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Auditor Market Power and Audit Quality Revisited: Effects of market concentration, market share distance, and leadership

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JEL classification: M4; L0
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1. Introduction

Over the past decades regulators around the world have repeatedly expressed concerns about the high level of supplier concentration in the audit market and its potential adverse consequences. In the U.S., the Government Accountability Office (GOA) expressed the following concerns in its 2008 report: "*The overall market continues to represent a tight oligopoly, which is a concentrated market in which a small number of firms have large enough market share to potentially use their market power, either unilaterally or through collusion, to greatly influence price and other business practices to their advantage….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, p. 15-16).

Whether and how auditor market power affects audit quality remains an unresolved question. Prior archival auditing studies examine the relation between audit market concentration and audit quality in the period before the 2008 GAO report (see Kallapur et al. 2010; Boone et al. 2012; Newton et al. 2013), but provide mixed evidence. Specifically, Kallapur et al. (2010) and Newton et al. (2013) report a positive association whereas Boone et al. (2012) reports a negative association. The GAO (2008) concluded that : "*The level of market concentration also does not appear to be affecting audit quality as many of our survey respondents and those we interviewed said that audit quality had improved, which some attributed to the Sarbanes-Oxley Act*" (GAO report 2008, p. 5), and acknowledged that the presence of high market shares may not necessarily result in less competition because oligopolistic competition can still be intense and result in favorable situations for audit clients.

The auditing literature provides little guidance on the nature of competition among audit firms. Simunic (1980) fails to reject the hypothesis that there is substantial price competition in the audit market, whereas Gerakos and Syverson (2015) show that the market for audit services

is not perfectly competitive. Consistent with imperfect competition, Bleibtrue and Stefani (2017) model the audit market as a Bertrand (i.e., price) competition so that a competitive equilibrium can be achieved with only a few participants. Dekeyser et al. (2019) argue that the characteristics of the audit market are more likely to resemble those of a product-differentiated oligopoly, where audit firms compete on quality and price. However, others suggest that the market is closer to a Cournot competition (Ciconte et al. 2015) where firms compete on quantity and competition is reduced as the number of competitors declines.

In this paper, we reexamine the issue of imperfect competition and auditor market power and its consequence on audit quality by relying on economic theory to define and test two competing measures of auditor market power: (1) a 'traditional' market concentration measure from Cournot models of market competition, and (2) a competing measure (i.e., industry market share distance) derived from spatial competition theory (Numan and Willekens 2012).

We argue that the relation between an auditor's market power and audit quality is ex ante ambiguous, for the following reasons. From prior auditing literature we know that audit firms compete by means of industry specialization and earn fee premiums by specializing in certain industries (Casterella et al. 2004; Francis et al. 2005; Numan and Willekens 2012). These audit fee premiums enable specialist audit firms to exert higher effort and expand their industry and client knowledge, which could lead to higher audit quality. However, whether an industry specialization strategy leads to greater market power depends on whether the specialist has close (specialist) competitors in the market (Hotelling 1929). In other words, even if an auditor is a specialist, the presence of a close competitor will put pressure on audit fees (Numan and Willekens 2012), which could result in lower audit effort and lower audit quality (Simunic 1980; Newton et al. 2013). In contrast, increased price competition may force an audit firm to distinguish itself from the competitor based on characteristics such as audit quality. Following this line of reasoning, competition among auditors may actually lead to higher audit quality.

We test for a relation between auditor market power and audit quality using U.S. data from relatively large public companies for the years 2009-2017. We conduct our empirical tests using two competing measures of market power: a market concentration measure capturing the average level of supplier power in the audit market, and a measure of industry market share distance introduced by Numan and Willekens (2012) and used in Bills and Stephens (2015). Following prior auditing literature, in all models we control for industry market share leadership to proxy for industry expertise. Industry market share leadership also captures how well an audit firm differentiates itself from its competitors (Neal and Riley 2004).

We infer audit quality from two measures of financial reporting quality: (1) the level of absolute abnormal accruals, and (2) the incidence of financial statement restatements. This design choice is motivated by Aobdia (2019), which investigates how academic audit quality proxies reflect auditors' and regulators' views of audit quality, and indicates that restatements and abnormal accruals represent practitioners' perceptions of audit quality.[1]

Following Francis et al. (2005) and Numan and Willekens (2012), we assume that competition between audit firms takes place at the local office level. We therefore define audit markets as 2-digit SIC industry segments per U.S. Metropolitan Statistical Area (MSA) at the local office level. Our results generally suggest that audit quality is not affected by market concentration, but is affected by market share distance to the closest competitor. Specifically, market power derived from market share dominance improves audit quality, whereas market share dominance of non-leaders is not associated with audit quality. Interestingly, we do not find a significant effect of industry leadership. Overall, these results suggest that audit quality

[1] Aobdia (2019) recommends researchers exert caution when using going concern assessments to proxy for audit quality. As DeFond and Zhang (2014) point out there is no consensus on which measures best capture audit quality. Based on the proxies proposed by DeFond and Zhang (2014), our choice of audit quality proxies cover broad variation in underlying audit characteristics. In particular, we cover variation along the dimensions of 1) directness (restatements is a direct measure, accruals quality is an indirect measure), 2) egregiousness (high for restatements, low for accruals quality), and 3) measurement quality (high for restatements, lower for accruals quality).

is positively affected by an industry leader's industry market share dominance over its competitors rather than by industry specialization per se.

Cross-sectional analyses reveal that our inferences hold in: (1) economically significant market segments, (2) audit engagements where the client constitutes less than 10% of the market segment's total fees, and (3) market segments where audit fees paid by clients are less concentrated. Because market power and leadership proxies can be subject to substantial measurement error in smaller market segments or when one client pays disproportionally large audit fees, these additional findings provide some comfort that our results are not driven by measurement error. Alternatively, these findings can be interpreted as suggesting that client bargaining power can mitigate the positive audit quality effects of market share distance.

Our study contributes to the literature on auditor competition in at least three ways. First, prior studies on the effects of competition on audit quality use market concentration measures to capture audit market structure but they do not rely on economic theory to motivate their use of market concentration as a proxy for audit market competition. Interestingly, Boone et al. (2012) note that "…*the effect of auditor concentration on audit quality does not necessarily translate into the effects of competition on audit quality*", and they "…*do not suggest that the high concentration in the audit market is equivalent to low competition*" (p. 1173) . We agree with this point and argue that the audit market can be characterized as a product-differentiated oligopoly and hence potentially superior proxies for auditor competition and market power exist. Second, prior studies use data mainly from before the financial crisis (2000-2009), whereas we study 2009-2017. Third, our results may be useful to regulators because they suggest that auditor market power is not necessarily bad because distant leaders provide higher audit quality. Finally, industry leadership is not a sufficient condition for auditors to offer quality-differentiated audits, suggesting that fierce competition has a negative effect on audit quality.

2. Prior auditing literature, relevant economic theories, and hypothesis development

Auditor market concentration as a proxy for market power

Auditor market concentration is the most common measure of the level of audit market competition in the auditing literature. However, Pearson and Trompeter (1994) suggest that concentration measures may not be appropriate because they do not capture (potential) price competition among market leaders. Consistent with this, Dunn et al. (2011) find that overall market concentration increased following the Big 5 to Big 4 consolidation but market shares became more equal following the consolidation. Dunn et al. (2011) argue that this may explain why evidence of an association between market concentration and competition after the consolidation is inconsistent (Feldman 2006; GAO 2008).

From a theoretical perspective, market concentration is derived as a proxy for competition in Cournot models of competition, where a reduction of the number of suppliers results in lower competition and higher prices. However, these models assume that firms compete on quantity and markets are homogeneous in that prices and products are similar (Cabral 2000). Dedman and Lennox (2009) and Numan and Willekens (2012) argue that there are both theoretical and empirical problems with using supplier concentration to measure competition. For example, a competitive outcome could be obtained with just one or two suppliers in the market because the threat of entry from new rivals can even lead a monopolist to charge a competitive price (Baumol et al. 1982). Empirically, the use of concentration measures assumes that all firms in an industry face the *same* level of competition, which is often not the case.

Nevertheless, recent studies that investigate the relation between audit quality and competition focus on market concentration as a measure of competition. Kallapur et al. (2010), Newton et al. (2013), and Boone et al. (2012) examine the relation between earnings quality and audit market concentration in the US. They measure auditor concentration at the MSA

level, based on prior evidence which shows that audit firms are local (Ferguson et al. 2003; Francis et al. 2005). Kallapur et al. (2010) find a positive association between audit market concentration and accrual quality, whereas Boone et al. (2012) find that higher concentration increases clients' propensity to just beat (rather than just miss) analyst earnings forecasts. Newton et al. (2013) use a conventional concentration measure and find that clients located in MSAs with lower concentration are more likely to restate earnings due to failures in applying GAAP. This leads them to conclude that audit quality is higher when competition is lower.

Francis et al. (2013) conclude that the effect of concentration on audit quality is very difficult to assess, and that theoretical and empirical evidence is mixed. On the one hand, they argue that more competition leads to stronger incentives for high quality audits. On the other hand, they argue that a large Big 4 market share may indicate strong demand for high-quality audits. They find that Big 4 clients in countries with a larger Big 4 market share have higher earnings quality. However, in countries where there is greater market concentration within the Big 4 client group, Big 4 clients have lower earnings quality.

Industry market share distance as a proxy for auditor market power in a spatial competition setting

The audit market is unlikely to be perfectly competitive (Gerakos and Syverson 2015) and can be characterized as a product-differentiated oligopoly (Dekeyser et al. 2019). Spatial competition models are commonly used to describe non-cooperative oligopolies in situations where there is competition through product differentiation (Tirole 1988). The spatial perspective recognizes that suppliers derive *market power* (in part) due to market separation created by space, however defined (i.e., not necessarily only physical distance or industry specialization). This spatial perspective is consistent with analytical auditing studies (Chan 1999; Chan, Ferguson, Simunic, and Stokes 2004). Compared to most of the existing audit

pricing literature, the spatial approach provides a fundamentally different way of conceptualizing the nature of competition in the market for audit services: competition is *imperfect* and local, and audit firms are *strategic* players. Based on spatial theory, Numan and Willekens (2012) predict that two distinct effects of the auditor's location in the audit market affect audit pricing: 1) the auditor's location relative to the client's preferences (e.g., is the auditor specialized in the client's industry?) and 2) the auditor's location relative to the closest competitor (e.g., is the auditor able to differentiate itself from its closest competitor?). By distinguishing between these two location characteristics, Numan and Willekens (2012) distinguish between *quality* and *market power* effects of auditor differentiation on audit pricing.[2] Defining industry specialization as the relevant location choice in the audit market, Numan and Willekens (2012) predict and find that the audit fee charged by the auditor not only increases in industry specialization (i.e., the alignment between the auditor's specialization choice and the client's preferences), but also increases in the industry market share distance between the incumbent audit office and its closest competitor (i.e., the auditor's location relative to the closest competitor). Their findings suggest that auditor market share distance has a positive effect on audit fees above and beyond industry specialization premiums. In this study, we assess industry market share distance as a second measure of auditor market power and study its effect on audit quality. Industry market share distance captures how much market power the incumbent auditor has compared to its closest competitor, whereas market concentration measures capture the average degree of market power in a market segment.

To our knowledge no prior study tests for an association between market share distance and audit quality. It is unclear a priori how an auditor's market share distance over its close competitors would relate to audit quality. In spatial competition models, the greatest pressure

[2] Numan and Willekens (2012) make a distinction between two sources of market power and hence price premiums that originate from industry specialization: 1) alignment with client preferences (which is an indication of ex ante auditor quality through superior industry knowledge) and 2) industry market share distance from the closest competitor (which is an indication of *imperfect* price competition).

on pricing derives from the competitor who is the closest (most similar) supplier (Hotelling 1929; Chan et al. 2004). When competitors are close (similar) in terms of specialization levels (so when market share distance is low), it is likely that the client is unwilling to pay a premium for industry specialization because the competitor delivers a similar quality level. This decrease in the fee premium may result in a decrease in audit effort and audit quality. In contrast, the closer two audit competitors are in terms of industry specialization, the higher the client's willingness to switch between these audit suppliers due to reduced switching costs (Hotelling 1929). This may increase the incumbent auditor's incentives to distinguish itself on other factors, which may result in higher-quality audits. This latter reasoning is consistent with arguments put forward by the GAO in its 2008 report, which recognizes that: "*...competition in an oligopoly can also be intense and result in a market with competitive prices, innovation and high-quality products*".

Hypothesis about the relation between auditor market power and audit quality

Based on prior empirical evidence and theoretical arguments in the above paragraphs, we present the following null hypothesis:

Ceteris paribus, there is no association between audit quality and the incumbent auditor's market power in a market segment.

3. Research design

Relevant market segments

Consistent with prior literature, we define audit markets using 2-digit SIC code industries at the (local) audit office level (Francis et al. 2005). Prior research finds that audit firms tend to differentiate their audit services along industries so we expect the audit market to be segmented according to the client's industry (Craswell et al. 1995; Francis et al. 2005). We further assume that competition between audit offices takes place at the city level, so we use

local audit offices based on U.S. MSAs as our unit of analysis. This assumption is consistent with Dedman and Lennox (2009), which suggests that firms perceive their markets to be smaller than SIC industries because geographical location also impacts competition. In addition, the local office choice is consistent with theory in Hotelling (1929) because working from the client's MSA implicitly assumes that audit firms geographically locate around clients. Findings in Numan and Willekens (2012) support this argument because the relation between audit fees and spatial competition (i.e., the incumbent auditor's market share distance from the closest competitor) is at the MSA level and not at the national level.

Auditor market power variables: Market concentration and industry market share distance

We define two alternative and competing measures of auditor market power. Following prior audit research, we use a traditional supplier concentration measure, namely the Herfindahl index (*Herfindex*) (e.g. Pearson and Trompeter 1994; Willekens and Achmadi 2003; Bandyopadhya and Kao 2004; Feldman 2006). The Herfindahl index is a measure of average market power in the market segment and implicitly assumes the same level of market power for all suppliers within a market segment.

Our second and competing measure of market power captures the incumbent auditor's market share distance (Numan and Willekens 2012). Auditor market share distance (*Distance_competitor*) is the incumbent auditor's market share distance from its closest competitor (Numan and Willekens 2012; Bills and Stephens 2015), measured as the absolute difference between the incumbent audit office's market share in the client's industry and the market share of the competitor that is closest (in terms of market share) to that of the incumbent auditor. This measure captures how much the closest competitor differs from the incumbent auditor in terms of industry market share and captures an auditor's individual market power. We expect *Distance* to better reflect an audit firm's individual market power, and to better

capture auditor market power as compared to *Herfindex*. *Distance* and *Herfindex* are by construction positively correlated because audit firms that succeed in gaining substantial market share will have a large distance to their closest competitor, which subsequently results in high market segment concentration.

Industry leadership: a crucial control variable for industry expertise in tests of auditor market power

Given the role of industry specialization as a differentiation strategy for audit firms to maintain a competitive advantage, industry expertise of the incumbent auditor is a crucial control variable (Craswell et al. 1995; Francis et al. 2005; Numan and Willekens 2012).[3] In the auditing literature, industry expertise is often measured in terms of the audit firm's industry market share within a particular industry. The underlying assumption is that the audit firm with the largest market share has developed the largest knowledge base within a particular industry. Hence, we include *Leader_office* measured as an indicator variable equal to 1 if incumbent audit office i is the market leader (i.e., has the highest market share) in the audit market, and 0 otherwise.[4,5]

Leadership Distance

Numan and Willekens (2012) find that the industry market share distance to the closest competitor positively affects audit fees only for market segment leaders, suggesting that a

[3] Industry specialization is often measured using market share based measures of industry specialization. These measures pick up "how well an audit firm has *differentiated itself from its competitors in terms of market share within a particular industry*" (Neal and Riley, 2004, p. 170), and thus, by construction, capture an auditor's location *relative to its competitors* (i.e. capture a construct that overlaps with 'industry market share distance').

[4] We base our measure on market share computed as the percentage of total audit fees in a 2-digit SIC code industry per MSA in year t

[5] Note that Reichelt and Wang (2010) examine whether audit quality is higher for industry leaders at national and city-office levels, and report a positive association between industry leadership and audit quality. However, they do not control for the incumbent auditor's market share distance from its closest competitors in the market. They base their measure of industry expertise on previous industry specialization literature using market share based measures of expertise and in which no distinction is made between the level of industry expertise and industry market share distance. Therefore, they are not able to distinguish whether industry experts (leaders) indeed deliver higher audit quality or whether a leader's market share dominance affects this relationship. In this paper we make this distinction explicitly and motivate this distinction based on economic theory.

differentiation strategy is only effective for industry leaders. We therefore create two distinct measures of *Distance. Distance if leader=0* is equal to the distance to the closest competitor (*Distance*) for auditors that are not market leaders, and zero otherwise. *Distance if leader=1* equals the distance to the closest competitor (*Distance*) for auditors that are market leaders, and zero otherwise.[6]

Audit Quality proxies

There is no consensus on which measures of audit quality are best and little guidance on how to evaluate these measures exists. Based on the framework proposed in DeFond and Zhang (2014), we use two different output based proxies: restatements and discretionary accruals.

Restatement analysis

We estimate the following model:

$$Restatement = \alpha_0 + \alpha_1 Herfindex + \alpha_2 Distance\_Competitor + \alpha_3 Leader\_office + \alpha_4 Leader\_national + \alpha_5 Size + \alpha_6 Relimp\_client + \alpha_7 Leverage + \alpha_8 Roa + \alpha_9 Sales\ growth + \alpha_{10} Loss + \alpha_{11} Litigation + \alpha_{12} Merger + \alpha_{13} Ln\_tenure + \alpha_{11} Raise + \alpha_{12} Switch + \alpha_{13} Big4 + Industry\ and\ year\ fixed\ effects + \varepsilon \quad (1)$$

where *Restatement* is an indicator variable equal to one if the company restates its current year financial statements, and zero otherwise.[7] Because it takes some time for a misstatement to be detected and disclosed, our sample ends in 2015. Consistent with Dao et al. (2012), we focus on misstatements that are likely to be intentional, defined as those that have a positive effect on the financial statements. The explanatory variables consist of our two market power proxies,

[6] *Herfindex*, *Distance_competitor* and *Leader_office* are calculated using all observations for which audit fee and location data are available in the Compustat Industrial Annual file and in Audit Analytics.
[7] Note that much of the recent literature refers to this variable as Misstatement, see o.a., Bills et al. (2016); Cassell et al. (2018) and Cassell et al. (2020).

Herfindex and *Distance_competitor,* and our industry specialization proxy, *Leader_office,* together with control variables. Because *Herfindex* is highly correlated with *Distance_competitor,* we estimate these models including and excluding *Herfindex*.

Leader_national and the set of control variables are based on prior literature (Romanus et al. 2008; Chin and Chi 2009; Dao et al. 2012; Cohen et al. 2014). We include *Size* because larger clients tend to make more misstatements. Other control variables are included because clients that are more likely to engage in earnings management are also more likely to misstate (Richardson et al. 2002; Callen et al. 2006; Romanus et al. 2008). Thus, we include leverage (*Leverage*), profitability (*ROA, Loss*), and industry litigiousness (*Litigation*). Because misstatement firms attract more external capital than non-misstatement firms, we also control for the amount of financing raised (*Raise*). Other factors that influence misstatements are growth in sales (*Sales growth*) and merger or acquisition activity (*Merger*). We also control for the relative importance of the client within the market segment (*Relimp_client*), and for audit(or) characteristics expected to influence the likelihood of a misstatement: audit firm size (*Big4*), the length of the auditor-client relationship (*Ln_tenure*), and auditor switching (*Switch*). Finally we include industry and year fixed effects. All variables are defined in Table 1.

Earnings quality analysis

Our second measure of audit quality follows Reichelt and Wang (2010) and is a measure of earnings quality. Here, we estimate performance-adjusted abnormal accrual using the cross-sectional Jones (1991) model. In the first step, we estimate the following model for each of the two-digit SIC code industry groups each year: [8]

$$\mathrm{TA}_{\mathrm{it}} = \beta_0 (1/A_{it-1}) + \beta_1 \Delta REV_{it} + \beta_2 PPE_{it} + \beta_3 ROA_{it-1} + \varepsilon_{it}. \quad (2)^{9}$$

[8] We require at least 20 firms in each industry group in each year.

[9] where:
$\mathrm{TA}_{\mathrm{it}}$ = Total accruals (net income from continuing operations minus operating cash flow) for firm i in year t divided by total assets at the end of year t-1,

In the second step, we calculate expected total accruals by using the estimated coefficients from equation (2) and making an adjustment for the change in accounts receivable following Dechow et al. (1995) and Reichelt and Wang (2010). Therefore, we use the following formula to calculate expected accruals :

$$ETA_{it} = \hat{\beta}_0 \left(\frac{1}{A_{it-1}}\right) + \hat{\beta}_1 (\Delta REV_{it} - \Delta REC_{it}) + \hat{\beta}_2 PPE_{it} + \hat{\beta}_3 ROA_{it-1} \quad (3)$$

Abnormal accruals are calculated as the difference between total accruals (TA_{it}) and expected accruals (ETA_{it}).[10,11]

To test the effect of industry specialist competitive pressure on earnings quality, we estimate the following regression: [12]

$$\begin{aligned} Abs\_abn\_accruals = {} & \alpha_0 + \alpha_1 Herfindex + \alpha_2 Distance\_competitor + \alpha_3 Leader\_office + \\ & \alpha_4 Leader\_national + \alpha_5 Size + \alpha_6 Relimp\_client + \alpha_8 Cfo + \alpha_9 Leverage + \\ & \alpha_{10} Loss + \alpha_{11} MTB + \alpha_{12} Litigation + \alpha_{13} Current\ ratio + \alpha_{14} Roa + \\ & \alpha_{15} Sales\_turn + \alpha_{16} Total\_accruals\_lag + \alpha_{17} Ln\_tenure + \alpha_{18} Big4 + \\ & Industry\ and\ year\ fixed\ effects + \varepsilon \end{aligned} \quad (4)$$

where *Abs_abn_accruals* is the absolute value of abnormal accruals. Control variables are based on prior abnormal accruals literature (Dechow and Dichev 2002) and are generally in line with the restatement analyses.[13] We also include operating cash flows (*Cfo*), a firm's growth

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A_{it-1} =Total assets for company i at the end of year t-1,
ΔREV_{it} = Change in revenue from prior year for firm i and the end of year t divided by total assets at the end of year t-1,
PPE_{it} = gross property, plant and equipment for firm i at the end of year t divided by total assets and the end of year t-1,
ROA_{it-1} = Return on assets, measured by net income for firm i fot year t-1 divided by average total assets for year t-1, and

[10] ΔREC_{it}, which represents the change in accounts receivable scaled by total assets from prior year, is included to control for earnings management taking place through management in revenues.

[11] We also test our model by specifying abnormal accruals as the residual term ε_{it} in equation (2) and by specifying abnormal accruals as the residual term ε_{it} in the following equation $TA_{it} = \beta_0(1/A_{it-1}) + \beta_1(\Delta REV_{it} - \Delta REC_{it}) + \beta_2 PPE_{it} + \beta_3 ROA_{it-1} + \varepsilon_{it}$. Results are consistent.

[12] Firms and year subscripts are omitted for brevity. Industry indicator variables and year indicator variables are not added to equation (2) because abnormal accruals are estimated by two-digit SIC code and year.

[13] While there are some slight differences in control variables between both models, the results are not sensitive to the exclusion or inclusion of these different control variables.

opportunities (*MTB*), prior year accruals (*Total_accruals_lag*), the current ratio (*Current*) and the ratio of sales to total assets (*Sales_turn*). We also include Industry and Year fixed effects. A definition of all variables is provided in Table 1.

[Insert Table 1 here]

4. Sample selection

The sample selection procedure is summarized in Table 2. For our restatement test, we end our sample period in 2015 because misstatements take time to be detected. We require a minimum of five clients per 2-digit SIC code industry per MSA, to ensure that the audit offices are able to compete for clients and that our market-level variables are not noisy. We also exclude observations in city markets where there is only one audit supplier who is de facto a monopolist. After removing observations where industry fixed effects perfectly predict the outcome variable, the final sample consists of 11,211 observations.

For our earnings quality test, we include data to 2017 but require a minimum of five clients per 2-digit SIC code industry per MSA. The final sample consists of 13,819 observations.

[Insert Table 2 here]

5. Results

Descriptive statistics

Table 3, Panel A presents descriptive statistics for the restatement sample. About 14,5 percent of the observations experience a restatement. The average (median) industry market share distance between an audit firm and its closest competitor (*Distance_competitor*) is 13.6% (5.1%). Industry leaders at the office level (*Leader_office*) audit on average 30% of the clients in our sample, compared to 20% at the national level (*Leader_national*). The average *Herfindex* is 0.399 and there is substantial variation in this index between market segments. The median

(mean) *Relimp_client* is about 0.035 (0.095) with the maximum indicating that the largest client accounts for 99.1% of the market segment's total audit fees.

Panel B presents descriptive statistics for the abnormal accruals sample. The mean (median) absolute abnormal accruals *(abs_abn_accruals)* is 0.23 (0.09). The mean (median) distance between an audit firm and its closest competitor in terms of industry market share (*Distance_competitor*) is 12.8% (4.4%). The average *Herfindex* is 0.398. At the office level, 32% of the clients are audited by a *Leader_office* whereas at national level, 18.6% are audited by a *Leader_national*. Overall, these descriptive statistics are similar for the restatement sample. The correlation between *Herfindex* and *Distance_competitor* is approximately 0.5 (untabulated) which is not surprising because more differentiation leads to higher market segment concentration. The average *Distance_competitor* for industry leaders is 33%, but only 5% for non-industry leaders.

[Insert Table 3 here]

Restatement analysis

Table 4 presents results from estimating equation (1). We report the results from five regressions: 1) including only *Herfindex,* following prior studies, 2) including only *Distance_competitor*, 3) splitting *Distance_competitor* into *Distance if leader=0* and *Distance if leader=1,* 4) adding *Herfindex to* regression 1, and 5) adding *Herfindex* to regression 2.[14] Because *Herfindex* calculates the average market power at the market segment level, we do not split this variable based on whether or not the audit firm is the industry leader. In all models, we include the industry specialization variables *Leader_office* and *Leader_national*. All regression models are significant (p-value<0.01), with Pseudo R^2s of approximately 0.03%.

[14] Numan and Willekens (2012) also add both the distance and the Herfindahl index to their regression models.

We find that *Herfindex* is not associated with the likelihood of a misstatement, but *Distance_competitor* is negatively associated with the likelihood of a misstatement (p-value < 0.05). This suggests that an auditor's market power is better captured by *Distance_competitor* than by *Herfindex*. Furthermore, audit firms which successfully differentiate from competitors supply higher audit quality, ceteris paribus. This contradicts fears that the absence of strong competitive pressure from rivals reduces incentives to maintain high quality auditing standards. This result also suggests that the audit fee premium for competitive distance in Numan and Willekens (2012) at least partially reflects higher audit quality. Alternatively, audit firms may use the fee premium to invest in the engagement resulting in higher audit quality.

Interestingly, the main effect of industry specialization is not significant. However, when including *Distance if leader=1* and *Distance if leader=0*, the negative association between distance and misstatements is attributable to the leader audit firms (*Distance if leader=1*, $p<0.05$; *Distance if leader*=0, $p>0.10$). This indicates that industry specialization and audit firm market power are *jointly* important drivers of audit quality. This result is consistent with the Numan and Willekens (2012) finding that the fee premium associated with competitive distance is driven by industry leaders. The Herfindahl index is not significant in any model. Thus, the individual position of each auditor relative to its competitors plays a greater role in explaining audit quality compared than does the overall level of concentration in the audit market.

Results on control variables are mainly consistent with expectations. Interestingly, clients with fees that constitute a large portion of the total market segment fees (*Relimp_client*) have a higher likelihood of misstatements. This is consistent with client bargaining power affecting audit fees or audit quality (Casterella et al., 2004).

The descriptive statistics showed that some clients account for a very large portion of the market segment's total fees (up to 99%). Audit firms that audit these highly important client

are consequently considered industry leaders and will have a substantial distance to the closest competitor. As a result, these firms are subject to two competing forces. On the one hand, because they are industry leaders, they provide higher audit quality. On the other hand, our results predict a higher likelihood of misstatement for highly important clients. Therefore, in an additional cross-sectional test, we separate important from less important clients.

[Insert Table 4 here]

Abnormal accruals analysis

Table 5 present the results from estimating equation (4). Overall, results are similar to those from the misstatement analysis. *Herfindex* is not associated with abnormal accruals, but *Distance_competitor* is negatively associated with abnormal accruals ($p<0.01$) suggesting that audit firms which successfully differentiat themselves supply, on average, higher audit quality. Further analysis reveals that this effect is attributable to differentiation from industry leaders, rather than non-industry leaders. The main effect of industry leadership (*Leader_office*) is not statistically significant, indicating that industry leadership and audit firm market power are jointly important determinants of audit quality. These inferences hold when including *Herfindex* in the model. Moreover, market concentration is not associated with abnormal accruals, suggesting that the audit firm's position relative to it's rivals is more important in influencing audit quality than is market concentration.

The signs of the control variables are consistent with prior research (Lim and Tan 2008; Reichelt and Wang 2010) or are insignificant. Finally, clients paying fees that constitute a large proportion of the market segment's total fees (*Relimp_client*) are associated with higher abnormal accruals ($p<0.01$).

[Insert Table 5 here]

Cross-sectional analyses

In this section, we perform untabulated cross-sectional tests to examine which factors contribute to or weaken the effects described previously. We first split the data analysis based on the relative size of the market segment to the total U.S. market. The measurement error of the market power and industry specialization proxies is likely to be larger in smaller market segments so this test allows us to rule out the possibility that our results are an artefact of measurement error in smaller industries. We find that the *Distance if leader=1* is only negatively associated with misstatements in the subsample of economically significant industries and not in the non-economically significant industries. We do not find an effect of *Distance* in the economical significant market segments, but this may be attributable to the low statistical power of restatement models (Defond and Zhang 2004). In the abnormal accruals sample, the results are similar to the main results in both economical significant and not-economically significant markets. In balance, these results provide comfort that our main results are not driven by smaller and less important market segments.

Because some client's audit fees constitute a large portion of the market segment's total audit fees and their auditors will, by construction, be considered industry leaders with a high market share distance, *Distance_competitor* and *Leader_office* may be subject to considerable measurement error. In order to test this assertion, we perform two different cross-sectional analyses. First, we split the sample based on whether the client constitutes more than 10% of the total market segment's audit fees. We find that *Distance_competitor* and *Distance if leader=1* are significant for less important clients but not for important clients in both the restatement and abnormal accrual regressions. This may reflect stronger bargaining power by the larger clients' management over disputed accounting choices (Asthana and Boone, 2012). Alternatively, these results could reflect larger measurement error in the market power and industry specialization proxies for larger clients.

Second, we split the sample based on the concentration of *the demand side* of the market segment. Here, we calculate a client concentration ratio (i.e., a Herfindahl index of the demand-side of the audit market (*Herfindex client*)) by first dividing the client's audit fee by the market segment's total audit fee in a given year. We then square this percentage and sum it across all clients in that market segment. We split the sample based on the median *Herfindex client*. The results show that *Distance_competitor* and *Distance if leader=1* are only significant in the sample with low *Herfindex client*. This may either reflect higher client bargaining power or more measurement error in the high *Herfindex client* sample. Interestingly, we find a higher likelihood of misstatement for *Leader_office* in the small *Herfindex client* sample. This suggests that industry leaders with a small distance to the closest competitor may be in intense competition for the leadership position, which could increase the willingness of the leading audit firm to succumb to client pressure.

Untabulated robustness checks and additional analyses

Because the concentration, competition, and leadership variables also impact audit fees (Numan and Willekens 2012), we add audit fees paid by the client as an additional control variable. Overall, the inferences remain unchanged. Next, we follow Reichelt and Wang (2010) and form *Industry specialist* as an indicator variable equal to 1 if the incumbent audit office has a market share larger than 50%, and 0 otherwise at office level, and a market share larger than 30%, and 0 otherwise at national level.[15] Consistent with the main results, we find a negative effect of *Industry specialist* when not including market share distance, but this effect disappears when including *Distance* in the model. This suggests that the revised proxy for industry specialization may capture market share distance rather than specialization.

[15] Untabulated analysis reveals that using this measure, all industry specialists are industry leaders and that the average market share distance of the industry specialist is statistically higher than the market share distance of leaders which are not industry specialists (0.46 versus 0.11 in the restatement sample). It is therefore not surprising to note that the correlation between Distance and Industry specialist (0.81) is higher than between Distance and Leader_office (0.66).

6. Conclusions and limitations

In this study, we reexamine the relation between auditor market power and audit quality. Despite repeated concerns by regulators around the world, whether and how auditor market power affects audit quality remains an unresolved question. We reexamine the issue of imperfect competition in the audit market and study its effects on audit quality. Relying on economic theory, we define and test two competing measures of auditor market power: (1) a 'traditional' market concentration measure (Herfindhal index) and (2) a competing measure derived from spatial competition theory (i.e., market share distance from closest competitor).

In our empirical tests, we do not find an effect of market concentration on audit quality, but the likelihood of a restatement and the abnormal accruals are lower when the distance to the closest competitor increases. Subsequent analysis reveals that this finding is driven by market share distance of industry leaders. Interestingly, we do not find an audit quality effect of industry leadership itself. Overall, our results suggest that audit quality is positively affected by an industry leader's market share distance to its closest competitor rather than by industry specialization per se. Additional cross-sectional analyses reveal that our results are strongest (1) in economically significant market segments, (2) for engagements where audit fees paid by the client constitute less than 10% of the total market segment audit fees, and (3) in market segments where the fees paid by clients are less concentrated. These additional results provide confidence that our findings are not driven by measurement error.

Regulators around the world have repeatedly expressed concerns about the potential adverse consequences of auditor market power. We find that audit quality increases with market share distance and hence market power of the industry leaders. Audit regulations aiming to decrease auditor market power by reducing the market shares of audit market leaders (using methods such as mandatory firm rotation) should be carefully evaluated with care because they could have a negative impact on audit quality.

Our study is subject to several limitations. First, we proxy for audit quality and look how variation in these proxies can be explained, but cannot make assessments about the general level of audit quality in the market for audit services. Furthermore, we do not include perception-based measures of audit quality. Second, we do not directly control for demand-side factors that affect audit quality such as characteristics and incentives of managers and internal or external monitors. Third, we study only publicly listed firms so the exclusion of audited private firms could lead to measurement error in our auditor market power proxies, as is the case in most prior research.

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TABLE 1. Variable definitions

Dependent variables	
Restatement	Indicator variable equal to 1 if firm restated its financial statements of the fiscal year, 0 otherwise
Abs_abn_accruals	The absolute value of performance-adjusted abnormal accruals as in Dechow et al. (1995) and explained in more detail in the research design section of the paper.
Independent variables	
Distance_competitor	Smallest absolute market share difference between the incumbent auditor and its closest competitor. An audit market is defined as a two-digit SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition).
Herfindex	Herfindahl concentration index per 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).
Leader_office	Indicator variable equal to 1 when an audit firm has the largest fee market share in an audit market, 0 otherwise. An audit market is defined as a two-digit SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition).
Leader_national	Indicator variable equal to 1 when an audit firm has the largest fee market share in an audit market, 0 otherwise. An audit market is defined as a two-digit SIC industry.
Big4	Indicator variable equal to one if incumbent auditor is a big 4 audit firm, 0 otherwise
Cfo	Operating cash flow scaled by total assets
Current ratio	Ratio of current assets to current liabilities
Leverage	Ratio of long-term debt to total assets
Litigation	Indicator variable equal to 1 if the company operates in a high litigation industry (SIC codes of 2833-2836, 3570-3577, 3600-3674, 5200-5961 and 7370-7370), and 0 otherwise
Relimp_client	The ratio of the audit fees that the client pays the audit firm divided by the total audit fees in an audit market.
Ln_tenure	The natural logarithm of the number of years that the auditor has audited the firm's financial statements
Loss	Indicator variable equal to 1 if loss, 0 otherwise
Merger	Indicator variable equal to 1 if the firm incurred merger and acquisition expenses, 0 otherwise
MTB	Ratio of market value of the firm to total assets
Raise	Ratio of net financing cash flow to total assets
Roa	Ratio of earnings before interest and tax to total assets
Sales growth	Percentage change in sales compared to previous fiscal year
Sales_turn	Ratio of sales to total assets
Size	Natural log of total assets
Switch	Indicator variable equal to 1 if the client changed its auditor in the year, 0 otherwise.
Total_accruals_lag	Total accruals scaled by total assets in previous year

TABLE 2. Sample selection

Panel A Sample for restatement analysis		
Total observations with all variables available in Compustat and Audit Analytics for the years 2009-2015	21,780	
Less than five observations per audit market	(10,444)	
Markets with only one audit firm active (monopolies)	(84)	
Total Sample		11,252
Less outcomes perfectly predicted by industry fixed effects	(41)	
Final sample		**11,211**
Panel B Sample for abnormal accrual analysis		
Total observations with all variables available in Compustat and Audit Analytics for the years 2009-2017	25,254	
Less than five observations per audit market	(11,381)	
Markets with only one audit firm active (monopolies)	(54)	
Total Sample		13,819

TABLE 3. Descriptive statistics

Panel A Descriptive statistics restatement sample	**N**	**Mean**	**StdDev**	**Min**	**P25**	**Median**	**P75**	**Max**
Dependent variable								
Restatement	11,211	0.145	0.352	0.000	0.000	0.000	0.000	1.000
Independent variables								
Herfindex	11,211	0.399	0.150	0.144	0.291	0.366	0.466	0.999
Distance_competitor	11,211	0.136	0.197	0.000	0.010	0.051	0.162	0.999
Leader_office	11,211	0.298	0.457	0.000	0.000	0.000	1.000	1.000
Leader_national	11,211	0.199	0.399	0.000	0.000	0.000	0.000	1.000
Size	11,211	5.655	2.482	0.176	3.925	5.723	7.458	11.172
Relimp_client	11,211	0.095	0.145	0.000	0.012	0.035	0.110	0.991
Leverage	11,211	0.201	0.297	0.000	0.000	0.090	0.302	1.871
Roa	11,211	-0.252	1.118	-8.540	-0.138	0.037	0.093	0.341
Sales growth	11,211	0.293	1.359	-1.000	-0.073	0.061	0.236	10.754
Loss	11,211	0.473	0.499	0.000	0.000	0.000	1.000	1.000
Litigation	11,211	0.388	0.487	0.000	0.000	0.000	1.000	1.000
Merger	11,211	0.276	0.447	0.000	0.000	0.000	1.000	1.000
Ln_tenure	11,211	1.918	0.880	0.000	1.386	2.079	2.565	3.664
Raise	11,211	0.198	0.522	0.000	0.000	0.003	0.131	3.803
Switch	11,211	0.058	0.235	0.000	0.000	0.000	0.000	1.000
Big4	11,211	0.642	0.479	0.000	0.000	1.000	1.000	1.000

This table presents descriptive statistics for the restatement sample. Variables are defined as in Table 1.

Panel B Descriptive statistics abnormal accruals sample

	N	Mean	StdDev	Min	P25	Median	P75	Max
Dependent variable								
Abs_abn_accruals	13,819	0.233	0.370	0.000	0.043	0.099	0.231	1.905
Independent variables								
Herfindex	13,819	0.398	0.146	0.144	0.296	0.366	0.465	0.999
Distance_competitor	13,819	0.128	0.189	0.000	0.007	0.044	0.153	0.999
Leader_office	13,819	0.283	0.450	0.000	0.000	0.000	1.000	1.000
Leader_national	13,819	0.186	0.389	0.000	0.000	0.000	0.000	1.000
Size	13,819	5.467	2.573	0.082	3.654	5.569	7.325	11.206
Relimp_client	13,819	0.090	0.142	0.000	0.010	0.031	0.103	0.994
Cfo	13,819	-0.225	1.018	-7.718	-0.136	0.055	0.115	0.338
Leverage	13,819	0.192	0.302	0.000	0.000	0.076	0.289	2.010
Loss	13,819	0.518	0.500	0.000	0.000	1.000	1.000	1.000
MTB	13,819	4.366	14.650	0.080	0.737	1.369	2.805	127.329
Litigation	13,819	0.413	0.492	0.000	0.000	0.000	1.000	1.000
Current ratio	13,819	3.284	3.755	0.011	1.214	2.106	3.859	23.367
Roa	13,819	-0.792	3.593	-29.579	-0.305	-0.008	0.064	0.509
Sales_turn	13,819	0.823	0.783	0.000	0.300	0.648	1.079	4.375
Total_accruals_lag	13,819	-0.375	1.482	-11.861	-0.159	-0.072	-0.027	0.418
Ln_tenure	13,819	1.924	0.874	0.000	1.386	1.946	2.565	3.664
Big4	13,819	0.607	0.488	0.000	0.000	1.000	1.000	1.000

This table presents descriptive statistics for the abnormal accruals sample. Variables are as defined in Table 1

TABLE 4. Logistic regressions restatement sample (N =11,211)

Parameter	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Intercept	-1.741	-2.69***	-1.874	-2.98***	-1.900	-3.02***	-1.886	-2.91***	-1.916	-2.95***
Herfindex	-0.371	-1.14					0.026	0.07	0.033	0.09
Distance_competitor			-0.591	-2.01**			-0.605	-1.72*		
Distance if Leader=0					-0.227	-0.36			-0.243	-0.37
Distance if Leader=1					-0.667	-2.09**			-0.685	-1.83*
Leader_office	-0.022	-0.20	0.086	0.69	0.138	0.96	0.088	0.70	0.141	0.97
Leader_national	0.051	0.46	0.048	0.44	0.046	0.42	0.048	0.44	0.046	0.42
Size	0.987	2.81***	0.022	0.74	0.022	0.72	0.023	0.74	0.022	0.72
Relimp_client	0.021	0.71	1.107	3.11***	1.122	3.13***	1.105	3.10***	1.120	3.12***
Leverage	0.243	1.96**	0.232	1.86*	0.229	1.84*	0.231	1.86*	0.229	1.84*
Roa	-0.075	-1.60	-0.074	-1.59	-0.075	-1.60	-0.074	-1.59	-0.075	-1.60
Sales growth	0.025	1.16	0.024	1.15	0.025	1.15	0.024	1.15	0.025	1.15
Loss	0.180	2.03**	0.184	2.08**	0.185	2.09**	0.184	2.08**	0.185	2.09**
Litigation	-0.091	-0.68	-0.086	-0.64	-0.085	-0.63	-0.086	-0.64	-0.084	-0.63
Merger	0.246	2.83***	0.247	2.84***	0.246	2.83***	0.247	2.85***	0.246	2.84***
Ln_tenure	-0.101	-1.63	-0.100	-1.62	-0.100	-1.62	-0.101	-1.63	-0.100	-1.62
Raise	-0.025	-0.25	-0.025	-0.25	-0.024	-0.24	-0.025	-0.25	-0.024	-0.24
Switch	0.219	1.42	0.218	1.42	0.222	1.44	0.218	1.41	0.222	1.44
Big4	0.337	2.55**	0.371	2.77***	0.357	2.67***	0.372	2.78***	0.358	2.67***
Year and Industry fixed effects	Yes		Yes		Yes		Yes		Yes	
n		11,211		11,211		11,211		11,211		11,211
P-value model		0.000		0.000		0.000		0.000		0.000
Pseudo R2		0.03		0.03		0.03		0.03		0.03

This table presents the results of a logistic regression with *Restatement* as dependent variable (N=11,211). All continuous variables are winsorized at the 1% level. Standard errors are adjusted for heteroscedasticity and clustered by client. Year and industry fixed effects are included. Significance (based on two-tailed tests) is indicated as follows: p<0.10 (*), p<0.05 (**), p<0.01 (***). Variables are defined as in Table 1.

TABLE 5. OLS regressions abnormal accruals sample (N=13,819)

Parameter	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Intercept	0.515	13.59***	0.510	13.94***	0.511	13.95***	0.506	13.16***	0.507	13.15***
Herfindex	-0.015	-0.64					0.009	0.32	0.009	0.30
Distance_competitor			-0.043	-2.79***			-0.048	-2.31**		
Distance if Leader=0					-0.069	-1.29			-0.073	-1.37
Distance if Leader=1					-0.038	-2.74***			-0.043	-2.04**
Leader_office	-0.000	-0.05	0.009	1.54	0.005	0.67	0.009	1.59	0.006	0.72
Leader_national	0.006	1.43	0.006	1.31	0.006	1.36	0.006	1.31	0.006	1.36
Size	-0.043	-16.23***	-0.043	-16.06***	-0.043	-15.97***	-0.043	-16.25***	-0.043	-16.16***
Relimp_client	0.120	5.98***	0.131	6.53***	0.130	6.54***	0.131	6.46***	0.130	6.48***
Cfo	-0.025	-2.70***	-0.025	-2.69***	-0.025	-2.69***	-0.025	-2.71***	-0.025	-2.71***
Leverage	0.043	2.71***	0.043	2.68***	0.043	2.69***	0.042	2.67***	0.043	2.68***
Loss	0.001	0.22	0.001	0.25	0.001	0.24	0.001	0.26	0.001	0.25
MTB	0.001	1.53	0.001	1.53	0.001	1.53	0.001	1.53	0.001	1.53
Litigation	0.017	1.91*	0.018	1.94*	0.018	1.93*	0.018	1.96*	0.018	1.94*
Current ratio	-0.005	-5.52***	-0.005	-5.51***	-0.005	-5.51***	-0.005	-5.51***	-0.005	-5.51***
Roa	-0.037	-16.99***	-0.037	-16.98***	-0.037	-16.98***	-0.037	-16.98***	-0.037	-16.98***
Sales_turn	-0.005	-0.74	-0.005	-0.75	-0.005	-0.76	-0.005	-0.76	-0.005	-0.76
Total_accruals_lag	-0.032	-6.00***	-0.032	-5.99***	-0.032	-5.99***	-0.032	-5.99***	-0.032	-5.99***
Ln_tenure	-0.003	-0.82	-0.003	-0.81	-0.003	-0.81	-0.003	-0.82	-0.003	-0.82
Big4	-0.012	-1.63	-0.009	-1.26	-0.008	-1.10	-0.009	-1.19	-0.008	-1.05
Year and Industry fixed effects	Yes		Yes		Yes		Yes		Yes	
n		13,819		13,819		13,819		13,819		13,819
P-value model		0.000		0.000		0.000		0.000		0.000
Adj. R2		0.52		0.52		0.52		0.52		0.52

This table presents the results of an OLS regression with *Abs_abn_accruals* as dependent variable (N=13,819). All continuous variables are winsorized at the 1% level, abnormal accruals are winsorized at the 2% level. Standard errors are adjusted for heteroscedasticity and clustered by client. Year and industry fixed effects are included. Significance (based on two-tailed tests) is indicated as follows: p<0.10 (*), p<0.05 (**), p<0.01 (***). Variables are defined as in Table 1.