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Audit Market Concentration, Audit Fees, and Audit Quality: Evidence from China

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SUMMARY: We investigate the effects of audit market concentration on audit fees and audit quality in China, where competition is intense and the legal environment is relatively weak compared with developed countries. Analyzing 12,334 firm-year observations for the period 2001 to 2011, we find a significant positive relation between concentration and audit fees. Path analysis shows that concentration improves client earnings quality and reduces the need for auditors to issue modified audit opinions through increased audit fees. Additional analysis indicates that the increased audit fees and client earnings quality resulting from increased concentration are associated with a lower likelihood of executives and auditors being sanctioned by regulators for audit failures. Together, our results suggest that concentration improves audit quality indirectly through increased audit fees and this positive indirect effect offsets the negative direct effect of concentration on audit quality. By separating the direct and the indirect effect of concentration on audit quality, our study would explain why previous studies that do not have a separation document mixed evidence. Our findings inform regulators that actions taken to eliminate the indirect effect of concentration, for example restricting the upper bound of audit fees, could produce unintended outcomes such as decreased audit quality.

Keywords: audit market concentration; audit fees; audit quality; China.

JEL Classifications: M41, M42.

INTRODUCTION

Policy makers in a number of developed countries have expressed concerns about the potential effects of audit market concentration on audit fees and audit quality over the last decade (Government Accountability Office [GAO] 2003, 2008; The American Assembly 2005; Oxera 2006, 2007; U.S. Treasury 2006, 2008). Essentially, the concern is that concentration reduces clients' choice of audit service suppliers, strengthens auditors' market power, and encourages complacency among auditors, resulting in higher audit fees but lower audit quality. However, the extant literature provides mixed evidence on the consequences of audit market concentration (Pearson and Trompeter 1994; Willekens and Achmadi 2003; Bandyopadhyay and Kao 2004; Feldman 2006; Kallapur, Sankaraguruswamy, and Zang 2010; Boone, Khurana, and Raman 2012; Carson, Simnett, Soo, and Wright 2012; Numan and Willekens 2012; Francis, Michas, and Seavey 2013; Newton, Wang, and Wilkins 2013).

In contrast to the situation in the developed countries, where audit markets are dominated by the Big 4 audit firms, the Chinese Ministry of Finance (MOF) has expressed concern about the intensely competitive and immature Chinese audit market characterized by many small-sized audit firms, which increases auditors' incentives to compete for clients by providing fee

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discounts, resulting in low audit quality (General Office of the State Council 2009). The MOF have proposed several mechanisms that likely increase audit firm size and concentration with an aim at enhancing audit quality (see DeFond, Wong, and Li 2000; Wang, Wong, and Xia 2008; Chen, Sun, and Wu 2010; Chan and Wu 2011; Firth, Mo, and Wong 2012). The difference in attitudes toward concentration between the developed countries and China as well as the fact that China is a setting where competition is thriving, while most of the developed countries worry about a lack of competition, motivate our examination of Chinese audit market. As suggested by the GAO (2003, 2008), perhaps the strong institutions in the U.S. may prevent concentration from deteriorating audit quality. However, it may not be the case under a weak legal environment such as China (Ball, Robin, and Wu 2003; H. Chen, J. Chen, Lobo, and Wang 2011). Thus, the objective of this paper is to investigate the effect of concentration on audit quality in a setting with significant competition and a relatively weak legal environment.

Prior studies suggest that the relation between audit market concentration and audit quality can be either positive or negative, depending on whether higher concentration results in decreased costs of telling the truth (Blair and Kaserman 1980; Chaney and Philipich 2002; Chaney, Jeter, and Shaw 2003) and thus increased audit efforts and audit fees (Blankley, Hurtt, and MacGregor 2012; Lobo and Zhao 2013; Eshleman and Guo 2014). Empirically, previous studies examining the overall association between concentration and audit quality provide mixed results. It is, therefore, important to understand the various relationships between concentration and audit quality to prevent regulatory intervention from producing potential unintended consequences. Toward this end, we employ path analysis to further examine the indirect effects of concentration on audit quality through audit fees.

Our Chinese sample consists of 12,334 firm-year observations from 2001 to 2011. We measure audit market concentration at the city level as the market shares of the local top 4 audit firms and two Herfindahl indexes of audit fees earned from listed clients of the local top 4 and all audit firms in a city-year grouping, respectively. We regress the logarithmic value of audit fees on concentration and find that concentration is significantly and positively associated with audit fees. This finding is consistent with the notion that auditors have greater market power in an oligopolistic audit market (GAO 2003, 2008; The American Assembly 2005; Oxera 2006, 2007; U.S. Treasury 2006, 2008) and supports the Chinese government's recent reforms to reduce price competition through increased concentration.

When we use client earnings quality (the absolute value of abnormal accruals) to proxy for audit quality, our regression analysis shows that audit market concentration has an insignificant overall effect on client earnings quality. In contrast, our path analysis suggests that concentration has a significant negative direct effect and a significant positive indirect effect on earnings quality through increased audit fees. On the one hand, the negative direct effect indicates that concentration reduces client's choice of audit service suppliers and increases auditor complacency, leading to decreased audit quality. On the other hand, the positive indirect effect suggests that concentration improves audit quality by increasing auditor market power and making auditors less lenient with clients, which allows them to charge higher audit fees to devote more resources to audit tasks. Furthermore, we find that while concentration has an insignificant overall effect on the issuance of modified audit opinions, it has a significant negative indirect effect on the propensity for auditors to issue modified audit opinions through increased audit fees. This suggests that concentration increases audit fees and earnings quality and thus leads to a decreased need for auditors to issue modified audit opinions. Furthermore, additional analysis indicates that the increased audit fees and client earnings quality resulting from increased concentration are associated with a decreased likelihood of executives and auditors being sanctioned by regulators for audit failures.

Our study has two major contributions. First, in response to the call by Francis et al. (2013) that encourages continued research on the effects of audit market concentration, we add to the concentration literature by providing Chinese evidence,[1] where the Big 4 dominance is low and the investor protection is relatively weak compared to developed countries such as the U.S. This study is relevant to the recent reforms by the Chinese government that intend to improve audit quality through increased concentration. Our findings provide relevant information to governments in developing countries where strong institutions have not yet been established. In addition, if regulators want to reduce concentration to enhance audit quality, then our path analysis suggests that audit fees play an important role in the association between concentrations and audit quality.

Second, our use of path analysis provides a comprehensive understanding of how audit market concentration influences audit quality. Since concentration has offsetting direct and indirect effects on client earnings quality, the separation of direct and indirect effects of concentration is essential and informs the Chinese government and officials as well as global regulators when making decisions. Actions that eliminate the offsetting effects of concentration on audit quality could produce potential unintended consequences. To reduce price competition, the Chinese government intended to require each local government to standardize audit pricing starting from 2011.[2] Some local governments allow actual audit fees to lie

[1] An advantage to examining a single country such as China is that institutions are held constant since audit market concentration is country-specific in nature (Francis et al. 2013).

[2] Our sample period ends at 2011, so the requirement of standardized audit pricing starting from 2011 should not significantly affect our results. In fact, our findings remain consistent when we exclude 2011 from our estimations. Besides, the allowance for audit fees to be set in a range and the suspending of the regulations in some provinces also prevent the standardized audit pricing from significantly affecting our results.

between a specific range of standardized audit fees and impose administrative penalties upon violation. Since our finding indicates that concentration improves audit quality indirectly through increased audit fees, the restrictions on audit fees, especially the upper bound, would eliminate the indirect effect, resulting in high accruals (low audit quality) as the market share audited by market leaders increases. Therefore, our study highlights the importance of examining both direct and indirect effects of concentration simultaneously on audit quality, and offers an understanding of the separate offsetting effects of concentration on audit quality.

The rest of the paper proceeds as follows. The following section describes the institutional background of this work. The third section reviews related studies and develops our hypotheses. The methodology and sample are discussed in the fourth. The empirical estimations and results are presented in the fifth section, and the sixth concludes this work.

INSTITUTIONAL BACKGROUND

Since the collapse of Arthur Andersen, policy makers in many developed countries, including the U.S., the United Kingdom, and the European Union, have expressed concerns about the potential influence of audit market concentration on audit fees and audit quality (GAO 2003, 2008; The American Assembly 2005; Oxera 2006, 2007; U.S. Treasury 2006, 2008). The key concern is that the lack of choice of auditors increases auditors' market power and auditor complacency and reduces auditors' incentive to improve audit quality, resulting in increased audit fees but decreased audit quality. As cited in Francis et al. (2013), the study conducted by GAO (2003) concludes that: "Domestically and globally, there are only a few large firms capable of auditing large public companies, which raises potential choice, price, quality, and concentration risk concerns." Similar concerns about the economic consequences of audit market concentration were also expressed by SEC Chairman Christopher Cox at the 2005 AICPA National Conference (Cox 2005) and by the Secretary of the U.S. Treasury, Henry Paulson (U.S. Treasury 2006). Reports issued by the U.S. Treasury, Oxera, and the European Commission recommend decreasing concentration and encouraging more audit firms to compete with the Big 4 (Oxera 2007; U.S. Treasury 2008, Sec. VIII: 4; European Commission 2010).

In contrast to the concerns raised by regulators, some researchers suggest that it is possible that audit market concentration results in lower audit fees but higher audit quality. For example, higher level of concentration would indicate better economies of scale or more intense competition within the remaining suppliers, resulting in lower audit fees (Pearson and Trompeter 1994; Numan and Willekens 2012). Likewise, increased concentration would reduce auditors' fear of client loss and allow auditors to concentrate on quality enhancement, resulting in higher auditor independence and audit quality (Kallapur et al. 2010; Newton et al. 2013).

It should be noted that the concerns expressed by the regulators in developed countries are largely due to the dominance of the Big 4 audit firms. The House of Lords in the U.K. has raised questions about the potential negative influence of audit market concentration by the Big 4 on audit quality (House of Lords 2010). Similarly, a green paper issued by the European Commission in 2010 warned against the increasing dominance of these audit firms (European Commission 2010), leading to several mechanisms being proposed to the European Parliament.

In contrast to developed countries, the Chinese government has expressed concern over the highly competitive audit market in China, which is characterized by many small-sized audit firms, resulting in intense competition through price competition (DeFond et al. 2000). For example, in 2010 there were more than 50 audit firms with the capacity to serve listed clients, while only three of these had capital over $10 million RMB (Gao 2011). Meanwhile, a sample covering the period 1999 to 2007 in Francis et al. (2013) shows that the Big 4 audit firms account for only 17 percent of the market share in China.

To reduce competition and to cultivate large domestic audit firms to compete with the Big 4 firms, the Chinese government has proposed several mechanisms, with an aim of enhancing audit quality through increased auditor size and audit market concentration. Specifically, the MOF issued several regulations in 2010 and 2011 to promote the restructuring of audit firms from limited liability organizations to partnership organizations, and considered increasing the requirements for audit firms to serve listed clients, such as the minimum amount of capital and number of employees, in order to enhance auditors' legal liability and size, and thus, it is hoped, audit quality (MOF 2011). Chan and Wu (2011) provide evidence that audit firm mergers serve as a fast and effective way to satisfy these requirements. They find that auditors are more likely to issue modified audit opinions after audit firm mergers. The wave of audit firm mergers over the last few years in China has reduced the number of audit firms while increasing audit firm size and audit market concentration.[3]

[3] Excluding observations in which the client engages an audit firm that is involved in mergers and acquisitions in the same year does not change our findings.

RELATED STUDIES AND HYPOTHESIS DEVELOPMENT

Audit Market Concentration and Audit Fees

Numerous studies have examined the impact of audit market concentration on audit fees and audit quality with mixed results. Although the GAO (2003) argues that a lack of choice may increase audit firms' market power, and thus audit fees, it fails to find significant evidence that concentration affects audit fees. Similarly, Basioudis and Papadimitriou (2007) use a U.K. sample and find no evidence that there is an increase in audit fees between 2001 and 2002 for clients of Arthur Andersen.

Some studies document that the collapse of Arthur Andersen strengthened the market power of the remaining Big 4 audit firms, and reduced the incentive to compete for clients through price competition, implying a positive relation between audit market concentration and audit fees. For example, using U.S. data, Chi (2006) finds that after the collapse of Arthur Andersen there was a general increase in audit fees across all clients, and Asthana, Balsam, and Kim (2009) find that audit fees and the ratio of audit fees over total assets increased significantly in 2002 after the Enron scandal. Outside the U.S., Hamilton, Li, and Stokes (2008) use Australian data and find that the Big 4 premiums were higher following the demise of Arthur Andersen, especially for former Andersen clients. Carson et al. (2012) also use Australian data covering the period 1996 to 2007, and find an increase in audit fees for the Big 4 and the Big 5 periods compared with the Big 6 one, with this increase being more pronounced for smaller clients.

Likewise, other studies focus on special audit markets or events, such as deregulation, and suggest a positive relation between audit market concentration and audit fees. For example, Maher, Tiessen, Colson, and Broman (1992) examine audit fees between 1977 and 1981, in which competition is thought to have increased due to federal investigations of anticompetitive behavior. They find that audit fees decreased between 1977 and 1981. Focusing on municipal audit markets, Sanders, Allen, and Korte (1995) find a decrease in audit fees for the period 1985 to 1989, and Jensen and Payne (2005) find that the deregulation that introduced price competition reduced audit fees significantly in the U.S. In the U.K., a report issued by Oxera (2006) concludes that concentration leads to higher audit fees.

Still, a number of recent studies directly measure audit market concentration, but the evidence is mixed. For example, Numan and Willekens (2012) find that audit fees increase with auditor-client industry alignment and industry market share distance to the closest competitor. Interestingly, they find that audit fees are negatively related to concentration, and this was also documented by Pearson and Trompeter (1994). Kallapur et al. (2010) use a U.S. sample covering 2000 to 2005 and measure concentration at the metropolitan level, but find no significant relation between concentration and audit fees.

Theoretically and empirically, both positive and negative relations between audit market concentration and audit fees are possible. On the one hand, from the perspective of classical micro-economic theory, an increase in concentration enhances the market power of the remaining suppliers and increases audit fees (Gettler 2004; Oxera 2006; European Commission 2010). That is, concentration reduces the auditor fear of client loss and increases their bargaining power and ability to determine the price of audit service. On the other hand, increased concentration can lead to reduced audit fees due to economies of scale or intense competition among the remaining suppliers (Pearson and Trompeter 1994; Danos and Eichenseher 1986; Numan and Willekens 2012). Given the unclear relation between audit market concentration and audit fees, we propose our first hypothesis as follows:

H1: Audit market concentration influences audit fees.

Audit Market Concentration and Audit Quality

Prior literature on audit market concentration and audit quality presents inconclusive evidence. Early studies provide indirect evidence on the relation between concentration and audit quality by utilizing special events, such as deregulation of price competition. For example, Hackenbrack, Jensen, and Payne (2000) examine restrictions on price competition and suggest that these are associated with better audit quality. Jeter and Shaw (1995), however, find an insignificant relationship between the lift of a ban on direct and uninvited competition and audit quality. Copley and Doucet (1993) focus on governmental audits, and measure competition as the number of bids received for an audit engagement and audit quality as compliance with professional standards for reporting and fieldwork. They find that a higher number of bids are associated with better compliance.

More recent studies directly measure audit market concentration, although the results are still inconclusive. While the GAO (2003, 2008) has warned of the potentially negative influences of concentration on audit quality, it finds no evidence to support the argument and suggests that more investigations are warranted. Some researchers document a positive association between concentration and audit quality. For example, Kallapur et al. (2010) use a U.S. sample covering 2000 to 2006, and find that greater concentration is associated with better accruals quality. Similarly, Newton et al. (2013) use a U.S. sample for the period 2000 to 2009, and find that a higher concentration is related to a lower likelihood of financial restatements.

In contrast, using U.S. data covering 2003 to 2009, Boone et al. (2012) restrict their sample to companies that would fail to meet the analysts' consensus earnings forecasts without the use of discretionary accruals. They find that concentration is associated with a higher likelihood of meeting analyst consensus earnings forecasts. They also document a positive relation between concentration and accruals quality, as in Kallapur et al. (2010), but only for companies excluded from their restricted sample. With a sample covering 42 countries from 1999 to 2007, Francis et al. (2013) investigate the influences of the Big 4 dominance and the Big 4 concentration on audit quality, measured as accruals quality, the likelihood of reporting a profit, and timely loss recognition. They provide cross-country evidence for a positive relation between the Big 4 dominance and audit quality, and a negative one between concentration within the Big 4 and audit quality.

The association between audit market concentration and audit quality is unclear *ex ante*. On the one hand, when an audit market is more concentrated, the fear of client loss is lower, since the choice of audit firms is limited. Therefore, auditors are less likely to become lenient with their clients, and their independence is less likely to be impaired, resulting in higher audit quality (Kallapur et al. 2010; Newton et al. 2013). Moreover, a more concentrated audit market would create economies of scale, enabling auditors to reduce audit costs while putting more effort into their work to enhance audit quality. On the other hand, in a concentrated audit market, auditors would have weak incentives to improve service quality, and are likely to become overconfident and complacent, resulting in poorer audit quality (Boone et al. 2012; Francis et al. 2013). Given the unclear relation between audit market concentration and audit quality, our second hypothesis is stated as follows:

H2: Audit market concentration influences audit quality.

Audit Market Concentration, Audit Fees, and Audit Quality

If our first hypothesis that concentration affects audit fees is supported, then we expect that, in addition to a direct effect, concentration influences audit quality indirectly through audit fees. Prior studies suggest that the relation between audit market concentration and audit quality depends on whether concentration increases (decreases) auditors' bargaining power and independence and decreases (increases) the cost of telling the truth (Blair and Kaserman 1980; Chaney and Philipich 2002; Chaney et al. 2003), thus increasing (decreasing) audit efforts and audit fees (Blankley et al. 2012; Lobo and Zhao 2013; Eshleman and Guo 2014). In other words, concentration would have both direct and indirect effects on audit quality. As discussed in the previous section, concentration would directly influence audit quality. Under concentrated audit markets, audit quality would either increase through enhanced auditor independence (Kallapur et al. 2010; Newton et al. 2013) or decrease via auditor overconfidence and complacency (Boone et al. 2012; Francis et al. 2013).

Beyond the direct effect, concentration would indirectly influence audit quality. For example, auditors have higher bargaining power and are more independent under concentrated audit markets. If this is the case, then auditors face a lower cost of telling the truth and can ask for higher audit fees as well as exert more efforts. As a result, audit quality improves. Simunic (1980) models the determinants of audit fees, including audit efforts and resources devoted. When clients are risky, auditors apply more audit plans and resources in audit procedures, leading to higher audit fees (Johnstone and Bedard 2001; Niemi 2002; Bedard and Johnstone 2004). However, if there is fee pressure, then auditors are less responsive to the increased risks (Houston 1999), which would have the potential to reduce audit quality. For example, Deis and Giroux (1992) show that audit hours are positively related to audit quality, and Caramanis and Lennox (2008) find that clients with lower audit hours are more likely to report positive discretionary accruals, have larger positive discretionary accruals, and meet earnings benchmarks. Consistently, higher audit fees are found to be associated with lower discretionary accruals (Larcker and Richardson 2004), higher earnings quality (Higgs and Skantz 2006), and better accruals quality (Srinidhi and Gul 2007). On the contrary, if concentration reduces audit fees, then it is possible that audit quality decreases.

Collectively, such indirect association between concentration and audit quality is conditional on concentration being associated with fees and depends on whether concentration increases or decreases audit fees. Since it is possible that the direct and the indirect effects offset each other, failure to separate the direct and the indirect effects of concentration may explain why the previous studies find mixed evidence on how concentration influences audit quality. This paper provides additional insights by explicitly separating the direct and the indirect effects of concentration on audit quality. Given the mixed evidence on the association between concentration and audit fees in the extant literature, we specify our third hypothesis as follows:

H3: Conditional on concentration being associated with audit fees, audit market concentration influences audit quality indirectly through audit fees.

RESEARCH DESIGN AND SAMPLE DESCRIPTION

Measurement of Audit Market Concentration

Following Kallapur et al. (2010), Dunn, Kohlbeck, and Mayhew (2011), Boone et al. (2012), Numan and Willekens (2012), Carson et al. (2012), and Newton et al. (2013), we utilize three different proxies of audit market concentration (*CON*) measured at the city level to better capture its influence on local audit firms and auditors. Our first proxy of concentration is the top 4 audit firm's market share (as a group) relative to the non-top 4 audit firms in a city, *TOP4SHARE* measured as the percentage of total clients' audit fees earned by the top 4 audit firms within city-year groupings, where industries are defined by the China Securities Regulatory Commission (CSRC) codes. We identify the largest four audit firms for each city, and thus allow the top 4 audit firms to vary across cities. *TOP4SHARE* close to 1 indicates that the market share of an audit market is concentrated in the top 4 audit firms, while *TOP4SHARE* close to 0 indicates the opposite. Our second proxy of concentration is a Herfindahl index based on total clients' audit fees audited by each top 4 audit firm in a city-year;[4] *TOP4HHI* is computed as the sum of the squares of each top 4 audit firm's market share based on audit fees earned within city-year groupings. *TOP4HHI* close to 1 indicates that within the top 4 audit firms, the market share of an audit market is concentrated in few audit firms, while *TOP4HHI* close to 0 indicates the opposite.[5] We also calculate a Herfindahl index based on all audit firms in a city-year, as our third measure of concentration (*ALLHHI*).

We use the largest four rather than ten audit firms in accordance with Boone et al. (2012) and Francis et al. (2013). Many (small) cities have fewer than ten audit firms, and using ten or more audit firms as the basis of concentration measures would assign value 1 to many (small) cities with few clients and audit firms. This problem is lessened when we measure concentration using top 4 local audit firms or at the province level. As a robustness check, we measure concentration based on the largest four (*TOP4SHARE* and *TOP4HHI*) or all audit firms (*ALLHHI*) at the province level. Measuring concentration at the province level coincides with the fact that provincial governments have great power on the provincial audit practices and regulations. In addition, audit firms generally have one office in a province to serve the clients in that province or near provinces. We measure concentration using province-years instead of province-industry-years because Chinese auditors, under the intense competition, compete for all the clients in the city. Supporting this, the untabulated analysis shows that the largest four audit firms at the city level audit 1.42 industries on average and 12 industries at most. Similarly, the largest four audit firms at the province level audit 4.02 industries on average and 18 industries at most. Nevertheless, we further calculate concentration for each province-industry-year using the largest four (*TOP4SHARE* and *TOP4HHI*) or all audit firms (*ALLHHI*) in a province. Overall, we obtain similar results when we measure concentration at the city, the province, and the province-industry levels.

Sample Selection

We begin with all Chinese non-financial listed companies in the China Center for Economic Research (CCER) database from 2001 to 2011 (16,846 firm-year observations).[6] We collect audit firm information from the *Taiwan Economic Journal* (*TEJ*) database and client characteristics, financial information, and stock market information from the CCER database. After excluding observations with missing audit firm information (19 observations), dependent variables information (4,021 observations), and control variables information (472 observations), our final sample consists of 12,334 firm-year observations. Our sample selection procedures are described in Table 1.

Sample distribution by year is presented in Panel A of Table 2. Our sample is distributed evenly across years. On average, each year contains 8 to 9 percent of the sample firms. Panel B of Table 2 shows that our sample is distributed unevenly across industries. Among our sample, about 16 percent of the observations come from the Machinery and Equipment industry (CSRC code: C7) and 11 percent operate in the Petroleum, Chemical, and Plastic industry (CSRC code: C4), whereas only 11 (0.09 percent) observations are from Wood and Furniture industry (CSRC code: C2) and 97 (0.79 percent) observations operate in the Communications and Culture industry (CSRC code: L).[7] We report the sample distribution by province in Panel C of Table 2. Within our sample, there are 30 provinces and 512 cities. The numbers of

[4] We also measure concentration measures based on the market shares of total assets audited instead of audit fees earned. The results are generally consistent.

[5] We focus on the largest four audit firms instead of international Big 4, because Big 4 have low market shares in China, and even no clients at all in some provinces. Using the local leaders to calculate concentration allows us to better capture the effect of concentration on local markets. We also measure concentration based on the top 6 or the top 8 audit firms, and generally find similar evidence. Finally, we obtain consistent results when we use the international Big 4 or the national top 10 audit firms to calculate concentration. The list of the top 10 audit firms is relatively stable across our sample period as in Wang et al. (2008). From 2001 to 2011, the lists of the top 10 audit firms change only 1.5 audit firms each year on average.

[6] The results remain unchanged when we remove the sample period 2011 and when we exclude clients operating in the provinces where audit-pricing standards have been enacted.

[7] When we exclude observations from Wood and Furniture industry and Communications and Culture industry, our results remain unchanged.

TABLE 1

Sample Selection Procedures

	Observations
All Chinese non-financial listed firms from 2001 to 2011	16,846
Less: Missing audit firm information	(19)
Less: Missing dependent variables information (audit fees, accruals, modified audit opinions)	(4,021)
Less: Missing control variables information	(472)
Final sample	12,334

cities and observations vary substantially across provinces. For example, 12.19 percent of clients operate in Guangdong province, whereas only 0.66 percent of clients operate in Qinghai province. More importantly, the variation in concentration is large across provinces. Within the top 4 audit firms, the market share is very concentrated in Henan province (0.715) but are relatively equally held in Heilongjiang province (0.382).

Descriptive Statistics

Table 3 shows the descriptive statistics of the variables used in this study. For our explanatory variables, *TOP4SHARE* ranges from 0.57 to 1.00, with a mean value of 0.91, and *TOP4HHI* varies from 0.25 to 1.00, with a mean value of 0.54. These results suggest that audit market concentration varies substantially across city-year groupings. The average and the median values of audit fees (*AF*) are \$794,168 RMB and \$480,000 RMB,[8] respectively. The absolute value of discretionary accruals (|*DACC*|) is 7 percent of total assets on average. Around 7 percent of the observations receive a modified audit opinion (*OPMAO*).[9]

With respect to the variables of client characteristics, our sample is comparable to those used in previous studies (Wang et al. 2008; Chen et al. 2010; Chen et al. 2011; Chan and Wu 2011). Total assets (*TA*) and total market value of equity (*MV*) are \$6.41 billion RMB and \$6.68 billion RMB on average and \$1.82 billion RMB and \$2.48 billion RMB in median, respectively. Receivables (*RECTA*) and inventory (*INVTA*) are on average 9 percent and 17 percent of total assets, respectively. The mean current ratio (*LIQ*) is 1.65, and the mean debt-to-asset ratio (*DA*) is 0.51. On average, our sample has a 2 percent return on assets (*ROA*) and outperforms the market returns (*ADJRET*) by 1 percent. The standard deviation of daily returns for the fiscal year (*STDRET*) has a mean value of 2.14, book-to-market ratio (*BM*) is 0.42 on average, and the mean beta (*BETA*) is 1.10. On average, our sample generates operating cash flow (*CFO*) equaling 6 percent of total assets, while 4 percent of the observations report a net loss for two consecutive years (*TWOLOSS*). The largest shareholders have 39 percent of shareholdings (*OWNER*), and 48 percent of the board seats are held by independent directors (*BDIND*) on average. The mean quick ratio (*QUICK*) is 0.89, and the mean sales turnover (*TURNOVER*) is 0.66. Twelve percent of the observations report net loss (*LOSS*), and on average a client has been publicly listed for 7.80 years (*AGE*). Among our sample, 66 percent are state-owned enterprises (*STATE*), 6 percent issue B shares (*ISSUEB*), 2 percent issue H shares (*ISSUEH*), and 1 percent cross-list on a foreign exchange (*CROSSLIST*).

For the variables of audit characteristics, 7 percent of the observations are audited by the international Big 4 audit firms (*BIG4*), 40 percent by local audit firms (*LOCAL*), 9 percent by industry specialized audit firms (*SPFIRM*), and 5 percent by industry specialized audit partners (*SPCPA*). On average, a client's total assets are 4 percent and 19 percent of the sum of total assets audited by the engaged audit firm (*CIFIRM*) and audit partners (*CICPA*), respectively. The mean audit firm tenure (*FIRMTENURE*) is 5.34 years and the mean audit partner tenure (*CPATENURE*) is 2.34 years. The sum of each client's total assets in logarithmic form audited by the engaged audit firm (*FIRMSIZE*) and audit partners (*CPASIZE*) is on average 955.64 and 151.62, respectively. Finally, *CMI, GDI, LEI,* and *LNLE* have mean values of 5.55, 6.78, 5.87, and 8.17, respectively. Details of variable definitions are provided in Appendix A.

[8] Throughout the current study, all the variables are measured in RMB (Chinese currency). \$1 RMB = U.S.\$0.158748 at the end of 2011.

[9] Like Chen et al. (2010) and Chen et al. (2011), *OPMAO* is coded 1 when a client receives an unqualified opinion with explanatory notes, qualified, disclaimer, or an adverse audit opinion, and 0 when they receive a clean unqualified opinion. An unqualified opinion with explanatory notes is considered as one type of modified audit opinions, because it is often used as a qualified opinion (Chen, Su, and Zhao 2000; Haw, Park, Qi, and Wu 2003), and it is treated in the same way as other non-clean opinions in disclosure requirements of delisting decisions by the CSRC and stock exchanges in China (Chen et al. 2010). In untabulated robustness checks, we code audit opinions according to their severity and find similar results. Specifically, 0 is assigned to unqualified opinions, 1 to unqualified opinions with explanatory notes, 2 to qualified opinions, and 3 to disclaimers and adverse opinions.

TABLE 2

Sample Distribution

Panel A: Year Distribution

Sample Year	%	Obs.	*TOP4SHARE* Mean	*TOP4HHI* Mean	*ALLHHI* Mean
2001	7.58%	935	0.918	0.560	0.521
2002	8.38%	1,034	0.914	0.541	0.500
2003	8.50%	1,049	0.907	0.553	0.508
2004	8.81%	1,087	0.902	0.558	0.509
2005	9.08%	1,120	0.912	0.562	0.518
2006	8.42%	1,038	0.910	0.569	0.517
2007	7.92%	977	0.927	0.565	0.527
2008	9.62%	1,187	0.911	0.539	0.492
2009	10.73%	1,323	0.905	0.523	0.474
2010	11.46%	1,413	0.892	0.505	0.449
2011	9.49%	1,171	0.908	0.545	0.498
Total	100.00%	12,334	0.908	0.545	0.498

Panel B: Industry Distribution

CSRC Code	Industry	%	Obs.	*TOP4SHARE* Mean	*TOP4HHI* Mean	*ALLHHI* Mean
A	Agriculture, Forestry, and Fishing	2.27%	280	0.926	0.641	0.602
B	Mining	1.70%	210	0.928	0.716	0.676
C0	Food and Beverage	4.24%	523	0.940	0.672	0.644
C1	Textiles and Clothing	4.23%	522	0.933	0.582	0.547
C2	Wood and Furniture	0.09%	11	0.835	0.391	0.288
C3	Paper and Printing	1.92%	237	0.964	0.632	0.617
C4	Petroleum, Chemical, and Plastic	11.28%	1,391	0.951	0.656	0.631
C5	Electronic	4.09%	505	0.897	0.508	0.459
C6	Metals and Minerals	9.37%	1,156	0.944	0.639	0.611
C7	Machinery and Equipment	16.34%	2,015	0.929	0.554	0.519
C8	Pharmaceutical and Biological Products	6.23%	769	0.923	0.541	0.503
C9	Other Manufacturing	1.21%	149	0.899	0.586	0.531
D	Electric, Gas, and Sanitary Services	4.14%	511	0.906	0.524	0.476
E	Construction	2.10%	259	0.844	0.446	0.364
F	Transportation and Storage	4.05%	500	0.888	0.472	0.415
G	Information Technology	6.30%	777	0.865	0.429	0.358
H	Wholesale and Retail Trades	6.75%	832	0.862	0.419	0.345
J	Real Estate	4.38%	540	0.823	0.397	0.310
K	Public Administration	3.10%	382	0.861	0.484	0.413
L	Communication and Culture	0.79%	97	0.848	0.429	0.350
M	Miscellaneous	5.42%	668	0.872	0.464	0.403
Total		100.00%	12,334	0.908	0.545	0.498

Panel C: Regional Distribution

Region	# of City and District	%	Obs.	*TOP4SHARE* Mean	*TOP4HHI* Mean	*ALLHHI* Mean
Anhui	24	3.21%	396	0.993	0.712	0.708
Beijing	10	7.22%	890	0.806	0.407	0.288
Chongqing	8	1.80%	222	0.950	0.569	0.537
Fujian	18	3.22%	397	0.987	0.602	0.589
Gansu	7	1.22%	150	0.978	0.712	0.702

(continued on next page)

TABLE 2 (continued)

Region	# of City and District	%	Obs.	*TOP4SHARE* Mean	*TOP4HHI* Mean	*ALLHHI* Mean
Guangdong	49	12.19%	1,504	0.800	0.445	0.366
Guangxi	10	1.61%	198	0.982	0.525	0.517
Guizhou	6	1.18%	146	0.889	0.522	0.463
Hainan	6	1.46%	180	0.916	0.513	0.467
Hebei	23	2.46%	304	0.983	0.689	0.681
Henan	24	2.51%	309	0.968	0.715	0.700
Heilongjiang	8	1.82%	224	0.730	0.382	0.285
Hubei	18	4.22%	521	0.949	0.590	0.560
Hunan	19	2.96%	365	0.987	0.639	0.629
Inner Mongolia	8	1.21%	149	0.988	0.577	0.571
Jilin	12	2.11%	260	0.902	0.530	0.487
Jiangsu	39	6.92%	853	0.957	0.550	0.530
Jiangxi	14	1.76%	217	0.974	0.621	0.604
Liaoning	20	3.51%	433	0.948	0.591	0.559
Ningxia	4	0.84%	104	0.982	0.618	0.611
Qinghai	2	0.66%	81	0.944	0.500	0.467
Shaanxi	7	1.83%	226	0.845	0.359	0.292
Shandong	43	5.72%	706	0.952	0.607	0.585
Shanxi	13	1.75%	216	0.939	0.653	0.609
Shanghai	18	9.86%	1,216	0.843	0.385	0.301
Sichuan	26	4.22%	520	0.900	0.596	0.549
Tianjin	6	1.93%	238	0.891	0.509	0.447
Xinjiang	11	1.99%	246	0.902	0.573	0.513
Yunnan	13	1.60%	197	0.998	0.655	0.653
Zhejiang	46	7.02%	866	0.980	0.688	0.668
Total	512	100.00%	12,334	0.908	0.545	0.498

TOP4SHARE is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings.

EMPIRICAL ESTIMATIONS AND RESULTS

Audit Market Concentration and Audit Fees

To test H1, we estimate the following audit fee model following prior studies (Simunic 1980; Francis, Reichelt, and Wang 2005; Wang et al. 2008; Huang, Raghunandan, and Rama 2009; H. Huang, Raghunandan, T. Huang, and Chiou 2015):

$$\begin{aligned} LNAF = {} & \beta_0 + \beta_1 CON + \beta_2 LNTA + \beta_3 RECTA + \beta_4 INVTA + \beta_5 LIQ + \beta_6 DA + \beta_7 ROA + \beta_8 ADJRET + \beta_9 STDRET \\ & + \beta_{10} BIG4 + \beta_{11} LOCAL + \beta_{12} SPFIRM + \beta_{13} SPCPA + \beta_{14} CIFIRM + \beta_{15} CICPA + \beta_{16} FIRMTENURE \\ & + \beta_{17} CPATENURE + \beta_{18} 3YEAROLD + \beta_{19} STATE + \beta_{20} ISSUEB + \beta_{21} ISSUEH + \beta_{22} CMI + \beta_{23} GDI \\ & + \beta_{24} LEI + \beta_{25} LNLE + Exchange + Year + Industry + \varepsilon. \end{aligned} \quad (1)$$

We measure the natural logarithm of audit fees (*LNAF*) as our dependent variable to alleviate the problem of heteroscedasticity. The explanatory variables of interests (*CON*) are the three measures of concentration (*TOP4SHARE, TOP4HHI,* and *ALLHHI*) described earlier. With respect to control variables, the prior literature indicates that larger clients with higher complexity are likely to be associated with higher audit fees, and thus we control for the client size effect (*LNTA*). The percentage of receivables and inventories (*RECTA* and *INVTA*) are controlled for audit complexity (Francis et al. 2005; Wang et al. 2008). The model controls for the client's financial condition using current ratio (*LIQ*), debt ratio (*DA*), and returns on assets (*ROA*), since clients in financial distress are likely to pay higher audit fees. We control for a client's annual market-adjusted stock performance (*ADJRET*) and stock return volatility (*STDRET*), because of the documented effects of stock performance on audit fees (Wang et al. 2008). The effect of the Big 4 audit firms (*BIG4*) on audit fees is controlled, because the Big 4 would have

TABLE 3

Descriptive Statistics

Variable	Mean	STD	P1	Q1	Median	Q3	P99
Explanatory and Dependent Variables							
TOP4SHARE	0.91	0.13	0.57	0.83	1.00	1.00	1.00
TOP4HHI	0.54	0.28	0.25	0.32	0.43	0.75	1.00
ALLHHI	0.50	0.31	0.11	0.23	0.40	0.75	1.00
AF (thousand)	794.17	2,480.83	150.00	350.00	480.00	700.00	5,500.00
LNAF	13.17	0.64	11.92	12.77	13.08	13.46	15.52
|DACC|	0.07	0.07	0.00	0.02	0.04	0.09	0.41
OPMAO	0.07	0.26	0.00	0.00	0.00	0.00	1.00
Client Characteristics							
TA (billion)	6.41	45.79	0.18	0.96	1.82	3.85	71.58
LNTA	21.45	1.12	19.02	20.68	21.32	22.07	24.99
MV (billion)	6.68	40.42	0.39	1.39	2.48	5.00	68.59
LNMV	21.75	1.02	19.78	21.05	21.63	22.33	24.95
RECTA	0.09	0.08	0.00	0.02	0.07	0.13	0.37
INVTA	0.17	0.15	0.00	0.07	0.13	0.22	0.72
LIQ	1.65	1.52	0.17	0.88	1.25	1.82	10.59
DA	0.51	0.23	0.07	0.36	0.50	0.64	1.61
ROA	0.02	0.08	−0.40	0.01	0.03	0.05	0.18
ADJRET	0.01	0.38	−1.65	−0.14	0.03	0.19	1.11
STDRET	2.14	0.69	0.94	1.60	2.08	2.58	4.24
BM	0.42	0.28	−0.31	0.22	0.36	0.56	1.31
BETA	1.10	0.32	0.27	0.90	1.09	1.28	2.15
CFO	0.06	0.10	−0.26	0.01	0.05	0.11	0.37
TWOLOSS	0.04	0.19	0.00	0.00	0.00	0.00	1.00
OWNER	0.39	0.16	0.09	0.26	0.37	0.51	0.76
BDIND	0.48	0.23	0.00	0.44	0.50	0.57	1.00
QUICK	0.89	1.20	0.03	0.32	0.55	0.94	8.53
TURNOVER	0.66	0.48	0.04	0.34	0.55	0.84	2.63
LOSS	0.12	0.32	0.00	0.00	0.00	0.00	1.00
AGE	7.80	4.32	1.00	4.00	8.00	11.00	18.00
3YEAROLD	0.87	0.34	0.00	1.00	1.00	1.00	1.00
EM	0.28	0.45	0.00	0.00	0.00	1.00	1.00
STATE	0.66	0.47	0.00	0.00	1.00	1.00	1.00
ISSUEB	0.06	0.25	0.00	0.00	0.00	0.00	1.00
ISSUEH	0.02	0.15	0.00	0.00	0.00	0.00	1.00
CROSSLIST	0.01	0.08	0.00	0.00	0.00	0.00	0.00
Audit Characteristics							
BIG4	0.07	0.25	0.00	0.00	0.00	0.00	1.00
LOCAL	0.40	0.49	0.00	0.00	0.00	1.00	1.00
SPFIRM	0.09	0.29	0.00	0.00	0.00	0.00	1.00
SPCPA	0.05	0.23	0.00	0.00	0.00	0.00	1.00
CIFIRM	0.04	0.05	0.00	0.02	0.03	0.05	0.33
CICPA	0.19	0.12	0.05	0.11	0.16	0.25	0.50
FIRMTENURE	5.34	3.47	1.00	2.00	5.00	8.00	15.00
CPATENURE	2.34	1.19	1.00	1.50	2.00	3.00	6.00
FIRMSIZE	955.64	897.71	63.58	408.48	644.62	1,130.55	5,923.16
CPASIZE	151.62	85.89	40.67	85.99	129.30	194.31	438.00
Institution Characteristics							
CMI	5.55	2.10	0.70	4.21	5.90	7.67	7.94
GDI	6.78	1.34	3.16	6.02	7.38	7.99	8.37
LEI	5.87	1.29	2.62	5.05	5.81	6.98	7.97
LNLE	8.17	0.66	6.91	7.65	8.23	8.69	9.35

All the continuous variables are winsorized at 1 percent and 99 percent.
See Appendix A for variable definitions.

TABLE 4

Pearson Correlation among Explanatory and Dependent Variables

Variable	*TOP4SHARE*	*TOP4HHI*	*ALLHHI*	*LNAF*	*|DACC|*	*OPMAO*
TOP4SHARE		0.590	0.697	−0.092	−0.038	−0.012
		< 0.001	< 0.001	< 0.001	< 0.001	0.191
TOP4HHI	0.590		0.988	−0.055	−0.026	−0.020
	< 0.001		< 0.001	< 0.001	0.004	0.024
ALLHHI	0.697	0.988		−0.071	−0.032	−0.019
	< 0.001	< 0.001		< 0.001	0.000	0.032
LNAF	−0.092	−0.055	−0.071		0.000	−0.068
	< 0.001	< 0.001	< 0.001		0.990	< 0.001
|DACC|	−0.038	−0.026	−0.032	0.000		0.065
	< 0.001	0.004	0.000	0.990		< 0.001
OPMAO	−0.012	−0.020	−0.019	−0.068	0.065	
	0.191	0.024	0.032	< 0.001	< 0.001	

TOP4SHARE is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. *LNAF* is the natural logarithm of audit fees. *|DACC|* is absolute value of discretionary accruals. *OPMAO* is 1 for modified audit opinions, and 0 otherwise. All the continuous variables are winsorized at 1 percent and 99 percent. All p-values are two-tailed.
See Appendix A for variable definitions.

more expertise and are likely to charge higher audit fees than the non-Big 4 ones (Mayhew and Wilkins 2003). We control for the effect of local audit firms (*LOCAL*) given their close connections with local governments and deep local knowledge (Wang et al. 2008). The superior audit quality of and the audit fee premiums for industry specialized audit firms (*SPFIRM*) and audit partners (*SPCPA*) are controlled (Francis et al. 2005; Reichelt and Wang 2010; Chen et al. 2010). We further control for client importance to the audit firm (*CIFIRM*) and audit partners (*CICPA*) (Chen et al. 2010). Audit firm tenure (*FIRMTENURE*) and audit partner tenure (*CPATENURE*) are controlled, because of the well-documented effects of low-balling and client-auditor relationships (Huang et al. 2009; Huang et al. 2015). As in Wang et al. (2008), we include an indicator of clients older than three years (*3YEAROLD*). State ownership is controlled for by including an indicator of state-owned enterprises (*STATE*), which may have different incentives and resources from the government (Wang et al. 2008). We control for the issuance of B or H shares (*ISSUEB* and *ISSUEH*) because of the potential influences from different regulations and accounting standards. Credit market index (*CMI*), government decentralization index (*GDI*), and legal environment index (*LEI*) are also controlled, since these indexes would influence audit decisions (Wang et al. 2008; Francis and Wang 2008). We further control for prices of commodities by including the natural logarithm of average living expenditure per person (*LNLE*) at the province level.[10] Audit fees are expected to be higher when the prices of commodities are higher. Finally, stock exchange, year, and industry dummies are controlled.

For brevity, we present the Pearson correlations among our dependent and explanatory variables of interest in Table 4, and do not show those among the control variables. We find a significant and negative relation between *LNAF* and our concentration measures (*TOP4SHARE, TOP4HHI,* and *ALLHHI*). Furthermore, our three concentration measures are highly and positively correlated with each other, indicating that they are likely to capture similar information. Given that the results of Pearson correlation are preliminary, we now move to regression results.

The regression results of audit fees on audit market concentration are shown in Table 5. Our audit fee models have substantial explanatory power with adjusted R^2 comparable to those in prior studies. The coefficients of most control variables have directions consistent with the prior literature. In particular, clients with larger size (*LNTA*), more complexity (*RECTA*), fewer current assets (*LIQ*), higher debt ratio (*DA*), poorer stock performance (*ADJRET*), and more volatile stock returns (*STDRET*) pay higher audit fees. In addition, the Big 4 audit firms (*BIG4*), industry specialized audit firms (*SPFIRM*), and industry specialized audit partners (*SPCPA*) earn a premium of audit fees, while local audit firms charge low audit fees (*LOCAL*). Consistent with Wang et al. (2008), clients older than three years (*3YEAROLD*) pay lower audit fees, and audit fees are lower for state-owned enterprises (*STATE*) than for non-state-owned ones, and increase along with the

[10] Alternatively, we control for province indicators and find similar results.

TABLE 5

Regression Results of Audit Fees on Audit Market Concentration

	Model 1		Model 2		Model 3	
	Dependent Variable					
	LNAF		*LNAF*		*LNAF*	
Variable	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Intercept	4.845	< 0.001	4.853	< 0.001	4.860	< 0.001
TOP4SHARE	0.069	0.035				
TOP4HHI			0.058	< 0.001		
ALLHHI					0.046	0.000
LNTA	0.314	< 0.001	0.315	< 0.001	0.315	< 0.001
RECTA	0.138	0.006	0.140	0.006	0.140	0.006
INVTA	−0.130	< 0.001	−0.132	< 0.001	−0.132	< 0.001
LIQ	−0.010	0.001	−0.009	0.002	−0.009	0.002
DA	0.144	< 0.001	0.146	< 0.001	0.146	< 0.001
ROA	0.016	0.785	0.012	0.838	0.013	0.829
ADJRET	−0.021	0.034	−0.020	0.040	−0.020	0.038
STDRET	0.038	< 0.001	0.039	< 0.001	0.038	< 0.001
BIG4	0.421	< 0.001	0.422	< 0.001	0.422	< 0.001
LOCAL	−0.038	< 0.001	−0.039	< 0.001	−0.039	< 0.001
SPFIRM	0.060	0.000	0.059	0.000	0.060	0.000
SPCPA	0.038	0.083	0.037	0.091	0.037	0.090
CIFIRM	−0.257	0.002	−0.246	0.002	−0.248	0.002
CICPA	−0.001	0.970	−0.003	0.920	−0.003	0.936
FIRMTENURE	0.007	< 0.001	0.007	< 0.001	0.007	< 0.001
CPATENURE	0.005	0.110	0.005	0.125	0.005	0.123
3YEAROLD	−0.022	0.071	−0.021	0.090	−0.021	0.085
STATE	−0.083	< 0.001	−0.083	< 0.001	−0.082	< 0.001
ISSUEB	0.390	< 0.001	0.391	< 0.001	0.391	< 0.001
ISSUEH	0.748	< 0.001	0.746	< 0.001	0.746	< 0.001
CMI	−0.014	< 0.001	−0.014	< 0.001	−0.014	< 0.001
GDI	0.019	< 0.001	0.018	< 0.001	0.018	< 0.001
LEI	0.000	0.942	−0.001	0.869	0.000	0.917
LNLE	0.156	< 0.001	0.157	< 0.001	0.158	< 0.001
Year Effect	Controlled		Controlled		Controlled	
Industry Effect	Controlled		Controlled		Controlled	
Exchange Effect	Controlled		Controlled		Controlled	
Clustering Effect	Firm-Year		Firm-Year		Firm-Year	
Adjusted R^2	61.96%		62.00%		61.99%	
Observations	12,334		12,334		12,334	

The dependent variable is natural logarithm of audit fees (*LNAF*), and the explanatory variables of interest are *TOP4SHARE, TOP4HHI,* and *ALLHHI*. *TOP4SHARE* is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. All the continuous variables are winsorized at 1 percent and 99 percent. Firm-year clustering effects are controlled (Gow, Ormazabal, and Taylor 2010). All p-values are two-tailed.
See Appendix A for variable definitions.

levels of governmental decentralization (*GDI*). As expected, audit fees are higher when living expenditures in a province (*LNLE*) are higher.

For our explanatory variables of interest, the coefficients of *TOP4SHARE, TOP4HHI,* and *ALLHHI* are all positive and significant at the 0.05 level. Given the coefficient of *TOP4SHARE* (0.069), moving from the first quartile (0.83) to the third quartile (1.00) increases audit fees by 1.2 percent.[11] Likewise, given the coefficient of *TOP4HHI* (0.058), moving from the first quartile (0.32) to the third quartile (0.75) results in 2.6 percent higher audit fees.[12] Also, given the coefficient of *ALLHHI* (0.046), moving from the first quartile (0.23) to the third quartile (0.75) increases audit fees by 2.5 percent.[13] These statistics support H1 that concentration influences audit fees. The positive effects of concentration on audit fees is consistent with clients having a limited choice of audit service suppliers and audit firms having greater market power in concentrated audit markets (GAO 2003, 2008; U.S. Department of Treasury 2008; European Commission 2010; House of Lords 2011). This increased market power reduces auditors' fear of client loss and allows them to charge higher fees, consistent with Gettler (2004), Chi (2006), and Asthana et al. (2009).

Audit Market Concentration and Client Earnings Quality

We evaluate H2 by examining a statistical property of audited client earnings, that is, the absolute value of discretionary accruals ($|DACC|$), to infer audit quality (Kallapur et al. 2010; Chen et al. 2011; Francis et al. 2013). Audit quality is deemed to be higher when clients have better earnings quality (a smaller absolute value of discretionary accruals) (Jones 1991; Burgstahler and Dichev 1997; Frankel, Johnson, and Nelson 2002; Graham, Harvey, and Rajgopal 2005). To investigate the association between audit market concentration and earnings quality, we estimate the following earnings quality model as in Chen et al. (2011):

$$\begin{aligned}|DACC| = {} & \beta_0 + \beta_1 CON + \beta_2 LNMV + \beta_3 BM + \beta_4 DA + \beta_5 BETA + \beta_6 CFO + \beta_7 TWOLOSS + \beta_8 OWNER + \beta_9 BDIND \\ & + \beta_{10} BIG4 + \beta_{11} LOCAL + \beta_{12} SPFIRM + \beta_{13} SPCPA + \beta_{14} FIRMTENURE + \beta_{15} CPATENURE \\ & + \beta_{16} CROSSLIST + \beta_{17} STATE + \beta_{18} ISSUEB + \beta_{19} ISSUEH + \beta_{20} CMI + \beta_{21} GDI + \beta_{22} LEI + Exchange \\ & + Year + Industry + \varepsilon. \end{aligned} \tag{2}$$

The dependent variable is the absolute value of discretionary accruals ($|DACC|$). *DACC* is measured as the residual from the modified Jones model, adjusted by controlling for operating performance (*ROA*) (Kothari, Leone, and Wasley 2005).

$$TACC = \beta_1 INVERSETA + \beta_2 \Delta REV + \beta_3 PPE + \beta_4 ROA + \varepsilon. \tag{3}$$

Equation (3) is estimated for each year and industry. The estimates of β_1, β_2, β_3, and β_4 derived are then used to calculate *DACC* as the actual value of *TACC* minus the predicted value of *TACC*. *TACC* is total accruals calculated as net income before extraordinary items less cash flow from operations, divided by beginning total assets. *INVERSETA* is 1 divided by beginning total assets. ΔREV is the change in revenues divided by beginning total assets. *PPE* is gross property, plant, and equipment, divided by beginning total assets. *ROA* is net income divided by beginning total assets. The change in receivables (ΔREC) is subtracted from the change in revenues (ΔREV) when deriving the predicted value of *TACC*.

We control for client characteristics including market value of equity (*LNMV*), book-to-market ratio (*BM*), debt ratio (*DA*), systematic risk (*BETA*), operating cash flow (*CFO*), consecutive losses (*TWOLOSS*), ownership of ultimate controller (*OWNER*), and independent directorship (*BDIND*). Cross-listing status (*CROSSLIST*) is controlled, because cross-listed clients have to comply with foreign exchange requirements (Hail and Leuz 2009). Other variables are defined as in the audit fee model.

As reported in Table 4 earlier, *TOP4SHARE, TOP4HHI,* and *ALLHHI* are all negatively and significantly related to $|DACC|$, suggesting that audit market concentration has a significant positive overall effect on client earnings quality. The significant results may result from the neglect of control variables, so we move to the regression results.

Table 6 presents the regression results of client earnings quality on audit market concentration. The explanatory power of our earnings quality models is comparable to those reported in the prior studies. In addition, the coefficients of many control variables are in the same direction as in previous studies. Specifically, clients with a lower book-to-market ratio (*BM*), higher debt ratio (*DA*), lower operating cash flow (*CFO*), non-state ultimate controller (*STATE*), shorter audit firm tenure (*FIRMTENURE*), and no issuance of B shares (*ISSUEB*) have poorer earnings quality. For the explanatory variables of interest,

[11] $(1.00 - 0.83) * [\exp(0.069) - 1] = 1.2$ percent.
[12] $(0.75 - 0.32) * [\exp(0.058) - 1] = 2.6$ percent.
[13] $(0.75 - 0.23) * [\exp(0.046) - 1] = 2.5$ percent.

TABLE 6

Regression Results of Client Earnings Quality on Audit Market Concentration

	Model 1		Model 2		Model 3	
	Dependent Variable					
	|*DACC*|		|*DACC*|		|*DACC*|	
Variable	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Intercept	−0.013	0.580	−0.013	0.570	−0.012	0.584
TOP4SHARE	0.003	0.626				
TOP4HHI			0.003	0.150		
ALLHHI					0.003	0.200
LNMV	0.003	0.003	0.003	0.003	0.003	0.003
BM	−0.023	< 0.001	−0.023	< 0.001	−0.023	< 0.001
DA	0.036	< 0.001	0.036	< 0.001	0.036	< 0.001
BETA	−0.001	0.704	−0.001	0.707	−0.001	0.706
CFO	−0.041	0.005	−0.041	0.004	−0.041	0.004
TWOLOSS	−0.001	0.738	−0.001	0.752	−0.001	0.749
OWNER	0.024	< 0.001	0.024	< 0.001	0.024	< 0.001
BDIND	0.003	0.300	0.004	0.291	0.004	0.292
BIG4	−0.003	0.286	−0.003	0.303	−0.003	0.302
LOCAL	0.003	0.052	0.003	0.061	0.003	0.060
SPFIRM	−0.005	0.035	−0.005	0.033	−0.005	0.034
SPCPA	0.008	0.011	0.008	0.011	0.008	0.011
FIRMTENURE	−0.001	0.003	−0.001	0.003	−0.001	0.003
CPATENURE	0.000	0.930	0.000	0.953	0.000	0.951
CROSSLIST	−0.009	0.148	−0.009	0.131	−0.009	0.134
STATE	−0.008	< 0.001	−0.008	< 0.001	−0.008	< 0.001
ISSUEB	−0.006	0.010	−0.006	0.011	−0.006	0.011
ISSUEH	−0.004	0.419	−0.004	0.408	−0.004	0.406
CMI	0.000	0.287	0.000	0.302	0.000	0.292
GDI	0.000	0.516	0.000	0.468	0.000	0.466
LEI	0.001	0.143	0.001	0.113	0.001	0.108
Year Effect	Controlled		Controlled		Controlled	
Industry Effect	Controlled		Controlled		Controlled	
Exchange Effect	Controlled		Controlled		Controlled	
Clustering Effect	Firm-Year		Firm-Year		Firm-Year	
Adjusted R^2	9.30%		9.32%		9.31%	
Observations	12,334		12,334		12,334	

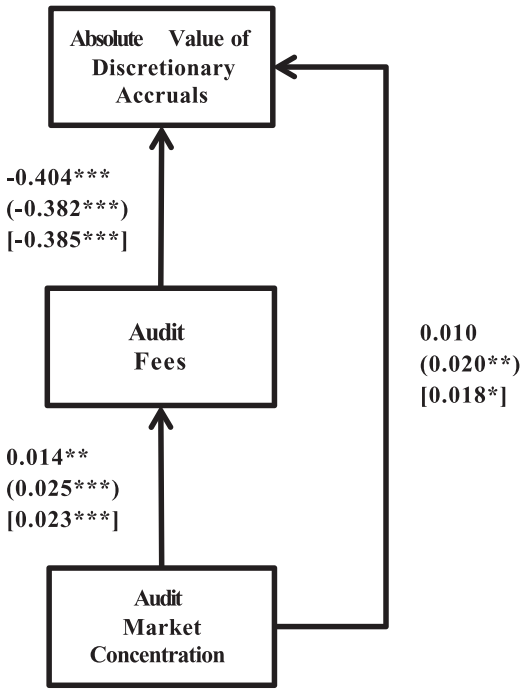
The dependent variable is the absolute value of discretionary accruals (|*DACC*|), and the explanatory variables of interest are *TOP4SHARE, TOP4HHI,* and *ALLHHI*. *TOP4SHARE* is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. All the continuous variables are winsorized at 1 percent and 99 percent. Firm-year clustering effects are controlled (Gow et al. 2010). All p-values are two-tailed.
See Appendix A for variable definitions.

the coefficients of *TOP4SHARE, TOP4HHI,* and *ALLHHI* are positive but insignificant at the conventional level, suggesting that audit market concentration has no significant overall effect on client earnings quality. Thus, our H2 is not supported.

To test our H3 that audit market concentration influences audit quality indirectly through audit fees, we utilize path analysis to decompose the correlation between the source variable, concentration, and the outcome variable, audit quality, into direct and indirect paths.[14] Figure 1 shows the paths among audit market concentration, audit fees, and client earnings quality.

[14] The primary path analysis we use is recursive (all the paths flow in one direction) and consists of manifest variables. See more details in Bhattacharya, Ecker, Olsson, and Schipper (2012).

FIGURE 1
Paths among Audit Market Concentration, Audit Fees, and Client Earnings Quality



***, **, * Denotes the significance at the 0.01, 0.05, and 0.10 levels, respectively (two-tailed).

Audit market concentration is measured as *TOP4SHARE, TOP4HHI,* or *ALLHHI*. Audit fees are measured as the natural logarithm of audit fees earned. Client earnings quality is measured as the absolute value of discretionary accruals. The coefficient on the upper side is the results based on *TOP4SHARE,* followed by *TOP4HHI* and *ALLHHI*.

We continue to control for the determinants of audit fees and client earnings quality in our path analysis, and allow concentration to influence client earnings quality directly as well as indirectly through audit fees.

The results are shown in Table 7. In regard to the model fitness, goodness-of-fit index (GFI), Bentler comparative fit index (CFI), and Bentler-Bonett normed fit index (NFI) are all higher than 0.9, supporting that our model is well constructed.[15] Consistent with previous findings, path analysis suggests that audit market concentration has an insignificant overall effect on client earnings quality. Interestingly, we find that concentration has a significant and positive direct effect on $|DACC|$ in two of three models, supporting the notion that concentration results in poor audit quality through auditor overconfidence and complacency. Moreover, we find a significant and negative indirect association between concentration and $|DACC|$. The path analysis indicates that concentration increases audit fees and such increases in turn improve earnings quality. This suggests that when the audit market becomes more concentrated, auditors with increased market power become less lenient with clients and can charge higher fees to devote more resources and efforts to audit tasks, leading to higher audit quality. Therefore, our H3 is supported.

Audit Market Concentration and Audit Opinions

Using audit opinions as another proxy of audit quality, we follow Chen et al. (2010) and Chen et al. (2011) to construct the following logistic regression model for estimation:

[15] Our model is constructed based on prior studies and is theoretically justified.

TABLE 7

Direct and Indirect Effects of Audit Market Concentration on Client Earnings Quality

	Model 1		Model 2		Model 3	
	Dependent Variable					
	$\|DACC\|$		$\|DACC\|$		$\|DACC\|$	
	Concentration Measure					
	TOP4SHARE		*TOP4HHI*		*ALLHHI*	
Effect	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Total Effect	0.004	0.670	0.010	0.275	0.009	0.355
Direct Effect	0.010	0.307	0.020	0.029	0.018	0.058
Indirect Effect	−0.006	0.033	−0.010	< 0.001	−0.009	0.000
CON −> *LNAF*	0.014	0.032	0.025	< 0.001	0.023	0.000
LNAF −> $\|DACC\|$	−0.404	< 0.001	−0.382	< 0.001	−0.385	< 0.001
Controls of *LNAF*	Included		Included		Included	
Controls of $\|DACC\|$	Included		Included		Included	
Goodness-of-Fit Index	0.997		0.997		0.997	
Bentler Comparative Fit Index	0.997		0.997		0.997	
Bentler-Bonett Normed Fit Index	0.997		0.997		0.997	
Observations	12,334		12,334		12,334	

The dependent variable is the absolute value of discretionary accruals ($|DACC|$), and the explanatory variables of interest are *TOP4SHARE, TOP4HHI,* and *ALLHHI*. *TOP4SHARE* is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. The mediating variable is the natural logarithm of audit fees (*LNAF*). All the continuous variables are winsorized at 1 percent and 99 percent. All p-values are two-tailed.
See Appendix A for variable definitions.

$$OPMAO = \beta_0 + \beta_1 CON + \beta_2 LagOPMAO + \beta_3 LNMV + \beta_4 QUICK + \beta_5 RECTA + \beta_6 INVTA + \beta_7 DA + \beta_8 TURNOVER + \beta_9 ROA + \beta_{10} LOSS + \beta_{11} AGE + \beta_{12} ADJRET + \beta_{13} BETA + \beta_{14} STDRET + \beta_{15} EM + \beta_{16} BM + \beta_{17} OWNER + \beta_{18} BDIND + \beta_{19} BIG4 + \beta_{20} LOCAL + \beta_{21} SPFIRM + \beta_{22} SPCPA + \beta_{23} CIFIRM + \beta_{24} CICPA + \beta_{25} FIRMSIZE + \beta_{26} CPASIZE + \beta_{27} STATE + \beta_{28} ISSUEB + \beta_{29} ISSUEH + \beta_{30} CMI + \beta_{31} GDI + \beta_{32} LEI + Exchange + Year + Industry + \varepsilon. \quad (4)$$

OPMAO is coded 1 when a client receives an unqualified opinion with explanatory notes, qualified, disclaimer, or an adverse audit opinion, and 0 when they receive a clean unqualified opinion. In addition to some variables controlled in the audit fee and the earnings quality models, we further control for quick ratio (*QUICK*), sales turnover (*TURNOVER*), an indicator of reporting net loss (*LOSS*), earnings management incentives (*EM*), audit firm size (*FIRMSIZE*), and audit partner size (*CPASIZE*).

As reported earlier in Table 4, the Pearson correlation between audit market concentration and the propensity for auditors to issue modified audit opinions (*OPMAO*) is significantly negative (*TOP4HHI* and *ALLHHI*). This suggests that auditors are less likely to issue modified audit opinions when the audit market becomes more concentrated. Given the previous result that earnings quality improves when the audit market is concentrated, we interpret the negative association between concentration and modified audit opinions as indicating that when the audit market is concentrated, it is less necessary for auditors to issue modified audit opinions due to the enhanced earnings quality.

Table 8 provides the regression results of modified audit opinions on audit market concentration. Our audit opinion models have significant explanatory power with the pseudo R^2 comparable to that in the prior literature. As in previous studies (Chen et al. 2010; Chen et al. 2011), clients with a modified audit opinion in the previous year (*LagOPMAO*), higher debt ratio (*DA*), lower sales turnover (*TURNOVER*), poorer operating performance (*ROA*), net loss (*LOSS*), poorer stock performance (*ADJRET*), stronger earnings management incentives (*EM*), lower book-to-market ratio (*BM*), higher client importance to audit

TABLE 8

Regression Results of Modified Audit Opinions on Audit Market Concentration

	Model 1		Model 2		Model 3	
	Dependent Variable					
	OPMAO		*OPMAO*		*OPMAO*	
Variable	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Intercept	1.988	0.326	1.700	0.392	1.702	0.391
TOP4SHARE	−0.472	0.272				
TOP4HHI			−0.173	0.379		
ALLHHI					−0.164	0.351
LagOPMAO	2.921	< 0.001	2.922	< 0.001	2.921	< 0.001
LNMV	−0.303	0.001	−0.306	0.000	−0.306	0.000
QUICK	0.059	0.363	0.058	0.376	0.058	0.377
RECTA	0.496	0.465	0.482	0.479	0.482	0.478
INVTA	−1.946	< 0.001	−1.941	< 0.001	−1.941	< 0.001
DA	1.956	< 0.001	1.946	< 0.001	1.947	< 0.001
TURNOVER	−0.318	0.019	−0.318	0.019	−0.318	0.019
ROA	−4.112	< 0.001	−4.104	< 0.001	−4.105	< 0.001
LOSS	1.136	< 0.001	1.138	< 0.001	1.138	< 0.001
AGE	−0.004	0.814	−0.004	0.818	−0.005	0.811
ADJRET	−0.490	0.000	−0.490	0.000	−0.490	0.000
BETA	0.189	0.272	0.186	0.280	0.186	0.279
STDRET	0.092	0.403	0.088	0.422	0.088	0.421
EM	0.535	< 0.001	0.532	< 0.001	0.533	< 0.001
BM	−0.589	0.020	−0.595	0.019	−0.594	0.019
OWNER	−0.545	0.126	−0.536	0.132	−0.538	0.131
BDIND	−0.248	0.340	−0.247	0.343	−0.248	0.340
BIG4	0.087	0.757	0.098	0.727	0.097	0.730
LOCAL	−0.051	0.644	−0.046	0.677	−0.046	0.679
SPFIRM	−0.015	0.947	−0.006	0.978	−0.008	0.972
SPCPA	0.040	0.886	0.040	0.884	0.040	0.885
CIFIRM	−0.691	0.605	−0.758	0.571	−0.754	0.573
CICPA	1.126	0.094	1.156	0.085	1.152	0.086
FIRMSIZE	0.000	0.550	0.000	0.539	0.000	0.540
CPASIZE	0.000	0.841	0.000	0.861	0.000	0.856
STATE	−0.159	0.164	−0.160	0.162	−0.161	0.161
ISSUEB	0.296	0.136	0.313	0.113	0.309	0.117
ISSUEH	0.497	0.168	0.473	0.188	0.479	0.184
CMI	0.036	0.241	0.033	0.281	0.033	0.273
GDI	−0.075	0.131	−0.076	0.128	−0.075	0.132
LEI	0.112	0.019	0.122	0.009	0.119	0.011
Year Effect	Controlled		Controlled		Controlled	
Industry Effect	Controlled		Controlled		Controlled	
Exchange Effect	Controlled		Controlled		Controlled	
Clustering Effect	Firm-Year		Firm-Year		Firm-Year	
Pseudo R^2	56.58%		56.58%		56.58%	
Observations	12,334		12,334		12,334	

The dependent variable is the issuance of modified audit opinions (*OPMAO*), and the explanatory variables of interest are *TOP4SHARE, TOP4HHI,* and *ALLHHI*. *TOP4SHARE* is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. All the continuous variables are winsorized at 1 percent and 99 percent. Firm-year clustering effects are controlled (Gow et al. 2010). All p-values are two-tailed.

See Appendix A for variable definitions.

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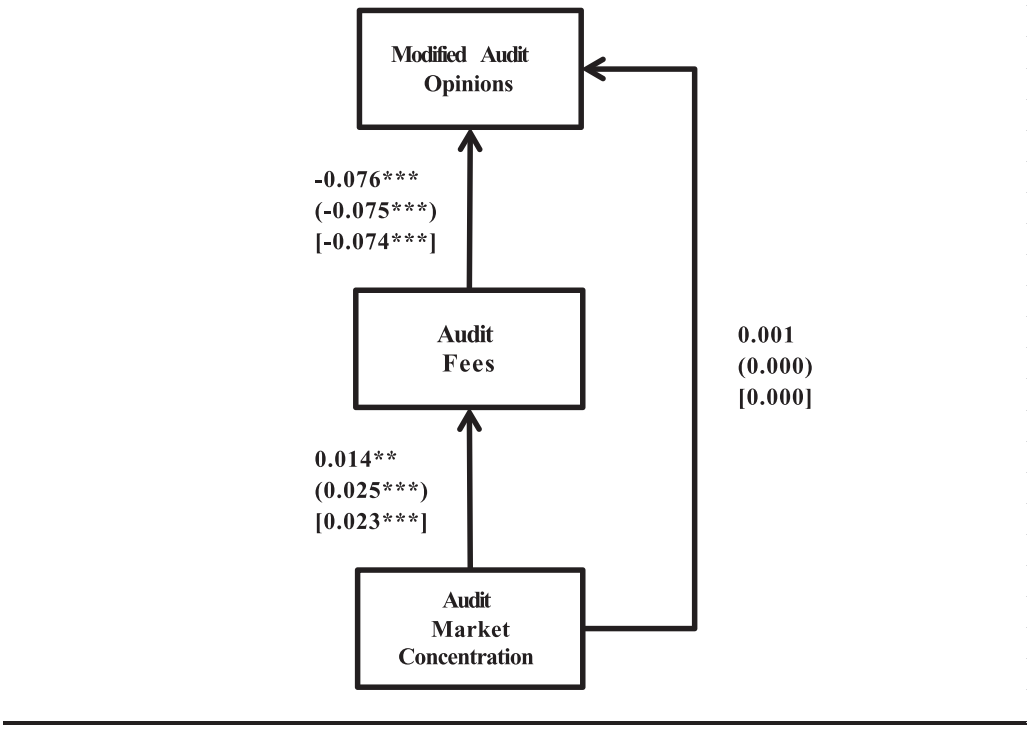
FIGURE 2
Paths among Audit Market Concentration, Audit Fees, and Modified Audit Opinions



***, **, * Denotes the significance at the 0.01, 0.05, and 0.10 levels, respectively (two-tailed).

Audit market concentration is measured as *TOP4SHARE, TOP4HHI,* or *ALLHHI*. Audit fees are measured as the natural logarithm of audit fees earned. Modified audit opinions are coded one when a client receives an unqualified opinion with explanatory notes, qualified, disclaimer, or an adverse audit opinion, and zero when they receive a clean unqualified opinion. The coefficient on the upper side is the results based on *TOP4SHARE,* followed by *TOP4HHI* and *ALLHHI*.

partners (*CICPA*), and higher litigation risks (*LEI*) are more likely to receive a modified audit opinion. For our explanatory variables of interest, none of our concentration measures is significant, suggesting an insignificant overall effect of concentration on the issuance of modified audit opinions.

We further consider the situation that audit market concentration would influence audit opinions through audit fees in the path analysis, after controlling for the determinants of audit fees and modified audit opinions. Figure 2 reports the paths among audit market concentration, audit fees, and modified audit opinions. In particular, we allow concentration to influence audit opinions through audit fees.

The results of the path analysis are presented in Table 9. GFI, CFI, and NFI are higher than 0.9, which suggests that our models have suitable fitness. Path analysis indicates that audit market concentration has insignificant overall and direct effects on the issuance of modified audit opinions. More importantly, we find a significant negative indirect correlation between concentration and modified audit opinions. Combined with the results reported in Table 7, the path analysis indicates that in concentrated audit markets auditors have greater market power and lower cost of telling the truth and can charge higher audit fees to devote more resources and efforts to the audits that they carry out. As a result, client earnings quality improves and the need for auditors to issue modified audit opinions decreases.[16]

[16] Prior studies document that client earnings quality influences audit opinion decisions (Francis and Krishnan 1999; C. Chen, S. Chen, and Su 2001; Chen et al. 2010; Chen et al. 2011; Firth et al. 2012). Thus, we also allow concentration to influence the issuance of modified audit opinions through audit fees and client earnings quality. Our results (untabulated) indicate a significant and negative indirect effect of concentration on the issuance of modified audit opinions.

TABLE 9

Direct and Indirect Effects of Audit Market Concentration on Modified Audit Opinions

	Model 1		Model 2		Model 3	
	Dependent Variable					
	OPMAO		*OPMAO*		*OPMAO*	
	Concentration Measure					
	TOP4SHARE		*TOP4HHI*		*ALLHHI*	
Effect	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
Total Effect	0.000	0.991	−0.002	0.868	−0.001	0.889
Direct Effect	0.001	0.929	0.000	0.976	0.000	0.973
Indirect Effect	−0.001	0.046	−0.002	0.001	−0.002	0.002
CON −> LNAF	0.014	0.032	0.025	< 0.001	0.023	0.000
LNAF −> OPMAO	−0.076	< 0.001	−0.075	< 0.001	−0.074	< 0.001
Controls of *LNAF*	Included		Included		Included	
Controls of *OPMAO*	Included		Included		Included	
Goodness-of-Fit Index	0.987		0.987		0.986	
Bentler Comparative Fit Index	0.944		0.944		0.943	
Bentler-Bonett Normed Fit Index	0.944		0.944		0.943	
Observations	12,334		12,334		12,334	

The dependent variable is the issuance of modified audit opinions (*OPMAO*), and the explanatory variables of interest are *TOP4SHARE, TOP4HHI,* and *ALLHHI*. *TOP4SHARE* is the market share of audit fees from listed clients held by the top 4 audit firms in city-year groupings. *TOP4HHI* is the Herfindahl index, computed as the sum of the squares of each top 4 audit firm's market share of audit fees earned from listed clients within city-year groupings. *ALLHHI* is the Herfindahl index, computed as the sum of the squares of each audit firm's market share of audit fees earned from listed clients within city-year groupings. The mediating variable is the natural logarithm of audit fees (*LNAF*). All the continuous variables are winsorized at 1 percent and 99 percent. All p-values are two-tailed.
See Appendix A for variable definitions.

Audit Market Concentration and Sanctions

In the previous section we find that audit market concentration reduces the propensity for auditors to issue modified audit opinions through increased audit fees. An alternative explanation is that the increase in audit fees in concentrated audit markets increases client importance and makes auditors lose their independence, resulting in lower likelihood of issuing modified audit opinions and thus poorer audit quality. However, if a concentrated audit market results in a widespread increase in audit fees, then the client importance of a specific client should not change. Therefore, increased audit fees due to concentration are less likely to reduce audit quality through increased client importance. Furthermore, if auditors become less independent and less likely to issue modified audit opinions in concentrated audit markets, then auditors and clients are more likely to be sanctioned for problematic financial statements and audits. To investigate this possibility, we replace the dependent variable in Equation (4) with an indicator of sanction and estimate the following logistic regression model:

$$\begin{aligned} SANCTION = {} & \beta_0 + \beta_1 CON + \beta_2 LNMV + \beta_3 QUICK + \beta_4 RECTA + \beta_5 INVTA + \beta_6 DA + \beta_7 TURNOVER + \beta_8 ROA \\ & + \beta_9 LOSS + \beta_{10} AGE + \beta_{11} ADJRET + \beta_{12} BETA + \beta_{13} STDRET + \beta_{14} EM + \beta_{15} BM + \beta_{16} OWNER \\ & + \beta_{17} BDIND + \beta_{18} BIG4 + \beta_{19} LOCAL + \beta_{20} SPFIRM + \beta_{21} SPCPA + \beta_{22} CIFIRM + \beta_{23} CICPA \\ & + \beta_{24} FIRMSIZE + \beta_{25} CPASIZE + \beta_{26} STATE + \beta_{27} ISSUEB + \beta_{28} ISSUEH + \beta_{29} CMI + \beta_{30} GDI \\ & + \beta_{31} LEI + Exchange + Year + Industry + \varepsilon. \end{aligned} \quad (5)$$

SANCTION equals 1 if a client or its auditors are sanctioned for problematic financial statements and audits by the CSRC, and 0 otherwise.[17] All other variables are defined before. In our sample, around 2 percent of observations are sanctioned for problematic audits.

[17] As in Chen et al. (2010), the sanctions relate to the firm-year in which the problem occurred, not the year of detection or announcement. Our results remain consistent when we focus on the sanctions announced within two years.

Untabulated results, consistent with Chen et al. (2010), indicate that clients with more volatile stock returns during the year (*STDRET*) are more likely to be sanctioned. In addition, the probability of sanctioned audit failures are significantly higher for clients with lower inventories (*INVTA*), higher debt ratio (*DA*), lower sales turnover (*TURNOVER*), net loss (*LOSS*), younger age (*AGE*), poorer stock performance (*ADJRET*), and fewer independent board directors (*BDIND*). Interestingly, state-owned enterprises (*STATE*) and clients audited by local auditors (*LOCAL*) are less likely to be sanctioned. For our explanatory variables of interest, we find a significant negative association between concentration and sanctioned audit failures in two of three models (*TOP4HHI* and *ALLHHI*).

We further examine the possibility that audit market concentration would influence sanctioned audit failures through audit fees and client earnings quality, after controlling for the determinants of audit fees, earnings quality, and sanctions. In particular, we allow concentration to influence sanctions through audit fees and client earnings quality.

Untabulated results of our path analysis indicate that audit market concentration (*TOP4SHARE, TOP4HHI,* and *ALLHHI*) has insignificant overall and direct effects on sanctions. Moreover, we find a significant and negative indirect correlation between concentration and sanctions. Thus, the path analysis suggests that concentration increases audit fees and client earnings quality, which in turn reduces the likelihood of sanctioned audit failures. This evidence is important and consistent with previous findings that the increases in audit fees when audit markets become more concentrated result in better client earnings quality and a reduction in the need for auditors to issue modified audit opinions.

CONCLUSIONS

We investigate the effects of audit market concentration on audit fees and audit quality in China, and further examine the indirect influences of concentration on audit quality through audit fees. Although there are differences in institutions and audit market characteristics between China and other countries (Ball et al. 2003; Leuz, Nanda, and Wysocki 2003), we provide relevant information to the regulators with the evidence from a country where audit markets are competitive and where sound institutions have not yet been established. We show that concentration has a significant positive indirect effect on audit quality through increased audit fees, which offsets the opposing negative effect, leading to an insignificant overall effect of concentration on audit quality. Specifically, concentration increases audit fees in China, which in turn improve client earnings quality and decrease the need for auditors to issue modified audit opinions. Supporting this argument, additional analysis suggests that increased audit fees and client earnings quality in concentrated audit markets are related to a decreased likelihood of executives and auditors being sanctioned for audit failures. These results suggest that concentration gives auditors greater market power and reduces their cost of telling the truth, allowing them to charge higher audit fees to devote more resources and efforts to the audit process. As a result, audit quality improves indirectly.

This study is important given the continued concerns expressed by global regulators about the potential harm to audit quality caused by concentrated audit markets (GAO 2003, 2008; The American Assembly 2005; Oxera 2006, 2007; U.S. Treasury 2006, 2008). Our results suggest that concentration indirectly enhances audit quality by increasing audit fees, supporting the concerns about severe price competition in China expressed by the Chinese government. In particular, the results of path analysis lend support to the recent reforms by the Chinese government to standardize audit pricing with the aim of deterring price competition. However, our analysis suggests that the governmental intervention should not set an upper bound in price, which would break down the benefits from increased concentration.

This paper provides valuable insights into the recent debate on audit market concentration, and should be of interest to global regulators in developed as well as developing countries. The separation of the offsetting direct and indirect effects of concentration on audit quality enhances our understanding of how concentration influences audit quality and could explain why the previous studies document mixed evidences. This study is informative to global regulators in making decisions against concentration. Our results suggest that audit fees play an important role in the association between concentration and audit quality and that regulatory interventions changing one of the offsetting effects could produce potential unintended consequences.

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