# Does Audit Market Competition Matter to Investors? Evidence from Cost of Bank Financing*

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December 2, 2019

**Abstract**

This paper studies the effect of audit market competition on the clients' cost of bank loans. Exploiting the demise of Arthur Andersen, which differently reduced the local audit market competition of metropolitan statistical areas (MSAs), we find that auditor competition increases the cost of bank loans of auditors' client firms. Further analysis indicates that this effect is more pronounced when external monitoring with respect to financial reporting is weaker and when a client is more economically important to its auditor. The findings are consistent with the auditor-client conflict of interest hypothesis.

Keywords: Auditor Competition; Cost of Bank Loans; Conflict of interests; Audit Quality

JEL Classification: D43, G21, M43, M49

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*We thank Jennifer Blouin, Brian Bushee, Wayne Guay, Thomas Ruchti (discussant), Xiaolu Xu (discussant), Yongxin Xu, Minlei Ye, Ronghuo Zheng (discussant), and the workshop participants from the Wharton School, University of Pennsylvania, Tsinghua International Corporate Governance Conference (2018), Hawaii Accounting Research Conference (2019), the 2019 FARS conference, FMCG conference (2019) for helpful comments. We thank Xiaoran Cao for assisting in the data collection. Frank Zhou gratefully acknowledges the financial support from Dean's Research Fund of the Wharton School of the University of Pennsylvania. All errors are our own.

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# 1 Introduction

Auditors are crucial in ensuring the proper functioning of the capital market through verifying the integrity of firm financial reporting. Improper accounting imposes significant costs on both shareholders and the economy by distorting resource allocation and household investments (e.g. Leuz and Wysocki, 2016; Breuer, 2018). However, highly concentrated audit markets in the United States and worldwide have raised concerns among regulators and market participants about the lack of auditor competition and its potential harms (e.g., Government Accountability Office, 2008; Harris, 2017; The Economist, 2017; Financial Times, 2016).[1] Radical proposals, including breaking up the Big Four, have been mooted in some jurisdictions (Financial Times, 2018). Despite the intuitive appeal of these concerns, empirical findings on the relation between audit market competition and audit quality are inconclusive. Whether competition among auditors has economic consequences on the client firms (e.g., whether it affects clients' financing cost) also remains an open question. DeFond and Zhang (2014) thus call for more evidence on the effect of auditor competition.

This study offers new insights by investigating how auditor competition affects audit quality perceived by investors, as measured by clients' cost of bank loans. Examining the cost of bank loans offers three main benefits. First, it suits our interest in gauging the *overall economic effect* of auditor competition. Cost of bank loans better captures the net cost or benefit associated with changes in audit quality, relative to other output-based measures, such as discretionary accruals and restatements (DeFond and Zhang, 2014), and is less subject to measurement errors than the cost of equity (Easton and Monahan, 2005).[2] Moreover, cost of bank loans is economically significant for client firms. Syndicated loans, which we focus on, are an important source of financing for public firms (Wittenberg-Moerman, 2008). A small change in loan spread can have a huge impact on client firms and financial markets (Francis et al., 2016). Finally, cost of bank loans and financial reporting quality are closely related: Higher quality financial reporting reduces the cost of debt, because it mitigates information asymmetry between borrowers and lenders and facilitates better

[1] For example, in the United States, the top four accounting firms, the Big Four, collectively accounted for 93.6% of market share in terms of audit fees as of 2017.

[2] Easton and Monahan (2005) document that cost of equity is subject to the mis-specification of the equilibrium asset pricing model. It is also unclear whether changes in audit quality *induced by auditor competition* would necessarily generate nondiversifiable risk and manifest in the cost of equity.

screening and monitoring (Graham et al., 2008; Kim et al., 2011). The close relation between financial reporting quality and cost of bank loans allows us to detect a change in audit quality through loan spreads.

The effects of auditor competition on audit quality can be governed by two competing hypotheses. According to the classical competition hypothesis, as supported by oligopoly competition models (e.g., Mussa and Rosen, 1978), more competition should increase audit quality and reduce the cost of bank loans. Specifically, facing more competition, auditors are incentivized to invest in additional technology and work harder to improve audit quality, as doing so allows them to retain clients who value high-quality audits. Greater auditor competition can also facilitate clients switching auditors, which can reduce entrenchment and increase audit quality (Government Accountability Office, 2008).

The conflict of interest hypothesis, in contrast, predicts that audit market competition increases the cost of bank loans, due to an important institutional feature of the audit market: auditors are paid by their clients. As competition intensifies, conflicts of interests between auditors and clients can induce auditors to become more lenient with their clients' financial reporting, which compromises audit quality (e.g., Chen et al., 2016). Anticipating the potential erosion of audit quality, lenders, for their part, may charge higher interest rates ex ante to compensate for the lower audit quality. As theories provide mixed predictions, how audit market competition affects the cost of bank loans is an empirical question.

We empirically investigate this question by examining audit market competition at the level of metropolitan statistical areas (MSAs).[3] Prior evidence primarily relies on cross-sectional variation in auditor competition (e.g., the Herfindahl index) for identification, which creates significant endogeneity issues. Specifically, omitted variables, such as local economic conditions and auditor and client characteristics, might influence both audit quality and auditor competition. For example, audit quality is generally higher in more developed areas with greater growth opportunities and corporate governance, where many auditors also set up offices and compete. These local endogenous variables, such as growth opportunities, can be difficult to measure and control properly in

[3] Studies indicate that auditors compete locally, because of their decentralized operations through a network of semi-autonomous local engagement offices (e.g., Reynolds and Francis, 2000).

a regression model. To control for such local endogenous factors, prior studies attempt to include MSA fixed effects. But including MSA fixed effects only works, when the local endogenous variables do not vary with time.

To overcome the endogeneity concerns, we exploit shocks to local audit market competition stemming from the demise of Arthur Andersen (AA) in 2002. AA was a top five audit firm and surrendered its license in 2002 because of its involvement in the Enron accounting scandal. Since eliminating a big auditor increased the supply of clients to the remaining auditors, AA's collapse sharply reduced competition among them (e.g., Feldman, 2006; Kohlbeck et al., 2008; DeFond and Zhang, 2014; Gerakos and Syverson, 2015). A larger AA local market share, which means a greater supply of AA clients to the remaining auditors in the local market, is on average associated with a more significant reduction in the level of local audit market competition.[4] We exploit this spatial variation in the changes in local audit market competition in a generalized difference-in-differences research design. Specifically, we compare changes in clients' cost of bank loans in MSAs where AA had a larger share in the pre-collapse year (*treated*, a larger decrease in competition) with those in MSAs where AA had a smaller share (*control*, a smaller decrease in competition). We eliminate AA's former clients from the research sample, as they are directly influenced by AA's demise in addition to changes in auditor competition.

The difference-in-differences results indicate that higher auditor competition increases the cost of bank loans, which supports the conflict of interest hypothesis. Specifically, client firms that experienced a larger *decrease* in competition receive a *lower* cost of bank loans by 8.6% (about 12.1 basis points) after AA's demise, relative to the control group. Consistent with greater auditor competition reducing audit quality, we find that greater auditor competition increases discretionary accounting accruals and, to a lesser extent, the incidence of restatements.

Our identification strategy presumes that the treatment and control groups follow parallel trends in their cost of bank loans. We validate this presumption graphically and then demonstrate that our results are not driven by differences between the two groups regarding trends in their industry and local economic conditions, bank credit supply channels, and the indirect effects of audit fee

[4]Consistent with prior studies showing a decrease in audit market competition after AA's collapse, we find that a higher AA market share in the pre-collapse year is associated with a more concentrated audit market and higher audit fees.

changes on audit quality.

As the collapse of AA brought about the passage of the Sarbanes-Oxley Act of 2002 (SOX), we also examine whether the law's enactment drives our findings. This will be the case if the effects of SOX on the audit quality of *non-AA clients* systematically vary with *AA's market share*. Specifically, we investigate the possibilities that AA's market share may relate to i) the pre-SOX audit quality level and the characteristics of non-AA clients, which are associated with the effects of SOX; ii) changes in the regulatory scrutiny of non-AA clients; iii) the exits of small auditors from the local audit markets (DeFond and Lennox, 2011); and iv) the portfolio rebalancing by the remaining Big 4 auditors that removed misaligned clients (Landsman et al., 2009). A battery of tests, combined with studies of AA's collapse, suggest that our results are not driven by the effects of SOX through these channels.

To provide additional evidence on the conflict of interest hypothesis, we explore the heterogeneous effects of auditor competition along two dimensions. The first concerns the economic importance of a client to its auditor. Facing fiercer competition, auditors are more likely to compromise audit quality when the clients are more economically important, because losing these clients hurts the auditor's revenue more. Consistent with this argument, we find that the effect of auditor competition on the cost of bank loans is larger when the client constitutes a higher proportion of the auditor's fee revenue.

The second dimension explores external monitoring. Strong monitoring deters auditor opportunism, as it increases the likelihood of detection. Therefore, when external monitoring is high, we expect a change in auditor competition to have less effect on the cost of bank loans. Using institutional ownership to proxy for the strength of monitoring (Cornett et al., 2008), we find evidence consistent with this argument. Overall, the cross-sectional evidence underscores that auditor-client conflicts of interest drive our findings.

Our paper contributes to the debate on the economic consequences of auditor competition. As will be discussed in Section 2, studies document mixed evidence on the relation between auditor competition and quality. Our study differs in two important ways. First, we primarily focus on audit quality perceived by investors, measured with clients' cost of bank loans, as opposed to other output-based measures of audit quality. Doing so allows us to capture the net benefit or cost of auditor competition and evaluate its capital market effects in dollar terms. This is consistent with regulators' concern about the capital market consequences of auditor competition. Second, compared to prior studies, our research design better identifies the causal effect of auditor competition by using the shock of AA's demise, rather than relying on the cross-sectional variation in the Herfindhal index.

Our paper also relates to a broader literature that reveals the dark side of competition in financial markets. Studies in other settings show that competition tends to prompt earnings management (Shleifer, 2004), tax avoidance (Cai and Liu, 2005), and credit rating inflation (Bolton et al., 2012; Becker and Milbourn, 2011). This study complements the literature by providing evidence on an adverse effect of auditor competition on client financing cost, due to lower perceived audit quality. Our findings are consistent with the notion that competition among monitors does not necessarily yield efficient outcomes when the monitors are paid by their clients.

Finally, our study may help inform regulators. We show that more competition can increase clients' financing cost, due to conflicts of interests between clients and their auditors. Therefore, when considering whether to promote competition, regulators should account for clients' and auditors' incentives. It is worth noting, too, that our results would not support arguments for further consolidation in the audit market. Instead, they suggest that, before rolling out new measures to facilitate more auditor competition, a more critical task may be resolving the conflicts of interests between clients and their auditors.

## 2 Related literature

This paper relates closely to studies that examine the effect of audit market competition on audit quality. These studies primarily rely on the Herfindahl index as their measure of competition.[5] However, conclusions regarding its effects significantly differ. For example, Boone et al. (2012) and Francis et al. (2013) document that greater competition improves audit quality, while Kallapur et al. (2010), Dunn et al. (2013), Newton et al. (2013), Huang et al. (2015), Newton et al. (2015), and Eshleman and Lawson (2016) find the opposite. While this mixed evidence may reflect an

[5]Herfindahl index is the sum of squared market shares in a local market. A larger value indicates more concentration. For example, if a market only has one auditor, then the index is equal to one.

ambiguous theoretical relation between audit market competition and audit quality, differences in the empirical designs and audit quality measures can also be potential contributing factors.

First, these studies primarily rely on cross-sectional variation in auditor competition for identification. The difficulty with this design is that differences in auditor competition across MSAs are endogenous to clients, auditors, and local economic factors, which can influence clients' audit quality and cost of bank loans. For example, an audit firm may specialize in a certain industry and have a higher market share in MSAs where the industry is more represented (e.g., Reichelt and Wang, 2010). Economic characteristics related to the regional industry compositions may simultaneously determine local audit market competition and audit quality.

Exhaustively controlling all these endogenous economic variables is difficult. Consistent with this design difficulty, studies often significantly differ in their choice of control variables. They also adopt different fixed effects structure to rule out time-invariant heterogeneities at different dimensions. For example, some studies include industry and year fixed effects, while others include MSA fixed effects. These differences in their empirical designs (e.g. choices in fixed effect structure and control variables) are likely to cause mixed evidence. For example, Eshleman and Lawson (2016) show that a model with MSA fixed effects produces the opposite effect of auditor competition, compared to a model without these fixed effects. Given these concerns about the empirical design, identifying the causal effect of auditor competition thus requires a setting with a sharp change in competition within an MSA that is relatively unrelated to the underlying economics of the local client firms. Our study advances this line of research by exploiting the spatial variation in changes of audit market competition, caused by the demise of Arthur Andersen, in a generalized difference-in-differences design, as will be discussed in Section 5.

Second, prior studies differ in how they measure audit quality. Specifically, the quality measures include incidence of restatement (Dunn et al., 2013) and discretionary accruals (Boone et al., 2012; Francis et al., 2013; Huang et al., 2015), among other factors. However, these measures should not be treated as equal, as they may reflect different dimensions of audit quality (DeFond and Zhang, 2014). For example, discretionary accruals capture small and "within GAAP" earnings manipulation, while restatements capture more egregious accounting issues. Auditor competition may have a larger effect on some dimensions of audit quality than others, which may explain the mixed prior findings. Our paper differs from these studies by using cost of bank loans as our primary dependent variable. As will be discussed in Section 3, cost of bank loans better summarizes all dimensions of audit quality, is less prone to measurement errors, and is strongly tied to audit quality, due to its importance in loan contracting. It also allows us to quantify the competition effect in dollar terms, which provides policymakers a more tangible idea of the economic consequences of auditor competition.

# 3 Hypothesis development

There is a longstanding debate about whether the audit market lacks competitiveness and whether more competition would improve audit quality. Proponents for more competition refer to the fact that the largest four auditors, namely the Big 4, control the majority of the audit market. They argue that such high concentration reduces auditor competition and decreases audit quality. This prediction follows from the classical oligopoly competition theory (e.g., Mussa and Rosen, 1978). When facing greater competition, profit-maximizing auditors are more incentivized to improve audit quality, for example, by investing in new technology and increasing audit hours and staff efficiency, because doing so allows them to retain clients who value high-quality audit service. Greater competition also facilitates auditor switching, which can in turn reduce entrenchment and increase audit quality (Government Accountability Office, 2008).[6]

However, opponents for more audit market competition point out that arguments in favor of more competition ignore the conflicts of interests between auditors and their clients: auditors are paid by the clients they monitor. Greater audit market competition may decrease audit quality when conflicts of interests are factored in. For example, clients receiving audit opinions they deem unsatisfactory can switch to rival auditors. In the presence of intensive competition, auditors may compromise audit quality to retain their clients, especially when their clients exert pressure on

[6]While plausible in theory, studies have found little evidence consistent with the existence of auditor entrenchment. For example, Mansi et al. (2004) and Gul et al. (2009) document a positive association between tenure and audit quality, which is inconsistent with the entrenchment story. In another study, Blouin et al. (2007) failed to find significant changes in audit quality after the clients of Arthur Andersen were forced to switch auditors. This finding is also inconsistent with the entrenchment story, as the entrenchment story implies that forced auditor switching should reduce entrenchment and increase audit quality.

them to do so (e.g., Chen et al., 2016).[7]

In sum, economic theories generate mixed predictions on the effect of audit market competition on audit quality. To investigate this question empirically, we examine the effect of audit market competition on client firms' cost of bank loans. Specifically, we expect that higher competition leads to lower (higher) audit quality, which increases (decreases) the cost of bank loans, according to the conflicts of interest (classical competition) hypothesis. For convenience, we state our hypothesis according to the conflicts of interest hypothesis.

H1: *Auditor competition reduces audit quality and increases clients' cost of bank loans*

Our empirical tests focus on the cost of bank loans for three reasons. First, examining the cost of bank loans suits our interest in gauging the *overall economic effect* of auditor competition, because the measure better captures the net benefit or cost associated with changes in audit quality and summarizes different dimensions of audit quality into a single measure (DeFond and Zhang, 2014). In contrast, as discussed in Section 2, output-based measures, such as restatements and discretionary accruals, capture different dimensions of audit quality and thus may not represent the effect of auditor competition in a holistic manner. Additionally, cost of bank loans is less prone to measurement errors, particularly relative to cost of equity (Easton and Monahan, 2005), as loan spreads are clearly defined in loan contracts.

Second, the cost of bank loans is economically important for publicly listed firms. As an important source of financing, bank loans account for about 54% of total debt (Graham et al., 2008). Syndicated bank loans, which we focus on, are much larger than other types of bank loans (Wittenberg-Moerman, 2008). Therefore, a small change in loan spread can have a huge impact on client firms and financial market at large (Francis et al., 2016). This would be of interest to regulators who concern the capital market effects of audit market competition.

Third, loan pricing relates closely to changes in audit quality. High quality financial reporting

[7]Audit market competition might also change audit fees, which in turn affect audit quality. This study primarily focuses on the direct effect of auditor competition on audit quality. We investigate the indirect effects through audit fees as additional analyses in Section 6.3.

reduces cost of bank loans, as it mitigates information asymmetry between borrowers and lenders and facilitates lenders' screening and monitoring (Graham et al., 2008; Kim et al., 2011). This linkage is even more significant for syndicated loans, which are often traded on the secondary market and are sensitive to the level of information asymmetry (Wittenberg-Moerman, 2008).

## 4 Sample selection

Our sample starts with the Audit Analytics database that includes auditing information of US publicly traded firms from year 2000 and onward. We follow prior studies and define a local audit market as a metropolitan statistical area (MSA).[8] We use the location of the audit engagement office to assign the client firm to an MSA.[9] MSA-years with fewer than five firms are excluded. We next merge the data with Compustat to obtain financial information for client firms. Lastly, we merge the data with the DealScan database that contains bank loan information, using the linking table provided by Chava and Roberts (2008). Our final sample, spanning from 2000 to 2004, consists of 7,065 bank loans facilities that involve 4,402 firm-years, where 3,425 firm-years have necessary firm-level control variables.

Table 1 presents the descriptive statistics for the variables used in our analysis. The average log loan spread is 4.95 (141 basis points), which is close to the one reported by Valta (2012) that uses the same loan data source. Loans differ in their characteristics. Loan issuance size varies over the cross section, with 4.4% of total assets at the 25th percentile and 21.7% of total assets at the 75th percentile. The majority (94.4%) of loans covered by Dealscan are syndicated. The concentration on syndicated loans means that our sample consists of larger borrowers. Firms in our sample generally have high profitability, with an average ROA of 11.7%. The average sample firm has about 31% fixed assets, relative to total assets, a debt-to-market-equity ratio of 0.88, and

[8]Focusing on spatial competition is consistent with other studies that examine audit market competition (e.g., Boone et al., 2012; Newton et al., 2013) and with evidence that auditors practice semi-autonomously in local audit markets (e.g., Reynolds and Francis, 2000). We acknowledge that, besides spatial competition, studies also consider competition in the dimension of industries, due to the industry expertise of auditors (e.g., Numan and Willekens, 2012; Chu et al., 2018). The scope for competition in this study is not narrowed to the industry level, as the effect of audit market competition does not necessarily draw on industry expertise. For example, conflict of interest may be more likely with non-expert auditors, which may have less reputation concerns and be more lenient to clients in their non-specialized industries.

[9]We use the definitions of MSAs published by US Census Bureau in 2000.

a market-to-book ratio of 2.63. They are generally not very risky, with an Altman's Z-score of 1.76. The average misstatement rate is 0.172.

[Insert Table 1.]

Panel C of Table 1 reports MSA-level summary statistics. There are 58 MSAs in our sample. An MSA on average has 39 firms and 75 firm-year observations. Not surprisingly, firms are not evenly distributed across MSAs. The smallest MSA has four firms and eight firm-year observations. The largest has 316 firms and 669 firm-year observations. Arthur Andersen had significant presence in the audit market in 2001, the year prior to its collapse. Its average market share in terms of audit fees is 16.3%. Market concentration, measured by Herfindahl Index (HHI), changes significantly around the collapse year. The average change of HHI, at 0.037, is substantial. According to guidelines of the Federal Trade Commission, a horizontal merger resulting in an increase of HHI by 0.02 in a highly concentrated market will raise significant competitive concerns and be presumed to enhance market power.[10]

## 5 Empirical strategy

To investigate the causal effect of audit market competition, we exploit the demise of Arthur Andersen, which creates spatial variation in the changes in auditor competition across MSAs. Below we discuss this empirical setting and our research design.

### 5.1 The collapse of Arthur Andersen

Our identification strategy exploits the demise of Arthur Andersen (AA) in 2002, which differentially affects auditor competition across MSAs. Specifically, as of 2001, AA was the fifth biggest audit firm in the United States. It surrendered its audit license in 2002, due to its involvement in the Enron accounting scandal. We argue that, *on average*, competition decreases more in local audit markets with a larger AA market share, because more clients became available for the remaining

[10]The FTC defines highly concentrated markets as those with an HHI over 0.25. The HHI of the audit market, as of 2001, was 0.32 and thus falls into the highly concentrated range (see US Department of Justice and Federal Trade Commission, 2010).

audit firms to compete for. Prior evidence supports a decrease in auditor competition following AA's collapse. For example, Feldman (2006) analyzes the audit market structure following AA's demise and documents a positive relationship between changes in local market concentration and audit fees. She concludes that the remaining accounting firms had more market power following AA's demise. In two recent studies, Gerakos and Syverson (2015, 2017) use the demise of AA as a shock to the supply of audits and document evidence consistent with a decline in competition. DeFond and Zhang (2014) review the recent audit literature and conclude that "the demise of Andersen decreases competition."[11]

To formally validate whether AA's market share is associated with changes in audit market competition, we test whether AA's market share in the pre-collapse year (2001) can explain the subsequent increase of market concentration measured by the Herfindahl index (HHI). As discussed in Section 2 and above, HHI is a widely used proxy for competition. If a larger AA market share is associated with a greater decrease in competition, it should be associated with a larger increase in HHI. As a supplementary test, we follow Feldman (2006) and Gerakos and Syverson (2015) and examine whether a larger AA market share is associated with a greater increase in audit fees, which one would expect to be associated with a greater decrease in competition. One may be concerned that the increase in audit fees around AA's collapse may relate to the introduction of SOX, as studies show that SOX increased the compliance cost of publicly-listed firms (Bova et al., 2014). However, in Section 6.3, we find no evidence that the enforcement intensity of SOX relates to AA's market share, implying that the increased compliance cost caused by SOX is less likely to vary with AA's market share.

Table 2 presents the regression results. Columns (1)-(2) report the MSA-level regression results of market concentration. We find that changes in local market concentration $\Delta HHI_{m,2001-2002}$ are positively associated with AA's local market share in the pre-collapse year, either measured by the market share in an MSA ($AA\ Share_{m,2001}$) or a binary variable (0/1) indicating whether an MSA has an above-median AA market share ($D_m^{AA\ Share}$). The point estimate of $AA\ Share_{m,2001}$

[11] The decrease in competition presumes that auditors are capacity constrained (Feldman, 2006; Landsman et al., 2009; Numan and Willekens, 2012). If capacity constraints were unlimited such that auditors could absorb as many clients as they wished, one should observe a perfectly competitive audit market. In this case, there should be no change in competition after AA's collapse. However, as shown by Gerakos and Syverson (2017), the audit market is far from being perfectly competitive, which is consistent with the existence of capacity constraints.

at 0.210 in Column (1) implies that an increase of $AA\ Share_{m,2001}$ by one standard deviation is associated with an increase in $\Delta HHI_{m,2001-2002}$ of 0.32 standard deviations. Columns (3)-(4) report the firm-level regression results of audit fees. We find that both $AA\ Share_{m,2001}$ and $D_m^{AA\ Share}$ are positively associated with the change in firm-level audit fees from 2001 to 2002. Overall, our results, as well as evidence from prior studies, assure that the decrease in local auditor competition following AA's demise was larger in MSAs with a larger AA market share in the pre-collapse year.

[Insert Table 2.]

## 5.2 Research design

We exploit the spatial variation in AA's local market share in a generalized difference-in-differences design. Specifically, we first evenly sort all MSAs in our sample into two groups by their AA's market share in 2001, one year prior to AA's collapse, and classify MSAs with an above-median market share as the treatment group ($D_m^{AA\ Share} = 1$) and the rest of the MSAs as the control group ($D_m^{AA\ Share} = 0$). The treatment and control groups differ in the *intensity of treatment*, as client firms in the treated MSAs experienced a larger *decrease* in local audit market competition than did those in the control MSAs, due to a greater supply of AA's clients to the remaining auditors in the local market after AA's demise.

The difference-in-differences regression then compares the changes in clients' cost of bank loans of the treatment group following AA's collapse, relative to those of the control group. The regression model is specified as follows.

$$\ln(Spread_{i,s,m,t}) = \omega_0 + \omega_1 D_m^{AA\ Share} \times Post_t + \omega_2 D_m^{AA\ Share} + \omega_3 Post_t + \psi' X + \eta_{i,s,m,t}, \quad (1)$$

where subscripts $i$, $s$, $m$, $t$ denote the loan facility, borrowing firm, MSA, and year, respectively. The outcome variable $\ln(Spread_{i,s,m,t})$ is the natural logarithm of loan spread, measured as the excess of borrowing interest rate over LIBOR or LIBOR-equivalent benchmark rate. $D_m^{AA\ Share}$ is a dummy variable that identifies the treated MSAs. The dummy variable $Post_t$ equals one if the year $t$ is on or after 2002 and zero otherwise. The primary interest lies in the coefficient on $D_m^{AA\ Share} \times Post_t$, $\omega_1$, which captures *changes* in the cost of bank loans before and after AA's collapse for the treatment group, relative to those of the control group. If greater competition increases the cost of bank loans, then we would find $\omega_1 < 0$.

The vector $X$ includes a set of control variables that could affect a firm's credit risk. We include a set of one-year lagged firm characteristics that include the natural logarithm of the total assets, $\ln(AT_{s,t-1})$, return on assets, $ROA_{s,t-1}$, the amount of tangible assets divided by total assets, $PPENT_{s,t-1}/AT_{s,t-1}$, leverage ratio, $Leverage_{s,t-1}$, market-to-book ratio, $MB_{s,t-1}$, cash flow volatility, $CF\_Vol_{s,t-1}$, audit fee divided by the total assets, $AuditFee_{s,t-1}/AT_{s,t-1}$, and Altman's Z score, $Z\text{-}Score_{s,t-1}$. We also control for loan characteristics, including the loan amount divided by lagged total assets, $Loan\ Size_{i,s,t}/AT_{s,t-1}$, the natural logarithm of loan maturity measured in months, $\ln(Maturity_{i,s,t})$, and a dummy variable indicating whether a loan is syndicated, $D_i^{Syndication}$. A detailed variable description can be found in the appendix. A set of three-digit SIC industry dummies and MSA dummies control for industry- and MSA-level heterogeneities. We cluster standard errors at the MSA level to allow for correlated errors within an MSA.

We address potential violations of the identification assumption in Section 6.3 and note two points here. First, the analysis excludes AA's former clients, as they were directly affected by AA's collapse and had to switch audit firms, making it difficult to disentangle the effect of the change in auditor competition from the direct effect of audit firm switch and AA's potential reputation concerns. Second, the timing of AA's collapse is relatively random, as the collapse was directly triggered by the detection of the Enron scandal. Although any omitted variables that manifested around 2002 (e.g., SOX) might still bias our estimate, at the minimum, the *randomized timing* could mitigate the effects stemming from omitted variables that kick in in other years.

# 6 Results

This section presents our main result on the effect of auditor competition on clients' cost of bank loans. We begin with our baseline findings and tests that address endogeneity concerns. We then explore heterogeneous effects of auditor competition along two dimensions: client importance and external monitoring.

### 6.1 Baseline results

This section examines whether local audit market competition affects clients' cost of bank loans. Table 3 presents the results, using the specification outlined in Eq.(1). Column (1) does not include any control variables or fixed effects. Column (2) adds MSA and three-digit SIC industry fixed effects. Column (3) further adds controls for firm characteristics. Column (4) adds audit fees to control for the competition effect through changes in the audit cost, due to the Sarbanes-Oxley Act (Iliev, 2010). Column (5) adds Z-score to control for observed credit risk. Column (6) adds controls for loan characteristics.

[Insert Table 3.]

Across all specifications, we find the coefficient estimate of $D_m^{AA\ Share} \times Post_t$ is statistically negative and stays relatively stable across all columns. The results suggest that auditor competition on average decreases the cost of bank loans, which supports the *conflict of interest hypothesis*. The economic significance is sizable. In column (1), the cost of bank loans for treated clients (firms located in MSAs with higher AA market share) decreases by 16.0% more than that for control clients (firms located in MSAs with lower AA market share), a decrease translating to a 22-basis-point decrease in the cost of bank loans for an average firm that has 141 basis points of loan spread in our sample. The corresponding estimate in column (6), our most rigorous specification, is an 8.6% decrease in the cost of bank loans, which represents 12.1 basis points.

The firm-level control variables have the expected signs. Loan spreads are lower for large and mature firms with good profitability, low leverage, and a high level of tangible assets. As for the loan characteristics controls, longer loan maturities and syndicated loans tend to have higher interest rates, whereas larger loan amounts tend to have lower rates.

Overall, the findings support the conflict of interest hypothesis that audit market competition increases the cost of bank loans of client firms and is inconsistent with the predictions by some regulators that more competition in the audit market yields positive economic consequences for clients.

## 6.2 Other audit quality measures

To corroborate the cost of bank loan results in Table 3, we use two output-based measures of audit quality: discretionary accruals and restatements. We expect auditor competition to have a greater effect on discretionary accruals than on material restatements. In particular, restatements are more likely to be used as evidence in courts, because restatements capture more egregious accounting problems that violate GAAP, whereas discretionary accruals mainly capture "within GAAP" earnings manipulation that carries less litigation risk (DeFond and Zhang, 2014). We model audit quality as a function of AA's market share, using the following specification.

$$AQ_{s,m,t} = \lambda_0 + \lambda_1 D_m^{AA\ Share} \times Post_t + \lambda_2 D_m^{AA\ Share} + \lambda_3 Post_t + \Psi' X + \eta_{s,m,t}, \tag{2}$$

where $AQ_{s,m,t}$ denotes one of two audit quality measures: (i) performance-matched discretionary accruals ($AQ_{s,m,t}^{Accrual}$), following Kothari et al. (2005), and (ii) restatement ($AQ_{s,m,t}^{Restatement}$), which is a dummy indicating an accounting restatement that hurts a firm's financial results. Since we are not constrained by the Dealscan data, we have a larger number of observations at the client-year level.

[Insert Table 4.]

Table 4 reports the empirical findings. We find that, following AA's collapse, clients in MSAs with higher AA market share experienced lower discretionary accruals and lower likelihood of restatements, relative to those in MSAs with lower AA market share. As expected, the result for restatements is statistically insignificant, suggesting that, on average, changes in competition following AA's collapse are not large enough to induce auditors to condone egregious accounting mistakes. In untabulated results, we find a statistically significant effect of auditor competition on restatement in low litigation-risk industries. This result is consistent with our expectation that auditors are concerned about expected litigation costs caused by restatements. However, this heterogeneous effect as a function of litigation risk does not apply to discretionary accruals, consistent with discretionary accruals being less linked to litigation risk than material restatements.

### 6.3 Endogeneity concerns

This section rules out several endogeneity concerns arising from the fact that the assignment of treatment and control groups by AA's market share is not random. This non-random assignment can present a threat for identifying the causal effect of auditor competition, only if the treatment and control groups do not follow parallel trends. The parallel trends assumption requires that the cost of bank loans of the treated firms evolve similarly to that of the control firms, absent the collapse of AA. Importantly, the identification assumption does *not* require that the level of cost of bank loans be the same for treated and control firms prior to AA's collapse, as long as the parallel trends are satisfied. Although the assumption is not directly testable, we show graphically that it holds in the period preceding AA's collapse. In particular, we estimate the following dynamic difference-in-differences model

$$\ln(Spread_{i,s,m,k}) = \omega_0 + \sum_{k=2000}^{2004} \omega_1^k D_m^{AA\ Share} \times Year_k + \sum_{k=2000}^{2004} \omega_2^k Year_k + \psi' X + \eta_{i,s,m,k}, \qquad (3)$$

where $k \neq 2001$. Dummy variable $Year_k$ marks one of sample years. Figure 2 plots the coefficients of $\omega_1^k$ in dots, with the vertical segments below and above the dots denoting the 90% confidence intervals.

[Insert Figure 2.]

Figure 2 demonstrates that the treatment and control groups follow parallel trends in their cost of bank loans prior to AA's collapse. Below, we discuss specific factors that can lead to violations of the parallel trends assumption.

#### 6.3.1 The enactment of SOX

AA's demise not only dramatically altered audit market competition, but was also accompanied by the enactment of SOX, which increased audit quality for all firms. The coefficient on $D_m^{AA\ Share} \times Post_t$ is likely to be biased by the effect of SOX, if the increase in the audit quality of non-AA clients, due to SOX, depends on AA's market share. We discuss and rule out four potential channels that might violate this condition.[12]

First, SOX may have a larger effect on improving the audit quality of client firms in MSAs with a larger AA presence. Specifically, SOX increases reporting requirements (i.e., internal control weakness), imposes stricter compliance standards, and raises the penalties for auditor and management misconduct. These changes arguably have stronger effects on client firms with lower audit quality prior to the enactment of the law (DeFond and Lennox, 2011). If non-AA client firms in MSAs with a larger AA presence had lower audit quality before AA's collapse, SOX would improve their audit quality more.

To address this concern, we propensity-score match each treated firm with a same-industry control firm, based on their audit quality (which SOX was supposed to affect) prior to AA's collapse. We also match on firm characteristics, because SOX can influence some firms (e.g., smaller firms) more than others and, in turn, influence their cost of bank loans. To implement this design, we use observations in the baseline sample prior to 2002 and estimate a probit model, where the dependent variable is a dummy that identifies the treated firms. The probit model includes firm size, tangibility, profitability, and the two output-based measures for audit quality, as proxied by performance-matched discretionary accruals and the incidence of accounting restatement. We then create a panel for the treated-control pairs and run our difference-in-differences analysis on the matched panel. In total, there are 820 treated firms that are matched to control firms.

Our matching design differs from regular matching designs in that it combines with the difference-in-differences design. An advantage of the matching design is that it holds constant the level of audit quality and firm characteristics *between the treated and control groups* prior to AA's collapse.[13] If the effects of SOX depend on clients' audit quality and observed firm characteristics, the matched treatment and control groups should be *similarly affected by SOX* and thus exhibit similar changes in cost of bank loans around AA's collapse.

[Insert Table 5.]

Table 5 presents the empirical analysis, using the propensity-score matched sample. The pair-

[12] The time dummy *Post* in Eq. (1) can pick up any SOX effect that is common to all firms.

[13] As we will show in Table 5, the cost of bank loans is also statistically indifferent between treated and control firms as a result of the matching.

wise difference test in Panel A indicates that treated and control firms are statistically indifferent across all matching variables as well as the cost of bank loans in the matched sample. Panel B reports regression results. The coefficient of $D_m^{AA\ Share} \times Post$ is statistically and economically significant across all four specifications, progressing from a parsimonious model without any control variables and fixed effects to a complex model, where all control variables and fixed effects are in place. The regression results suggest that SOX does not drive our baseline findings through differences in the audit quality levels and firm characteristics between the treated and control groups.

Second, our results in Table 3 may pick up an increase in regulatory scrutiny over non-AA clients following the enactment of SOX. Specifically, MSAs with a larger AA presence could attract more attention from PCAOB or other regulators, due to concerns about AA's audit quality. The increased regulatory attention could spill over to non-AA clients in the same MSA. Although it is natural to assume that AA negligently audited all clients, a careful review of literature finds that the *actual* audit quality of AA was *not* worse than that of its peer audit firms. For example, Blouin et al. (2007) show that the audit quality of AA's clients did not change after they switched to other audit firms following AA's demise. Therefore it is unlikely that regulators increased scrutiny over non-AA clients out of the concern over AA's actual audit quality.

[Insert Table 6.]

Although studies do not find that AA performed negligent audits, firms in MSAs with a larger AA presence could still be *perceived* to be more likely to have low audit quality, due to the revelation of AA's accounting fraud, and thus receive more regulatory attention. Therefore, our results can still pick up the effects of regulatory scrutiny, if changes in the *perceived* audit quality of AA correlate with AA's market share. To rule out this concern, we regress changes in the perceived audit quality of AA on AA's market share, where changes in the perceived audit quality are measured by the abnormal equity returns of AA's clients around AA's demise. Table 6 shows that the coefficient on AA's market share is statistically insignificant at 10% level. The result is robust to abnormal returns calculated based on different models (the market model and the Fama-French three-factor model), event windows (three-day and seven-day windows), and events dates related to AA's demise as suggested by Chaney and Philipich (2002). The results suggest that changes in perceived audit quality of AA do not systematically vary with AA's market share, inconsistent with the concern that our baseline findings pick up the effects of changes in the perception over AA's audit quality, due to the revelation of AA's fraud.

To further rule out that our finding results from changes in regulatory scrutiny, we exclude from our sample all firms based in the Houston MSA, where Enron had its headquarters. As shown in column (1) of Table 7, eliminating the Houston MSA does not materially affect our finding. In another test, we control in the baseline regression a dummy variable indicating whether an MSA has a PCAOB regional office in a given year. The establishment of a PCAOB office *following AA's demise* could increase regulatory attention in a region. In column (2), we find that controlling for PCAOB dummies does not affect our baseline result. The two tests reinforce the idea that changes in regulatory scrutiny do not drive our findings.

[Insert Table 7.]

Third, DeFond and Lennox (2011) document that a number of low-quality small auditors exited the market after SOX and that their clients subsequently experienced improvement in audit quality. To the extent that the auditor exit is correlated with AA's presence, it may provide another alternative explanation to the high audit quality observed in MSAs with a larger AA presence.

To address the concern about small auditor exits, we first show that the propensity of the auditor exit is uncorrelated with AA's market share. We measure small auditor exit in each MSA by i) the number of small auditors that exited and ii) their market share (in terms of audit fees as of 2002). We only account for exiting small auditors up to 2004, the end of our sample period. The Pearson correlation between AA's market share and small auditor exits, as reported in Table 8 Panel A, is statistically and economically insignificant. This result continues to hold when we consider small auditor exits up to 2008, which is the last year of the sample used in DeFond and Lennox (2011). To further alleviate this concern, we take an extra step and eliminate all client firms whose auditors exited the market following AA's collapse in our analysis. This ensures that clients that were forced to give up their low quality auditors do not appear in our sample and therefore cannot drive the improvement in audit quality. Our results are little affected. We also restrict our analysis to clients of the Big 4 that are not affected by small auditor exits and find that our main results still hold (untabulated).

[Insert Table 8.]

Fourth, as shown by Landsman et al. (2009), Big 4 auditors rebalanced their client portfolios, following the enactment of SOX. To the extent that this tendency to rebalance relates to AA's market share, our result may capture changes in the *composition* of clients following SOX. To rule out this concern, we constrain our sample within clients that do not switch auditors during the sample period and examine changes in the cost of bank loans within existing clients. We show that our results continue to hold for this subsample.

[Insert Table 9.]

#### 6.3.2 Other endogeneity concerns and robustness checks

This section addresses other endogeneity concerns. First, our results might be driven by shocks to industries in which AA specialized, as AA's market share would be higher in MSAs where AA-specialized industries clustered. If industries in which AA specialized happened to experience any industry shocks that coincide with AA's collapse, our regression specification might pick them up. For example, shocks to oil and gas industries, which were AA's specialized industries and cluster in oil-rich areas, coincided with AA's collapse (Nelson et al., 2018), and might have a chance to confound our estimate. Furthermore, *the enforcement of SOX* can also be industry-specific and thus drive our baseline findings. To rule out these time-varying industry confounding factors, we add industry-by-year fixed effects that absorb time-varying shocks to each two-digit SIC industry. In this specification, spatial variation in AA's local market share within an industry-year is used as the source of identification. We find that the addition of the industry-by-year dummies does not substantially alter the magnitude of coefficient on $D_m^{AA\ Share} \times Post$, suggesting that time-varying industry shocks have limited effects on our baseline results.

[Insert Table 10.]

Second, we perform placebo tests to ensure that our main results do not pick up persistent local economic trends that simultaneously relate to the cost of bank loans and AA's market share. For example, economically developed MSAs may have more competitive audit markets and lower costs of bank loans. To rule out concerns about local economic trends, we run several placebo tests by artificially assigning the treatment year to a randomly chosen year. We expect the treatment effect of audit market competition to be muted when using a pseudo event year; otherwise, it would suggest our empirical finding potentially picks up factors other than competition. Table 11 presents the regression results. Columns (1)-(5) respectively set the pseudo event year to 2006, 2007, 2008, 2009, and 2010 and repeat the regression specification in Eq.(1). In line with the baseline model, all the placebo tests employ a five-year window centering around the pseudo event year.[14] Across all five specifications, the coefficient estimate of $D_m^{AA\ Share} \times Post$ is statistically and economically insignificant, further strengthening the causal interpretation of the baseline findings.

[Insert Table 11.]

Third, banks may be concerned about the audit quality of AA's clients and lend more to other firms. The increase of credit supply to non-AA clients may in turn lower non-AA's clients' cost of bank loans. While intuitively appealing, Blouin et al. (2007) and Nelson et al. (2018) carefully investigate AA's former clients and conclude they did not appear to receive low-quality audits from AA, nor were they discriminated against in the market, due to their association with AA. We therefore do not expect this channel to drive our result. Nevertheless, our results are robust to controlling for the loan amount, which directly tackles this concern.

Fourth, audit fees can change as a result of a change in competition. As shown in Table 2, a larger AA market share in the pre-collapse year is associated with a higher increase in audit fees around AA's collapse, which could in turn affect audit quality and clients' cost of bank loans. However, it is unclear how a change in audit fees induced by competition necessarily affects audit quality. On the one hand, higher audit fees, due to less competition, could increase audit input and thereby increase audit quality. For example, Lobo and Zhao (2013) find that audit efforts, proxied by abnormal audit fees, are positively associated with audit quality. Moreover, a concentrated audit

[14] To avoid an overlapping of sample period of placebo tests with the year of AA's collapse, we do not assign as the pseudo event year any year prior to 2006.

market may increase the economy of scale and allow auditors to spread fixed cost. This cost saving can in turn allow auditors to invest more in their audit technology and hire additional staff, which increases audit quality. On the other hand, a competition-induced fee increase should not affect audit quality if the increase is purely driven by auditors' incentive to capture rents. Chu et al. (2018) find evidence consistent with this effect, using clients' switching costs to measure auditors' ability to capture rents. Pinning down specific audit fee channels is beyond the scope of the paper. But to ensure that our results are not purely driven by changes in audit fees, we control for them in our regressions.

Finally, we examine the robustness of our classification of treatment and control groups. The baseline regression specification split MSAs into two groups by the median of AA's market share. We examine the robustness of the results to two alternative measures. For the first measure, we stratify MSAs into quintiles by their market share of AA in 2001 and mark the $i$-th quintile by a dummy variable $D_m^{AA\ Share\_Qi}$, where integer $i = 1, 2, ..., 5$. We expect the treatment effect of competition to increase with quintile rank, with the first quintile (marked by $D_m^{AA\ Share\_Q1}$) being the weakest and the fifth (marked by $D_m^{AA\ Share\_Q5}$) the strongest. In other words, we predict that the coefficient estimate of $D_m^{AA\ Share\_Qi} \times Post$ decreases with $i$. For the second measure, we directly use the local market share of AA in 2001, denoted by $AA\ Share_{m,2001}$, to measure the shock of AA's collapse to competition without grouping MSAs. We expect a negative coefficient estimate on $AA\ Share_{m,2001} \times Post$. Table 12 reports the regression results for the two alternative measures. Overall, the coefficient estimates are consistent with our expectation, suggesting our baseline findings are not an artifact of a particular measurement choice.

[Insert Table 12.]

So far, all of the robustness tests, along with our baseline findings, suggest that audit market competition increases the cost of bank loans. In light of the collective evidence in Section 6.3, for omitted variables to explain our findings, they should be correlated with AA's market share and the cost of bank loans of non-AA's clients, operate within an industry-year and within an MSA, take effect right around 2002, and be unrelated to a series of firm characteristics and audit quality, clients' selection of Big 4 auditors, and regulatory scrutiny.

### 6.4 Two dimensions of auditor competition heterogeneity

Our main finding is consistent with the conflict of interest hypothesis. This section provides further evidence to support the hypothesis by exploring the cross-sectional effects of audit market competition along two dimensions: the role of external monitoring by institutional investors and the importance of a client to its auditor.

#### 6.4.1 Client importance

The conflict-of-interest problem should increase with the importance of the client firm, as auditors are more likely to cater to clients that account for more of their total revenue (Chen et al., 2016). Therefore, the adverse effect of audit market competition should be more pronounced for economically important clients, because losing these clients hurts auditors' revenue more. We measure the importance of a client firm by the share of client audit fee, relative to the total audit fees received by the local audit office, and evenly partition our sample by client importance.

[Insert Table 13.]

We present the regression results in Table 13. The subsample analysis indicates that the effect of auditor competition on the cost of bank loans mainly comes from the subsample of economically important clients. We report a triple-difference regression in Column (7), where the dummy variable $D^{HighShare}$ marks economically important clients. The statistically significant triple-interaction term further assures the coefficient of $D_m^{AA\ Share} \times Post$ in both subsamples is statistically different. The results of client importance support the hypothesis that conflicts of interest explain the relation between auditor competition and the cost of bank loans.

#### 6.4.2 External monitoring

Another implication of the conflict of interest hypothesis is that the effect of audit market competition on the cost of bank loans decreases in the presence of strong external monitoring. Stronger monitoring increases the likelihood of detecting accounting misconduct, thereby heightening the auditor's reputational cost of lowering professional standards. Thus, in the presence of strong external monitoring, cost of bank loans should respond less to changes in audit market competition, if conflicts of interest primarily drive the effect of auditor competition.

We test this hypothesis by employing institutional ownership to proxy for external monitoring. In the empirical set-up, since institutional investors favor firms with high market capitalizations, we scale a firm's institutional ownership share by its market capitalization, so that the sample partition is not influenced by client size (O'Brien and Bhushan, 1990; Ferreira and Matos, 2008).

[Insert Table 14.]

We collect institutional-ownership from Thomson Reuters 13F database. We sort all firms in the baseline sample by their average institutional ownership in 2000 and 2001 into two subsamples of high and low institutional ownership. In Table 14, we find, across all regression specifications, the estimated coefficients of $D_m^{AA\ Share} \times Post$ are only statistically negative in the subsample of low institutional ownership, where the external monitoring is low. A triple-difference regression results using the full sample is reported in column (7), where $D^{HighInst}$ is a dummy that takes a value of one if a client is classified into the high institutional ownership group and zero otherwise. The statistically significant estimate of $D_m^{AA\ Share} \times Post \times D^{HighInst}$ suggests the effects of audit market competition across the groups of high and low institutional ownership are significantly different. The evidence based on external monitoring further supports the conflict of interest hypothesis.

# 7 Conclusion

Regulators have long been concerned that a highly concentrated audit market can jeopardize the proper functioning of the capital market, and this concern has led them, in some jurisdictions, to take steps to reduce the market dominance of the Big Four. However, surprisingly, regulators' concern seems to be supported only by isolated accounting scandals, as the empirical evidence on the effects of competition on audit quality is inconclusive. This study advances this debate by investigating the effect of auditor competition on the cost of bank loans.

The study identifies the causal effect of auditor competition using the shock of Arthur Andersen's demise, which differentially impacts auditor competition across local audit markets, due to the variation of AA's market share. Our finding is consistent with the conflict-of-interest hypothesis that auditor competition decreases audit quality and increase the cost of bank loans. Two cross-sectional analyses further underscore the conflict of interest hypothesis by showing our findings are stronger when clients are more economically important to local audit offices and when external monitoring is weaker. Our results are robust in that they appear not to be driven by trends in the local economy, industry shocks, the passage and enforcement of SOX, and other consequences of AA's collapse, such as client selection and exits of small auditors.

Our results should not be interpreted as promoting the idea that the audit industry should be further consolidated to benefit the clients. But our findings do caution against applying predictions from classical oligopoly competition models, where an increase in competition results in higher quality (e.g., Mussa and Rosen, 1978). Our empirical evidence, combined with prior findings, suggest that auditors' profit maximization objective and the conflict of interests between auditors and clients affect clients' cost of bank loans. The collective evidence points to the importance of accounting for conflict of interests when regulating the audit market.

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# Appendix: Variable Description

| Variables | Definition |
|---|---|
| ***Loan-level Variables*** | |
| $\ln(Spread_{i,s,t})$ | The natural logarithm of loan spread that is measured as all-in-spread drawn in DealScan database. All-in-spread is defined as the amount the borrower pays in basis points over LIBOR for each dollar drawn down. This measure adds the borrowing spread of the loan over LIBOR with any annual fee paid to the bank group. Source: DealScan. |
| $Loan\ Size_{i,s,t}/AT_{s,t-1}$ | Defined as the dollar value of the loan issued in year $t$ divided by the lagged total assets of the firm measured at the end of corresponding fiscal year. Source: DealScan and Compustat. |
| $\ln(Maturity_{i,s,t})$ | The natural logarithm of loan maturity measured in months. Source: DealScan. |
| $D^{Syndication}$ | Dummy variable that takes value one if the distribution method of the loan facility is coded as 'Syndication'. Source: DealScan. |
| ***Firm-level Variables*** | |
| $\ln(AT_{s,t})$ | The natural logarithm of total assets (AT). Source: Compustat. |
| $ROA_{s,t}$ | Return on assets, measured as operating income (OIBDP) divided by total assets (AT). Source: Compustat. |
| $PPENT_{s,t}/AT_{s,t}$ | Firm tangibility, defined as net capital stock (PPENT), relative to total assets (AT). Source: Compustat. |
| $Leverage_{s,t}$ | Leverage ratio, defined as current debt (DLC) plus long-term debt (DLTT), divided by total market capitalization measured at corresponding fiscal year-end. Source: Compustat and CRSP. |
| $MB_{s,t}$ | Market-to-book ratio, measured as market capitalization divided by total assets (AT) measured at the end of the fiscal year. Source: Compustat and CRSP. |
| $CF\_Vol_{s,t}$ | Cash flow volatility. We first calculate the change in quarterly operating income (OIBDPQ), relative to total assets(ATQ), and next compute cash flow volatility as the standard deviation of the value obtained in the first step over the past eight consecutive quarters. Source: Compustat. |

| Variables | Definition |
|---|---|
| ***Firm-level Variables*** | |
| $AuditFee_{s,t}/AT_{s,t}$ | Audit fee of firm $s$ in year $t$, which is calculated as the audit fee divided by total assets (AT). Source: Compustat and AuditAnalytics. |
| $Z\text{-}Score_{s,t}$ | We follow Sufi (2009) and calculate the Z-Score as $Z\text{-}Score$=$3.3\times\frac{OIBDP}{AT}+\frac{SALE}{AT}+1.4\frac{RE}{AT}+1.2\times\frac{WCAP}{AT}$. Source: Compustat. |
| $AQ^{Accrual}_{s,t}$ | Accrual-based earnings management measured by the performance-matched discretionary accrual, following Kothari et al. (2005). It is calculated as a firms discretionary accruals minus the discretionary accruals of a matching firm that is assigned to the same two-digit SIC industry and has the closest return on assets. We estimate within each fiscal year and two-digit SIC industry the following cross-sectional model. $\frac{TA_{s,t}}{Asset_{s,t-1}}=\beta_0+\beta_1\frac{1}{Asset_{s,t-1}}+\beta_2\frac{\Delta Sale_{s,t}-\Delta AR_{s,t}}{Asset_{s,t-1}}+\beta_3\frac{PPE_{s,t}}{Asset_{s,t-1}}+\epsilon_{s,t}$, where $TA_{s,t}$ is total accruals measured by earnings before extraordinary items and discontinued operations ($IBC$), $Asset_{s,t-1}$ is total assets ($AT$) of year $t-1$, $\Delta Sale_{s,t}$ is the change in sales ($SALE$) from year $t-1$ to $t$, $\Delta AR_{s,t}$ is the change in accounts receivable ($RECT$) from year $t-1$ to $t$, and $PPE_{s,t}$ is gross capital stock ($PPEGT$). Discretionary accruals is defined as the residual from estimating the above cross-sectional regression. Source: Compustat. |
| $AQ^{Restatement}_{s,t}$ | Dummy variable that takes a value of one if the financial report of firm s in year $t$ is restated in the future and the restatement negatively impacts the financial outcome of the restated year and zero otherwise. Source: AuditAnalytics. |
| ***MSA-level Variables*** | |
| $AA\ Share_{m,2001}$ | The market share of Arthur Andersen in terms of audit fee in MSA $m$ in year 2001. Source: AuditAnalytics. |
| $D^{AA\ Share}_{m}$ | Dummy variable that takes a value of one for MSAs with above-median market share of AA in 2001 and zero otherwise. Source: AuditAnalytics. |
| $\Delta HHI_{m,2001-2002}$ | The change of auditor market concentration in MSA $m$ from 2001 to 2002. It is defined as the Herfindahl index of auditor market share (in terms of audit fee) for MSA $m$ in 2002 less that in 2001. Source: AuditAnalytics. |

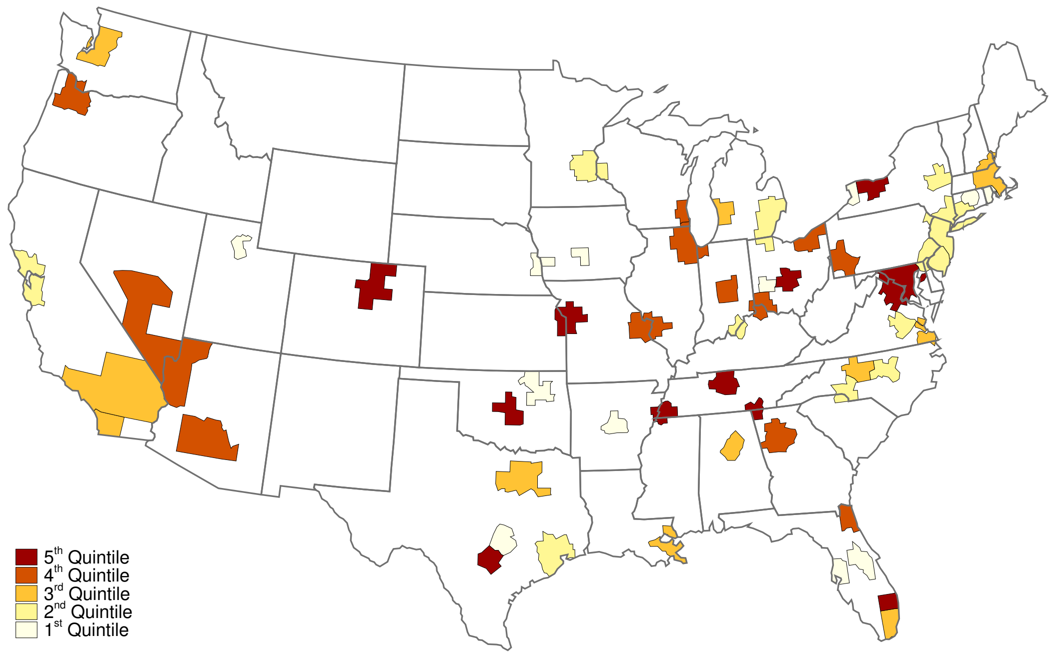


Figure 1: The figure plots the change in auditor concentration, as measured by a Herfindahl Index (HHI), of 58 metropolitan statistical areas (MSAs) from 2001 to 2002. We subtract the HHI of 2001 from that of 2002 and use different colors to represent each quintile of the change, with dark red for the fifth quintile, light red for the fourth quintile, orange for the third quintile, yellow for the second quintile, and light yellow for the first quintile.

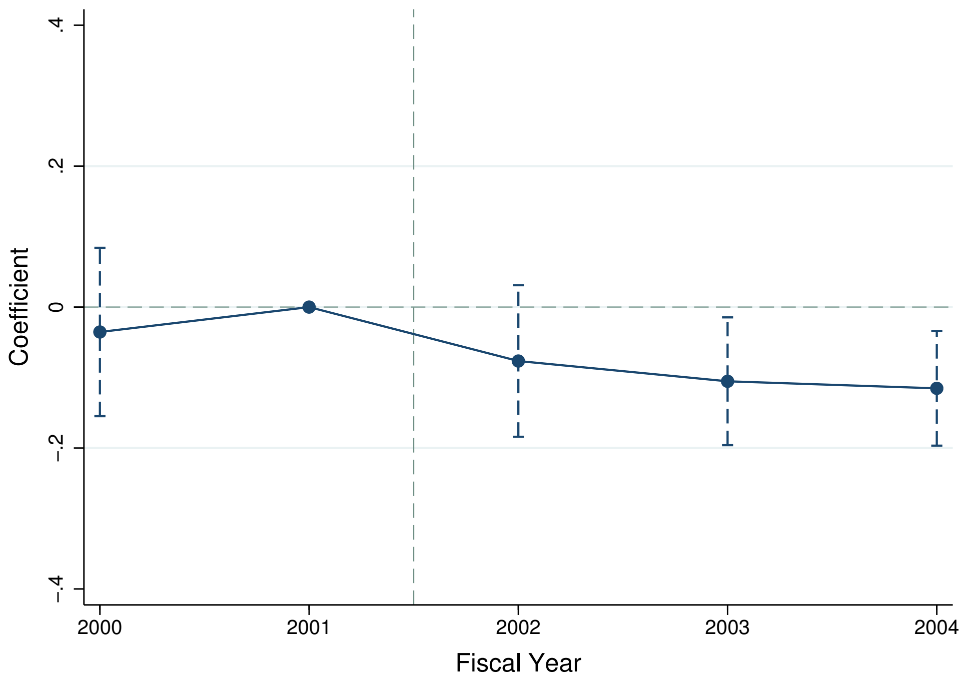


Figure 2: This figure shows the dynamic effect of audit market competition on the cost of bank loans over the sample period of 2000 through 2004. We estimate the regression model outlined in Eq. (3) and plot coefficients $\omega_1^k$ in dots, with $k$ corresponding to fiscal years on the $x$-axis. The coefficient for the year of 2001, $\omega_1^{2001}$, is absorbed due to colinearity and set to zero. The vertical sections above and below each dot represents 90% confidence intervals.

Table 1: Summary Statistics

The table presents summary statistics for the variables used in the regression analysis during the period of 2000 through 2004. Panel A reports the descriptive statistics for a set of loan-level variables, including the natural logarithm of loan spread $\ln(Spread_t)$, loan size divided by lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Panel B reports firm-level characteristics. These include the natural logarithm of total assets $\ln(AT_t)$; return on assets $ROA_t$; the amount of tangible assets $PPENT_t/AT_t$, as measured by net capital stock divided by total assets; market-to-book ratio $MB_t$; leverage ratio $Leverage_t$, defined as total debt divided by market value of equity; cash flow volatility $CF\_Vol_t$, as measured by the standard deviation of quarterly earnings change, relative to total assets, over past eight quarters; audit fee $AuditFee_t/AT_t$, defined as the total audit fee divided by total assets; and Altman's Z-score, $Z\text{-}Score_t$. Other firm-level variables include two measures for audit quality: i) performance-matched discretionary accruals, $AQ_t^{Accrual}$, and ii) a dummy variable indicating whether an accounting restatement occurs in year $t$ that negatively impacts financial statements, $AQ_t^{Restatement}$ . Panel C reports the descriptive statistics of MSA-level variables. $\Delta HHI_{m,2001-2002}$ measures the change in concentration of local audit market from 2001 to 2002 and is calculated as the HHI of the market share (in terms of audit fee) of all auditors operating in MSA $m$ in 2002 less that in 2001. $AA\ Share_{m,2001}$ denotes AA's market share of MSA $m$ in 2001. Detailed variable descriptions are provided in the appendix.

| | N | Mean | Std. Dev. | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| ***Panel A: Loan level*** | | | | | | |
| $\ln(Spread_t)$ | 7,065 | 4.945 | 0.872 | 4.382 | 5.165 | 5.617 |
| $Loan\ size_t/AT_{t-1}$ | 7,065 | 0.169 | 0.246 | 0.044 | 0.107 | 0.217 |
| $\ln(Maturity_t)$ | 7,065 | 3.507 | 0.733 | 2.890 | 3.584 | 4.094 |
| $D^{Syndicate}$ | 7,065 | 0.944 | 0.230 | 1.000 | 1.000 | 1.000 |
| ***Panel B: Firm level*** | | | | | | |
| $\ln(AT_t)$ | 3,425 | 6.812 | 1.901 | 5.509 | 6.742 | 8.045 |
| $ROA_t$ | 3,425 | 0.117 | 0.139 | 0.082 | 0.122 | 0.170 |
| $PPENT_t/AT_t$ | 3,425 | 0.310 | 0.229 | 0.128 | 0.252 | 0.454 |
| $Leverage_t$ | 3,425 | 0.884 | 2.646 | 0.092 | 0.291 | 0.761 |
| $MB_t$ | 3,425 | 2.625 | 2.210 | 1.219 | 1.970 | 3.268 |
| $CF\_Vol._t$ | 3,425 | 0.018 | 0.025 | 0.006 | 0.011 | 0.022 |
| $AuditFee_t/AT_t$ $(\times 1,000)$ | 3,425 | 1.359 | 2.090 | 0.334 | 0.711 | 1.592 |
| $Z\text{-}Score_t$ | 3,425 | 1.763 | 1.984 | 1.066 | 1.924 | 2.681 |
| $AQ_t^{Accrual}$ | 13,314 | 0.000 | 0.188 | -0.071 | 0.000 | 0.072 |
| $AQ_t^{Restatement}$ | 13,255 | 0.172 | 0.377 | 0.000 | 0.000 | 0.000 |
| ***Panel C: MSA level*** | | | | | | |
| $\Delta HHI_{m,2001-2002}$ | 58 | 0.037 | 0.085 | 0.006 | 0.036 | 0.070 |
| $AA\ Share_{m,2001}$ | 58 | 0.163 | 0.131 | 0.081 | 0.144 | 0.219 |

Table 2: Validity Test: The Effects of Arthur Andersen's Collapse on Competition and Audit Fees

This table reports the association between AA's market share and the change in Herfindahl Index of auditors' local market share ($\Delta HHI_{m,2001-2002}$) from 2001 to 2002 and on the change in clients' audit fees ($\Delta AuditFee_{s,2001-2002}$) over the same period. $AA\ Share_{m,2001}$ denotes AA's market share in MSA $m$ in 2001. The binary variable $D_m^{AA\ Share}$ marks MSAs with above-median AA market share. In columns (3)-(4), we follow Gerakos and Syverson (2015) and include a set of firm-level control variables consisting of firm size, industry segment numbers, leverage ratio, return on assets, inventory, a dummy variable indicating auditor change, a dummy variable identifying Big 4 auditors, and a dummy variable indicating whether a client firm has foreign sales. Three-digit SIC industry dummies are controlled in columns (3)-(4). Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

| | $\Delta HHI_{m,2001-2002}$ | | $\Delta AuditFee_{s,2001-2002}$ | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $AA\ Share_{m,2001}$ | 0.210*** | | 1.408** | |
| | [2.73] | | [2.49] | |
| $D_m^{AA\ Share}$ | | 0.059*** | | 0.308*** |
| | | [2.79] | | [3.77] |
| Firm Controls | No | No | Yes | Yes |
| Industry FE | No | No | Yes | Yes |
| N | 58 | 58 | 2,130 | 2,130 |
| $R^2$ | 0.103 | 0.122 | 0.608 | 0.609 |

Table 3: Baseline Regressions: Auditor Competition and Cost of Bank Loans

This table reports the regression results of the cost of bank loans on auditor competition, using a difference-in-differences specification during 2000-2004. The dependent variable, denoted by $\ln(Spread_t)$, is the natural logarithm of loan spread, which measures the spread of the borrowing interest rate over LIBOR or the LIBOR equivalent plus any fees. The indicator variable $D_m^{AA\ Share}$ identifies treated firms in MSAs with above-median AA market share in 2001. Indicator variable $Post$ is one for the period on and after 2002 and zero otherwise. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. A set of MSA dummies and three-digit SIC industry dummies are controlled in various specifications. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $D_m^{AA\ Share} \times Post$ | -0.160*** | -0.160*** | -0.118*** | -0.121*** | -0.114*** | -0.086** |
| | [-2.82] | [-3.36] | [-2.92] | [-3.02] | [-2.76] | [-2.16] |
| $D_m^{AA\ Share}$ | 0.220** | | | | | |
| | [2.22] | | | | | |
| $Post$ | 0.053 | 0.004 | 0.013 | 0.024 | 0.017 | -0.045 |
| | [1.27] | [0.10] | [0.36] | [0.64] | [0.43] | [-1.08] |
| $\ln(AT_{t-1})$ | | | -0.244*** | -0.252*** | -0.254*** | -0.261*** |
| | | | [-20.67] | [-20.73] | [-20.94] | [-23.43] |
| $ROA_{t-1}$ | | | -0.771*** | -0.809*** | -0.408*** | -0.404*** |
| | | | [-4.78] | [-5.22] | [-3.26] | [-3.11] |
| $PPENT_{t-1}/AT_{t-1}$ | | | -0.115 | -0.122 | -0.183** | -0.198** |
| | | | [-1.38] | [-1.45] | [-2.08] | [-2.43] |
| $Lervage_{t-1}$ | | | 0.044*** | 0.044*** | 0.042*** | 0.043*** |
| | | | [4.71] | [4.76] | [4.48] | [4.85] |
| $MB_{t-1}$ | | | -0.054*** | -0.053*** | -0.056*** | -0.053*** |
| | | | [-6.11] | [-5.93] | [-6.21] | [-6.24] |
| $CF\_Vol_{t-1}$ | | | -0.588 | -0.458 | -0.598 | -0.329 |
| | | | [-1.12] | [-0.86] | [-1.00] | [-0.59] |
| $AuditFee_{t-1}/AT_{t-1}$ | | | | -16.451** | -23.613*** | -19.615*** |
| | | | | [-2.61] | [-3.13] | [-2.71] |
| $Z\text{-}Score_{t-1}$ | | | | | -0.051*** | -0.055*** |
| | | | | | [-2.85] | [-3.41] |
| $Loan\ Size_t/AT_{t-1}$ | | | | | | -0.199*** |
| | | | | | | [-4.33] |
| $\ln(Maturity_t)$ | | | | | | 0.158*** |
| | | | | | | [8.43] |
| $D^{Syndication}$ | | | | | | 0.118** |
| | | | | | | [2.55] |
| MSA FE | No | Yes | Yes | Yes | Yes | Yes |
| Industry FE | No | Yes | Yes | Yes | Yes | Yes |
| N | 7,065 | 7,065 | 5,468 | 5,468 | 5,468 | 5,468 |
| $R^2$ | 0.006 | 0.284 | 0.543 | 0.544 | 0.549 | 0.565 |

Table 4: Auditor Competition and Audit Quality

This table reports the regression results of audit quality measured by i) performance-matched discretionary accrual, $AQ_t^{Accrual}$, and ii) restatements, $AQ_t^{Restatement}$, which is a dummy variable indicating whether a firm has an accounting restatement in year $t$. The dummy variable $D_m^{AA\ Share}$ marks MSAs with above-median AA market share in 2001. The dummy variable $Post$ is one for the period on and after 2002 and zero otherwise. Firm-level control variables include firm size ($\ln(AT_t)$), market-to-book ratio ($MB_t$), leverage ratio ($Leverage_t$), audit fee ($AuditFee_t/AT_t$), and return on assets ($ROA_t$). We additionally control the discretionary accruals ($AQ_t^{Accrual}$) in the regression of accounting restatement. A set of MSA dummies and three-digit SIC industry dummies are controlled in the regressions. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Vars. | $AQ_t^{Accrual}$ | $AQ_t^{Restatement}$ |
|---|---|---|
| | (1) | (2) |
| $D_m^{AA\ Share} \times Post$ | -0.016*** | -0.008 |
| | [-3.07] | [-0.70] |
| $Post$ | 0.008** | 0.069*** |
| | [2.21] | [12.21] |
| Firm Control | Yes | Yes |
| MSA FE | Yes | Yes |
| Industry FE | Yes | Yes |
| N | 13,314 | 13,225 |
| $R^2$ | 0.037 | 0.117 |

Table 5: Propensity Score Matching Analysis

This table reports the regression results of cost of bank loans on auditor competition in a propensity-score matched sample. The sample consists of 820 treated firms that are matched to control firms based on the same two-digit SIC industry and their propensity scores, generated based on a set of pre-collapse firm characteristics, including firm size, tangibility, profitability, discretionary accounting accruals, and restatement incidence. The matching is carried out in 2001, one year before AA's collapse. Panel A reports the pairwise $t$-test results between the treated and control firms in the matched sample for all matching variables and firm-level aggregated loan spreads in 2001. Panel B reports the regression results in the matched sample. Column (1) reports regression results without including any control variables and fixed effects, whereas regression models in columns (2)-(4) progressively include MSA and industry fixed effects, firm control variables, and loan control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

Panel A: Balance Tests

| | Treated Firms | | | Matched Control Firms | | | Difference | |
|---|---|---|---|---|---|---|---|---|
| | Mean | STD | Median | Mean | STD | Median | (1)-(4) | $t$-stat. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $\ln(AT)$ | 6.115 | 1.882 | 6.027 | 6.096 | 1.752 | 6.098 | 0.019 | 0.217 |
| $ROA$ | 0.100 | 0.170 | 0.121 | 0.092 | 0.167 | 0.114 | 0.008 | 0.938 |
| $Tangibility$ | 0.310 | 0.239 | 0.250 | 0.304 | 0.236 | 0.227 | 0.006 | 0.493 |
| $AQ^{Accrual}$ | -0.009 | 0.160 | -0.007 | 0.000 | 0.152 | 0.003 | -0.009 | -1.224 |
| $AQ^{Restatement}$ | 0.160 | 0.367 | 0.000 | 0.148 | 0.355 | 0.000 | 0.012 | 0.684 |
| $\ln(Spread)$ | 5.049 | 0.837 | 5.298 | 5.003 | 0.831 | 5.165 | 0.046 | 0.796 |

Panel B: Regression Analysis

| Dep. Var. | $\ln(Spread_t)$ | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $D_m^{AA\ Share} \times Post$ | -0.239*** | -0.155*** | -0.158*** | -0.147*** |
| | [-3.68] | [-2.82] | [-3.11] | [-2.86] |
| $D_m^{AA\ Share}$ | 0.093 | | | |
| | [1.08] | | | |
| $Post$ | 0.056 | -0.030 | 0.045 | 0.009 |
| | [1.20] | [-0.73] | [0.90] | [0.17] |
| Firm Controls | No | No | Yes | Yes |
| Loan Controls | No | No | No | Yes |
| MSA FE | No | Yes | Yes | Yes |
| Industry FE | No | Yes | Yes | Yes |
| N | 5,155 | 5,155 | 4,725 | 4,725 |
| $R^2$ | 0.007 | 0.337 | 0.599 | 0.610 |

Table 6: Perceived Change in Audit Quality around AA's Demise

This table reports the regression results of cumulative abnormal returns (CARs) of AA's clients to AA's demise around two important event dates following Chaney and Philipich (2002): January 10, 2002 when AA announced documents had been shredded, and February 4, 2002 the first trading day following the announcement that AA was creating independent oversight board. Columns (1)-(4) use the CARs computed by the market model and columns (5)–(8) use CARs computed by the Fama-French three-factor model. Firm-level control variables include firm size ($\ln(AT_t)$), market-to-book ratio ($MB_t$), leverage ratio ($Leverage_t$), net capital stock dividend by total asset($PPENT_t/AT_t$), and return on assets ($ROA_t$). A set of three-digit SIC industry dummies are controlled in the regressions. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Model | Market Model | | | | Fama-French Three-Factor Model | | | |
|---|---|---|---|---|---|---|---|---|
| Dep. Vars. | Jan 10 CAR[-1,+1] | Jan 10 CAR[-3,+3] | Feb 04 CAR[-1,+1] | Feb 04 CAR[-3,+3] | Jan 10 CAR[-1,+1] | Jan 10 CAR[-3,+3] | Feb 04 CAR[-1,+1] | Feb 04 CAR[-3,+3] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $AA\ Share_{m,2001}$ | 0.001 | -0.005 | -0.004 | -0.004 | 0.003 | -0.005 | 0.005 | 0.001 |
| | [0.07] | [-0.17] | [-0.17] | [-0.12] | [0.15] | [-0.20] | [0.24] | [0.04] |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 814 | 814 | 814 | 814 | 814 | 814 | 814 | 814 |
| $R^2$ | 0.195 | 0.227 | 0.248 | 0.265 | 0.188 | 0.225 | 0.286 | 0.279 |

Table 7: Robustness Tests on Regulatory Scrutiny

This table reports robustness test results on regulatory scrutiny. Column (1) reports results using a subsample that excludes firms in the Houston MSA. Column (2) reports the full sample result that includes in baseline regression an indicator variable $D_{m,t}^{PCAOB}$ marking whether MSA $m$ has a PCAOB regional office in year $t$. All specifications control for a full set of firm-level and loan-level control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. A set of MSA dummies and three-digit SIC industry dummies are controlled in the regressions. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | |
|---|---|---|
| | Excluding Houston MSA | Controlling for PCAOB Locations |
| | (1) | (2) |
| $D_m^{AA\ Share} \times Post$ | -0.093** | -0.101*** |
| | [-2.34] | [-2.69] |
| $Post$ | -0.045 | -0.017 |
| | [-1.09] | [-0.47] |
| $D_m^{PCAOB}$ | | -0.093*** |
| | | [-3.06] |
| Firm Controls | Yes | Yes |
| Loan Controls | Yes | Yes |
| MSA FE | Yes | Yes |
| Industry FE | Yes | Yes |
| N | 5,219 | 5,468 |
| $R^2$ | 0.575 | 0.565 |

Table 8: Robustness Tests on Small Auditor Exits

This table reports the robustness test results on small auditor exits, which are respectively measured by a) the number of exited small auditors in an MSA, $Exit\ Auditor_{number}$; b) the market share (in terms of audit fees as of 2002) of exited small auditors in an MSA, $Exit\ Auditor_{share}$. Both measures are based on exited small auditors during 2002–2004. $AA\ Share_{m,2001}$ denotes the local market share of AA in MSA $m$ in 2001. Panel A reports the Pearson correlation matrix between AA's market share and two measures of small auditor exits, with $P$-values reported in brackets below the corresponding correlation coefficients. Panel B reports the regression results in a sample that excludes all exited small auditors due to the introduction of SOX. Column (1) reports regression results without including any control variables and fixed effects, whereas regression models in columns (2)-(4) progressively include MSA and industry fixed effects, firm control variables, and loan control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

Panel A: Pearson Correlation Matrix Between AA's Presence and Small Auditor Exits

| | $AA\ Share_{m,2001}$ | $Exit\ Auditor_{number}$ | $Exit\ Auditor_{share}$ |
|---|---|---|---|
| $AA\ Share_{m,2001}$ | 1.000 | | |
| $Exit\ Auditor_{number}$ | -0.002 | 1.000 | |
| | [0.991] | | |
| $Exit\ Auditor_{share}$ | -0.091 | 0.126 | 1.000 |
| | [0.496] | [0.347] | |

Panel B: Regressions Excluding Exited Small Auditors

| Dep. Var. | $\ln(Spread_t)$ | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $D_m^{AA\ Share} \times Post$ | -0.160*** | -0.160*** | -0.113*** | -0.087** |
| | [-2.82] | [-3.36] | [-2.74] | [-2.20] |
| $D_m^{AA\ Share}$ | 0.220** | | | |
| | [2.18] | | | |
| $Post$ | 0.053 | 0.004 | 0.016 | -0.045 |
| | [1.25] | [0.10] | [0.40] | [-1.11] |
| Firm Controls | No | No | Yes | Yes |
| Loan Controls | No | No | No | Yes |
| MSA FE | No | Yes | Yes | Yes |
| Industry FE | No | Yes | Yes | Yes |
| N | 7,029 | 7,029 | 5,436 | 5,436 |
| $R^2$ | 0.006 | 0.286 | 0.549 | 0.564 |

Table 9: Robustness Tests on Big Four Client Portfolio Rebalancing

This table reports the robustness test results on client portfolio rebalancing using a subsample of firms that did not switch auditors during the sample period 2000-2004. Column (1) reports regression results without including any control variables and fixed effects, whereas regression models in columns (2)-(4) progressively include MSA and industry fixed effects, firm control variables, and loan control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $D_m^{AA\ Share} \times Post$ | -0.238*** | -0.226*** | -0.144*** | -0.112** |
| | [-3.71] | [-4.47] | [-2.94] | [-2.41] |
| $D_m^{AA\ Share}$ | 0.283** | | | |
| | [2.43] | | | |
| $Post$ | 0.110** | 0.049 | 0.029 | -0.040 |
| | [2.50] | [1.27] | [0.73] | [-0.99] |
| Firm Controls | No | No | Yes | Yes |
| Loan Controls | No | No | No | Yes |
| MSA FE | No | Yes | Yes | Yes |
| Industry FE | No | Yes | Yes | Yes |
| N | 5,213 | 5,213 | 4,012 | 4,012 |
| $R^2$ | 0.009 | 0.320 | 0.590 | 0.608 |

Table 10: Robustness Tests Controlling for Industry-by-Year Fixed Effects

This table reports robustness test results on industry-specific shocks to industries in which AA specialized. Industry-by-year fixed effects as well as MSA fixed effects are included in all specifications. Column (1) reports regression results without any control variables, whereas the regression specifications in columns (2)-(3) progressively include firm control variables and loan control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| $D_m^{AA\ Share} \times Post$ | -0.164*** | -0.135** | -0.097* |
| | [-3.51] | [-2.66] | [-1.94] |
| $Post$ | -0.489*** | -0.035 | -0.024 |
| | [-5.96] | [-0.29] | [-0.23] |
| Firm Controls | No | Yes | Yes |
| Loan Controls | No | No | Yes |
| MSA FE | Yes | Yes | Yes |
| Industry × Year FE | Yes | Yes | Yes |
| N | 7,065 | 5,468 | 5,468 |
| $R^2$ | 0.227 | 0.504 | 0.530 |

Table 11: Placebo Tests

This table reports the regression results for the placebo tests. We repeat the regression specification in column (6) of Table 3, except that the event year is replaced with a pseudo event year, as indicated by the subscript of *Post*. A full set of firm-level and loan-level control variables are included in all regression specifications. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. We also include MSA dummies and three-digit SIC industry dummies. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $D_m^{AA\ Share} \times Post_{2006}$ | 0.058 | | | | |
| | [0.91] | | | | |
| $D_m^{AA\ Share} \times Post_{2007}$ | | -0.059 | | | |
| | | [-1.18] | | | |
| $D_m^{AA\ Share} \times Post_{2008}$ | | | -0.080 | | |
| | | | [-1.23] | | |
| $D_m^{AA\ Share} \times Post_{2009}$ | | | | -0.020 | |
| | | | | [-0.31] | |
| $D_m^{AA\ Share} \times Post_{2010}$ | | | | | 0.020 |
| | | | | | [0.46] |
| Firm Controls | Yes | Yes | Yes | Yes | Yes |
| Loan Controls | Yes | Yes | Yes | Yes | Yes |
| MSA FE | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes |
| N | 4,549 | 4,206 | 4,058 | 3,384 | 2,741 |
| $R^2$ | 0.476 | 0.498 | 0.466 | 0.371 | 0.434 |

Table 12: Robustness Tests on Regression Specifications

This table reports the robustness checks for our baseline regressions. Columns (1)-(2) examine alternative choices of treated and control groups. In column (1), we divide MSAs into quintiles by AA's market share in 2001 and denote the $i$ th quintile by a dummy variable $D_m^{AA\ Share\_Qi}$. Column (2) directly uses the value of AA's local market share in MSA $m$ in 2001, $AA\ Share_{m,2001}$, to measure the treatment effect. All specifications control for a full set of firm-level and loan-level control variables. Lagged firm-level control variables include the natural logarithm of total assets $\ln(AT_{t-1})$, return on assets $ROA_{t-1}$, net capital stock divided by total assets $PPENT_{t-1}/AT_{t-1}$, leverage ratio $Leverage_{t-1}$, market-to-book ratio $MB_{t-1}$, cash flow volatility $CF\_Vol_{t-1}$, audit fees divided by total assets $AuditFee_{t-1}/AT_{t-1}$, and Altman's $z$ score $Z\text{-}Score_{t-1}$. Loan-level control variables consist of the loan size scaled by the lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | |
|---|---|---|
| | (1) | (2) |
| $D_m^{AA\ Share\_Q2} \times Post$ | -0.127 | |
| | [-1.43] | |
| $D_m^{AA\ Share\_Q3} \times Post$ | -0.168* | |
| | [-1.78] | |
| $D_m^{AA\ Share\_Q4} \times Post$ | -0.200** | |
| | [-2.35] | |
| $D_m^{AA\ Share\_Q5} \times Post$ | -0.221** | |
| | [-2.64] | |
| $AA\ Share_{m,2001} \times Post$ | | -0.329* |
| | | [-1.89] |
| $Post$ | 0.072 | -0.035 |
| | [0.90] | [-0.78] |
| Firm Controls | Yes | Yes |
| Loan Controls | Yes | Yes |
| MSA FE | Yes | Yes |
| Industry FE | Yes | Yes |
| N | 5,468 | 5,468 |
| $R^2$ | 0.565 | 0.564 |

Table 13: Heterogeneity of Audit Market Competition by Client Importance

This table examines the heterogeneous effect of auditor competition on the cost of bank loans along the dimension of client importance with respect to its auditor. We define the importance of a client as its average ratio of audit fees, relative to its local engagement auditor's fee revenue, over the 2000–2001 period. Columns (1)-(6) report difference-in-differences regression results in the subsamples sorted by client importance level, whereas column (7) reports the results of a triple-difference regression in the full sample. Dummy variables $D_m^{AA\ Share}$, $Post$, and $D^{HighShare}$ respectively mark firms in MSAs with above-median AA market share in 2001, the period on and after 2002, and more important firms with respect to their audit firms. Lagged firm-level control variables include the natural logarithm of total assets ($\ln(AT_{t-1})$), return on assets ($ROA_{t-1}$), the net capital stock divided by the total assets ($PPENT_{t-1}/AT_{t-1}$), leverage ratio ($Leverage_{t-1}$), market-to-book ratio ($MB_{t-1}$), cash flow volatility ($CF\_Vol_{t-1}$), audit fee divided by total assets ($AuditFee_{t-1}/AT_{t-1}$), and Altman's $Z$ score ($Z\text{-}Score_{t-1}$). Contemporaneous loan-level control variables consist of loan size scaled by lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. A set of MSA dummies and three-digit SIC industry dummies is controlled in all specifications. Robust $t$-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | Low | High | Low | High | Low | High | Full Sample |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $D_m^{AA\ Share} \times Post$ | -0.089 | -0.184** | -0.011 | -0.143** | 0.020 | -0.117** | 0.024 |
| | [-1.58] | [-2.62] | [-0.20] | [-2.45] | [0.34] | [-2.15] | [0.50] |
| $D_m^{AA\ Share} \times Post \times D^{HighShare}$ | | | | | | | -0.151** |
| | | | | | | | [-2.08] |
| $D_m^{AA\ Share} \times D^{HighShare}$ | | | | | | | 0.133 |
| | | | | | | | [1.35] |
| $Post \times D^{HighShare}$ | | | | | | | 0.034 |
| | | | | | | | [0.65] |
| $Post$ | -0.111** | 0.042 | -0.030 | 0.043 | -0.070 | -0.023 | -0.076* |
| | [-2.03] | [0.89] | [-0.62] | [0.85] | [-1.57] | [-0.47] | [-1.74] |
| $D^{HighShare}$ | | | | | | | 0.019 |
| | | | | | | | [0.27] |
| Firm Controls | No | No | Yes | Yes | Yes | Yes | Yes |
| Loan Controls | No | No | No | No | Yes | Yes | Yes |
| MSA FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 2,730 | 3,726 | 2,193 | 2,924 | 2,193 | 2,924 | 5,117 |
| $R^2$ | 0.390 | 0.372 | 0.582 | 0.619 | 0.597 | 0.632 | 0.567 |

Table 14: Heterogeneity of Audit Market Competition by Institutional Ownership

This table examines the heterogeneous effect of auditor competition on the cost of bank loans by institutional ownership. Columns (1)-(6) report difference-in-differences regression results in the subsamples sorted by firms' institutional ownership averaged over 2000 and 2001, whereas column (7) reports the results of a triple-difference regression in the full sample. All institutional ownership has been adjusted by its market capitalization. Dummy variables $D_m^{AA\ Share}$, $Post$, and $D^{HighInst}$ respectively mark firms in MSAs with above-median AA market share in 2001, the period on and after 2002, and firms with above-median institutional ownership averaged over 2000 and 2001. Lagged firm-level control variables include the natural logarithm of total assets ($\ln(AT_{t-1})$), return on assets ($ROA_{t-1}$), the net capital stock divided by the total assets ($PPENT_{t-1}/AT_{t-1}$), leverage ratio ($Leverage_{t-1}$), market-to-book ratio ($MB_{t-1}$), cash flow volatility ($CF\_Vol_{t-1}$), audit fee divided by total assets ($AuditFee_{t-1}/AT_{t-1}$), and Altman's $Z$ score ($Z$-$Score_{t-1}$). Loan-level control variables consist of loan size scaled by lagged total assets $Loan\ Size_t/AT_{t-1}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_t)$, and a dummy variable indicating whether the loan is syndicated $D^{Syndication}$. A set of MSA dummies and three-digit SIC industry dummies is controlled in all specifications. Robust $t$-statistics clustered at the MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed variable descriptions are provided in the appendix.

| Dep. Var. | $\ln(Spread_t)$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | Low | High | Low | High | Low | High | Full Sample |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $D_m^{AA\ Share} \times Post$ | -0.172** | 0.029 | -0.179** | 0.045 | -0.147** | 0.058 | -0.173** |
| | [-2.64] | [0.59] | [-2.54] | [0.94] | [-2.17] | [1.22] | [-2.37] |
| $D_m^{AA\ Share} \times Post \times D^{HighInst}$ | | | | | | | 0.207** |
| | | | | | | | [2.03] |
| $D_m^{AA\ Share} \times D^{HighInst}$ | | | | | | | -0.128 |
| | | | | | | | [-1.41] |
| $Post \times D^{HighInst}$ | | | | | | | -0.059 |
| | | | | | | | [-0.89] |
| $Post$ | 0.056 | -0.179*** | 0.046 | -0.139*** | -0.030 | -0.141*** | -0.030 |
| | [1.03] | [-5.21] | [0.88] | [-4.24] | [-0.56] | [-4.36] | [-0.52] |
| $D^{HighInst}$ | | | | | | | 0.288*** |
| | | | | | | | [4.94] |
| Firm Controls | No | No | Yes | Yes | Yes | Yes | Yes |
| Loan Controls | No | No | No | No | Yes | Yes | Yes |
| MSA FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3,929 | 2,743 | 2,915 | 2,323 | 2,915 | 2,323 | 5,238 |
| $R^2$ | 0.334 | 0.336 | 0.563 | 0.420 | 0.579 | 0.433 | 0.576 |