Auditor Competition and Cost of Bank Loans

Abstract

This paper examines the effect of auditor competition on the cost of bank loans of client firms. Exploiting the demise of Arthur Andersen that differently reduces the local audit market competition of metropolitan statistical areas (MSAs), we find a *decrease* in clients' cost of bank loans in areas with a larger *decrease* in competition. The competition effect on cost of bank loans is more pronounced when external monitoring is lower and when auditors compete more fiercely with price. Our finding is explained by a model in which clients shop for audit opinions and a more competitive audit market forces auditors to compromise audit quality to maintain client relationship and market share.

1 Introduction

The US audit market is highly concentrated. As of 2017, the top four accounting firms, namely the Big Four, collectively accounted for 93.6% of market share in terms of audit fees. Regulators and market participants have expressed concern that the lack of competition resulting from such high concentration might erode audit quality and negatively affect efficient capital allocation (e.g., Government Accountability Office, 2008; The Economist, 2017; Financial Times, 2016). Despite these concerns, evidence on the effects of competition on audit quality is far from conclusive. Furthermore, it remains unclear whether the resulting change in audit quality would materially influence the financing cost of capital market.

This study fills the void and investigates the effects of audit market competition on cost of bank loans. We focus on cost of bank loans for several reasons. First, the concern by regulators and market participants is whether audit market competition eventually affects clients' financing cost. Zimmerman (2013) argues that changes in audit quality usually has a second order effect on firm value. Examining cost of bank loans allows us to jointly test whether audit market competition affects audit quality and whether the resulting changes in audit quality materially affects clients' cost of capital. If the effect on cost of capital is inconsequential, the concern becomes less acute. Second, cost of bank loans is less subject to measurement error. In contrast, other financial reporting quality measures of audit quality, such as discretionary accruals and meeting or beating analyst forecasts, can have high measurement error and even bias (DeFond and Zhang, 2014). Third, studies have established a robust link between audit quality and cost of bank loans (Minnis, 2011; Minnis and Sutherland, 2017),[1] which increases the power of our empirical tests and alleviates the concerns by DeFond and Zhang (2014) that perception-based measures of audit quality such as cost of equity capital have low power. In other words, if competition affects audit quality, the change in audit quality should have a higher likelihood of affecting cost of bank loans. Finally, bank financing is quantitatively important. Compared with public equity and bond offerings, private bank financing is more common, which makes the effect of audit market competition on cost of

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[1]Studies show that firms that provide audited financial statements and have higher audit quality also have lower cost of debt, as quality-assured financial statements help banks to reduce information frictions (Pittman and Fortin, 2004; Minnis, 2011; Minnis and Sutherland, 2017). As bank lending becomes more transactional based over time requiring verifiable hard information from financial statements, the role of financial statements and, by extension, the quality of audit, have become increasingly more important (Armstrong et al., 2010).

bank loans an economically important question.

Theoretically, in a classical monopolistic pricing model, monopolistic producers can charge a higher price and reduce the quantity to increase monopolistic rent. Mapping this idea to the auditing market means that monopolistic auditors and, by extension, auditors in a less competitive market, can charge higher fees and reduce quality in order to capture economic rents. For example, Mussa and Rosen (1978) demonstrate that monopolistic producers produce lower quality products than do oligopolists. The prediction of monopolistic pricing models speaks to the concerns of regulators and academics.

However, classical monopolistic competition models ignore a crucial feature of the audit market and service industry in general. Auditors' principle revenue comes from their client firms. This implies auditors providing adverse opinions risk losing their client firms, a phenomenon known as "opinion shopping" (Chen et al., 2015; Lennox, 2000). We incorporate opinion shopping into an analytical model of auditors competing for clients. Based on prior studies (e.g., Newton et al., 2015), our model assumes that opinion shopping is easier when competition intensifies. We demonstrate that a highly competitive audit market incentivizes auditors to issue audit reports that favor their clients to avoid losing market share.[2] Therefore, in the presence of audit opinion shopping, more competition reduces audit quality. Anticipating the potential erosion of audit quality, lenders ex-ante charge higher interests.

We empirically test the effect of audit market competition on clients' cost of bank loans in a sample of US publicly traded firms that are matched to bank loan data from DealScan database.[3] We focus on competition at the local market level, as prior studies document that auditors compete locally as they have decentralized organizations and operate through a network of semi-autonomous local engagement offices (e.g., Reynolds and Francis, 2000; Numan and Willekens, 2012; Chu et al., 2018). We follow prior studies and measure local markets with metropolitan statistical areas (MSAs).[4]

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[2]Similar effects have been shown in the credit rating literature. For example, Bolton et al. (2012) model the competition of rating agencies in the presence of debt issuers shopping for higher ratings and show that credit rating can be upwardly biased as competition intensifies.

[3]To the extent that firms that receive syndicated loans receive sufficient monitoring by lenders, which diminishes the role of auditors, our results are likely to offer a lower bound on the effects of auditor competition.

[4]We do not preclude that auditors also compete in other dimensions. For example, auditors compete within industries due to the heterogeneous industry specialization across auditors (e.g., Gerakos and Syverson, 2015; Chu et al., 2018). We do not focus on within-industry competition because measures of within-industry market share of auditors are likely to be correlated with unobserved industry characteristics (Minutti-Meza, 2013). Furthermore,

Empirically testing the effects of competition on cost of bank loans is challenging, as unobserved factors might influence both auditor competition in each local market and clients' cost of bank loans. We establish the causal effect by exploiting shocks to local audit market competition due to the demise of Arthur Andersen (AA) in 2002. AA was one of top five accounting firms and surrendered its auditing license in 2002 as the firm was convicted of obstruction of justice for shredding documents related to the investigation of the Enron accounting scandal. AA's collapse eliminated a large auditor from clients' choice set, which increased the supply of clients to local audit markets. We argue that AA's elimination reduced competition for clients among the remaining auditors. A larger AA market share implies a greater supply of AA's clients to the local audit market, and therefore decreases the need of the remaining auditors to compete for market share. In other words, a larger AA market share is associated with a larger reduction in competition among the remaining auditors for clients.[5] Our research design compares changes in clients' cost of bank loans in local markets where AA had a large share (a larger decrease in competition) relative to that in local markets where AA had a small share (a smaller decrease in competition), using a generalized difference-in-difference design. Because the collapse of AA directly affected AA's former clients who were forced to switch auditors, we drop all former clients of AA from the sample.[6]

Our finding is consistent with the model prediction that a decrease in competition enhances audit quality, which reduces cost of bank loans. Specifically, we find that relative to those firms in MSAs where AA previously had a low market share (a smaller decrease in competition), firms in MSAs where AA previously had a high market share (a larger decrease in competition) experience a lower cost of bank loan by 15.9% (about 22 basis points) after AA's demise. The results are robust to controlling for a set of firm and loan characteristics and MSA and industry fixed effects. Consistent with audit quality being the mechanism, we find that performance matched discretionary accruals decrease as competition decreases. We also find that income-decreasing restatements decrease as

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because we lose many observations by requiring Dealscan data for bank loans, we cannot measure market share at the MSA-industry level introduces because doing so introduces large measurement errors. Therefore, readers should exert caution when generalizing our findings to other dimensions of competition.

[5]Our argument assumes that AA's market share proxies for the magnitude of the supply shock of clients to the local market. Consistent with this argument, Gerakos and Syverson (2015) find that audit fees increase in the post-AA era for industries where AA had a higher market share. Landsman et al. (2009) find evidence indicating that AA's collapse represents a shock to client supply to the local market. We also empirically demonstrate a monotonic relation between AA's market share and increase in local market concentration, measured by Herfindhal index.

[6]Blouin et al. (2007) show no material improvement of audit quality of AA' former clients after the forced auditor switch, though Chaney and Philipich (2002) and Krishnamurthy et al. (2006) document a negative stock market reaction of AA's former clients surrounding dates on which AA was under severe scrutiny.

competition decreases but only for low litigation risk industries.

Our identification strategy utilizes the fact that because AA's local market shares in its pre-collapse period are predetermined, uncontrolled factors driving the formation of AA's market share in each MSA are uncorrelated with *changes* in cost of bank loans of *non-AA's clients*. Although the assumption is not testable, we show that cost of bank loans of the treatment and control groups exhibits parallel trends prior to AA's collapse, which alleviates the concern that AA's market shares are correlated with unobserved time trends.

In addition to demonstrating parallel trends, we directly rule out three endogeneity concerns. First, AA's market share in a particular geographical area can be correlated with the industry composition of the area. Our findings may pick up industry time trends. For example, AA had a larger market share in the oil and gas industry that primarily clusters in the Houston area. A larger AA market share can therefore capture local firms' exposure to economic shocks of a particular industry, in this case, oil and gas. We include industry-by-year fixed effects that allow us to capture any time-varying across-industry heterogeneity and show that our results hold.

A second potential concern is that local economic conditions (that are not specific to an industry) may simultaneously determine AA's market share and cost of bank loans. However, we argue the timing of AA's collapse is relatively random as it was triggered by Enron's fraud. If AAs local market shares pick up trends in local economic conditions, we expect to find similar effects on cost of bank loans by artificially assigning the year of AA's collapse to another year. Following this idea, we run placebo tests by replacing the event year (2002) with a randomly chosen year and find the estimated coefficients become insignificant, which alleviate the concern that trends in the local economy bias our estimates. In addition, our MSA fixed effects also absorb the effects of time-invariant unobserved local economic conditions.

A third concern is that the event year of AA's collapse overlaps the enactment of the Sarbanes Oxley Act (SOX). Studies document an increase in audit fees and changes in auditors' client selection criteria as a result of more complex auditing procedures and increase in litigation risk following SOX (e.g., Johnstone and Bedard, 2004; Landsman et al., 2009; Iliev, 2010). However, we are not aware of any empirical evidence that the enforcement of SOX and the associated changes are systematically correlated with AA's market share. Nevertheless, we take a more prudential approach to rule out a SOX effect. Specifically, we match each firm in the treatment group with

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a firm from the control group using propensity scores generated from a set of pre-SOX client characteristics and audit quality that could explain the effects of SOX. We repeat our difference-in-difference specification in the matched sample and find similar results. Including industry-by-year fixed effects also alleviates the concern of SOX driving our results, to the extent that the effects of SOX mainly operate at the industry level (Reichelt and Wang, 2010).

In addition to the endogeneity concerns above, our results cannot be explained by two direct effects of AA's collapse. First, Landsman et al. (2009) show that the supply of AA's clients increased the capacity constraints of the remaining auditors. A larger AA market share should be associated with more constrained capacity of the remaining auditors, which predicts a decline in audit quality and an increase in cost of bank loans. The prediction is the opposite of our findings. Second, we show that auditor switching and Big 4 auditors rebalancing client portfolios post-SOX do not drive our results.

Having demonstrated that a decrease in auditor competition reduces cost of bank loans, we explore the heterogeneous effects of auditor competition along two dimensions. The first dimension explores the external monitoring. In our model, strong external monitoring increases the likelihood that auditors' opportunistic behavior is detected, which in turn deters auditors from lowering audit quality. Therefore, an increase in auditor competition is less likely to increase the cost of bank loans when external monitoring is high. Using analyst following and institutional ownership to proxy for the strength of external monitoring, we find evidence consistent with our prediction.

The second dimension studies the abnormal audit fees paid by the client firms. We use the abnormal audit fees as a measure of intensity of price competition in light of findings from prior studies that auditors also compete with fees (Chaney et al., 2003). While we do not model price competition, we argue that auditors facing fiercer price competition charge lower audit fees and have less room to compete with price. To maintain their market shares, auditors are more likely to cater to their clients' preference, which, according to our model, erodes audit quality. Consistent with our prediction, the results are mainly driven by the subsample of client firms paying abnormally low audit fees (that is, fiercer price competition). In contrast, we find no statistically significant correlation of auditor competition and cost of bank loans in the subsample of abnormally high audit fees.

Our paper contributes to the debate on the effect of auditor market competition on audit

quality. As noted by DeFond and Zhang (2014), prior studies document mixed evidence. For example, using a cross-country setting and engagement level data, Francis et al. (2013) find that concentration within the Big Four auditors is associated with lower audit quality. Similarly, Boone et al. (2012) find evidence that competition lowers auditors' tolerance for earnings management. In contrast, using the US setting, Newton et al. (2013) find that higher concentration of local auditing markets is associated with lower likelihood of restatement, consistent with the notion that concentration increases with audit quality. Along these lines, Newton et al. (2015) document a positive association between local auditing market competition and the likelihood of shopping for opinion of internal control. The mixed evidence might reflect the theoretical ambiguity as well as the empirical challenge of addressing endogeneity issues. In this study, we build a theoretical model that accounts for the factor of audit opinion shopping. Empirically, we identify the causal effect by using the shock of AA's demise that differently affects the local market competition. Both theoretical prediction and empirical findings point to the negative effect of auditor competition on audit quality.

This study also contributes to our understanding of the role of auditors in bank financing. Prior studies examine the usefulness of provision of audited financial statements (Minnis, 2011), and the use of financial statements as monitoring devices by banks (Minnis and Sutherland, 2017). Studies show that firms that provide audited financial statements and have higher audit quality have lower cost of debt (Mansi et al., 2004; Pittman and Fortin, 2004; Minnis, 2011). Given the importance of auditors' role in assuring financial statement quality, we study the effect of auditor competition on cost of bank loans. To our knowledge, our study is the first to examine how financial market investors, banks in particular, perceive the competition in auditor market and provides scientific evidence to policymakers as to the nature of audit market concentration. Although increasing competition might be beneficial in other settings, clients' incentives to shop opinions might reverse this effect.

Finally, our results also offer insights into the nature of auditor competition in the presence of audit opinion shopping. Prior studies document that audit opinion shopping tends to compromise audit quality. This study extends these studies by showing that a competitive auditor market could exacerbate the opinion-shopping behavior of clients. Our finding is consistent with the notion that the competition among monitors does not necessarily yield efficient outcomes if the companies being

monitored pay their monitors (Bolton et al., 2012). Our study is also related to a broader literature that reveals the dark side of competition in the financial market. For example, it has been shown that competition tends to give rise to earning management (Shleifer, 2004), tax avoidance (Cai and Liu, 2005), and credit rating inflation (Bolton et al., 2012; Becker and Milbourn, 2011).

2 Model

This section first presents a simple stylized model to illustrate the effect of competition among auditors on audit quality in the presence of clients shopping for favorable audit opinions. The model demonstrates that more competition can decrease audit quality and increase clients' cost of bank loans because auditors that provide adverse opinions risk losing market share. The section also discusses related studies on the effects of auditor competition and on the role of audit quality on cost of bank loans.

2.1 Model

Our model adapts Bolton et al. (2012)'s framework, which models credit rating agencies' competition for clients' business by issuing credit ratings, and shows that clients' rating shopping, that is, clients' preferences for choosing rating agencies that provide higher ratings, leads to inflated ratings. Our model below demonstrates that a similar result applies to competition among auditors for clients.

2.1.1 Model setup

Let the true state of the world of a client i be $\omega \in \{g, b\}$, where g refers to the good state and b refers to the bad state and the realization of the state is observed only by the client. The good state occurs with probability π. The game described below is repeated for two periods. The states of each period are assumed to be independent.

To generate a role for an auditor, we assume that the client always prefers to report g and is therefore required (by regulators) to hire an auditor to certify its disclosures. The preference is needed because if the client always reports truthfully, there will be no need for auditors to certify the disclosures. In the baseline model, only one auditor, labeled with j, operates in the market.

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The baseline model is then compared with the case in which two duopolist auditors, labeled with j and k, compete with each other for market share.

We first set up the auditor's production technology. Auditor j has a production technology, called e_j, which represents the quality of a signal θ_j it receives regarding the true state of the world,

$$\Pr\{\theta_j = g | \omega = g\} = \Pr\{\theta_j = b | \omega = b\} = e_j, \tag{1}$$

where $e_j < 1$ to prevent complete unraveling. The production technology e_j takes two values h, l with $1 > h > l > 0$. A higher e_j means a more precise signal. The same notations apply to auditor k. To simplify the analysis, we assume that e_j and e_k are exogenous, that is, auditors are endowed with a production technology.[7]

We next specify the payoff function to the incumbent auditor, that is, the auditor that performs the audit service. The incumbent auditor receives a payoff at the end of each of the two periods after the state ω of each period is realized. The payoff to the incumbent auditor in each period depends on (1) the quality of the signal e, which generates a net pay-off, $b(e)$, to the auditor, (2) the loss of reputation given the detection of a lying report.

We impose several assumptions on the payoff function. First, the net benefit of a more precise signal $b(e)$ increases with quality, that is, $b(h) > b(l)$. For simplicity, we will refer to $b(e)$ as audit fees. Because the signal precision, e is exogenous, audit fees are also exogenously given. We do so to focus on the choice of audit quality when auditors compete for clients that shop for better audit opinions, and abstract away from modeling the bargaining between client and auditors as well as price competition among auditors. We defer the discussions about price competition and how it could affect the model predictions to section 2.2.

Second, conditional on lying and that the auditor's report differs from the realization of the true state, the incumbent auditor incurs a reputation loss of ρ with probability α. The assumption is but one of many ways to capture the cost of untruthful audit. More generally, a reputation loss can occur in the form of incurring lawsuits from clients' shareholders, or even losing one's license,

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[7]The assumption is not crucial for our analysis and reflects the reality that auditors typically have procedures in place before they conduct audits. When we allow auditors to choose the technology, if retaining clients is very important and the auditor anticipates that it will misreport conditional on observing b, it will choose a worse technology l to reduce the signal precision. A lower signal precision reduces the expected cost of manipulation because a report inconsistent with the true state can be attributed to a bad technology. In this sense, competition also lowers audit quality.

like the case of Arthur Andersen. The probability α can be viewed as the strength of shareholder monitoring or external information environment that increases the probability of the revelation of audit failure. For the detection technology, we make the simplifying assumption that the auditor will be checked only if the report deviates from the true state of the world, which is revealed at the end of each period. Because the auditor's signal is not perfect, a difference between the auditor's report and the true state of the world can be an honest mistake. We assume that in this case, the auditor will not be punished, so the auditor does not need to be concerned with Type I errors (false positive) when it comes to detection. With probability α, lying can be detected and the auditor loses the auditor fee $b(e)$ and is further punished by ρ.

In each period, the auditor chooses a report $r \in \{g, b\}$ to maximize its expected payoff after observing the signal. Specifically, the incumbent auditor in the second period chooses a report $r \in \{g, b\}$ to maximize the second period expected payoff, conditional on observing the second-period signal θ. The incumbent auditor in the first period maximizes the sum of the expected payoffs from both periods, conditional on observing the first-period signal θ. Audit quality is said to be lower when the auditor does not report truthfully. For example, the auditor reports g when observing b.

To accommodate opinion shopping, we give the client the option to switch to another auditor (when available) at the end of the first period if the incumbent auditor reports b.[8] We assume that when the client chooses to switch auditor, it commits to hire the chosen auditor in the second period. As a result, the auditor that is not hired by the client receives zero payoff in the second period. We use such a stylized setting to capture the notion that incumbent auditors may lose market share when issuing adverse opinions. As demonstrated later, whether auditors that issue adverse opinions lose their market shares depends on whether the benefit of lying outweighs its cost and the optimal response by the competitor auditor.

Finally, we set up lenders. A typical model of a lending relationship needs to specify the frictions that lead to the riskiness of the loans. Examples include asymmetric information or costly monitoring. Detailing these mechanisms is beyond the scope of the paper and will not change the main intuition of the results. The main prediction is unaffected as long as higher audit quality reduces cost of bank loans. We therefore choose to model lenders in a very stylized way described

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[8]The client has no incentive to switch when the incumbent auditor issues g.

below.

We assume that lenders offer the borrower credits at the beginning of each period, which abstracts away from lenders' credit-rationing decisions. The loan contract specifies the interest payment r and the amount of loan i with $g > i > b$. The loan amount is specified so that the loan is risky. Audit quality affects cost of bank loans because lenders incur a cost c in the state of the world in which the auditor does not report truthfully. The cost c can be interpreted as the monitoring cost incurred by the lender when the audit report cannot be trusted.[9] Lenders are assumed to have rational expectations and understand the game played between the client and its auditor.

The timeline of the game is depicted in Figure 1. In what follows, we focus on pure strategy Nash equilibrium for client i's incumbent auditor j's report after j observes the signal θ_j and examine conditions under which j reports the truth.

[Insert Figure 1]

2.1.2 Monopolistic audit market

Our baseline model features a single auditor j. Because it is the only auditor, it does not need to be concerned about losing market share. We first focus on the second period of the game. First, consider the case in which the auditor observes g. The payoff to j conditional on e_j is

$$U(r|e_j, \theta_j = g) = \begin{cases} b(e_j) & \text{if } r = g \\ -\alpha e_j \rho + (1 - \alpha e_j) b(e_j) & \text{if } r = b. \end{cases} \tag{2}$$

By reporting b when the auditor observes g, auditor j incurs a reputation loss only when the true state is revealed to be g and lying is detected. This event happens with probability αe_j, because from the auditor's perspective, the true state will be g with probability e_j, and lying (to report b) will be detected with probability α. With probability $1 - \alpha e_j$, the true state is consistent with the auditor's report or lying won't be detected. In this case, there is no reputation loss and the auditor

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[9]Alternatively, we can set up the model so that lenders are averse to uncertainty and charge a higher risk premium when the auditor is expected to be untruthful, because untruthful audit report increases the uncertainty regarding the state of the world. What is important to us is that lenders care about audit quality in some ways. Minnis (2011) provides empirical evidence supporting the assumption that audit quality matters for lenders.

gets $b(e_j)$. If the auditor reports g truthfully, it will get a payoff $b(e_j)$ and incur no reputation loss.

Second, consider the case in which the auditor observes b. The payoff to j conditional on e_j is

$$U(r|e_j, \theta_j = b) = \begin{cases} b(e_j) & \text{if } r = b \\ -\alpha e_j \rho + (1 - \alpha e_j)b(e_j) & \text{if } r = g. \end{cases} \tag{3}$$

The payoff in (3) is identical to that in (2). By reporting g, auditor j incurs a reputation loss with probability αe_j.

Based on (2) and (3), the optimal decision is to report truthfully because lying only reduces the auditor's expected payoff due to the reputation loss.

Now we examine the first period reporting decision by the auditor. Because it is the only auditor in the market, the client will have to choose it in the second period. So it does not need to be concerned that its report will result in clients switching to other auditors. It follows that the equilibrium in the second period does not affect the first period reporting decision and that the first period equilibrium will be identical to that in the second period.

Because the auditor's report is always truthful, the lender does not incur a monitoring cost ex post. Ex ante, the interest rate r is chosen so that the lender earns zero profit in a competitive lending market,

$$\pi(i + r) + (1 - \pi)b = i,$$

which implies that the interest rate is

$$r = \frac{(1 - \pi)(i - b)}{\pi}. \tag{4}$$

Proposition 1. *In equilibrium, a monopolistic auditor chooses to report truthfully. The lender charges interest for the amount $\frac{(1-\pi)(i-b)}{\pi}$.*

2.1.3   Duopolist audit market

Now consider the case in which auditor j faces competition from a second auditor k. We assume that the client prefers $r = g$ and will switch to k if k offers a report $r = g$ while j reports $r = b$. In doing so, the client promises to hire k in the next period, and auditor j will receive a payoff of

zero in the next period. This assumption captures opinion shopping and is crucial to deliver the results below. For simplicity, we do not further assume information asymmetry among auditors. Specifically, we focus on the case where auditors observe the same signals and anticipate each other's reports. This case corresponds to our ideal experiment in the empirical setting, which is the effect of competition among auditors, holding everything else constant. We assume that the client will retain j, the incumbent auditor, if both k and j offer the same reports.

We first note that the second period reporting decision is identical to that in Proposition 1 because the auditor is not concerned about whether it can retain the client. In other words, whoever is the chosen auditor by the client will report truthfully, which means that the auditor will obtain $b(e)$ in the second period.

In the first period, the two auditors compete with each other. The payoff to the incumbent auditor j conditional on observing θ_j now depends on what j expects k to report. The reason is that the auditor that offers the unfavorable report in the first period might lose the client in the second period and receive a payoff of 0.

First, the payoffs conditional on observing $\theta_j = g$ are summarized in Table 1. The rows report j's report and the column reports k's report. The entries represent the payoff to j conditional on the reports of j (row) and k (column). Table 1 shows that the dominant strategy is to report g when the signal is g. The reason is that reporting b will only result in losing the client and incurring the reputation loss.

Table 1: Payoffs conditional on $\theta_j = g$

Report	g	b
g	$b(e_j) + b(e_j)$	$b(e_j) + b(e_j)$
b	$-\alpha e_j \rho + (1 - \alpha e_j)b(e_j)$	$-\alpha e_j \rho + (1 - \alpha e_j)b(e_j) + b(e_j)$

Next, we examine the strategy of the incumbent auditor j when both auditors observe $\theta_j = b$. The payoffs conditional on observing $\theta_j = b$ are summarized in Table 2. Again, the rows present j's reports and the columns present k's reports. The entries represent the payoffs to j (the first element in the bracket) and to k (the second element in the bracket) conditional on the reports of j (row) and k (column).

Table 2 shows the potential dilemma for auditor j. If j chooses to report b truthfully and k

responds by a report g, j will lose the client and the audit fee for the second period. Anticipating this is the equilibrium, j might report g in order to keep the client.

Table 2: Payoffs conditional on $\theta = b$

Report	g	b
g	$[-\alpha e_j \rho + (1 - \alpha e_j)b(e_j) + b(e_j), 0]$	$[-\alpha e_j \rho + (1 - \alpha e_j)b(e_j) + b(e_j), 0]$
b	$[b(e_j), -\alpha e_k \rho + (1 - \alpha e_k)b(e_k) + b(e_k)]$	$[b(e_j) + b(e_j), 0]$

Whether j has the incentive to misreport to keep the client depends on two conditions. First, the payoff from retaining client i by reporting g relative to that from losing the client by reporting b is non-negative, that is,[10]

$$\Delta \equiv -\alpha e_j \rho - \alpha e_j b(e_j) + b(e_j) \geq 0. \tag{5}$$

This condition implies that when k chooses to misreport, j's optimal decision is also to misreport.

Second, the competitor auditor k has incentive to misreport when j truthfully reports b, that is, the payoff to the competitor auditor k from reporting g is higher than the payoff from reporting b, that is,

$$\Delta_K \equiv -\alpha e_k \rho + (1 - \alpha e_k)b(e_k) + b(e_k) \geq 0. \tag{6}$$

This condition is necessary because, as shown in Propostion 1, auditor j has no incentive to misreport absent of competition from auditor k for its client. It immediately follows from (5) that the condition (6) holds when the condition (5) holds and $e_j = e_k$. As a result, condition (5) suffices for characterizing the condition for a misreporting equilibrium. We summarize it in Proposition 2.

Proposition 2. *When $e_j = e_k$, a misreporting equilibrium exists, that is, a duopolist auditor reports g when observing b, when the benefit of misreporting is large, that is, $\Delta \geq 0$.*

The plausibility of a misreporting equilibrium depends on Δ. A higher Δ increases the attractiveness of lying. Condition (5) shows that Δ decreases with external monitoring α and reputation cost ρ. Higher external monitoring and reputation cost make lying more costly, which reduces the attractiveness of misreporting.

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[10]Note that the payoff function assumes that auditor j still obtains a fee even if it is fired. This assumption captures the empirical regularities that both auditors are paid in the case of switching since the contract is signed prior to the conduction of an audit. The main results of the model, however, do not depend on this assumption.

Corollary 1. *A duopolist auditor is less likely to misreport when reputation cost and external monitoring are high.*

Because of rational expectation, lenders correctly anticipate the likelihood of misreporting. If condition (5) does not hold, competition has no effect on cost of bank loans because lenders do not incur the monitoring cost c. Monitoring is instead delegated to the auditor. In this case, the interest charged by the lenders is identical to that of the monopolistic case, $\frac{(1-\pi)(i-b)}{\pi}$. If condition (5) holds, competition impairs audit quality. In this case, neither the client nor the auditor will report truthfully, so the reports becomes uninformative. The lender therefore need to incur the monitoring cost c irrespective of the (reported) state of the world. The equilibrium condition that determines the interest becomes

$$\pi(i + r - c) + (1 - \pi)b = i,$$

which implies an interest

$$\frac{(1 - \pi)(i - b) + \pi c}{\pi}. \tag{7}$$

The interest rate in (7) is higher than that in the case of a monopolistic auditor, $\frac{(1-\pi)(i-b)}{\pi}$. The intuition is that misreporting is costly for the lender, who compensates for the cost of misreporting with a higher interest rate.[11]

Proposition 3. *More competition increases cost of bank loans.*

2.2 Hypothesis Development

The model shows that competition for clients in the presence of opinion shopping can lower audit quality. The crucial assumption of the model that delivers the prediction is clients' incentive to shop for favorable audit opinions. Empirical studies generally support this assumption (e.g., Lennox, 2000; Kinney et al., 2004; Lu, 2006).

The insights from the model contrast with those from classical monopolistic competition models, which do not assume conflicts of interests between the producers and consumers of a product.

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[11]Also notice that the result does not qualitatively depend on whether the monitoring cost is incurred ex-ante or ex-post. If the monitoring cost is incurred ex-ante, the lender can simply add c to the total investment i and make it the principal of the loan. So the equilibrium interest becomes $\frac{(1-\pi)(i+c-b)}{\pi}$.

According to those models, if demand increases with product quality, more intense competition will result in higher quality. For example, Mussa and Rosen (1978) compare a monopolist producer's price and quality schedule with that of an oligopolist and show that quality offered by the monopolist is lower than that offered by an oligopolist. Applying the theory to the audit market, more competition among auditors will lead to higher audit quality, which in turn reduces cost of bank loans.

Although both forces are likely to be present, because opinion shopping describes the data, we state our hypothesis in the alternative form:

H1: *Auditor competition increases clients' cost of bank loans.*

It is worth noting that most models of competition, including ours, focus on the extreme cases of monopolistic producers and duopolist producers. When mapping our model into the empirical setting, we need the additional assumption that more competition makes it easier for clients to shop for opinions. Newton et al. (2015) provides evidence supporting this assumption.

An economic significant relation between competition among auditors and clients' cost of bank loans also relies on the premise that a change in audit quality induced by competition affects cost of bank loans. Studies have documented a negative association between audit quality and cost of bank loans (Mansi et al., 2004; Pittman and Fortin, 2004; Chen et al., 2016) and between accounting quality and cost of bank loans (Francis et al., 2005). However, the association applies to the whole sample of firms. Changes in audit quality induced by competition might not be material enough to affect clients. DeFond and Zhang (2014, p. 288) argue that "the auditor's influence over firm value is comparatively small relative to the multitude of other firm-level and economy-wide factors." Given that lenders can privately monitor firms through debt covenant and private communication (Sufi, 2007), it is conceivable that a change in audit quality does not affect cost of bank loans. As a result, H1 is also a joint test of whether competition affects audit quality and whether the corresponding change in audit quality affects cost of bank loans.

The next two hypotheses concern the cross-sectional predictions regarding the effects of competition among auditors on clients' cost of bank loans. Corollary 1 predicts that a strong external monitoring can weaken the positive effect of competition among auditors on cost of bank loans be-

cause stronger external monitoring increases the likelihood of detection of opportunistic behavior. Prior studies document institutional investors and stock analysts serve as external monitors. For example, Chen et al. (2017) suggest institutional investors can affect audit quality by forming a more independent audit committee that tends to appoint a tougher auditor. Fang (2008) indicates stock analysts frequently engage with managers and question various aspects of earning numbers. Dyck et al. (2010) document stock analysts are directly involved in corporate fraud detection. Outside our model, stronger monitoring can also disincentivize a client firm from conducting opinion shopping that could potentially hurt the benefits of shareholders. This force also weakens the positive relation between competition among auditors and cost of bank loans. We formally summarize the hypothesis below.

H2: *Auditor competition is more likely to increase clients cost of bank loans when external monitoring is low.*

A large literature examines how auditors compete with fees (e.g., DeAngelo, 1981; Chaney et al., 2003). Although our model does not capture price competition, we argue that fiercer price competition reinforces the incentives to cater to the client and lower audit quality predicted in our model. Auditors that face fiercer price competition charge lower audit fees. When competition further intensifies, they have less room to lower fees to capture clients. In this case, auditors are likely to find other ways to compete and the force in our model is likely to manifest. Fiercer price competition presumably also increases clients' bargaining power in the auditor-client relationships, as clients have more switching options available. If client firms possess stronger bargaining power (Casterella et al., 2004), they can use auditor switching as a threat, thus increasing the likelihood of opinion shopping. The discussion leads to the following hypothesis.

H3: *Auditor competition is more likely to increase clients cost of bank loans when fee pressure between auditor and client is high (auditors charge low audit fees).*

3   Sample selection

We start with the AuditAnalytics database that includes auditing information of all US publicly traded firms from year 2000 and onward. The database covers information about auditor names and auditors engagement office of each client firm. We first classify client firms into metropolitan statistical areas based on the location of their corresponding auditors' engagement offices. We use the definitions of metropolitan statistical area published by US Census Bureau in year 2000. We then calculate the market share of each auditor in terms of audit fees for each MSA every year. MSA-years with fewer than four firms are excluded as the measures for market share can be noisy. When calculating the market shares, we pool the market share of all non-Big 5 auditors and treat the collection of non-Big 5 auditors as a single auditor.

We next merge client firms with financial information from Compustat database. Firm-year observations with missing values of financial variables are dropped. Lastly, we merge the data with bank loan information from DealScan database based on the link table used by Chava and Roberts (2008). For the difference-in-difference regression setting that exploits the natural experiment of AA collapse, we take a five-year sample period centered around event year 2002. The final sample consists of 7,067 bank loan facilities that involve 4,402 firm-year observations from 2000 to 2004.

4   Empirical Strategy

Our identification strategy takes advantage of the demise of AA that differently affects the local auditor competition across MSAs in our sample. Arthur Andersen used to be the fifth biggest audit firms in the US as of 2001. AA went out of business in 2002 due to destroying relevant documents related to Enron's scandal (although only a small portion of AA's employees were involved). The demise of AA has two important features that allow us to identify the causal effects of audit market competition on clients' cost of bank loans. First, the collapse of AA was triggered by the Enron scandal and was not anticipated. Therefore, it is unlikely that clients took actions in the years prior to the collapse of AA, which alleviates endogeneity concerns. Second, the sudden disappearance of a big player in the market introduced supply shocks to local audit markets. Because local audit markets with a higher market share of AA in the pre-collapse period experienced a larger increase in the supply of clients, we argue that the incentive to compete for clients declined more for these

markets. We also verify later that markets where AA had a larger share experienced higher increase in market concentration post AA's collapse, which is associated with less competition.

We evenly sort all MSAs in our sample into two groups according to their corresponding market share of AA in 2001, one year prior to AA collapse. We label as treatment the group of MSAs with higher market share of AA and the rest as control. We argue that the treatment group experienced a larger *decrease* in local market competition relative to that of the control group because of a larger supply of AA's clients. The difference in the *intensity* of treatment in turns allows us to identify whether changes in local audit market concentration affect clients cost of bank loans. Our analysis excludes AAs clients, as their cost of bank loans can be affected by reputation concerns due to AAs audits. The difference-in-difference regression is specified as follows:

$$ln(Loan\ Spread_{i,s,t}) = \omega_0 + \omega_1 Treat \times Post + \omega_2 Treat + \psi' X + \eta_{i,s,t}, \tag{8}$$

where subscripts i, s, t denote the loan facility, borrowing firm, and year, respectively.

The outcome variable $ln(Loan\ Spread_{i,s,t})$ is the logarithm of loan spread, measured as the excess of borrowing interest rate over LIBOR or LIBOR equivalent benchmark rate. The indicator variable $Treat$ is one if firm s is based in a MSA that is classified into treatment group and zero otherwise. The dummy variable $Post$ takes value one if the year t is on or after 2002, and zero otherwise.

The vector X includes a set of control variables following Valta (2012). We include a set of firm characteristics that include firm size, $ln(Assets_{s,t})$, return on assets, $ROA_{s,t}$, the amount of tangible assets, $Tangibility_{s,t}$, leverage ratio $Leverage_{s,t}$, market to book ratio $MB_{s,t}$, cash flow volatility $CF\_Vol_{s,t}$, and Altman Z score, $Z\text{-}Score_{s,t}$. We also control for loan characteristics including the loan facility amount, $LoanSize_{i,s,t}$, the maturity of loan facility, $ln(Maturity_{i,s,t})$, and a dummy variable indicating whether a loan is syndicated ($D^{Syndication}$). A set of three-digit SIC industry dummies and year dummies are in place to control for industry- and year-level heterogeneities. We cluster standard errors at the MSA level.

Our primary interest lies in coefficient ω_1 that captures the difference of treatment and control groups in the *change* of cost of bank loans before and after AA collapse. Because we estimate the change in cost of bank loans, the identification assumption is that the spatial variation of AAs

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market share is exogenous to the *change* in non-AAs clients economic characteristics. We address potential violations of the identification assumption in later sections.

5   Results

This section presents our main result on the effect of competition among auditors on clients cost of bank loans. We begin with descriptive analysis and a validity test to show AA's collapse has material impact on local audit market competition. We then present our baseline findings, followed by addressing endogeneity concerns and documenting the mechanisms underlying the baseline findings. We finally explore heterogeneous effects of auditor competition along two dimensions: external monitoring and abnormal audit fees.

5.1   Descriptive statistics

Table 1 presents the descriptive statistics for the variables used in our analysis. The average log loan spread is 4.95 (141 basis points). Loans differ in their characteristics. Loan issuance size varies over the cross section with 4.4% of total asset at the 25th percentile and 37.4% of total asset at the 75th percentile. The majority (94.4%) of loans covered by Dealscan are syndicated loans. The concentration on syndicated loans means that our sample consists of larger borrowers. To the extent that larger borrowers have other means to communicate with lenders other than financial statements, and are subject to more monitoring by analysts and institutional investors, auditor market competition may impact them less. Firms in our sample are generally large firms with high profitability with an average ROA of 11.7%. The average firm has about 31% intangible assets, debt to market equity ratio of 0.89, and market to book ratio of 2.5. Firms in our sample are generally not very risky with Altman Z-score of 1.76. The average restatement rate is 0.123.

[Insert Table 1.]

Panel B of Table 1 reports the distribution of the number of firm years and the number of firms across MSAs. An MSA on average has 39.4 firms and 75 firm-year observations. Not surprisingly, firms are not evenly distributed across MSAs. The smallest MSA has 4 firms and 8 firm-year observations. The largest MSA has 317 firms and 669 firm-year observations.

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Our research design builds on the premise that the AA's collapse increased the supply of clients to the remaining auditors, which decreased the local audit market competition, and that a larger AA's market share further reduces competition. To formally validate this assumption, we regress the change of local auditor concentration, as measured by the Herfindahl Hirschman Index (HHI) of auditor local market share, on AA's market share in the pre-collapse year (2001).

Table 2 presents the regression results. In Columns (1) and (2), we find the change of local auditor concentration $\Delta HHI_{m,2001-2002}$ is positively associated with AA's local market share, either measured by the percentage of AA's market share ($AA\ Mkt\ Share_{m,2001}$) or a binary variable (0/1) indicating MSAs with above-median AA's market share ($D_{m,2001}^{AA\ Mkt\ Share}$). In other words, MSAs where AA had a higher market share experience a larger increase in market concentration relative to MSAs where AA had a smaller market share. The point estimate of $D_{m,2001}^{AA\ Mkt\ Share}$ at 0.059 implies that the change of auditor concentration from 2001 to 2002 is 5.9% higher in MSAs with a high market share of AA than that in MSAs with a low market share. Columns (3) and (4) report quantitatively similar results when we measure local auditor concentration by the HHI of local market share among the big 5 auditors. In fact, the big 5 auditors have occupied majority of audit market for public firms, so the resulting high correlation of the two concentration measures leads to highly similar coefficient estimates between Columns (1)-(2) and Columns (3)-(4). Overall, our results suggest the sudden demise of AA indeed imposes a shock to the local audit market competition.

[Insert Table 2.]

5.2 Baseline Results

This section examines whether shocks to local market competition induced by the collapse of AA affect clients' cost of bank loans. Table 3 presents the results using the specification outlined in Eq.(8). Recall that our difference-in-difference design marks as treated ($Treat = 1$) loans issued to clients located in MSAs where AA had a larger market share prior to its demise, and as control ($Treat = 0$) loans issued by clients located in MSAs where AA had a smaller market share. Clients located in MSAs with a higher AA's market share experience a larger decrease in competition. If audit market competition increases cost of bank loans, we will see a larger change in cost of bank

loans for clients located in MSAs with a higher AA's market share relative to those located in MSAs with a lower AA's market share.

[Insert Table 3.]

Table 3 reports the regression results progressively. Column (1) does not any control variables and 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 level of price competition and changes in the audit cost due to Sarbanes Oxley act (Iliev, 2010). Column (5) adds Z-score to control for observed credit risk. Column (6) adds controls for loan characteristics.

Across all specifications, we find the coefficient estimate of $Treat \times Post$ is statistically negative and stays relatively stable across all columns. The economic significance is sizable. In Column (1), the cost of bank loans for clients located in MSAs with high AA's market share decrease by 16.0% relative to that for clients located in MSAs with high AA's market share, a decrease translating to 22 basis point decrease in the cost of bank loans for an average firm that has 141 basis point cost of bank loans in our sample. The corresponding estimate in column (6), our most strict specification, is 8.6%, which represents 12.1 basis points.

The firm-level control variables generally have the expected signs. For example, firm size $(ln(Assets_{s,t}))$, profitability $(ROA_{s,t})$, tangibility $(Tangibility_{s,t})$, and growth potential $((MB_{s,t}))$ correlate negatively with cost of bank loans. Firm leverage $(Leverage_{s,t})$, on the other hand, positively correlates with cost of bank loans. The results suggest the creditors, on average, prefer large and mature firms with good profitability, low leverage, and a high level of tangible assets. As for the loan characteristics controls, a longer loan maturity and syndicated loans tend to have higher interest rates, whereas a large loan amount tends to have lower interest rates.

Overall, the finding from Table 3 supports our model prediction that more competition increases cost of bank loans, and is inconsistent with traditional oligopolistic competition models that predict an increase in audit quality and a reduction in cost of bank loans as competition intensifies. At this point, however, it remains possible that competition might reduce audit quality through other channels. In what follows, we rule out several endogeneity concerns, and validate the channels through which our main results manifest. We also use cross-sectional tests to further validate that our main results are driven by competition among auditors.

5.2.1 Endogeneity concerns

Our difference-in-difference analysis compares the change in the cost of bank loans charged to non-AA clients before and after AA's collapse as a function of AA's market share. The identifying assumption of the difference-in-difference analysis is that AA's market share is unrelated to unobserved factors that *changed* the cost of bank loans of non-AA clients around AA's demise. In other words, absent of the AA's collapse, the costs of bank loans of the treatment and control groups follow parallel trends. Although the assumption is not directly testable, Figure 3 plots the cost of bank loans over time separately for the treatment and control groups. The graphs do not suggest a correlation between time trends and AA's market shares prior to AA's collapse.

[Insert Figure 3.]

We next investigate three scenarios in which the identification assumption may fail. First, our results might be driven by shocks to industries in which AA are specialists. Prior studies document that auditors specialize in different industries (e.g., Gerakos and Syverson, 2015). AA's market share would be higher in MSAs where industries that AA specialized in were more represented. For example, oil and gas industry is more represented in Houston and was more likely to be audited by AA. If industries in which AA specialized experienced economic shocks, higher market share would capture the extent to which local economy was exposed to the economic shocks, which in turn affected cost of bank loans. To rule out this concern, we add industry-by-year fixed effects that absorb time-varying economic 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. The result shows that the addition of the industry-by-year dummies doesn't effectively alter the magnitude of coefficient on $Treat \times Post$, suggesting that time varying industry shocks do not drive our results.

Second, the local economical conditions at the level of MSA can be another source of endogeneity. For instance, the economic development of a MSA can be correlated with AA's market share and, at the same time, determines the cost of bank loans of local firms. However, the timing of AA collapse is unlikely to be anticipated by client firms, as it was triggered by the detection of Enron's fraud. Therefore, if the pre-collapse market share of AA coincidentally picks up any effects of local economic conditions, we would expect these effects to continue in the years after the collapse of

AA. Therefore, if we artificially assign the treatment year to a randomly chosen year, we should observe similar effects on cost of bank loans.

Following this idea, we perform placebo tests to rule out any spurious correlation between AA's market share and the local economy that may affect cost of bank loans. Table 4 presents the regression results. Columns (1)-(4) respectively set the pseudo event year to 2005, 2007, 2009, and 2011 and repeat the regression specification in Eq.8. Across all four specifications, the coefficient estimate of $Treat \times Post$ is statistically and economically insignificant. The results suggest local economic conditions have little impact on the baseline results.

[Insert Table 4.]

Furthermore, to the extent all auditors prefer more economically developed areas, we should observe both lower market concentration and lower cost of bank loan in these areas, which points to a positive relation between AA's market share (high concentration) and cost of bank loans. This argument works against finding a negative correlation of AA's market share and change in cost of bank loans. Our empirical findings would therefore be stronger if local economic conditions were absent.

Third, the event year 2002 in our regression design overlaps with the legislation year of Sarbanes-Oxley Act (SOX). A potential concern is that our empirical findings are driven by the consequences of SOX, which aims to discipline the auditing profession. However, SOX uniformly applies to every firm. By design, the time dummy $Post$ in difference-in-difference specification should capture this time trend caused by SOX if there is any. Our industry-by-year fixed effect structure further rules out the concern that the differential effects of SOX across industries drive the relation between AA's regional market share and changes in non-AA clients' cost of bank loans around 2002.

It remains possible that after controlling for industry-by-year fixed effects, the effects of SOX differ across each firm within an industry-year, which drive the relation between AA's regional market share and changes in non-AA clients' cost of bank loans around 2002. Before addressing this concern, we argue that individual client firms' exposure to SOX is unlikely to explain our findings. Because we account for industry-by-year fixed effects, to explain our findings, trends in the unobserved determinants of cost of bank loans of a *non-AA client within a given industry-year* have to be correlated with *AA's market share* in that region, and the correlation has to be systematic

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across the 57 MSAs in our sample. Although we cannot completely rule out this possibility, we are not aware of an economic theory that predicts this result. Nevertheless, we employ a propensity score matching approach to sharpen the empirical design. For each firm in the treatment group, we find a closest matching firm in the control group from the same two-digit SIC industry code based on the propensity scores of being in the treatment group. In particular, we estimate a probit model where the dependent variable is set to one for firms in the treatment group of the baseline sample. The probit model includes firm size, tangibility, and profitability, and two measures for audit quality, as proxied by performance-based discretionary accruals computed using the model of (Kothari et al., 2005) and accounting restatement. The model is estimated using observations in the pre-SOX year. We produce the propensity scores from the model output. Presumably, the effects of SOX should be similar among client firms with similar characteristics and audit quality prior to SOX, considering SOX aims to improve the service quality in the audit profession. In total, there are 2,048 treated firms that are matched to control firms.

Table 5 presents the empirical results. Panel A reports the matching quality. The pairwise difference test indicates the treated firms and their matching control firms are statistically insignificant along the matching variables. We repeat the regression specification in each column of Table 3 using the propensity-score matched sample and report the estimates in Panel B. The coefficient estimate $Treat \times Post$ is statistically significant and economically sizable across all columns. In Column (1), for instance, the estimate of $Treat \times Post$ implies the change of cost of bank loans from before to after event for treated firms is 34.3% lower than their corresponding control firms. In sum, the three robustness checks in this section, together with our baseline findings, all point to a positive causal effect of audit market competition and cost of bank loans.

[Insert Table 5.]

Besides the endogeneity concerns, we rule out several alternative explanations for our results. Prior studies document that SOX changed client-auditor matching (Landsman et al., 2009). If Big 4 auditors located in MSAs with a bigger AA's market share tend to select less risky clients post-SOX, our results could be driven by client selection. In untabulated anaysis, we show that our results continue to hold when restricting our sample to Big 4 clients only and to client firms that do not switch auditors. We also control for litigation risk based on the court ideology measure

proposed by Huang et al. (2018) to rule out the possibility that changes in litigation enforcement vary with AA's market share. Untabulated analysis shows that our results continue to hold.

The final issue we deal with is that in the baseline difference-in-difference specification, we use an indicator variable $Treat$ to classify two groups of MSAs that are differently affected by the collapse of AA. We do so to reduce measurement error in the treatment variable. We examine the robustness of the results to two alternative measures to proxy for the change of competition surrounding the AAs event.

The first measure is a set of dummy variables. We stratify MSAs into five quantiles by their respective market share of AA in 2001 and mark the i-th quantile by a dummy variable $AA\_Share^{Q_i}$, where integer $i = 1, 2, ..., 5$. The magnitude of AA's shock should increase with the order of the quantile, with the first quantile (as marked by $AA\_Share^{Q_1}$) experiencing the weakest and the fifth quantile (as marked by $AA\_Share^{Q_5}$) strongest. Thus, the treatment effect of auditor concentration on cost of bank loans should increase with the order of quantile accordingly. We repeat the regression specification in Column 5-6 of Table 3 and report the regression results in Columns 3-4 of Table 6. We choose MSAs assigned to the first quantile as the reference group, so $AA\_Share^{Q_1}$ and the relevant interaction terms are absorbed and not reported. The coefficient estimates of $AA\_Share^{Q_i} \times Post$ all appear to be negative and, in general, the coefficient of $AA\_Share^{Q_i} \times Post$ decreases with i. The results are consistent with our baseline findings that auditor concentration is negatively related to cost of bank loans.

[Insert Table 6.]

The second measure directly uses AAs market share in 2001 to represent the AA's shock to local auditor competition without grouping MSAs. The results reported in Columns 5-6 of Table 6 remain qualitatively similar to our baseline results. Both alternative measures employ a more detailed partition of MSA-sample provides richer cross-sectional variation but risks measurement errors in a relatively small sample. We therefore take a more prudential approach in our baseline regression by partitioning the MSAs into two groups.

5.2.2 The effect on audit quality

Our main hypothesis argues that fiercer auditor competition lowers the audit quality, which is the mechanism through which cost of bank loans changes. In this section, we formally test the mechanism. We use two measures of audit quality from prior studies, the amount of discretionary accruals and whether a firm restated its financial statements (see DeFond and Zhang (2014) for a review of proxies for audit quality measures). For this test, we are able to use a broader sample instead of just borrowers covered by the Dealscan data.[12] As a result, we have a higher number of observations at the client-year level. We model audit quality as a function of AA's market share using the following specification,

$$Audit\ Quality_{s,t} = \lambda_0 + \lambda_1 Treat \times Post + \lambda_2 Treat + \lambda_3 Post + \Psi'X + \kappa_{j,t} + \eta_{s,t}, \tag{9}$$

where Audit $Quality_{s,t}$ denotes one of two audit quality measures. Our hypothesis predicts $\lambda_1 < 0$.

[Insert Table 7.]

Table 7 uses abnormal accruals as the measure of audit quality. We follow Kothari et al. (2005) and use the performance-matched discretionary accrual. In particular, we first estimate the following modified Jone model

$$\frac{TA_{s,t}}{Asset_{s,t-1}} = \beta_1 \frac{1}{Asset_{s,t-1}} + \beta_2 \frac{\Delta Sale_{s,t}}{Asset_{s,t-1}} + \beta_3 \frac{PPE_{s,t}}{Asset_{s,t-1}} + \epsilon_{s,t}, \tag{10}$$

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 $t-1$, $Sale_{s,t}$ is the change in sales ($SALE$) from year $t-1$ to t, and $PPE_{s,t}$ is gross capital stock ($PPEGT$). We next substitute the estimated coefficient into the following equation to estimate the normal accrual $NA_{s,t}$.

$$NA_{s,t} = \hat{\beta}_1 \frac{1}{Asset_{s,t-1}} + \hat{\beta}_2 \frac{\Delta Sale_{s,t} - \Delta AR_{s,t}}{Asset_{s,t-1}} + \hat{\beta}_3 \frac{PPE_{s,t}}{Asset_{s,t-1}}, \tag{11}$$

where $AR_{s,t}$ is the change in account receivable ($RECT$). The discretionary accrual is the difference between $\frac{TA_{s,t}}{Asset_{s,t-1}}$ and $NA_{s,t}$. The result shows that clients in MSAs with high AAs market share

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[12]The results remain qualitatively similar if we restrict to firms appearing in the baseline sample only.

experienced lower accrual-based earnings manipulation relative to clients in MSAs with low AAs market share following the collapse of AA. The result is consistent with lower competition increasing accrual quality.

Table 8 uses the likelihood of restatement as a measure of audit quality. The dependent variable is one if a firm restates its financial statement and the financial impact of the restatement is negative, and zero otherwise. The result shows that clients in MSAs with high AA's market share experienced lower level of restatement following the collapse of AA relative to clients in MSAs with low AA's market share. The result, however, holds only for clients in low litigation risk industries. In other words, auditors in high litigation risk industries do not change their audit quality in response to competition. Because restatements are significant events, no results from high litigation risk industries are consistent with heightened concerns for lawsuits from auditors' perspective and are consistent with our model in section 2.2. A lower restatement rate in low litigation risk industries are consistent with higher audit quality.

[Insert Table 8.]

5.3   Two Dimensions of Auditor Competition Heterogeneity

In this section, we explore the heterogeneity of audit market competition along two dimensions. The first dimension relates to the role of external monitoring by institutional investors and stock analysts. The second dimension relates to audit fees.

5.3.1   External monitoring

Our model in section 2 predicts that auditors' incentive to lower their professional standards facing fiercer competition decreases with stronger external monitoring. In the model, stronger external monitoring increases the reputational cost for the auditors to lower their professional standards. Moreover, clients are less likely to engage in opportunistic behavior facing stronger external monitoring, which in turn reduces auditors' incentive to lower audit quality.

We test this hypothesis by employing institutional ownership and analyst coverage as proxies for external monitoring. Prior studies document a positive role of institutional investors in corporate governance, which is associated with better information environment and external monitoring

(Ajinkya et al., 2005). Similar effects have been found for analyst coverage. Analysts specialize in information production. A reduction in information asymmetry increases the likelihood that misreporting can be discovered. Therefore, if intense auditor competition erodes audit quality, we would conjecture this effect to be weaker for firms with a higher share of institutional ownership and higher analyst coverage.

We collect institutional ownership data from Thomson Reuters 13F database. The SEC requires all institutional organizations, companies, universities, and so on that exercise discretionary management of investment portfolios over $100 million in asset value to report those holdings on a quarterly basis. We sort all firms in the baseline sample by their institutional ownership share as of the end of 2001, prior to AA collapse year, and repeat the baseline regression in Eq.8 in subsamples of high and low institutional ownership share. Prior study documents institutional ownership share is correlated with firm size (Ferreira and Matos, 2008). To remove the size effect, the institutional ownership share is scaled by firm market capitalization so that our result does not simply reflect a size effect. We report the regression results in Table 9. In Columns (1)-(2) where no control variables are added, the coefficient estimate of $Treat \times Post$ is statistically negative in the subsample of low institutional ownership share but statistically and economically insignificant in the subsample of high institutional ownership share. The results are robust to various regression specifications that control for the firm and loan-level characteristics and a set of industry-by-year dummies. In Column (7), we pool firms in both subsamples and perform the same triple-difference regression as in Eq.13 except that we replace D^{Fee} with a binary variable D^{IO} that takes value one if the firm is assigned to the group high institutional ownership and zero otherwise. We find the coefficient of $Treat \times Post \times D^{IO}$ is statistically estimate, suggesting the estimates of $Treat \times Post$ in the subsamples of high and low institutional ownership share are significantly different in the subsample analysis.

[Insert Table 9.]

We obtain analyst earning forecasts data from I/B/E/S database. We sort all clients in the baseline sample into subsamples according to the number of analysts that report earning forecasts for a client during the fiscal year 2001. To the extent that stock analysts tend to prefer large firms, we adjust the analyst count also by market capitalization to avoid the sample partition

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reflecting the difference of client size. We perform the baseline regression in each subsample and report the regressions results in Table 10. We find the effect of audit market competition on cost of bank loans only appears in the subsample of low analyst coverage, whereas the effect vanishes when the analyst coverage is high. The difference in the effect of auditor competition between the subsamples of high and low analyst coverage persists across various specifications controlling for firm and bank loan characteristics and a set of industry dummies or industry-by-year dummies. We also perform a triple-difference test in Column (7), where the indicator variable D^{Analy} is one if the firm is assigned to high analyst coverage subsample and zero otherwise. The statistically significant estimate for $Treat \times Post \times D^{Analy}$ implies the difference between the coefficient of $Treat \times Post$ in two subsamples are not statistically indifferent.

[Insert Table 10.]

Overall, our findings highlight the importance of external monitoring, proxied by institutional ownership and analyst following, in driving the relation between competition and cost of bank loans. Consistent with our model prediction, higher external monitoring reduces the auditors' incentive to engage in opportunistic behavior, which dampens the relation between competition and cost of bank loans. Classical competition theories do not have this prediction.

5.3.2 Audit Fees

From the discussion in section 2, lower audit fees due to fiercer competition among auditors can lower audit quality and increase clients' cost of bank loans. We test the prediction by examining auditors that receive lower fees conditional on observed client characteristics. To measure the fee pressure, we estimate an audit fee prediction model and use the residual term from the estimation to proxy for the audit fee pressure. We follow Gerakos and Syverson (2015) and estimate the following model using all Compustat firms that have audit fee information from AuditAnalytics during $2000-2001$,

$$
\begin{aligned}
\ln(Audit\ Fee_{s,t}) = {} & \pi_0 + \pi_1 \ln(Assets_{s,t}) + \pi_2 \ln(Industry\ Seg_{s,t}) + \pi_3 Leverage_{s,t} \\
& +\pi_4 ROA_{s,t} + \pi_5 Inventory_{s,t} + \pi_6 D_{s,t}^{Auditor\ Change} + \pi_7 D^{Foreign} + \pi_8 Big4 + \kappa_j + \rho_{s,t}
\end{aligned}
\tag{12}
$$

where $\ln(Audit\ Fee_{s,t})$ denotes the log of audit fees, $\ln(Industry\ Seg_{s,t})$ the log of industry segment numbers, $Inventory_{s,t}$ the inventory plus receivables divided by total assets, $D_{s,t}^{Auditor\ Change}$ a dummy variable that takes value one if a firm s changes its auditor in year t, and $D^{Foreign}$ a dummy variable that takes value one if a firm has sales in foreign countries. $Big4$ is a dummy variable indicating whether the Big four auditor firm has an office in same MSA as the client's headquarters. κ_j denote three-digit industry dummies. The estimated results are presented in the Appendix.

We argue that a lower residual from the estimation suggests fiercer price competition among auditors. We evenly sort firms into subsamples according to their audit fee pressure in 2001 and predict that the change in cost of debt concentrates on auditors with higher fee pressure, that is, lower residuals from the audit fee regression.

The regression results in Table 11 indicate that the effect of auditor competition on cost of bank loans in the baseline regression is mainly driven by the group of firms that pay relatively less auditor fees (high fee pressure). In the subsample of high fee pressure, the coefficient estimate of $Treat \times Post$ is significantly positive. In contrast, the coefficient estimate of $Treat \times Post$ is insignificant in the subsample of low fee pressure. This result is robust across all regression models regardless whether we add firm level control variables. In Column (7), we pool all firms together and run a triple-difference regression in the full sample. The regression specification is given as follows

$$ln(Loan\ Spread_{i,s,t+1}) = \phi_0 + \phi_1 Treat \times Post \times D^{Fee} + \phi_2 Treat \times Post + \phi_3 Treat \times D^{Fee}$$
$$+ \phi_4 Post \times D^{Fee} + \phi_5 Treat + \phi_6 Post + \phi_7 D^{Fee} + \Psi'X + \kappa_{j,t} + \eta_{i,s,t+1}$$

$$(13)$$

where binary variable D^{Fee} is one if the audit fee pressure of a firm is above the median and zero otherwise.

[Insert Table 11.]

The estimated coefficient for the variable of interest $Treat \times Post \times D^{Fee}$ is significantly negative, suggesting the effect of competition on cost of bank loans depends on the audit fees. As discussed in section 2.2, fiercer price competition leaves less room for auditors to further lower price and

forces them to compete in other ways. In the presence of opinion shopping, our model predicts that auditors will lower audit quality. Fiercer price competition presumably also increases the client's bargaining power to force concession from their auditors. Under both interpretations, lower audit fees are associated with a higher likelihood of opportunistic behavior and a greater effect of competition on audit quality.

6   Conclusion

Regulators have long been concerned that a highly concentrated audit market can erode audit quality. Motivated by these concerns, regulators in some jurisdictions have already taken actions to break up the concentrated auditing market dominated by the Big Four.[13] However, surprisingly, the perception shared by regulators of low competition impairing audit quality seems to be supported only by isolated fraudulent events and the empirical evidence as to the causal effects of audit market competition on audit quality is far from conclusive. Furthermore, given the scrutinizing role of auditors in the capital market, it's also important to know whether auditor competition materially impacts functioning of the capital market. In light of these issues, we study the effect of auditor competition on audit quality and, by extension, the cost of bank loans.

We first model oligopolistic audit market under the assumption that clients shop for better audit opinions (i.e., opinion shopping). Our model predicts that, in the presence of audit opinion shopping, competition in the auditing market can lower audit quality. We empirically test the model's prediction using the spatial variation in the market share of Arthur Anderson as shocks to local market competition. We find that a larger decrease in local market competition due to Arthur Anderson's collapse reduces clients' cost of bank loans more. Our results are robust to a battery of robustness checks and are not driven by trends in the local economy, industry shocks, or the passage of SOX. The effects on cost of bank loans are stronger when auditors face higher price competition and when clients and auditors face weaker external monitoring.

Our results should not be interpreted as promoting the idea that the audit industry should be further consolidated in order to benefit the clients. Rather, the evidence suggests that higher concentration does not necessarily hurt clients. Our findings caution against applying predictions from

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[13]For example, an important goal of the recent European audit reform is to promote audit market competition. See http://europa.eu/rapid/press-release_MEMO-16-2244_en.htm.

classical oligopoly competition models where an increase in competition results in lower price and higher quality (e.g., Mussa and Rosen, 1978). Our theory and empirical evidence, combined with findings from prior studies for opinion shopping, suggest that clients' incentive to shop for better opinions plus auditors' profit maximization objective jointly affect audit quality. The collective evidence of the paper points to an important role of clients' opportunistic behavior in regulating the audit market.

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Appendix: Variable Description

Variables	Definition
Loan-level Variables	
$\ln(Loan\ Spread_{i,s,t})$	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 Database.
$Loan\ Size_{i,s,t}$	It is defined as the amount of loan facility issued in year t divided by total assets measured at the end of corresponding fiscal year. Source: DealScan and Compustat Databases.
$\ln(Maturity_{i,s,t})$	The natural logarithm of loan maturity measured in months. Source: DealScan Database.
$D^{Syndication}$	Dummy variable that takes value one if the distribution method of the loan facility is coded as 'Syndication'. Source: DealScan Database.
Firm-level Variables	
$\ln(Assets_{s,t})$	The natural logarithm of total assets (AT). Source: Compustat Database.
$ROA_{s,t}$	Return on assets, measured as operating income (OIBDP) divided by total assets (AT). Source: Compustat Database.
$Tangibility_{s,t}$	It is measured as net capital stock (PPENT) relative to total assets (AT). Source:Compustat Database.
$Leverage_{s,t}$	Leverage ratio, defined as current debt (DLC) plus long-term debt (DLTT) and then divided by total market capitalization measured at corresponding fiscal year end. Source: Compustat and CRSP Databases.
$MB_{s,t}$	Market to book ratio, measured as the market capitalization divided by total assets (AT) measured at the end of fiscal year. Source: Compustat and CRSP Databases.
$CF\_Vol_{s,t}$	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 Database.

Variables	Definition
Firm-level Variables	
$AuditFee_{s,t}$	Audit fee of firm s in year t, which is calculated as the audit fee divided by total assets (AT). Source: Compustat and AuditAnalytics Database.
$Z\text{-}Score_{s,t}$	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 Database.
$EM_{s,t}^{Accrual}$	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 corresponding accruals of a matched firm from the same fiscal year and two-digit SIC industry with the closest return on assets. We estimate within each fiscal year and two-digit SIC industry the following modified Jones model $\frac{TA_{s,t}}{Asset_{s,t-1}} = \beta_1\frac{1}{Asset_{s,t-1}} + \beta_2\frac{\Delta Sale_{s,t}}{Asset_{s,t-1}} + \beta_3\frac{PPE_{s,t}}{Asset_{s,t-1}} + \epsilon_{s,t}$, 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, and $PPE_{s,t}$ is gross capital stock ($PPEGT$). We obtain normal accrual NA by substituting the estimated coefficients $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$ into $NA_{s,t} = \hat{\beta}_1\frac{1}{Asset_{s,t-1}}+\hat{\beta}_2\frac{\Delta Sale_{s,t}-AR_{s,t}}{Asset_{s,t-1}}+\hat{\beta}_3\frac{PPE_{s,t}}{Asset_{s,t-1}}$, where $\Delta AR_{s,t}$ is the change in account receivable ($RECT$). The discretionary accrual is defined as the difference between $\frac{TA_{s,t}}{Asset_{s,t-1}}$ and $NA_{s,t}$. Source: Compustat Database.
$Restatement_{s,t}$	A dummy variable that takes value one if the financial report of firm s in year t is restated in a future time and the financial impact of the restatement is negative, and zero otherwise. Source: AuditAnalytics Database.
MSA-level Variables	
$\Delta HHI_{m,2001-2002}$	The change of auditor market concentration in MSA m from 2001 to 2002. It is defined as the Herfindahl Hirschman index of auditor market share (in terms of audit fee) for MSA m in 2002 less that in 2001. Source: AuditAnalytics Database.
$\Delta HHI_{m,2001-2002}^{Big5}$	The change of auditor market concentration of big five auditors in MSA m from 2001 to 2002. It is defined the same as $\Delta HHI_{m,2001-2002}$ except that only market share of the big five auditors is considered. Source: AuditAnalytics Database.
$AA\ Share_{m,2001}$	The market share of Arthur Andersen in terms of audit fee in MSA m in year 2001. Source: AuditAnalytics Database.

Lender offers loan with interest rate r_1.

Auditor performs auditing service and issues a report $r \in \{g, b\}$. Lender chooses the monitoring decision.

True state of the world is realized. Lender and auditor receive payoff. Client chooses auditor. Lender offers credit credits with interest rate r_2.

Auditor performs auditing service and issues a report $r \in \{g, b\}$. Lender chooses the monitoring decision.

True state of the world is realized. Lender and auditor receive payoff.

t=0   t=1   t=2

Figure 1: Timeline

This figure depicts the timeline of the model in section 2.1.
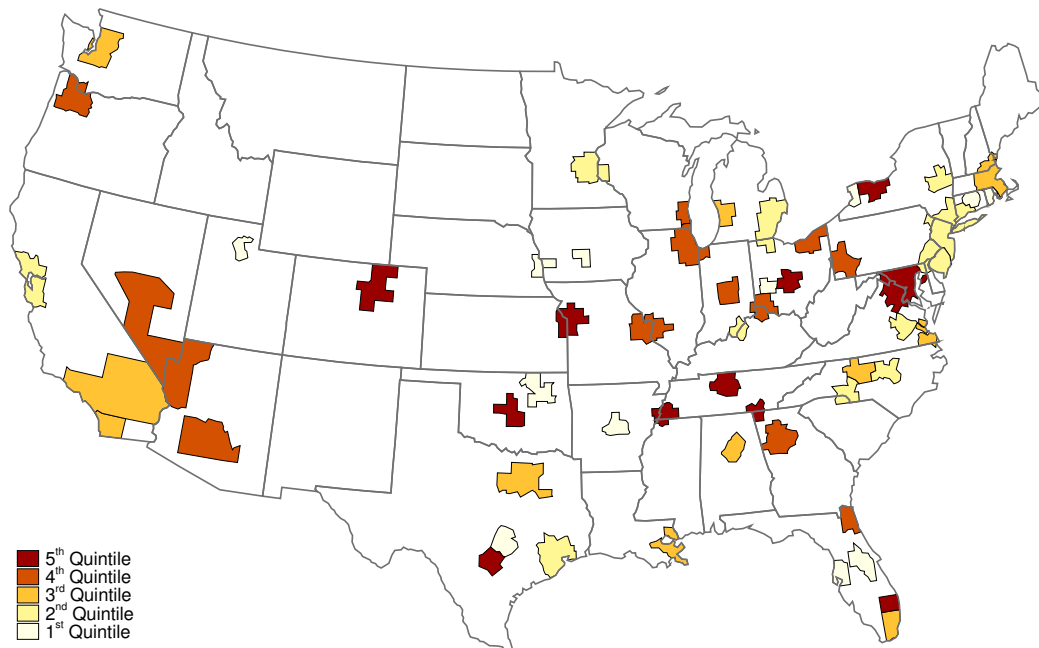
Figure 2: The figure plots the change of auditor concentration, as measured by a Herfindahl Hirschman Index (HHI), in metropolitan statistical areas (MSAs) from 2001 to 2002. We deduct the HHI of 2001 from that of 2002 and use different colors to represent each quintile of the change, with dark red for the fifth quintile, light red for the fourth quintile, orange for the third quintile, yellow for the secon quindtile, and light yellow for the first
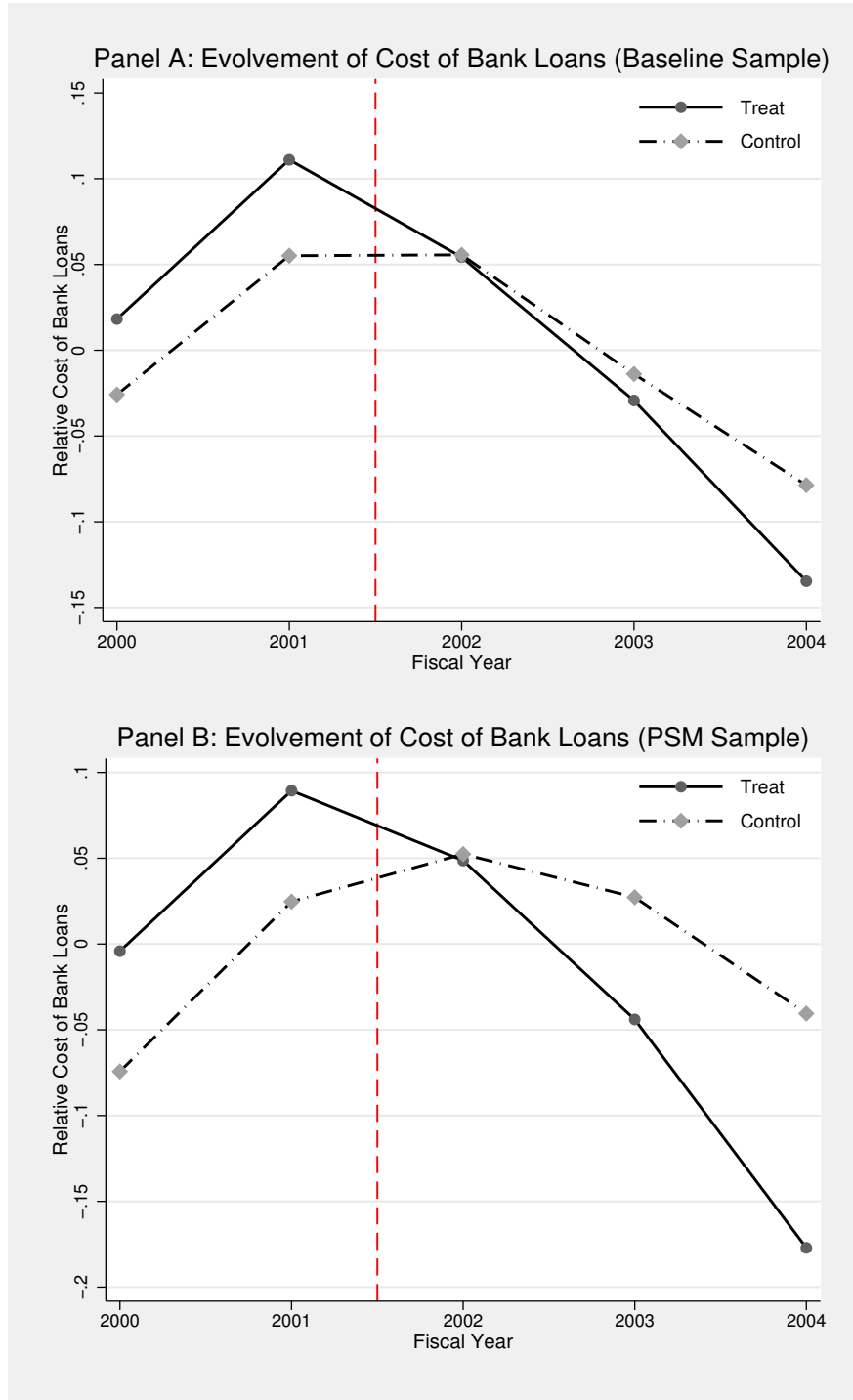
Figure 3: This figure shows the evolvement of cost of bank loans over sample period 2000–2004 in the full sample (Panel A) and propensity-score matched sample (Panel B) as defined in Table 5, respectively. In each panel, we regress the log of cost of bank loans on the same set of control variables and industry and MSA dummies (except $Treat$, $Control$, and $Treat \times Control$) as in the Column 6 of Table 3 and plot the average residual across treated/control group over each year.

Table 1: Summary Statistics

The table presents summary statistics for the dependent and independent variables used in the regression analysis during period 2000–2004. Panel A reports the descriptive statistics for a set of loan-level variables that include the natural logarithm of loan spread $\ln(Loan\ Spread_{i,s,t})$, loan size $Loan\ Size_{i,s,t}$, the natural logarithm of loan maturity measured in months $\ln(Maturity_{i,s,t})$, and a dummy variable indicating the loan distribution method $D_{i,t}^{Syndication}$. Panel B reports firm-level characteristics that include the natural logarithm of total assets $\ln(Assets_{s,t})$, as a measure for firm size; return on assets $ROA_{s,t}$; the amount of tangible assets $Tangibility_{s,t}$, as measured by net capital stock (PPENT) divided by total assets; market to book ratio $MB_{s,t}$; leverage ratio $Leverage_{s,t}$, as defined by total debts divided by market capitalization; cash flow volatility $CF\_Vol_{s,t}$, as measured by the standard deviation of quarterly earning change relative to total assets; and Altman z score, $Z\text{-}Score_{s,t}$. Other firm-level variables include an earnings management measure proxied by performance-matched abnormal accrual, $EM_{s,t}^{Accrual}$, and a dummy variable $Restatement_{s,t}$, indicating whether a financial statement issued by firm s in year t has been restated and the financial impact of the restatement is negative. Panel C reports the descriptive statistics of three MSA level variables. The first variable $\Delta HHI_{m,2001-2002}$ considers all auditors in a MSA and is calculated as the HHI of auditors' market share (in terms of audit fees) of MSA m in 2002 less that in 2001. The second variable $\Delta HHI_{m,2001-2002}^{Big\ 5}$ is defined similarly but only considers big five auditors. AA's market share in 2001 is denoted by $AA\ Share_{m,2001}$. The detailed variable description is provided in the appendix.

	N	Mean	Std. Dev.	P25	Median	P75
Panel A: Loan level						
$\ln(Loan\ Spread_{i,s,t})$	7,067	4.945	0.872	4.382	5.165	5.617
$Loan\ size_{i,s,t}$	7,067	0.169	0.246	0.044	0.107	0.217
$\ln(Maturity_{i,s,t})$	7,067	3.507	0.733	2.890	3.584	4.094
$D^{Syndicate}$	7,067	0.944	0.230	1.000	1.000	1.000
Panel B: Firm level						
$\ln(Assets_{s,t})$	3,427	6.812	1.900	5.509	6.747	8.045
$ROA_{s,t}$	3,427	0.117	0.139	0.082	0.122	0.170
$Tangibility_{s,t}$	3,427	0.310	0.229	0.128	0.251	0.454
$Leverage_{s,t}$	3,427	0.888	2.651	0.092	0.291	0.761
$MB_{s,t}$	3,427	2.625	2.210	1.219	1.970	3.268
$CF\_Vol._{s,t}$	3,427	0.018	0.025	0.006	0.011	0.022
$AuditFee_{s,t}$	3,427	1.359	2.089	0.332	0.711	1.592
$Z\text{-}Score_{s,t}$	3,427	1.762	1.984	1.064	1.922	2.681
$EM_{s,t}^{Accrual}$	13,388	-0.000	0.215	-0.076	-0.001	0.077
$Restatement_{s,t}$	15,923	0.123	0.329	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
$\Delta HHI_{m,2001-2002}^{Big\ 5}$	58	0.037	0.086	0.005	0.035	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 Collapse on Competition

This table reports OLS regression of the change of auditor competition from 2001 to 2002 on AA's market share in 2001. The first dependent variable $\Delta HHI_{m,2001-2002}$ considers all auditors in a MSA and is calculated as the HHI of auditors' market share (in terms of audit fees) of MSA m in 2002 less that in 2001. The second dependent variable $\Delta HHI^{Big\ 5}_{m,2001-2002}$ is defined similarly but only considers big five auditors. AA's market share in 2001 is denoted by $AA\ Share_{m,2001}$. $D^{AA\ Share}_{m,2001}$ is a binary variable that is one if $AA\ Share_{m,2001}$ is above the median and zero otherwise. Robust t-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% level, respectively.

	$\Delta HHI_{m,2001-2002}$			$\Delta HHI^{Big\ 5}_{m,2001-2002}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AA\ Share_{m,2001}$	0.210***	0.728***		0.211***	0.731***	
	[2.73]	[3.90]		[2.74]	[3.90]	
$AA\ Share^2_{m,2001}$		-1.132***			-1.134***	
		[-3.03]			[-3.02]	
$D^{AA\ Share}_{m,2001}$			0.059***			0.059***
			[2.79]			[2.79]
N	58	58	58	58	58	58
R^2	0.103	0.196	0.122	0.104	0.197	0.122

Table 3: Auditor Competition and Cost of Bank Loans: A Difference-in-Difference Test

This table reports the regression of cost of bank loans on auditor competition using the difference-in-difference specification during period 2000–2004. The dependent variable is the log of loan spread $\ln(Loan\ Spread_{i,s,t})$ for loan facility i borrowed by firm s in year t. The indicator variable $Treat$ is one if AA's local market share in 2001 is above the median, and zero otherwise. Indicator variable $Post$ is one for the period on and after 2002 and zero otherwise. Control variables for firm characteristics include firm size $\ln(Assets_{s,t})$, return on assets $ROA_{s,t}$, the amount of tangible assets $Tangibility_{s,t}$, leverage ratio $Leverage_{s,t}$, market to book ratio $MB_{s,t}$, cash flow volatility $CF\_Vol_{s,t}$, audit fees $AuditFee_{s,t}$, and Altman z score $Z\text{-}Score_{s,t}$. Loan-level control variables consist of the amount of loan facility $Loan\ Size_{i,s,t}$, the maturity of loan facility $\ln(Maturity_{i,s,t})$, and a dummy variable indicating the loan distribution method $D^{Syndication}$. 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% level, respectively. The detailed variable description is provided in the appendix.

Dep. Var.	$\ln(LoanSpread_{i,s,t})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$Treat \times Post$	-0.160***	-0.160***	-0.118***	-0.121***	-0.114***	-0.086**
	[-2.82]	[-3.36]	[-2.92]	[-3.02]	[-2.76]	[-2.16]
$Treat$	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]
$\ln(Assets_{s,t-1})$			-0.244***	-0.252***	-0.254***	-0.261***
			[-20.67]	[-20.73]	[-20.94]	[-23.43]
$ROA_{s,t-1}$			-0.771***	-0.809***	-0.408***	-0.404***
			[-4.78]	[-5.22]	[-3.26]	[-3.11]
$Tangibility_{s,t-1}$			-0.115	-0.122	-0.183**	-0.198**
			[-1.38]	[-1.45]	[-2.08]	[-2.43]
$Lervage_{s,t-1}$			0.044***	0.044***	0.042***	0.043***
			[4.71]	[4.76]	[4.48]	[4.85]
$MB_{s,t-1}$			-0.054***	-0.053***	-0.056***	-0.053***
			[-6.11]	[-5.93]	[-6.21]	[-6.24]
$CF\_Vol_{s,t-1}$			-0.588	-0.458	-0.598	-0.329
			[-1.12]	[-0.86]	[-1.00]	[-0.59]
$AuditFee_{s,t-1}$				-0.016**	-0.024***	-0.020***
				[-2.61]	[-3.13]	[-2.71]
$Z\text{-}Score_{s,t-1}$					-0.051***	-0.055***
					[-2.85]	[-3.41]
$Loan\ Size_{i,s,t-1}$						-0.199***
						[-4.33]
$\ln(Maturity_{i,s,t-1})$						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: 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 but are suppressed for brevity. 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% level, respectively.

Dep. Var.	$\ln(Loan\ Spread_{i,s,t})$			
	(1)	(2)	(3)	(4)
$Treat \times Post_{2007}$	-0.059			
	[-1.18]			
$Treat \times Post_{2008}$		-0.080		
		[-1.23]		
$Treat \times Post_{2009}$			-0.020	
			[-0.31]	
$Treat \times Post_{2010}$				0.020
				[0.46]
Firm Controls	YES	YES	YES	YES
Loan Controls	YES	YES	YES	YES
MSA FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
N	4,206	4,058	3,384	2,741
R^2	0.498	0.466	0.371	0.434

Table 5: Difference-in-Differences Results in the Propensity-Score-Matched Sample

This table reports the regression of cost of bank loans on auditor competition using the difference-in-differences specification in a propensity-score matched sample. The sample consists of 544 treated firms that are matched to control firms in the pre-SOX period. Control firms are a subset of the non-treated firms selected as the closest match to the treated firms, based on the same two-digit SIC industry and propensity scores generated based on a set of pre-SOX firm characteristics including firm size, tangibility, profitability, discretionary accounting accrual, and restatement incidence. Panel A reports the summary statistics and compares the mean of matching variables for the treated and control groups in the matched sample in the pre-collapse period. Panel B reports the regression results. 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% level, respectively. The detailed variable description is provided in the appendix.

Panel A: Comparison of Treated and Matched Control Firms

	Treated Firms			Matched Control Firms			Difference	
	Mean	STD	Median	Mean	STD	Median	(1)-(4)	t-stat.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(Assets_{s,t})$	6.497	2.001	6.399	6.659	1.843	6.642	-0.162	-1.483
$ROA_{s,t}$	0.111	0.176	0.124	0.115	0.148	0.125	-0.004	-0.469
$Tangibility_{s,t}$	0.312	0.242	0.248	0.311	0.227	0.262	0.001	0.080
$EM_{s,t}^{Accrual}$	-0.010	0.187	-0.006	0.005	0.190	0.001	-0.014	-1.332
$Restatement_{s,t}$	0.159	0.366	0.000	0.188	0.391	0.000	-0.029	-1.347

Panel B: DID Results using the Propensity Score Matched Sample

Dep. Var.	$\ln(LoanSpread_{i,s,t})$			
	(1)	(2)	(3)	(4)
$Treat \times Post$	-0.343***	-0.252***	-0.164***	-0.154***
	[-4.45]	[-4.19]	[-2.75]	[-2.67]
$Treat$	0.129			
	[1.53]			
$Post$	0.009	-0.030	0.069	0.025
	[0.15]	[-0.62]	[1.18]	[0.45]
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	4,096	4,096	3,657	3,657
R^2	0.018	0.407	0.633	0.647

Table 6: Robustness Checks

This table reports the robustness checks for our baseline specification. Columns (1)–(2) examine the choice for the selection of treated and control groups. In Column (1), we divide MSAs into quintiles by AA's market share in 2001 and denote the ith quintile by a dummy variable AA_Share^{Qi}. Column (2) uses AA's market share of 2001, $AA\ Share_{m,2001}$, to measure the treatment effect. In Column (3), the dummy variable $Year200i$ is one for year $200i$ and zero otherwise. Column (4) repeats the baseline regression by including industry-by-year fixed effects. All specifications control the same set of firm-level and loan-level control variables (except $Treat$, $Post$, and $Treat \times Post$) as in the Column (6) of Table 3. Robust t-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% level, respectively. The detailed variable description is provided in the appendix.

Dep. Var.	$\ln(LoanSpread_{i,s,t})$			
	(1)	(2)	(3)	(4)
$AA\_Share^{Q2} \times Post$	-0.127			
	[-1.43]			
$AA\_Share^{Q3} \times Post$	-0.168*			
	[-1.78]			
$AA\_Share^{Q4} \times Post$	-0.200**			
	[-2.35]			
$AA\_Share^{Q5} \times Post$	-0.221**			
	[-2.64]			
$AA\ Share_{m,2001} \times Post$		-0.329*		
		[-1.89]		
$Treat \times Year2002$			-0.060	
			[-1.02]	
$Treat \times Year2003$			-0.076*	
			[-1.67]	
$Treat \times Year2004$			-0.112***	
			[-2.66]	
$Year2002$			0.030	
			[0.58]	
$Year2003$			-0.057	
			[-1.34]	
$Year2004$			-0.153***	
			[-3.69]	
$Treat \times Post$				-0.097*
				[-1.94]
$Post$	0.072	-0.035		-0.024
	[0.90]	[-0.78]		[-0.23]
Firm Controls	YES	YES	YES	YES
Loan Controls	YES	YES	YES	YES
MSA FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	NO
Industry × Year FE	NO	NO	NO	YES
N	5,468	5,468	5,468	5,468
R^2	0.565	0.564	0.570	0.530

Table 7: Auditor Competition and Earnings Management

This table reports regression of earnings management on auditor competition using the difference-in-difference specification. The dependent variable $EM_{s,t}^{Accrual}$ is measured by the performance-matched discretionary accrual following Kothari et al. (2005). The indicator variable $Treat$ marks MSAs with above-median AA market share. Indicator variable $Post$ is one for the period on and after 2002 and zero otherwise. We use audit fee ($AuditFee_{s,t}$) to control for audit quality input. Firm-level control variables include firm size ($\ln(Assets_{s,t})$), market to book ratio ($MB_{s,t}$), leverage ratio ($Leverage_{s,t}$), and return on assets ($ROA_{s,t}$). 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% level, respectively. The detailed variable description is provided in the appendix.

	$EM_{s,t}^{Accrual}$		
	(1)	(2)	(3)
$Treat \times Post$	-0.021***	-0.020***	-0.021***
	[-3.06]	[-3.02]	[-3.06]
$Treat$	0.021***	0.017***	
	[3.53]	[3.22]	
$Post$	0.006*	0.007**	0.007**
	[1.68]	[2.09]	[2.07]
$AuditFee_{s,t}$	0.001	-0.001	-0.001
	[0.67]	[-0.69]	[-0.66]
$\ln(Assets_{s,t})$		-0.014***	-0.014***
		[-7.96]	[-7.87]
$MB_{s,t}$		-0.000	-0.000
		[-0.36]	[-0.48]
$Leverage_{s,t}$		-0.001**	-0.001***
		[-2.64]	[-2.71]
$ROA_{s,t}$		0.028***	0.027***
		[3.41]	[3.24]
MSA FE	NO	NO	YES
Industry FE	YES	YES	YES
N	13,388	13,314	13,314
R^2	0.027	0.041	0.045

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Table 8: Auditor Competition and Accounting Restatement

This table reports a difference-in-difference regression of accounting restatement on auditor competition using the linear probability model in the industries of low and high litigation risk, as defined by Reichelt and Wang (2010), respectively. The dependent variable is one if a firm-year has restatement that negatively influences financial outcome and zero otherwise. The indicator variable $Treat$ marks MSAs with above-median AA market share in 2001. Dummy variable $Post$ is one for the period on and after 2002 and zero otherwise. Audit-related control variables include audit fees $\ln(Audit\ Fees_{s,t})$ and accounting-based earning management measure $EM_{s,t}^{Accrual}$. We also control a set of firm-level characteristic variables including firm size $(\ln(Assets_{s,t}))$, market to book ratio $(MB_{s,t})$, leverage ratio $(Leverage_{s,t})$, and return on assets $(ROA_{s,t})$. 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% level, respectively. The detailed variable description is provided in the appendix.

	Low Litigation Risk			High Litigation Risk		
	(1)	(2)	(3)	(4)	(5)	(6)
$Treat \times Post$	-0.028**	-0.028**	-0.028**	0.055	0.053	0.061
	[-2.30]	[-2.26]	[-2.25]	[1.49]	[1.41]	[1.65]
$Treat$	0.009	0.013		-0.052**	-0.045*	
	[0.91]	[1.31]		[-2.07]	[-1.95]	
$Post$	0.076***	0.073***	0.073***	0.073***	0.065***	0.063***
	[8.89]	[8.06]	[7.86]	[3.65]	[3.13]	[3.21]
$AuditFee_{s,t}$	0.000	0.002	0.002	-0.004**	0.001	0.001
	[0.37]	[1.51]	[1.38]	[-2.10]	[0.57]	[0.30]
$EM_{s,t}^{Accrual}$	-0.060***	-0.049**	-0.047**	-0.079***	-0.057***	-0.040**
	[-2.89]	[-2.49]	[-2.39]	[-4.12]	[-2.85]	[-2.11]
$\ln(Assets_{s,t})$		0.014***	0.013***		0.025***	0.025***
		[3.71]	[3.23]		[4.91]	[5.22]
$MB_{s,t}$		-0.007***	-0.006***		0.005	0.005
		[-3.32]	[-3.00]		[1.01]	[0.94]
$Leverage_{s,t}$		-0.000	-0.000		-0.004	-0.001
		[-0.45]	[-0.49]		[-1.34]	[-0.15]
$ROA_{s,t}$		-0.004	-0.001		0.022	0.017
		[-0.24]	[-0.05]		[0.80]	[0.56]
MSA FE	NO	NO	YES	NO	NO	YES
Industry FE	YES	YES	YES	YES	YES	YES
N	9,567	9,523	9,523	3,322	3,300	3,300
R^2	0.088	0.092	0.107	0.107	0.120	0.163

Table 9: Institutional Ownership

This table examines the effect of auditor competition on cost of bank loans as a function of institutional ownership, which is scaled by the market capitalization to control for the effect stemming from firm sizes. We evenly sort firms into subsamples by the average institutional ownership in 2000 and 2001, where we label as 'Low' if the institutional ownership is lower than the median value and as 'High' otherwise. Column (7) reports the results of a triple-difference regression in the full sample. The dummy variable $Treat$ 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. The dummy variable $D^{HighInst}$ takes value one if a firm's average institutional ownership in 2000 and 2001 is above the median and zero otherwise. Firm-level control variables include firm size ($\ln(Assets_{s,t})$), return on assets ($ROA_{s,t}$), the amount of tangible assets ($Tangibility_{s,t}$), leverage ratio ($Leverage_{s,t}$), market to book ratio ($MB_{s,t}$), cash flow volatility ($CF\_Vol_{s,t}$), audit fees ($AuditFee_{s,t}$), and Altman Z score (Z-$Score_{s,t}$). Loan-level control variables consist of the amount of loan facility Loan $Loan\ Size_{i,s,t}$, the maturity of loan facility $\ln(Maturity_{i,s,t})$, and a dummy variable indicating if the loan is syndicated $D^{Syndication}$. All control variables are suppressed for brevity. A set of MSA dummies and three-digit SIC industry dummies are controlled. Robust t-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% level, respectively. The detailed variable description is provided in the appendix.

Dep. Var.	ln($LoanSpread_{i,s,t}$)						
	Low	High	Low	High	Low	High	Full Sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Treat \times Post$	-0.175***	0.021	-0.180**	0.041	-0.147**	0.054	-0.176**
	[-2.69]	[0.43]	[-2.59]	[0.85]	[-2.23]	[1.14]	[-2.41]
$Treat \times Post \times D^{HighInst}$							0.202*
							[1.94]
$Treat \times D^{HighInst}$							-0.122
							[-1.30]
$Post \times D^{HighInst}$							-0.060
							[-0.88]
$Post$	0.060	-0.176***	0.050	-0.139***	-0.025	-0.141***	-0.025
	[1.11]	[-5.16]	[0.99]	[-4.24]	[-0.48]	[-4.39]	[-0.45]
$D^{HighInst}$							0.289***
							[4.82]
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	3,963	2,768	2,946	2,347	2,946	2,347	5,293
R^2	0.335	0.339	0.563	0.423	0.579	0.435	0.577

Table 10: Analyst Coverage

This table examines the effect of auditor competition on cost of bank loans as a function of analyst coverage, which is scaled by the market capitalization to control for the effect stemming from firm sizes. We evenly sort firms into subsamples by the average analyst coverage in 2000 and 2001, where we label as 'Low' if the analyst coverage is lower than the median value and as 'High' otherwise. Column (7) reports the results of a triple-difference regression in the full sample. The dummy variable $Treat$ 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. The dummy variable $D^{HighAnaly}$ takes value one if a firm's average analyst coverage in 2000 and 2001 is above the median and zero otherwise. Firm-level control variables include firm size ($\ln(Assets_{s,t})$), return on assets ($ROA_{s,t}$), the amount of tangible assets ($Tangibility_{s,t}$), leverage ratio ($Leverage_{s,t}$), market to book ratio ($MB_{s,t}$), cash flow volatility ($CF\_Vol_{s,t}$), audit fees ($AuditFee_{s,t}$), and Altman Z score ($Z\text{-}Score_{s,t}$). Loan-level control variables consist of the amount of loan facility $Loan\ Size_{i,s,t}$, the maturity of loan facility $\ln(Maturity_{i,s,t})$, and a dummy variable indicating if the loan is syndicated $D^{Syndication}$. All control variables are suppressed for brevity. A set of MSA dummies and three-digit SIC industry dummies are controlled. Robust t-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% level, respectively. The detailed variable description is provided in the appendix.

Dep. Var.	$\ln(LoanSpread_{i,s,t})$						
	Low	High	Low	High	Low	High	Full Sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Treat \times Post$	-0.286***	0.020	-0.242***	0.049	-0.206***	0.056	-0.273***
	[-4.54]	[0.42]	[-3.37]	[0.90]	[-3.01]	[1.01]	[-4.11]
$Treat \times Post \times D^{HighAnaly}$							0.326***
							[3.52]
$Treat \times D^{HighAnaly}$							-0.267**
							[-2.59]
$Post \times D^{HighAnaly}$							-0.074
							[-0.90]
$Post$	0.088	-0.139***	0.038	-0.099**	-0.039	-0.100**	-0.004
	[1.52]	[-3.63]	[0.59]	[-2.27]	[-0.64]	[-2.21]	[-0.06]
$D^{HighAnaly}$							0.365***
							[4.23]
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	3,691	2,527	2,611	2,216	2,611	2,216	4,827
R^2	0.385	0.278	0.628	0.382	0.643	0.391	0.600

Table 11: Abnormal Audit Fees

This table examines the effect of auditor competition on cost of bank loans as a function of abnormal audit fees, which is proxied by the residual from an audit fee prediction model estimated during 2000–2001. We evenly sort firms into subsamples by the median value of abnormal audit fees in 2001, where we label as 'Low' if the abnormal fee is lower than the median value and as 'High' otherwise. Column (7) reports the results of a triple-difference regression in the full sample. Dummy variable $Treat$ marks MSAs with above-median AA market share in 2001. Dummy variable $Post$ is one for the period on and after 2002 and zero otherwise. Dummy variable $D^{HighFee}$ is one for a firm with above-median abnormal fee in 2001 and zero otherwise. Firm-level control variables include firm size ($\ln(Assets_{s,t})$), return on assets ($ROA_{s,t}$), the amount of tangible assets ($Tangibility_{s,t}$), leverage ratio ($Leverage_{s,t}$), market to book ratio ($MB_{s,t}$), cash flow volatility ($CF\_Vol_{s,t}$), audit fees ($AuditFee_{s,t}$), and Altman Z score ($Z\text{-}Score_{s,t}$). Loan-level control variables consist of the amount of loan facility Loan $Loan\ Size_{i,s,t}$, the maturity of loan facility $\ln(Maturity_{i,s,t})$, and a dummy variable indicating if the loan is syndicated $D^{Syndication}$. All control variables are suppressed for brevity. A set of MSA dummies and three-digit SIC industry dummies are controlled. Robust t-statistics clustered at MSA level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% level, respectively. The detailed variable description is provided in the appendix.

Dep. Var.	$\ln(LoanSpread_{i,s,t})$						
	Low	High	Low	High	Low	High	Full Sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Treat \times Post$	-0.299***	0.050	-0.164***	0.011	-0.137**	0.026	-0.169***
	[-4.27]	[0.58]	[-2.77]	[0.16]	[-2.39]	[0.39]	[-2.71]
$Treat \times Post \times D^{HighFee}$							0.174*
							[1.81]
$Treat \times D^{HighFee}$							0.024
							[0.25]
$Post \times D^{HighFee}$							-0.117*
							[-1.70]
$Post$	0.037	-0.094	0.034	-0.060	-0.029	-0.097*	-0.010
	[0.79]	[-1.44]	[0.68]	[-1.03]	[-0.58]	[-1.75]	[-0.18]
$D^{HighFee}$							-0.021
							[-0.33]
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	3,147	2,485	2,706	2,145	2,706	2,145	4,851
R^2	0.409	0.401	0.641	0.581	0.657	0.591	0.573