.580	0.534	0.510	0.509	0.510	0.511	0.510	0.510	0.510
POWER	0.572	0.688	0.718	1.000	0.863	1.000	0.909	1.000	0.930	1.000
BIGN	0.697	1.000	0.798	1.000	0.704	1.000	0.767	1.000	0.451	0.000
TIER2	0.087	0.000	0.075	0.000	0.067	0.000	0.000	0.000	0.015	0.000

(TABLE 3 continued)

Panel B: Audit Quality Sample

	Quintile 1: Lowest Concentration (N = 34,236)		*Quintile 2 (N = 8,390)*		*Quintile 3 (N = 1,966)*		*Quintile 4 (N = 166)*		*Quintile 5: Highest Concentration (N = 688)*	
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
$RESTATE$	0.095	0.000	0.081	0.000	0.072	0.000	0.030	0.000	0.060	0.000
$MKTSIZE$	0.936	1.000	0.844	1.000	0.656	0.750	0.602	0.500	0.336	0.250
$LNASSETS$	5.167	5.287	5.737	5.960	5.433	5.745	6.225	6.045	4.930	5.287
ROA	-0.262	0.010	-0.121	0.021	-0.174	0.019	-0.045	0.038	-0.129	0.012
$GROWTH$	0.243	0.000	0.258	0.000	0.242	0.000	0.271	0.000	0.185	0.000
$LOSS$	0.456	0.000	0.344	0.000	0.338	0.000	0.211	0.000	0.263	0.000
LEV	0.267	0.086	0.305	0.150	0.241	0.136	0.239	0.208	0.174	0.096
MW	0.029	0.000	0.028	0.000	0.022	0.000	0.048	0.000	0.020	0.000
$LNBUSSEG$	1.013	0.693	1.085	0.693	1.070	0.693	1.076	0.693	0.940	0.693
$LNGEOSEG$	1.075	0.693	1.059	0.693	0.997	0.693	0.923	0.693	0.877	0.693
$MERGER$	0.058	0.000	0.064	0.000	0.057	0.000	0.066	0.000	0.041	0.000
$BIGN$	0.686	1.000	0.775	1.000	0.649	1.000	0.747	1.000	0.317	0.000
$TIER2$	0.088	0.000	0.077	0.000	0.057	0.000	0.000	0.000	0.012	0.000
$OFFICESIZE$	16.921	17.500	16.233	16.560	15.070	15.182	15.232	15.811	13.402	13.421
$CITYLEADER$	0.418	0.000	0.618	1.000	0.818	1.000	0.964	1.000	1.000	1.000
$SHORT\_TEN$	0.094	0.000	0.085	0.000	0.091	0.000	0.084	0.000	0.092	0.000
SEC_DIST	0.370	0.000	0.025	0.000	0.037	0.000	0.000	0.000	0.001	0.000

This table contains the mean and median for relevant variables used in the study. Panel A contains descriptive statistics for the Audit Pricing Sample while Panel B contains descriptive statistics for the Audit Quality Sample. In both panels, descriptive statistics are displayed for each quintile of audit market concentration ($AUDCONC$). In each sample, all independent variables are winsorized at the 1st and 99th percentiles. Variable definitions are provided in Table 1.

TABLE 4 Pearson Correlation Coefficients

Panel A: Correlations for Audit Pricing Sample (N = 44,085)

Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1 *LNFEE*																
2 *AUDCONC*	**-0.01**															
3 *MKTSIZE*	**0.10**	**-0.47**														
4 *LNASSETS*	**0.84**	**0.05**	**0.06**													
5 *EMP*	**0.64**	**0.05**	**0.04**	**0.69**												
6 *CR*	**-0.16**	**-0.05**	**0.02**	**-0.12**	**-0.20**											
7 *CA_TA*	**-0.25**	**-0.09**	**0.07**	**-0.41**	**-0.25**	**0.44**										
8 *ARINV*	**-0.08**	**0.04**	**-0.02**	**-0.15**	**0.01**	**-0.11**	**0.47**									
9 *ROA*	**0.33**	**0.06**	**0.01**	**0.49**	**0.22**	**0.09**	**-0.12**	**0.10**								
10 *LEV*	**0.12**	**0.06**	**-0.03**	**0.17**	**0.10**	**-0.24**	**-0.37**	**-0.12**	**-0.07**							
11 *LOSS*	**-0.30**	**-0.09**	**0.02**	**-0.42**	**-0.29**	**0.06**	**0.16**	**-0.11**	**-0.43**	**0.04**						
12 *GROWTH*	**0.12**	**0.01**	0.01	**0.18**	**0.03**	**-0.03**	**-0.14**	**-0.07**	**0.17**	**0.05**	**-0.20**					
13 *GC*	**-0.31**	**-0.04**	**-0.03**	**-0.44**	**-0.19**	**-0.18**	**0.02**	**-0.01**	**-0.54**	**0.04**	**0.33**	**-0.15**				
14 *MW*	**0.14**	0.00	**0.01**	**0.05**	0.01	**-0.01**	0.00	0.00	**0.02**	-0.01	**0.02**	**0.02**	**-0.02**			
15 *MERGER*	**0.21**	0.01	-0.01	**0.17**	**0.11**	**-0.04**	**-0.09**	**-0.04**	**0.06**	**0.03**	**-0.06**	**0.08**	**-0.06**	0.01		
16 *LNBUSSEG*	**0.31**	**0.07**	0.00	**0.31**	**0.24**	**-0.13**	**-0.18**	**0.06**	**0.16**	**0.05**	**-0.17**	**0.05**	**-0.13**	**0.03**	**0.07**	
17 *LNGEOSEG*	**0.38**	**-0.03**	**0.09**	**0.27**	**0.21**	**0.02**	**0.11**	**0.13**	**0.16**	**-0.10**	**-0.11**	**0.04**	**-0.15**	**0.06**	**0.10**	**0.16**

(TABLE 4 continued)

Variable	*BUSY*	*SWITCH*	*SHORT_TEN*	*CITYLEADER*	*SCALE*	*POWER*	*BIGN*	*TIER2*
LNFEE	**0.06**	**-0.38**	**-0.13**	**0.30**	**0.23**	0.01	**0.51**	**-0.09**
AUDCONC	**-0.02**	**-0.04**	-0.01	**0.25**	**-0.09**	**0.20**	**0.01**	**-0.04**
MKTSIZE	**0.02**	0.00	**0.01**	**-0.21**	**0.10**	**-0.23**	**0.07**	**0.05**
LNASSETS	**0.06**	**-0.42**	**-0.10**	**0.35**	**0.21**	**0.06**	**0.58**	**-0.13**
EMP	**-0.05**	**-0.27**	**-0.08**	**0.30**	**0.09**	**0.21**	**0.34**	**-0.11**
CR	**-0.01**	**-0.04**	**-0.01**	**-0.06**	**0.06**	**-0.16**	0.00	0.01
CA_TA	**-0.12**	**0.08**	**0.02**	**-0.15**	**0.01**	**-0.12**	**-0.14**	**0.06**
ARINV	**-0.18**	**0.08**	**0.03**	**-0.03**	**-0.13**	**0.23**	**-0.13**	**0.07**
ROA	**-0.03**	**-0.24**	**-0.03**	**0.16**	**0.05**	**0.07**	**0.28**	**0.02**
LEV	**0.10**	0.01	0.00	**0.09**	0.00	**0.08**	**0.08**	**-0.05**
LOSS	**0.05**	**0.26**	**0.06**	**-0.16**	**-0.03**	**-0.14**	**-0.20**	**0.04**
GROWTH	**0.04**	**-0.07**	**-0.02**	**0.03**	**0.04**	**-0.02**	**0.09**	0.00
GC	0.01	**0.30**	**0.03**	**-0.13**	**-0.10**	**0.01**	**-0.31**	-0.01
MW	-0.01	**0.12**	**0.02**	**0.01**	0.01	-0.01	**0.01**	**0.03**
MERGER	0.00	**-0.12**	**-0.03**	**0.04**	**0.04**	**0.02**	**0.07**	**-0.01**
LNBUSSEG	0.00	**-0.11**	**-0.02**	**0.13**	**0.01**	**0.13**	**0.14**	**-0.03**

Variable	*BUSY*	*DELAY*	*SHORT_TEN*	*CITYLEADER*	*SCALE*	*POWER*	*BIGN*	*TIER2*
BUSY								
DELAY	**-0.13**							
SHORT_TEN	**-0.03**	0.00						
CITYLEADER	**0.06**	**0.02**	**-0.14**					
SCALE	**0.14**	**0.06**	**-0.12**	**-0.08**				
POWER	**-0.05**	**-0.09**	**0.01**	**0.02**	**0.03**			
BIGN	**0.20**	**0.07**	**-0.27**	**-0.15**	**0.34**	**0.43**		
TIER2	**-0.03**	**-0.04**	**0.05**	**0.11**	**-0.16**	**-0.22**	**-0.47**	

(TABLE 4 continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Panel B: Correlations for Audit Quality Sample (N = 45,446)																	
1 *RESTATE*																	
2 *AUDCONC*	**-0.03**																
3 *MKTSIZE*	**0.03**	**-0.51**															
4 *LNASSETS*	**0.05**	**0.05**	**0.06**														
5 *ROA*	**0.01**	**0.05**	**0.02**	**0.50**													
6 *GROWTH*	**0.04**	0.00	**0.02**	**0.19**	**0.15**												
7 *LOSS*	**-0.01**	**-0.10**	**0.03**	**-0.43**	**-0.37**	**-0.19**											
8 *LEV*	0.00	0.00	0.00	**-0.04**	**-0.09**	-0.01	**0.02**										
9 *MW*	**0.06**	-0.01	**0.02**	**0.05**	**0.02**	**0.02**	**0.02**	0.00									
10 *LNBUSSEG*	**0.03**	**0.03**	**0.03**	**0.31**	**0.15**	**0.07**	**-0.15**	-0.01	**0.03**								
11 *LNGEOSEG*	**0.03**	**-0.06**	**0.10**	**0.27**	**0.15**	**0.06**	**-0.09**	**-0.02**	**0.07**	**0.19**							
12 *MERGER*	-0.01	0.00	0.00	**0.14**	**0.04**	**0.07**	**-0.04**	0.00	**0.01**	**0.06**	**0.09**						
13 *BIGN*	**0.06**	**-0.04**	**0.11**	**0.58**	**0.28**	**0.11**	**-0.20**	**-0.02**	**0.02**	**0.16**	**0.22**	**0.06**					
14 *TIER2*	**-0.02**	**-0.04**	**0.06**	**-0.11**	**0.02**	0.00	**0.03**	-0.01	**0.03**	**-0.02**	**-0.02**	0.00	**-0.45**				
15 *OFFICESIZE*	**0.05**	**-0.28**	**0.41**	**0.54**	**0.27**	**0.11**	**-0.14**	**-0.03**	**0.06**	**0.16**	**0.27**	**0.08**	**0.75**	**-0.16**			
16 *CITYLEADER*	**0.02**	**0.25**	**-0.22**	**0.32**	**0.13**	**0.03**	**-0.15**	0.00	**0.02**	**0.13**	**0.06**	**0.03**	**0.32**	**-0.16**	**0.16**		
17 *SHORT_TEN*	0.00	-0.01	**0.02**	**-0.09**	**-0.01**	-0.01	**0.06**	0.00	**0.02**	**-0.02**	**-0.03**	**-0.02**	**-0.14**	**0.11**	**-0.10**	**-0.07**	
18 *SEC_DIST*	0.00	**-0.28**	**0.20**	**-0.12**	**-0.10**	**-0.03**	**0.09**	0.00	0.00	**-0.03**	**-0.05**	**0.02**	**-0.22**	**0.06**	**0.03**	**-0.19**	**0.02**

This table reports Pearson correlation coefficients among the variables used in each of the analyses. Panel A reports correlations for the audit pricing sample while Panel B reports correlations for the audit quality sample. Correlations significant at the 5 percent level are bolded, those significant at the 10 percent level are underlined, all others are insignificant. See Table 1 for variable definitions.

The correlation between certain variables is quite high. For example, the correlation between $BIGN$ and $OFFICESIZE$ is 0.75. This may cause multicollinearity, which would affect the inferences one can draw from the coefficient on either of these variables. However, multicollinearity between these two variables will not affect the inferences I draw on the variables of interest, $AUDCONC$ and $MKTSIZE$.[19] The correlation between audit market concentration and $CITYLEADER$ is 0.25, highlighting the fact that, as concentration in a local market decreases, it is less likely that any one auditor can be considered an industry specialist.

[19] The results reported in this paper are robust to the exclusion of either $BIGN$ or $OFFICESIZE$.

5. EMPIRICAL RESULTS

5.1 Results for Audit Pricing Analysis

To test whether the effect of audit market concentration on audit fees differs for different size audit markets, I estimate Equation (1). Table 5 reports the results. Model 1 of Table 5 includes only audit market concentration ($AUDCONC$) with no control for the size of the audit market. Consistent with Numan and Willekens (2012), the significant negative coefficient on $AUDCONC$ indicates that firms located in more concentrated audit markets actually pay lower audit fees. Model 2 controls for the size of the audit market. Here, we find a negative coefficient on $AUDCONC$ and a positive coefficient on $MKTSIZE$, suggesting that audit fees are decreasing in the concentration in the audit market and increasing in the size of the audit market. Finally, Model 3 is the full model with the interaction term $AUDCONC \times MKTSIZE$ (Eq. 1). Once the interaction term is included, the coefficient on $AUDCONC$ becomes significantly positive (coef. = 0.193, Z-stat. = 3.41). If the size of the audit market is in the lowest quintile (i.e., $MKTSIZE = 0$), concentration results in significantly higher audit fees. However, an F-test indicates that the sum of the coefficients on $AUDCONC$ and $AUDCONC \times MKTSIZE$ is significantly negative (coef. = -0.422, Z-stat. = -8.34). Therefore, when the audit market is in the largest quintile (i.e., $MKTSIZE = 1$), higher concentration results in lower audit fees. To summarize, the evidence in Table 5 suggests that the effect of audit market concentration on audit fees does depend on the size of the market. This supports Hypothesis 1.

The results are also economically significant. The coefficient of 0.193 on $AUDCONC$ implies that, holding $MKTSIZE$ constant at 0, clients in the most concentrated markets (quintile 5) pay audit fees which are 21.3 percent higher than clients in the least concentrated markets (quintile 1).[20] The size of the audit market has an even greater effect. The coefficient of 0.427 on $MKTSIZE$ suggests that, holding $AUDCONC$ constant at 0, clients in the largest markets (quintile 5) pay audit fees which are 53.3 percent greater than clients in the smallest markets (quintile 1).

[20] To see this, note that the dependent variable is in log form. Therefore, the effect of a one unit change in $AUDCONC$ on audit fees is given by $e^{0.193} = 1.213$.

TABLE 5 The Effect of Audit Market Concentration on Audit Pricing

	Model 1			Model 2			Model 3		
Variable	estimate	t-stat.		estimate	t-stat.		estimate	t-stat.	
$Intercept$	9.378	83.23	***	9.097	74.98	***	8.982	71.97	***
$AUDCONC$	-0.348	-10.27	***	-0.225	-7.17	***	0.193	3.41	***
$MKTSIZE$				0.301	16.61	***	0.427	18.11	***
$AUDCONC \times MKTSIZE$							-0.615	-8.44	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE$							-0.422	-8.34	***
$LNASSETS$	0.423	45.02	***	0.420	45.35	***	0.419	44.66	***
EMP	0.083	13.09	***	0.082	13.14	***	0.083	13.04	***
CR	-0.042	-21.69	***	-0.042	-22.18	***	-0.042	-22.81	***
CA_TA	0.520	15.82	***	0.505	15.53	***	0.498	15.00	***
$ARINV$	0.012	0.43		0.020	0.76		0.024	0.90	
ROA	-0.103	-12.14	***	-0.103	-12.11	***	-0.103	-12.29	***
LEV	0.079	3.15	***	0.077	3.06	***	0.079	3.05	***
$LOSS$	0.132	14.88	***	0.132	15.40	***	0.131	15.57	***
$GROWTH$	0.000	-0.04		0.000	0.00		0	-0.04	
GC	0.115	6.18	***	0.114	6.06	***	0.115	6.16	***
MW	0.401	4.35	***	0.398	4.34	***	0.397	4.35	***
$MERGER$	0.098	7.06	***	0.098	7.28	***	0.098	7.04	***
$LNBUSSEG$	0.134	22.58	***	0.132	22.55	***	0.133	22.78	***
$LNGEOSEG$	0.255	28.05	***	0.251	26.90	***	0.249	27.15	***
$BUSY$	0.058	2.69	***	0.056	2.59	**	0.057	2.66	**
$DELAY$	0.001	4.49	***	0.001	4.34	***	0.001	4.29	***
$SHORT\_TEN$	-0.082	-3.73	***	-0.082	-3.70	***	-0.082	-3.70	***
$CITYLEADER$	0.022	0.80		0.074	2.65	**	0.085	3.08	***
$SCALE$	-0.024	-0.70		-0.008	-0.24		-0.018	-0.56	
$SCALE \times CITYLEADER$	0.082	2.08	**	0.029	0.72		0.017	0.45	
$POWER$	-0.027	-3.63	***	-0.005	-0.55		0.005	0.56	
$BIGN$	0.483	10.90	***	0.480	10.96	***	0.494	11.90	***

(TABLE 5 continued)

Variable	Model 1 estimate	Model 1 t-stat.		Model 2 estimate	Model 2 t-stat.		Model 3 estimate	Model 3 t-stat.	
$TIER2$	0.319	13.53	***	0.309	12.80	***	0.315	13.19	***
$Industry\ FE$	Yes			Yes			Yes		
N	44,085			44,085			44,085		
$Adj.R^2$	0.846			0.847			0.848		

This table contains estimated coefficients from linear regressions in which the dependent variable ($LNFEE$) is the natural log of audit fees paid to the auditor. Each model includes industry fixed effects, where industries are defined using two-digit SIC codes. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. The model is estimated separately for each year, and t-statistics are calculated using the method of Fama and MacBeth (1973). Variable definitions are provided in Table 1.
***, **, and * denotes statistical significance at the 1, 5, and 10 percent level, respectively, using a two-tailed test.

5.2 Results for Audit Quality Analysis

Having shown that audit market concentration and the size of the audit market jointly determine audit fees, I next examine what effect these variables have on audit quality. Table 6 reports the results of estimating the audit quality regression (Eq. 2). Model 1 is a replication of the results of Newton et al. (2013). Consistent with Newton et al., the coefficient on $AUDCONC$ is a significant - 0.751 (Z-stat. = 4.38), indicating that greater audit market concentration is associated with a lower likelihood of issuing an accounting restatement. Model 2 augments the basic model with a control for audit market size. Interestingly, the coefficient on $MKTSIZE$ is a significant 0.500 (Z-stat. = 2.92), indicating that firms in larger audit markets are more likely to issue accounting restatements.[21] Finally, Model 3 is the full model (Eq. 2). Once controlling for audit market size and its interaction with concentration, the coefficient on $AUDCONC$ is positive and marginally significant (Z-stat. = 1.65). Therefore, in the smallest audit markets (i.e., in markets where $MKTSIZE = 0$), audit quality is decreasing in concentration. However, the sum of the coefficients on $AUDCONC$ and $AUDCONC \times MKTSIZE$ is a significant -1.170 (Z-stat. = -5.03). This suggests that, in larger audit markets, concentration has a positive effect on audit quality. This helps explain why Newton et al. (2013) find a positive relation between audit market concentration and audit quality. The authors examine the unconditional relationship between the two constructs. Model 3 shows that the relation between concentration and audit quality depends on the size of the audit market.

[21] To the extent that audit markets are characterized by fixed costs, this finding is inconsistent with the prediction made in Berry and Waldfogel (2010), who predict that product quality is increasing in market size. Berry and Waldfogel study the newspaper industry, a manufacturing industry. In contrast, the audit market is a service industry. This means that, although there is a large fixed cost component, the marginal cost of conducting another audit is significant. In particular, each additional audit requires a significant time investment. Therefore, the negative coefficient on $MKTSIZE$ may be caused by auditor workload compression. i.e., auditors in these markets may face time pressure to audit all of the clients in these markets (Lopez and Peters 2012).

TABLE 6 The Effect of Audit Market Concentration on Audit Quality

Variable	Model 1 estimate	Model 1 Z-stat.		Model 2 estimate	Model 2 Z-stat.		Model 3 estimate	Model 3 Z-stat.	
$Intercept$	-3.352	-9.95	***	-3.448	-10.26	***	-3.620	-10.48	***
$AUDCONC$	-0.751	-4.38	***	-0.617	-3.51	***	0.576	1.65	*
$MKTSIZE$				0.500	2.92	***	0.867	4.35	***
$AUDCONC \times MKTSIZE$							-1.746	-3.74	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE$							-1.170	-5.03	***
$LNASSETS$	0.278	5.78	***	0.286	5.90	***	0.285	5.87	***
$LNASSETS^2$	-0.019	-4.79	***	-0.020	-4.90	***	-0.020	-4.82	***
ROA	-0.215	-6.42	***	-0.217	-6.47	***	-0.218	-6.48	***
$GROWTH$	0.198	4.50	***	0.198	4.50	***	0.198	4.51	***
$LOSS$	0.032	0.62		0.033	0.64		0.031	0.60	
LEV	0.001	0.56		0.001	0.48		0.001	0.45	
MW	0.752	8.95	***	0.758	9.01	***	0.760	9.08	***
$LNBUSSEG$	0.146	2.32	**	0.143	2.27	**	0.146	2.31	**
$LNGEOSEG$	0.178	2.80	***	0.176	2.76	***	0.174	2.72	***
$MERGER$	-0.243	-2.87	***	-0.237	-2.79	***	-0.232	-2.73	***
$BIGN$	0.318	2.91	***	0.382	3.34	***	0.435	3.82	***
$TIER2$	-0.121	-0.95		-0.113	-0.89		-0.090	-0.71	
$OFFICESIZE$	-0.055	-2.47	**	-0.081	-3.38	***	-0.094	-3.95	***
$CITYLEADER$	0.021	0.39		0.043	0.79		0.047	0.86	
$SHORT\_TEN$	0.061	1.03		0.054	0.90		0.053	0.89	
SEC_DIST	-0.030	-0.46		-0.029	-0.44		-0.046	-0.70	
$Industry\ FE$	Yes			Yes			Yes		
N	45,446			45,446			45,446		
$Pseudo\ R^2$	0.042			0.043			0.044		

This table contains estimated coefficients from logistic regressions in which the dependent variable ($RESTATE$) is equal to 1 if the client subsequently restate its earnings, otherwise it is equal to zero. Each model includes industry fixed effects, where industries are defined using two-digit SIC codes. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. Z-statistics are adjusted for standard errors which are adjusted for heteroskedasticity and are clustered by firm (Peterson 2009). Variable definitions are provided in Table 1.

(TABLE 6 continued)

Variable	*Model 1*		*Model 2*		*Model 3*	
	estimate	**Z-stat.**	**estimate**	**Z-stat.**	**estimate**	**Z-stat.**

***, **, and * denotes statistical significance at the 1, 5, and 10 percent level, respectively, using a two-tailed test.

6. SENSITIVITY ANALYSIS

6.1 Alternative Measures of Market Size

This section provides additional tests to assess the sensitivity of the results to alternative measures of audit market size. This is important, since, to the best of my knowledge, prior literature has not attempted to measure the size of the audit market. The primary proxy for the size of the audit market is a weighted count of the number of clients in a given MSA. Each client is weighted by its total assets to reflect the fact that larger clients will require more auditing. In this section, I test the robustness of the results to using a measure of audit market size which weights each client by its total sales, rather than by its total assets. In addition, I use a third measure, which is simply a count of the number of clients in the MSA.

Panel A of Table 7 reports the results of re-estimating the audit fee model (Eq. 1) after replacing the original audit market size proxy ($MKTSIZE$) with one of the two alternative proxies discussed above ($MKTSIZE^{ROBUST}$).[22] In Model 1, $MKTSIZE^{ROBUST}$ is the quintile rank of the weighted count of the number of clients in the MSA, where each client is weighted by its sales, rather than by its assets. The results are quite similar to the main results reported in section 5. The coefficient on $AUDCONC$ is significantly negative (-0.260) and an F-test indicates that the sum of the coefficients on $AUDCONC$ and $AUDCONC \times MKTSIZE^{ROBUST}$ is significantly positive (coef. = 0.664, t-stat. = 7.12). Thus, consistent with the results reported earlier in the paper, audit market concentration results in higher audit fees, unless the MSA is a large audit market (i.e., unless the value of $MKTSIZE$ is sufficiently high). In Model 2, $MKTSIZE^{ROBUST}$ is the quintile rank of the count of the number of clients in each MSA. The results are qualitatively similar.

Panel B of Table 7 reports the results of re-estimating the audit quality model (Eq. 2) after replacing the original audit market size proxy with one of the two alternative proxies discussed above. In Model 1, $MKTSIZE^{ROBUST}$ is the quintile rank of the weighted count of the number of clients in an MSA, where each client is weighted by its total sales. In Model 2, $MKTSIZE^{ROBUST}$ is the quintile rank of the number of clients in an MSA. Using either model, the results are similar. Audit market concentration appears to be associated with a higher likelihood of issuing an accounting restatement. However, when the audit market is sufficiently large, concentration

[22] All regressions in Panel A include all of the control variables listed in Eq. (1). All regressions in Panel B include all of the control variables listed in Eq. (2). The coefficients for these variables are not tabulated to save space.

is associated with a lower likelihood of issuing an accounting restatement. Overall, these results are similar to those documented in Table 5.

TABLE 7 Sensitivity Analysis Using Alternate Measure of Audit Market Size

Panel A: Audit Pricing Tests (Dependent Variable = $LNFEE$)

	Model 1: Market Size is Based on Sales in City			***Model 2: Market Size is Based on Number of Clients in City***		
Variable	**estimate**	**t-stat.**		**estimate**	**t-stat.**	
$Intercept$	8.929	69.83	***	8.989	61.19	***
$AUDCONC$	0.255	4.57	***	0.309	4.61	***
$MKTSIZE^{ROBUST}$	0.485	16.87	***	0.393	7.87	***
$AUDCOMP \times MKTSIZE^{ROBUST}$	-0.656	-8.66	***	-0.767	-7.42	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE^{ROBUST}$	-0.401	-16.65	***	-0.470	-16.98	***
$Controls$	Yes			Yes		
$Industry\ FE$	Yes			Yes		
$Year\ FE$	Yes			Yes		
N	40,085			40,085		
$Adj. R^2$	0.848			0.847		

Panel B: Audit Quality Tests (Dependent Variable =$RESTATE$)

	Model 1			***Model 2***		
Variable	**estimate**	**Z-stat.**		**estimate**	**Z-stat.**	
$Intercept$	-3.700	-10.60	***	-4.296	-10.08	***
$AUDCONC$	0.694	1.97	**	1.030	2.19	**
$MKTSIZE^{ROBUST}$	0.930	4.25	***	1.336	3.63	***
$AUDCONC \times MKTSIZE^{ROBUST}$	-1.856	-3.99	***	-1.863	-3.35	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE^{ROBUST}$	-1.162	-5.06	***	-0.834	-3.39	***
$Controls$	Yes			Yes		
$Industry\ FE$	Yes			Yes		
N	45,446			45,446		
$Pseudo\ R^2$	0.043			0.044		

This table reports sensitivity analyses using alternate measures of audit market size. Panel A reports the results of estimating the audit fee model (Eq. 1) after replacing the original proxy for audit market size ($MKTSIZE$) with alternate proxies. In Model 1, the alternate proxy ($MKTSIZE^{ROBUST}$) is the quintile rank of the size of the audit market, where audit market size is calculated as $\sum_{i=1}^{n} sale_i$, where i is a client in an audit market and $sale$ is the client's total sales. MSAs are ranked each year, and the value of $MKTSIZE^{ROBUST}$ ranges from 0 to 1, with 1 indicating the largest markets. In Model 2, the alternate proxy ($MKTSIZE^{ROBUST}$) is the quintile rank of the size of the audit market, where audit market size is calculated as the number of clients in an MSA in a given year. MSAs are ranked each year and the value of $MKTSIZE^{ROBUST}$ ranges from 0 to 1, with 1 indicating the largest markets. Both models include all of the control variables in Eq. 1 as well as industry and year fixed effects. Panel B reports the results of estimating the audit quality logistic regression (Eq. 2) after replacing the original proxy for audit market size with the alternate proxies. Both models include all of the control variables in Eq. 2 as well as industry fixed effects. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. Test statistics calculated as in Fama and MacBeth (1973) in Panel A. In Panel B, t-statistics

(TABLE 7 continued)

Panel B: Audit Quality Tests (Dependent Variable =$RESTATE$)

Variable	***Model 1*** estimate	Z-stat.	***Model 2*** estimate	Z-stat.

are adjusted for standard errors which are clustered by firm and year (Peterson 2009). Variable definitions are provided in Table 1.

***, **, and * denotes statistical significance at the 1, 5, and 10 percent level, respectively, using a two-tailed test.

Finally, it could be argued that the best proxy for the size of the audit market is the sum of all audit fees charged to clients in a given MSA. I construct this variable and call it $MKTSIZE^{FEE}$. I then test whether the results are robust to using this alternate definition of audit market size. Table 8 reports the results of re-estimating Eq. (1) with $MKTSIZE^{FEE}$ in place of $MKTSIZE$.

TABLE 8 Audit Pricing Regression Using Fee-based measure of market size

Variable	***Model 1*** estimate	t-stat.		***Model 2*** estimate	t-stat.		***Model 3*** estimate	t-stat.	
$Intercept$	9.378	83.23	***	8.962	70.77	***	8.783	63.40	***
$AUDCONC$	-0.348	-10.27	***	-0.141	-5.29	***	0.328	6.30	***
$MKTSIZE^{FEE}$				0.425	12.15	***	0.609	13.33	***
$AUDCONC \times MKTSIZE^{FEE}$							-0.628	-9.32	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE^{FEE}$							-0.300	-6.10	***
$LNASSETS$	0.423	45.02	***	0.419	45.91	***	0.418	45.39	***
EMP	0.083	13.09	***	0.082	12.81	***	0.082	12.75	***
CR	-0.042	-21.69	***	-0.042	-22.10	***	-0.042	-22.7	***
CA_TA	0.520	15.82	***	0.508	15.99	***	0.503	15.63	***
$ARINV$	0.012	0.43		0.014	0.50		0.017	0.61	
ROA	-0.103	-12.14	***	-0.102	-12.00	***	-0.103	-12.0	***
LEV	0.079	3.15	***	0.078	3.22	***	0.079	3.22	***
$LOSS$	0.132	14.88	***	0.130	15.10	***	0.130	14.98	***
$GROWTH$	0.000	-0.04		-0.001	-0.08		-0.001	-0.13	
GC	0.115	6.18	***	0.112	5.93	***	0.114	6.01	***
MW	0.401	4.35	***	0.401	4.35	***	0.401	4.35	***
$MERGER$	0.098	7.06	***	0.097	7.56	***	0.097	7.49	***
$LNBUSSEG$	0.134	22.58	***	0.131	22.52	***	0.132	22.48	***
$LNGEOSEG$	0.255	28.05	***	0.252	26.63	***	0.250	26.47	***
$BUSY$	0.058	2.69	***	0.056	2.55	**	0.056	2.62	**
$DELAY$	0.001	4.49	***	0.001	4.39	***	0.001	4.36	***
$SHORT\_TEN$	-0.082	-3.73	***	-0.082	-3.68	***	-0.083	-3.64	***
$CITYLEADER$	0.022	0.80		0.089	3.25	***	0.103	3.73	***
$SCALE$	-0.024	-0.70		0.009	0.27		0.000	0.01	
$SCALE \times CITYLEADER$	0.082	2.08	**	0.006	0.16		-0.010	-0.27	

(TABLE 8 continued)

Variable	Model 1 estimate	t-stat.		Model 2 estimate	t-stat.		Model 3 estimate	t-stat.	
$POWER$	-0.027	-3.63	***	-0.008	-1.06		0.000	-0.06	
$BIGN$	0.483	10.90	***	0.471	10.34	***	0.486	11.05	***
$TIER2$	0.319	13.53	***	0.310	12.33	***	0.318	12.79	***
$Industry\ FE$	Yes			Yes			Yes		
N	44,085			44,085			44,085		
$Adj. R^2$	0.846			0.847			0.848		

This table contains estimated coefficients from Fama and MacBeth (1973) style regressions where the dependent variable is $LNFEE$. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels using a two-tailed test. $MKTSIZE^{FEE}$ is the sum of all audit fees charged to clients in a given MSA. All other variables are defined in Table 1.

Consistent with the evidence presented earlier, the coefficient on audit market size remains significantly positive, suggesting that auditors charge higher fees in larger markets. Also consistent with the evidence presented earlier, the interaction term $AUDCONC \times MKTSIZE^{FEE}$ is significantly negative (coef. = -0.628, Z-stat. = -9.32) and the coefficient on $AUDCONC$ continues to be positive and significant (coef. = 0.328, Z-stat. = 6.30).

Table 9 reports the results of using this alternate measure of audit market size in the audit quality model (Eq. 2). Looking at Model 3, I find results consistent with the evidence reported earlier in the paper. The coefficient on $AUDCONC$ is positive, the coefficient on $MKTSIZE^{FEE}$ is positive, and the coefficient on the interaction term $AUDCONC \times MKTSIZE^{FEE}$ is negative. The only exception is that the coefficient on $AUDCONC$ is not quite statistically significant using a two-tailed test (Z-stat. = 1.61).

TABLE 9 Audit Quality Regressions using Fee-based measure of market size

Variable	Model 1 estimate	Z-stat.		Model 2 estimate	Z-stat.		Model 3 estimate	Z-stat.	
$Intercept$	-3.352	-9.95	***	-3.678	-10.35	***	-3.997	-10.27	***
$AUDCONC$	-0.751	-4.38	***	-0.492	-2.56		0.711	1.61	
$MKTSIZE^{FEE}$				0.670	2.57		1.134	3.47	***
$AUDCONC \times MKTSIZE^{FEE}$							-1.567	-2.96	***
$F\ test: AUDCONC + AUDCONC \times MKTSIZE^{FEE}$							-0.856	-3.73	***
$LNASSETS$	0.278	5.78	***	0.284	5.87	***	0.284	5.86	***
$LNASSETS^2$	-0.019	-4.79	***	-0.020	-4.88	***	-0.020	-4.84	***
ROA	-0.215	-6.42	***	-0.216	-6.45	***	-0.217	-6.47	***
$GROWTH$	0.198	4.50	***	0.197	4.47	***	0.196	4.46	***
$LOSS$	0.032	0.62		0.030	0.59		0.029	0.56	
LEV	0.001	0.56		0.001	0.53		0.001	0.52	
MW	0.752	8.95	***	0.758	9.02	***	0.760	9.05	***

(TABLE 9 continued)

	Model 1			Model 2			Model 3		
Variable	estimate	Z-stat.		estimate	Z-stat.		estimate	Z-stat.	
$LNBUSSEG$	0.146	2.32	**	0.143	2.27	**	0.145	2.31	**
$LNGEOSEG$	0.178	2.80	***	0.176	2.77	**	0.174	2.74	***
$MERGER$	-0.243	-2.87	***	-0.241	-2.84	***	-0.237	-2.80	***
$BIGN$	0.318	2.91	***	0.369	3.23	***	0.415	3.63	***
$TIER2$	-0.121	-0.95		-0.110	-0.86		-0.087	-0.68	
$OFFICESIZE$	-0.055	-2.47	**	-0.077	-3.17	***	-0.087	-3.57	***
$CITYLEADER$	0.021	0.39		0.044	0.79		0.047	0.84	
$SHORT\_TEN$	0.061	1.03		0.055	0.91		0.054	0.91	
SEC_DIST	-0.030	-0.46		-0.031	-0.47		-0.047	-0.71	
$Industry\ FE$	Yes			Yes			Yes		
N	45,446			45,446			45,446		
$Pseudo\ R^2$	0.042			0.043			0.043		

The dependent variable in all models is $RESTATE$. Standard errors are adjusted for heteroskedasticity and firm-level clustering (Peterson 2009). *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels using a two-tailed test. $MKTSIZE^{FEE}$ is the sum of all audit fees charged to clients in a given MSA. All other variables are defined in Table 1.

6.2 Cost of Living Differences Test

A second major concern is that the relationship between audit market size and audit pricing is being driven by cost of living differences across MSAs. Specifically, it may be the case that large cities have both (i.) large audit markets and (ii.) a higher cost of living. If this is the case, the size of the city is a correlated omitted variable. To address this concern, I estimate the following linear regression with standard errors clustered by firm and year:

$$LNFEE = \gamma_0 = \gamma_1 AUDCONC + \gamma_2 MKTSIZE + \gamma_3 AUDCONC \times MKTSIZE + \gamma_4 CITYSIZE + \gamma_5 AUDCONC \times CITYSIZE + \sum CONTROLS + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon \quad (3)$$

Where,

$CITYSIZE$ = The quintile rank of city size, where the size of the city is measured as the population of the city (in thousands).[23] Ranks are scaled so that values of $CITYSIZE$ range from 0 to 1, with 1 being the largest cities.

[23] Population data is obtained from the U.S. Census data, available at: http://www.census.gov/compendia/statab/cats/population/estimates_and_projections--states_metropolitan_areas_cities.html.

Firm and year subscripts are omitted for ease of exposition. The model includes all control variables from Equation (1). Ceteris paribus, I expect that audit fees will be higher in larger cities. If the results documented in Table 5 are being driven by larger cities having higher prices, I should observe that the coefficients γ_1 and the sum $\gamma_1 + \gamma_3$ should not be significantly different from zero.

Table 10 reports the results. Despite controlling for the size of the city via $CITYSIZE$, I continue to find results similar to those reported in Table 5. The coefficient on $AUDCONC$ is a significant 0.108, suggesting that concentration is positively related to audit fees. However, an F-test indicates that the sum of the coefficients on $AUDCONC$ and $AUDCONC \times MKTSIZE$ is a significant -0.471. This suggests that audit fees are actually lower in more concentrated markets if those markets are also large. Overall, the evidence in Table 10 suggests that cost of living differences are not driving the audit pricing results.[24]

TABLE 10 Sensitivity Analysis Including Control for Population of City

Variable	**estimate**	**t-stat.**	
$Intercept$	8.994	71.51	***
$AUDCONC$	0.108	1.67	*
$MKTSIZE$	0.427	19.87	***
$AUDCONC \times MKTSIZE$	-0.579	-7.95	***
$F\ Test: AUDCONC + AUDCONC \times MKTSIZE$	-0.471	-9.12	***
$CITYSIZE$	0.001	0.30	
$AUDCONC \times CITYSIZE$	-0.103	-3.95	***
$F\ Test: AUDCONC + AUDCONC \times CITYSIZE$	0.005	0.58	
$Controls$	Yes		
$Industry\ FE$	Yes		
N	44,085		
$Adj. R^2$	0.848		

This table reports estimated coefficients from estimating a linear regression in which the dependent variable ($LNFEE$) is the natural log of audit fees (Eq. 3). The model includes all of the control variables in Eq. 1 as well as industry and year fixed effects. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. The model is estimated separately for each year, as in Fama and MacBeth (1973). Variable definitions are provided in Table 1.
***, **, and * denotes statistical significance at the 1, 5, and 10 percent level, respectively, using a two-tailed test.

6.3 Alternate Measure of Audit Quality

In this section I test whether the results of the audit quality analyses are robust to alternate definitions of audit quality. As another measure of audit quality, I use the residual from the following regression model:

[24] Although there is no reason to expect that cost of living differences would be driving the audit *quality* results, I have tested whether this is the case by estimating a logit model similar to Eq. (2) after including $CITYSIZE$ and its interaction with $AUDCONC$. I continue to find results similar to those reported earlier.

$$ACC_t = \tau_0 + \tau_1 SGR_t + \tau_2 EMPGR_t + \tau_3 CF_{t-1} + \tau_4 CF_t + \tau_5 CF_{t+1} + \varepsilon_t \qquad (4)$$

Where,

ACC_t	=	Total accruals, calculated as in Richardson et al. (2005).
SGR_t	=	Sales growth, calculated as sales in year t less sales in year t-1, all scaled by sales in year t-1.
$EMPGR_t$	=	Employee growth rate, calculated as the number of employees in year t less the number of employees in year t-1, all scaled by the number of employees in year t-1.
CF_t	=	Cash flows from operations in year t scaled by average total assets.
$BADACC$	=	Bad accruals, estimated as the residual from Eq. (4).

Subscript t denotes the year. The model is based on that of Dechow and Dichev (2002) and modified by Bushman et al. (2011). The model is estimated separately for each industry-year, where industries are defined using two-digit SIC codes. I require each industry-year to have 30 observations to estimate the equation. As explained by Allen et al. (2013), the residual represents accruals which did not result in future cash flows. To the extent that accruals that do not map into future cash flows are earnings management, the residual from this model can tell us about how much earnings management the auditor tolerated.

In conducting the test, I use all firm-year observations on Compustat with available auditor information on Audit Analytics for the 2000-2011 time period. This leaves me with 40,869 firm-year observations. From this sample, I delete all observations which have a negative value for the residual in Model (4).[25] This leaves me with a sample of 26,775 firm-year observations. I then estimate the following linear regression with standard errors clustered by firm and year:

$$BADACC = \theta_0 + \theta_1 AUDCONC + \theta_2 MKTSIZE + \theta_3 AUDCONC \times MKTSIZE + \sum CONTROLS + Industry\ Fixed\ Effects + \varepsilon \qquad (5)$$

Firm and year subscripts are omitted for ease of exposition. The model includes all control variables in the restatement analysis (Model 2). Variable definitions are provided in Table 1. If the economies of scale theory is valid, the coefficient on θ_3 should be significantly negative, indicating that when auditors achieve economies of scale, their clients engage in less earnings management.

[25] Alternatively, one could take the absolute value of the residual under the assumption that extreme "bad accruals" are low earnings quality. However, this is akin to taking the absolute value of discretionary accruals and assuming that extreme discretionary accruals are low earnings quality. Recent research has shown that this can lead to erroneous inferences (e.g., Hribar and Nichols; Eshleman and Guo 2013a).

Table 11 reports the results of estimating Eq. (5). Model 1 is the baseline model, which does not includes audit market size or its interaction with audit market concentration. The significantly negative coefficient on $AUDCONC$ (-0.025) is consistent with the restatement analyses reported in Table 6. Model 2 augments Model 1 with audit market size. The results suggest that audit market size is negatively related to audit quality, although the coefficient on market size is not statistically significant. Finally, Model 3 is the full model. The coefficient on the interaction term $AUDCONC \times MKTSIZE$ is significantly negative (coef. = -0.049, t-stat. = -2.16), consistent with audit quality being highest in large and highly concentrated markets. This result supports the economies of scale argument.

TABLE 11 Audit Quality Regression Using Alternate Measure of Audit Quality

	Model 1			***Model 2***			***Model 3***		
Variable	**estimate**	**t-stat.**		**estimate**	**t-stat.**		**estimate**	**t-stat.**	
$Intercept$	0.158	6.04	***	0.157	5.96	***	0.152	5.73	***
$AUDCONC$	-0.025	-2.74	***	-0.022	-2.54	**	0.010	0.63	
$MKTSIZE$				0.011	0.99		0.023	1.74	*
$AUDCONC \times MKTSIZE$							-0.049	-2.16	**
$F\ Test: AUDCONC + AUDCONC \times MKTSIZE$							-0.039	-3.08	***
$LNASSETS$	-0.022	-5.91	***	-0.022	-5.85	***	-0.022	-5.85	***
$LNASSETS^2$	0.001	4.48	***	0.001	4.43	***	0.001	4.44	***
ROA	0.002	0.34		0.002	0.33		0.002	0.32	
$GROWTH$	0.011	2.90	***	0.011	2.90	***	0.011	2.91	***
$LOSS$	-0.040	-8.98	***	-0.040	-8.97	***	-0.040	-8.95	***
LEV	0.003	0.85		0.003	0.85		0.003	0.87	
MW	-0.015	-2.36	**	-0.015	-2.38	**	-0.015	-2.38	**
$LNBUSSEG$	0.003	1.35		0.003	1.32		0.003	1.35	
$LNGEOSEG$	-0.005	-2.10	**	-0.006	-2.13	**	-0.006	-2.16	**
$MERGER$	-0.010	-1.54		-0.010	-1.52		-0.010	-1.50	
$BIGN$	0.021	2.74	***	0.023	2.78	***	0.025	3.05	***
$TIER2$	0.014	1.72	*	0.014	1.74	*	0.015	1.86	*
$OFFICESIZE$	-0.002	-1.50		-0.003	-1.62		-0.003	-1.91	*
$CITYLEADER$	-0.001	-0.22		0.000	-0.08		0.000	-0.06	
$SHORT\_TEN$	0.008	1.29		0.008	1.28		0.008	1.29	
SEC_DIST	0.005	1.49		0.006	1.51		0.005	1.29	
$Industry\ FE$	Yes			Yes			Yes		
N	26,775			26,775			26,775		
$Pseudo\ R^2$	0.135			0.135			0.135		

This table reports estimated coefficients from estimating a linear regression in which the dependent variable ($BADACC$) is bad accruals, estimated as the residual from Equation (4). The model includes all of the control variables in Eq. 2 as well as industry and year fixed effects. Each continuous independent variable is winsorized at

(TABLE 11 continued)

Variable	Model 1 estimate	Model 1 t-stat.	Model 2 estimate	Model 2 t-stat.	Model 3 estimate	Model 3 t-stat.

the 1^{st} and 99^{th} percentile to reduce the influence of outliers. T-statistics are based on standard errors which are clustered by firm and year (Peterson 2009). Variable definitions are provided in Table 1.
***, **, and * denotes statistical significance at the 1, 5, and 10 percent level, respectively, using a two-tailed test.

7. CONCLUSION

Regulators, audit clients, and academics have taken an interest in the effects of audit market concentration on audit pricing and audit quality. The extant literature has examined these issues and has produced puzzling and sometimes mixed evidence. In this paper I argue that the existing literature is ignoring a potentially important variable: the size of the audit market. I find that audit fees are higher in more concentrated markets when those markets are also small in size. Conversely, audit fees are actually lower in markets which are both highly concentrated and large. This finding contrasts with Numan and Willekens (2012). I show that this difference in findings is attributable to Numan and Willekens's lack of control for the size of the audit market. In subsequent tests, I find that the effect of audit market concentration on audit quality depends on the size of the audit market. In small audit markets, greater concentration leads to a higher frequency of accounting restatements. On the other hand, in larger audit markets, greater concentration (less competition) leads to a lower frequency of restatements.

The findings in this paper are subject to a few limitations. First, the proxy for audit market size may measure the size of the audit market with error. To alleviate this concern, I have performed all of the analyses using alternative proxies for audit market size. Second, the use of the likelihood of issuing an accounting restatement as a proxy for audit quality is also subject to measurement error. There may be firms which do not restate their earnings, yet received a poor quality audit.

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