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Public audit oversight and the originate-to-distribute model☆

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ABSTRACT

The originate-to-distribute (OTD) model, in which the originators of mortgages sell or securitize the mortgages to third parties, likely contributed to the 2008 financial crisis. Auditors were blamed for permitting clients to understate the risks of the model in their financial reports, fostering undisciplined lending. We investigate whether public audit oversight influences OTD lending by promoting more vigilant audits of the financial reports of originators. Using a difference-in-differences design prior to the financial crisis, we find reduced OTD lending by banks after the Public Company Accounting Oversight Board (PCAOB) criticizes their auditors' audits of financial reports regarding OTD transactions. The reduction is greater for banks with poorer risk controls and stronger incentives to manage earnings. We also find a reduction in gains on loan sales and securitizations. The results suggest that PCAOB inspections can help discipline OTD lending, a real effect of public audit oversight in the United States.

1. Introduction

The originate-to-distribute (OTD) model, in which the originators of mortgages sell or securitize the mortgages to third parties, likely played a crucial role in fueling the 2008 financial crisis (Purnanandam, 2011; Rosen, 2011). For example, the Financial Crisis Inquiry Commission (FCIC, 2011, 125) reports: "The originate-to-distribute model undermined responsibility and accountability for the long-term viability of mortgages and mortgage-related securities and contributed to the poor

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quality of mortgage loans." While many factors give rise to the failure of this model (e.g., lax screening; Keys et al., 2010), auditors are often accused of turning a blind eye to their clients' deliberate or unintentional understatement of risks of OTD transactions in financial reports before the crisis (Sikka, 2009; Kothari and Lester, 2012; Doogar et al., 2015). This accusation is evidenced by numerous subsequent investigations of and lawsuits against auditors of distressed or bankrupt financial institutions.[1]

Despite the narrative of audit failures before the financial crisis (2002−2007), there is no systematic evidence linking audit practices to OTD activities. In this paper, we investigate the influence of public audit oversight on OTD mortgage lending. The Sarbanes-Oxley Act of 2002 in the United States led to the creation of the Public Company Accounting Oversight Board (PCAOB) to oversee the audits of public companies. Prior studies document that PCAOB inspections improve the auditing practices and credibility of audit clients' financial reports (Gramling et al., 2011; DeFond and Lennox, 2017; Fung et al., 2017; Aobdia, 2020; Gipper et al., 2020; Shroff, 2020). Limited evidence exists, however, on the real effect implications of these inspections in the U.S., particularly for OTD transactions. We examine the extent to which PCAOB inspections can help discipline OTD mortgage lending before the financial crisis (2002−2007) by inducing more vigilant audits of financial reports regarding those transactions. Although the disciplinary effect, if any, was insufficient to prevent the financial crisis, our analysis helps us to better understand the role of auditing in the proliferation of OTD lending.[2]

The OTD model typically involves selling originated financial assets into legal entities (e.g., finance companies or special-purpose entities) that then issue asset-backed securities to institutional investors (e.g., money-market funds). The volume of OTD lending depends on its economic benefits and costs. The benefits include improved risk sharing and bank liquidity (Loutskina and Strahan, 2009; Lemmon et al., 2014); the costs are reduced screening and monitoring, and increased vulnerability to funding crises (Keys et al., 2010; Loutskina, 2011). Within generally accepted accounting principles (GAAP), accounting benefits, such as sale accounting and off−balance sheet treatment, have also been shown to influence OTD lending (Dechow and Shakespeare, 2009; Han et al., 2015; Dou et al., 2018a).[3] We do not expect PCAOB inspections to alter these benefits and costs.

In contrast, we focus on the accounting benefits that arise from misapplications of GAAP for OTD transactions. These benefits can be private benefits to bank managers, such as more bonuses due to upward earnings management. They can also be misperceived benefits to both bank managers and shareholders, when managers are misguided by reported numbers and perceive the profitability of OTD transactions as being higher than it actually is.[4] This scenario may occur when executives deal with complex transactions, such as securitization (Ryan, 2017). We are interested in the extent to which PCAOB inspections can help curtail such benefits and thus OTD lending.

Prior studies find that when PCAOB inspectors identify deficiencies in specific audit areas, such as internal controls, auditors appear to remediate the deficiencies because audit quality improves in those areas for other clients (Drake et al., 2016; DeFond and Lennox, 2017; Fung et al., 2017; Aobdia, 2018, 2020). Hanlon and Shroff (2020) also confirm that many Public Oversight Board inspectors believe that, as a result of inspection feedback, audit firms change their general audit procedures for future audit engagements. Thus, PCAOB inspections that identify audit deficiencies related to OTD transactions could increase the auditor's scrutiny of its clients' accounting practices for such transactions. This increased scrutiny may lead clients to curtail OTD activities as such scrutiny makes it more difficult for managers to conceal the risks of OTD transactions or better inform them about these risks. However, ex ante there are at least two reasons why PCAOB inspection deficiencies may not change OTD lending. First, auditors may not improve the quality of the audits beyond those directly inspected by the PCAOB. This is particularly likely if the issues are minor, if the issues are specific to one engagement, or if auditors disagree with the issues raised by the PCAOB (which happened reasonably often around the inception of the PCAOB inspection program). Second, if the accounting benefits from OTD lending are minor compared to other economic advantages, clients may not curtail their OTD lending in response to increased auditor scrutiny.

Motivated by studies on the content of PCAOB inspection reports (Drake et al., 2016; DeFond and Lennox, 2017; Acito et al., 2018; Aobdia, 2020), we examine OTD-related audit deficiencies identified by the PCAOB. This allows us to identify a setting

[1] For example, in the bankruptcy proceeding of the nation's then second-largest originator of subprime mortgages, New Century, the bankruptcy examiner reported that KPMG auditors allowed the company's deficiencies in reporting mortgage sales and securitizations to persist, and in some cases acted as advocates for the company when certain accounting practices were questioned by KPMG specialists (Missal, 2008). The New Century Trustee sued KPMG, seeking to recover $1 billion in damages for negligence and abetting breaches of fiduciary duty. The lawsuit was eventually settled for a confidential amount (Newquist, 2010). Also see litigations against the other three Big 4 auditors: Deloitte (http://www.wsj.com/articles/SB10001424052702303901504577463162591386398), PwC (http://www.law360.com/articles/577009/pwc-to-pay-10-5m-as-part-of-aig-class-action-deal), and Ernst and Young (http://www.cbsnews.com/news/10-million-settlement-reached-in-case-against-ernst-young/).

[2] We do not mean to imply that the PCAOB and auditors prevented the crisis from happening. Our aim is not to rewrite history, but to test whether auditing, and auditing oversight, can affect OTD lending.

[3] SFAS 91, SFAS 140, and FIN 46R were the rules governing accounting for loan origination and distribution transactions and consolidation of securitization entities during our sample period (2002−2007).

[4] Deliberate (unintentional) misapplications of GAAP for OTD transactions pertain to bank management's extraction of private benefits (learning of OTD transactions' profitability), on the premise that bank management has a reasonable (poor) understanding of the risks of OTD lending. Studies are divided on whether bank management was aware of the impending risks of the OTD model before the financial crisis (Fahlenbrach and Stulz, 2011; Cheng et al., 2014; Ryan et al., 2016).

where we can assess the real effect of PCAOB inspections in the OTD mortgage market. We exploit the time-series and cross-sectional variation in these deficiencies during PCAOB inspections of the U.S. operations of the Big 4 audit firms occurring from 2003 to 2006.[5] During this period, the PCAOB identified OTD audit deficiencies for three of the Big 4 auditors. According to its 2003 inspection report, KPMG improperly permitted two clients to exclude unamortized loan origination fees and costs associated with loans sold from the gains or losses on loan sales, rendering the clients' financial results incomparable to those of their peers. The 2004 inspection of Deloitte found that the audit firm failed to verify the underlying assumptions of a client in estimating the fair value of retained interest from securitization, resulting in a subsequent restatement.[6] Finally, according to its 2004 inspection report, PwC did not rely on an appropriate legal opinion in assessing whether a bond transfer during securitization qualified as a sale under the Statement of Financial Accounting Standards (SFAS) 140. The deficiency pertains to an audit issue and might be less directly related to the OTD model of mortgage lending. We reproduce these deficiencies in Appendix A and describe the corresponding accounting issues in Appendix B. Clients of the three auditors are treated banks. Ernst and Young did not receive any OTD audit deficiencies, and therefore its audit clients serve as the control group. We end our search of OTD-related deficiencies at the 2006 inspections, for which the reports are released in 2007, as we are interested in the pre-crisis period, in which loose audits of OTD clients were heavily criticized.

We obtain information on 27 million mortgages from the Home Mortgage Disclosure Act database that were originated and subsequently sold or securitized by public bank holding companies (hereafter banks) that were clients of Big 4 auditors from 2002 to 2008. We merge these data with bank regulatory Y−9C filings and Audit Analytics to obtain bank and auditor information. Following Gilje et al. (2016), we conduct our main analyses at the bank-county-year level to better account for local credit demand. Specifically, we measure OTD lending using the total amount of mortgages that are originated and subsequently sold or securitized by a bank in a county-year. We employ a first-difference research design to examine changes in OTD lending by banks in specific counties. This approach differences out the effects of bank-specific time-invariant factors (e.g., the distance from a county to a bank's headquarters) as well as bank-specific trends (e.g., a decline in the lending capacity that began before the inspections) within a county. Our test variable is set to one for the years after a bank's auditor receives OTD audit deficiencies and zero otherwise (*PCAOB Deficiency*). We control for bank characteristics and loan and applicant characteristics in that county-year. In addition, we include county-year fixed effects to capture local demand shocks that could affect a bank's lending activities and auditor-fixed effects to control for time-invariant auditor attributes. Overall, our research design constitutes a generalized difference-in-differences specification (Angrist and Pischke, 2009).

We find that a bank's OTD lending growth decreases by 14% after the PCAOB identifies OTD audit deficiencies for its auditor, relative to other banks. The decrease does not occur before the PCAOB criticisms are identified and communicated to the auditor. Thus, the continuation of divergent trends between treated and control banks that began in prior years are unlikely to explain the relative decrease. Consistent with prior studies on the audit firm-wide effects of PCAOB inspections (e.g., DeFond and Lennox, 2017; Aobdia and Shroff, 2017; Aobdia, 2020; Shroff, 2020), the relative decrease first appears one year after the release of the PCAOB inspection report and does not reverse in subsequent years (see Fig. 2). These results support our prediction that these PCAOB criticisms help discipline banks' OTD lending by increasing auditors' scrutiny of their accounting practices for OTD transactions.

Our results are stronger for banks audited by Deloitte, where the PCAOB identified a severe departure from GAAP, than for banks audited by KPMG or PwC, which had less severe audit deficiencies. This result is consistent with more severe PCAOB criticisms having stronger effects on banks' OTD lending. In addition, we find that the reduction in OTD lending is concentrated in banks that have a weak risk-management function and thus have more to learn about their OTD business from better-audited financial reports. The reduction is also concentrated in banks that have lower earnings before gains on loan sales and securitizations and thus have stronger incentives to manage earnings upward to conceal the risks of OTD lending. The findings are robust to using three alternative samples and three alternative specifications, as discussed in detail in Section 4.5. In a placebo test, we find that OTD audit deficiencies uncovered by the PCAOB do not influence banks' mortgage originations that are retained on the books. This result suggests that omitted bank-level variables, such as bank-wide changes in credit standards, are unlikely to explain our findings. We also find that our results are primarily for loans that are not sold to government-sponsored entities. This evidence suggests that the disciplinary effects take place among more "toxic" loans.

Finally, we examine whether PCAOB inspection deficiencies pressure auditors to curb overstatements of gains on loan sales and securitizations. We find that, relative to the control group, a bank's gains on loan sales and securitizations decrease after the PCAOB reports OTD audit deficiencies of the bank's auditor. In economic terms, the decrease represents about 3% of

[5] We focus on the Big 4 auditors for three reasons. First, most banks engaging in OTD lending are big banks and are thus naturally the clients of these audit firms. Second, the Big 4 auditors are relatively homogeneous in comparison to other auditors. Third, the Big 4 auditors have been inspected annually since 2003, whereas non-Big 4 auditors receive inspections at different times (Tier 2 and small auditors have been inspected annually and triennially, respectively, since 2004). Nevertheless, our results are robust to including Tier 2 auditors in the sample (see Section 4.5).

[6] Academic papers and anecdotal evidence suggest that the accounting issues behind these OTD audit deficiencies are prevalent and consequential. Dechow et al. (2010) document that the assumptions concerning discount rates, default rates, and prepayment rates provide management with wide discretion to overstate the gains on loan sales and securitizations. Anecdotal evidence supports this premise. The bankruptcy court examiner for New Century discusses seven key accounting issues in 200 pages that contribute to the collapse of this subprime mortgage originator (Missal, 2008, 177−377). Among them, two are issues raised by the PCAOB in the 2003 and 2004 inspections of KPMG and Deloitte, respectively: exclusion of loan origination costs (Section VI.C.3), and overstatement of retained interest (Section VI.B). The other five issues are related to repurchase reserves, allowance for loan losses, mortgage servicing rights, hedge accounting, and goodwill.

an average bank's return on equity.[7] We also provide exploratory evidence about the implications of our findings for the severity of the 2008 financial crisis. We calculate cumulative size-adjusted stock returns during the crisis period (2008–2009) for our sample banks. We find that the treated banks (audited by Deloitte, KPMG, and PwC) performed significantly better than control banks (audited by E&Y) during this period. This result is consistent with the reduction in OTD lending mitigating some of the effects of the financial crisis. However, since this is a simple cross-sectional univariate comparison, we strongly caution that other factors could also influence this result.

Our paper contributes to three strands of the literature. First, we extend the literature on PCAOB inspections by documenting the real effects of these inspections in the OTD mortgage market. Prior studies find evidence suggesting that PCAOB inspections improve audit quality and affect auditor-client relationships (e.g., Drake et al., 2016; Aobdia and Shroff, 2017; DeFond and Lennox, 2017; Fung et al., 2017; Acito et al., 2018; Aobdia, 2018, 2020). However, with the exception of Shroff (2020), these studies do not examine whether PCAOB inspections have real economic consequences on auditor clients' operations.[8] Our study also adds to an emerging line of research that focuses on the content of the deficiencies identified during PCAOB inspections. Because the largest U.S. audit firms are inspected annually by the PCAOB, many prior studies have struggled to assess audit firm-wide effects of PCAOB inspections of these auditors, due to the lack of variation in the data. We overcome this empirical challenge by linking specific Part I deficiencies of PCAOB inspection reports to subsequent auditor and client behavior. Focusing on the Big 4 audit firms in the U.S. is important because they audit the majority of U.S. companies and most of the U.S. stock exchanges' market capitalization.

Second, our paper contributes to the OTD literature (e.g., Purnanandam, 2011) by examining the role of public audit oversight. Dechow et al. (2010) find that management benefits from misapplications of GAAP for OTD transactions, even in the presence of independent directors and directors with financial expertise. Our findings suggest that PCAOB inspections can help curtail these misapplications and thus OTD lending, and such curtailment is greater for bank managers with stronger incentives to manage earnings. Moreover, the result that the reduction varies with a bank's risk-management function is consistent with more effective audits providing better information about the OTD business, thereby helping managers make more informed decisions (Ryan, 2017).

More generally, our study informs the debate on the role of audit failures before the financial crisis of 2008 (Sikka, 2009; Kothari and Lester, 2012; Doogar et al., 2015; Desai et al., 2016).[9] During the crisis, U.S. wealth losses were estimated at approximately $70,000 for every American, and the Dow Jones Industrial index dropped by more than half (Barnichon et al., 2018). In a congressional hearing on April 6, 2011, the former chief accountant of the Securities and Exchange Commission (SEC), Lynn Turner, recommended: "The PCAOB should launch an in-depth study into the role auditors played in the financial crisis … The PCAOB should make such analysis of audit failures an ongoing function of the Board, in order to ensure that changes in policy and oversight practices are adopted in a timely fashion to address correctable weaknesses in the audit process." Our findings suggest that PCAOB inspections helped discipline OTD lending to some extent before the crisis, but such a disciplinary effect was clearly insufficient to prevent the crisis. Our results highlight a link between lax auditing practices during 2002–2007 and the financial crisis. This link implies that auditors and the PCAOB might have had an opportunity to more effectively curb the proliferation of OTD lending prior to 2008.

Our study has some limitations. First, we rely on a small sample composed of four auditors and 55 banks. While these banks are large, conducted $3.6 trillion of OTD lending transactions during the sample period, and were audited by the largest auditors in the U.S., it is unclear whether our inferences can generalize to other settings. Second, our primary result, which finds a decrease in OTD lending following PCAOB deficiencies, is statistically significant at the 10% level using two-tailed tests. We conduct many robustness tests to corroborate our primary result; the results in many of our subsequent tests become stronger. Third, we cannot completely rule out an alternative possibility that following the release of PCAOB inspection reports or the restatement announcement by the client of Deloitte, banks of auditors with OTD deficiencies become aware of the issues and become more vigilant vis-à-vis their OTD accounting, even if auditor scrutiny remained unchanged. Even if this explanation is valid, our main inference that client behavior is ultimately influenced by the outcome of PCAOB inspections would remain unchanged. We encourage researchers to continue exploring this line of research on public audit oversight, auditors, and financial institutions to determine whether our results can generalize to different samples, regulatory regimes, and countries.

[7] Another possibility is that clients switch auditors, perhaps with opinion shopping in mind. While prior studies find that PCAOB inspection deficiencies affect the auditor-client relationship (Abbott et al., 2013; Acito et al., 2018; Aobdia and Shroff, 2017; Aobdia, 2020), they do not examine the deficiencies in OTD audits. We observe that only three banks that have auditors with OTD audit deficiencies switch to auditors without such deficiencies. Excluding the three banks from our sample does not alter our inferences.

[8] Shroff (2020) focuses on the economic consequences of PCAOB inspections on non-financial companies' investment activities, but his evidence is limited to auditors and companies outside of the United States. Whether PCAOB inspections have real economic consequences on the largest audit firms and financial institutions in the U.S. remains an open and important question.

[9] Doogar et al. (2015) and Desai et al. (2016) examine whether auditors respond to information in the banks' financial reports during the period leading up to the crisis about their potential for distress and find mixed results. Our paper differs from these studies in that we examine how public audit oversight helps discipline OTD lending. See also Erickson et al. (2000) for the role of auditors in the failure of Lincoln Savings and Loan.

2. Background and hypothesis development

2.1. OTD lending

The OTD model of mortgage lending, in which loan originators sell or securitize the mortgages to third parties, allows financial institutions to achieve better risk sharing with other market participants and increases bank liquidity (Loutskina and Strahan, 2009; Lemmon et al., 2014). However, these benefits come with significant costs. Originators have diminished economic incentives to screen and monitor borrowers and are more susceptible to a funding crisis when the securitization market freezes (Keys et al., 2010; Loutskina, 2011). The model also incentivizes originators to make loans and reap the accounting benefits from loan sales or securitizations (Kothari and Lester, 2012). Under GAAP, originators can derecognize loans from the balance sheet and book gains on loan sales and securitizations at the time of the sale, even if they retain contractual or non-contractual (implicit) interests (Chen et al., 2008; Dechow et al., 2010; Dou et al., 2014). To compute the gains on loan sales and securitizations, an originator must determine the fair value of the retained interests in the sold loans. Given that these retained interests are illiquid and thus not publicly traded, managers must determine their fair value using models and internally generated inputs. These inputs pertain to the prediction of future cash flows, which depend on estimated default and prepayment rates, as well as the discount rate for the predicted cash flows. Thus, underestimation of future defaults, prepayments, and the discount rate usually inflate gains on sale.

Given the amount of subjectivity and judgment involved in making managerial estimates, prior research provides evidence of earnings management using gains on loan sales and securitizations. Dechow et al. (2010) find that when originators have lower levels of or more negative changes in pre-securitization earnings, they tend to recognize greater gains on loan sales and securitizations. Further, Dechow et al. (2010) provide evidence that managers exercise discretion over discount rates to achieve earnings targets.

The April 2007 bankruptcy of New Century, the second largest originator of subprime residential mortgage loans from 2005 to 2006, provides a telling example of OTD accounting and auditing issues. The bankruptcy examiner discusses seven key accounting issues that contributed to the collapse of New Century (Missal, 2008). First, New Century understated its repurchase allowance, a liability on loans that the company had sold but was potentially obligated to repurchase, either because the borrower defaulted shortly after the sale or because New Century failed to comply with the representations and warranties in the loan purchase agreements. Second, consistent with the results in Dechow et al. (2010), New Century failed to properly value the residual interests it held in off–balance sheet securitizations due to artificially low discount rate, prepayment, and credit loss assumptions in the retained interest models. Third, New Century improperly amortized its deferred loan origination fees and costs and excluded certain costs from its deferral and amortization methodology. The other four issues are related to allowance for loan losses, mortgage servicing rights, hedge accounting, and goodwill (Missal, 2008).

The examiner also discusses how New Century's auditor, KPMG, could have done more to prevent the accounting issues from taking place. Finally, the examiner's report implies that issues in New Century's accounting and internal controls over financial reporting prevented the company from detecting signs of struggle in its OTD lending business in a timely manner. Had New Century had more accurate knowledge of the dismal economic profitability of its OTD business, it might have been able to change its business practices before it was too late.

2.2. PCAOB inspections

As part of the Sarbanes-Oxley Act of 2002 (SOX), Congress established the PCAOB to provide independent oversight and inspections of accounting firms auditing SEC-registered companies. These inspections are conducted annually (at minimum triennially) for audit firms that regularly audit more than 100 (100 or fewer) publicly traded companies. The PCAOB began with limited inspections of the U.S. operations of the Big 4 auditors in 2003. These limited inspections, “voluntarily” accepted by the audit firms, are anecdotally considered a test-run of the full inspections that began in 2004.

Section 104 of SOX requires PCAOB inspections to review individual audit engagements and the overall quality control systems of the audit firms. For the former, the PCAOB selects specific engagements using a risk-based approach, and the inspectors typically examine high-risk areas of the engagement, such as the audit of complex accounting estimates (e.g., PCAOB, 2008; PCAOB, 2016). Approximately 50% of the audit deficiencies identified by the PCAOB fall into this area (Aobdia, 2019). Fig. 1 shows the timeline for an inspection. For each inspected engagement, after notifying the audit firm and requesting initial information, the PCAOB sends a team of experienced former auditors to conduct fieldwork (CAQ, 2012), which generally takes one or two weeks. PCAOB inspectors analyze the engagement work papers and interact with the engagement team to better understand their audit work.

When PCAOB inspectors identify potential issues in an audit that they cannot resolve through discussion with the engagement team, the PCAOB issues a comment form to the audit firm shortly after the fieldwork is conducted (e.g., CAQ, 2012; Aobdia, 2019). The comment form gives the audit firm a formal opportunity to respond to the issues raised by the inspectors. If the audit firm's response does not satisfactorily answer the inspector's concerns, the deficiency is considered for inclusion in the final inspection report, which, for the U.S. operations of the Big 4 audit firms, is typically released the year after the inspection. The audit deficiencies that are sufficiently serious are reported in Part I of the final inspection report. In these deficiencies, the PCAOB claims that the engagement team's work was not sufficient to support the audit opinion. Although this portion of the report is publicly available, the names of the companies with deficient audits are not disclosed.

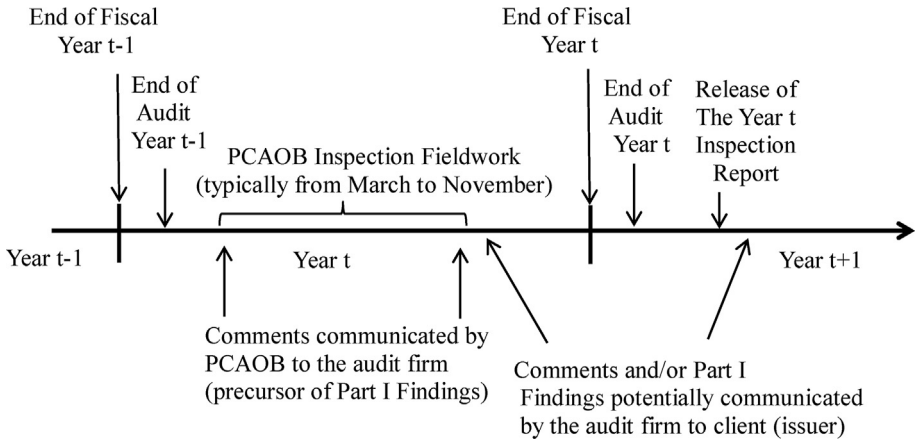


Fig. 1. PCAOB Inspection Timeline for a Given Auditor. This figure presents the timeline of a PCAOB inspection of a given auditor.

These deficiencies are typically referred to as Part I findings. While these findings primarily relate to audit deficiencies and do not imply that the company's financial statements are misstated, occasionally PCAOB inspectors identify departures from GAAP in the company's financial statements. If the SEC, the auditor, and the company believe that these issues are material, the company will need to restate its previously issued financial statements.

The PCAOB also reviews the quality control systems of the audit firms. The PCAOB combines a bottom-up approach, where it generalizes similar patterns of Part I Findings identified in several engagements to an audit firm-wide issue, and a top-down approach, which focuses on areas such as partner management practices in the audit firm, tone at the top, and internal monitoring activities within the audit firm (e.g., Aobdia, 2020). While the PCAOB may or may not identify deficiencies in the quality control systems of the audit firms, these deficiencies are not publicly released if the audit firm addresses the comments to the satisfaction of the board within one year of the release of the inspection report (SOX Section 104(g) (2)).

2.3. Hypothesis development

We develop the Hypothesis in two steps. First, auditors increase their scrutiny of OTD accounting practices after the PCAOB identifies deficiencies in their audit of OTD accounting. Second, banks subsequently reduce their OTD lending due to fewer accounting benefits from (intentional or unintentional) misapplications of accounting rules for such lending. The reduction can result either from fewer opportunities for bank managers to conceal risks of the OTD activities or from better financial statements that provide bank managers with a more accurate (and negative) assessment of their profitability.

Ex ante, we expect an auditor to increase its scrutiny of clients' accounting treatment for OTD transactions following identification of a PCAOB deficiency in this area for several reasons. Prior studies find that auditors react to deficiencies identified by the PCAOB on both inspected and other engagements of the audit firm. For example, using proprietary PCAOB inspection data, Aobdia (2018) finds that auditors increase effort on engagements with PCAOB deficiencies. He also finds evidence of office-level and partner-level spillovers of the engagement that receives PCAOB inspection deficiencies. At the audit firm level, DeFond and Lennox (2017) find evidence suggesting that auditors improve their audits of internal controls when the PCAOB reports higher deficiency rates in this area. Drake et al. (2016) examine the PCAOB disclosure of a 2007 criticism of Deloitte's quality control system for auditing income tax accounts. They find that, following increased auditor scrutiny over these accounts, Deloitte clients increased the reported valuation allowance on deferred tax assets and increased the reported reserve for uncertain tax benefits.[10] Aobdia (2020) also finds evidence suggesting that PCAOB inspection deficiencies about the quality control systems of the audit firms are associated with worse audit quality, and remediation of these deficiencies improves audit quality.

In 2008, the PCAOB released a report on the 2004–2007 inspections of domestic, annually inspected audit firms. The report noted that two areas of concern were the auditing of fair value and management estimates. The PCAOB also indicated that audit firms had taken significant action to remediate the identified audit deficiencies.[11] Remediation efforts included the

[10] In the context of international PCAOB inspections, Fung et al. (2017) and Krishnan et al. (2017) also find, following PCAOB inspections, an improvement in financial reporting quality for all companies, even those that are not publicly listed in the U.S. However, they do not examine whether the PCAOB identifies audit deficiencies in the inspection.

[11] Such reactions likely arise from both external and internal pressure. Externally, the PCAOB can impose various penalties on errant audit firms (Cohn, 2015a,b; DeFond and Lennox, 2017), and deficient audits alert audit committees of all clients, potentially affecting the auditor–client relationship due to reputational effects. For example, former PCAOB chairman, James Doty, claims: "Whether an audit committee's own company audit is being reviewed as part of an inspection, or whether it's another company within the same industry, PCAOB inspection reports provide insight into areas of risk and audit quality that are of concern to all audit committees" (Whitehouse, 2012). Internally, promotion to partner and financial penalties might be tied to inspection outcomes, creating incentives for all engagement teams to reduce deficiencies by improving their work (Johnson et al., 2019).

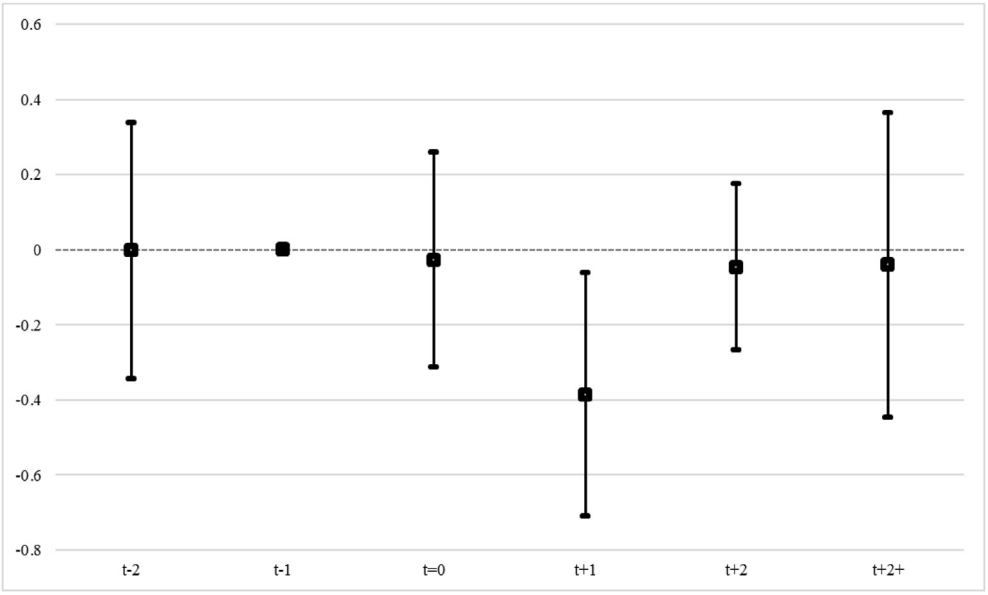


Fig. 2. Dynamic Effect of Inspections with OTD Audit Deficiencies. This figure graphically shows the results presented in Table 5 and plots the changes in OTD lending around the time when the PCAOB reports audit deficiencies in OTD lending. We also plot the two-tailed 95% confidence interval around the average changes in OTD lending to assess statistical significance. The time $t = 0$ corresponds to the change in OTD lending between the beginning and the end of the inspection report release year where OTD audit deficiencies are identified by the PCAOB, and t+1 from the beginning and the end of the year following the inspection report release year, respectively. To map out the pattern in the counter-factual treatment effects we include indicators for every period in the sample except for t-1 which serves as the benchmark year.

creation of subject-matter networks for areas where there have been deficiencies, increases in industry-expertise requirements, and the recruiting of valuation specialists (PCAOB, 2008, 26–27). Consistent with the PCAOB report's assertions, Church and Shefchik (2012) document a significant decline during our sample period in audit deficiencies in fair-value measurements and management estimates for the Big 4 auditors. Hanlon and Shroff (2020) survey 170 inspectors from auditor public oversight boards in 20 countries, including 43 PCAOB inspectors. They confirm that a large majority of inspectors believe that auditors frequently respond to inspector feedback by changing audit procedures, quality control systems, and scrutiny of management estimates. In sum, it is plausible that audit firms would take actions to improve all their OTD audits following the PCAOB identification of deficiencies, particularly when they are severe.[12]

When determining the amount of OTD lending, bank managers balance the economic benefits and costs, within-GAAP benefits, and the accounting benefits from misapplications of GAAP for OTD transactions, as discussed above. To the extent that a PCAOB inspection that identifies OTD audit deficiencies significantly lowers the accounting benefits for the auditor's clients, we expect these clients to curtail their OTD lending.[13] This curtailment would represent an indirect real effect of PCAOB inspections, consistent with Shroff (2020) finding that foreign companies audited by PCAOB-inspected auditors without deficiencies increase their capital expenditures by 0.5% of their assets and their external capital financing by 1.4% of assets. We state our primary Hypothesis in its alternative form:

Hypothesis. *Banks curtail their OTD lending after the PCAOB identifies OTD-related deficiencies of their auditor.*

Despite the above discussion, there are compelling arguments for why OTD-related audit deficiencies might not affect a bank's OTD lending. First, auditors may not improve the quality of all their OTD audits, especially if they disagree with the PCAOB's findings. Audit firms' replies to their early PCAOB inspection reports indicate from time to time that PCAOB

[12] Conversations with current and former PCAOB staff support this premise.

[13] An alternative possibility is that, following the release of PCAOB inspection reports, the banks of auditors with OTD deficiencies become aware of these deficiencies and become more vigilant vis-à-vis their OTD accounting, even if auditor scrutiny remains unchanged. For this non-mutually exclusive explanation to hold in light of our difference-in-differences design, banks would need to focus on their auditor's PCAOB report sufficiently more than the PCAOB reports of other auditors. Further, our result that the reduction in OTD lending is concentrated in banks with a weak risk-management function, which are arguably less sophisticated, makes it unlikely that such banks would scrutinize PCAOB inspection reports. Similar arguments apply in case banks react instead to the restatement announcement by one of Deloitte's clients. In light of our difference-in-differences design, banks audited by Deloitte would need to focus on the restatement significantly more than other banks for this alternative explanation to be valid. More plausibly, prompted by the deficiency, Deloitte engaged in greater scrutiny of its OTD audits, similar to what the audit firm did after deficiencies were identified by inspectors in the application of EITF 95–22 (PCAOB, 2004a). Nevertheless, we are unable to completely separate this possibility from increased auditor scrutiny because the inspection reports for the U.S. operations of the largest auditors are typically released a few months after the inspection is over. Even if this alternative explanation were valid, our results would still be consistent with PCAOB inspections influencing OTD lending, albeit through a different channel.

deficiencies are issues of differences in professional judgment and not about the quality of the execution of the audit. Anecdotally, Glover et al. (2009, 231) report "several auditors who have had engagements inspected by the PCAOB have told us that the inspectors often fail to look at the riskiest areas of an audit because the technical complexity of such areas is beyond the inspection team's expertise. We are also aware of instances where field inspectors were assigned to examine audit areas in which they had little or no technical expertise." This observation is particularly relevant to OTD audits due to the complexity of OTD transactions and the associated accounting rules.

Nevertheless, the PCAOB identified departures from GAAP for OTD lending for two of the three auditors (Deloitte and KPMG) in our sample with PCAOB inspection deficiencies, one of which led to a material restatement. These departures from GAAP were acknowledged by the audit firms as legitimate in their replies to their inspection reports. However, two of the three auditors with OTD deficiencies in our sample only have one audit deficiency, and for one (PwC), the issue appears less severe. This suggests that this particular issue might not have risen to the level of a quality control system deficiency for the entire audit firm. In general, it is not certain whether the audit firms improved the quality of all their OTD audits following the PCAOB reports with the deficiencies.

Second, even if audit firms improve their OTD audits, reducing the reported gains on loan sales and securitizations of their clients, it remains unclear whether these clients would curtail their actual OTD activities following this increased auditor scrutiny. OTD lending confers several important economic benefits on banks, as discussed above. Banks also retain the flexibility to time their loan sales and securitizations to window-dress their financial statements (Dechow and Shakespeare, 2009). Such flexibility does not obviously fall under the purview of the auditor. If the accounting benefits from misapplications of GAAP are minor in comparison with other benefits, then banks are unlikely to curtail their OTD lending. Further, some banks may respond to the lower per unit of OTD lending profitability by increasing the quantity of OTD transactions, to make up for the total profit shortfall. In such a case, they would have to easily obtain additional financing, information systems, and personnel that are necessary for such an expansion (Dou et al., 2018b). Thus, whether OTD lending is affected by PCAOB inspection outcomes is ultimately an empirical question.

3. Data and sample construction

3.1. Data on PCAOB audit deficiencies

We search the PCAOB inspection reports corresponding to the inspections conducted between 2003 and 2006 and specifically focus on OTD-related audit deficiencies publicly disclosed in the Part I Findings. We choose this period because loose OTD audits were heavily criticized in the pre-financial crisis period. We find that three of the Big 4, KPMG, Deloitte, and PwC, received such deficiencies, whereas Ernst & Young did not. Appendix A provides the specific deficiencies identified by the PCAOB, while Appendix B illustrates how the deficiencies potentially influenced banks' earnings.

KPMG received three deficiencies during its limited inspection in 2003, all of which are related to issues in the computation of gains and losses on the sale of loans. The PCAOB noted that all three deficiencies are departures from GAAP, which suggests that all of them were sufficiently serious to affect the clients' financial statements. However, the PCAOB reports: "[t]he issuer and KPMG concluded that the findings were immaterial, individually and in the aggregate" (PCAOB, 2004b). Thus, it is unclear how much KPMG reacted to these deficiencies. Deloitte received one deficiency during its first full inspection in 2004. This deficiency is also related to issues in the computation of gains and losses on securitization transactions. The client changed assumptions and booked additional gains to offset writedowns of previously overstated interest-only strips. According to the PCAOB inspection report, the company eventually restated its financial statements following the PCAOB inspection, which suggests that the issue was serious (PCAOB, 2005a). Thus, we expect that Deloitte reacted strongly to the deficiency and took remedial actions for other engagements. Finally, PwC received one deficiency during its 2004 inspection. The issue, while related to a securitization transaction, appears to be limited to an audit issue rather than an issue in the client's financial statements. The audit firm inappropriately relied on a legal opinion that was not addressed to the client. Thus, while PwC received a deficiency in OTD audits, it is plausible that PwC did not react strongly to its Part I Finding. Supporting this view, PwC indicates in its reply to the 2004 inspection that two-thirds of the deficiencies identified by the PCAOB reflected differences in professional judgment, suggesting that PwC believed that its audit opinions were supported in the majority of audits with Part I Findings (PCAOB, 2005b). In contrast, KPMG and Deloitte did not contest the Part I Findings in their replies to the inspection reports. We consider each audit firm separately in later analyses.[14]

[14] While the audit deficiency for PwC uncovered by the PCAOB seems less severe than those uncovered for KPMG and Deloitte, we do not include PwC in the control group for two reasons. First, the PCAOB typically identifies and reports audit deficiencies, not departures from GAAP, in its inspection reports. Audit deficiencies can impact financial reporting quality when the client's pre-audit financial statements are misstated. Given that PCAOB inspectors do not have direct access to the client's information, only to the auditor's workpapers, it happens from time to time that the PCAOB identifies an audit deficiency, which ultimately leads to a restatement, because the auditor discovers the misstatement while remediating the deficiency identified by PCAOB inspectors (e.g., Aobdia, 2019). The inspection report will not necessarily note the misstatement, either because of timing differences, or because the decision to restate is made between the company, the auditor, and the SEC, without involving the PCAOB (PCAOB, 2004c). Second, PCAOB inspection reports include, in Part II of the report, a nonpublic discussion about quality control system deficiencies of the audit firms. Because we do not have access to the nonpublic version of the PCAOB reports for this paper, we cannot rule out that the deficiency in PwC was not discussed in the Part II of the report. Nevertheless, classifying PwC and Ernst & Young into the control group does not alter our inferences.

3.2. Sample construction

We merge bank regulatory Y−9C filings with Audit Analytics to obtain the names of bank auditors. The Home Mortgage Disclosure Act (HMDA) database contains granular mortgage information at the loan-level. To capture OTD lending, we use mortgages that are sold or securitized by a lender to third parties.[15] We connect our sample banks to the lenders (at the subsidiary level) from the HMDA database using the following steps. (1) We first download the organization hierarchy of each bank from the National Information Center, which includes a list of subsidiary names, locations, and RSSD ID (a unique identifier assigned to financial institutions by the Federal Reserve). (2) As lenders from the HMDA database have Respondent ID and Agency Code but not RSSD ID, we merge them with the Call Reports to obtain the RSSD ID for commercial bank subsidiaries.[16] These subsidiaries are then linked to the parent bank via the RSSD ID (3) For non-bank subsidiaries (e.g., mortgage companies). On the list, we manually match them to the lenders from the HMDA database by name and location. We update the link table annually to accommodate changes in banks' organization structures. Mortgages that are sold or securitized are then aggregated at the bank-county-year level, the primary unit of our analyses.[17]

Merging our three datasets results in an initial sample of 27, 319, 827 OTD loans corresponding to an aggregate amount of $4.7 trillion from 93,467 bank-county-years (673 bank-years and 186 unique banks) from 2002 to 2008. Dropping observations with missing data on banks and loan characteristics reduces our sample by 353 and 2271 bank-county-years, respectively. We also drop 127 banks that report zero gain or loss in loan sales and securitizations in all years during our sample period (banks also report zero gain or loss when it is non-zero but immaterial). The purpose is to restrict the sample to banks that substantially engage in OTD activities. This restriction eliminates a reasonably large number, 21,069, of bank-county-year observations, but less than 10% of the OTD loan amounts in the sample, consistent with the eliminated banks being only marginally involved in OTD lending during the sample period. Finally, we trim the bank-county-year level growth in OTD loans at the 2.5 and 97.5 percentiles to mitigate the influence of outliers.[18] Doing so eliminates 2,918,212 loans originated in 3488 bank-county-years. Our final sample consists of 66,306 bank-county-year observations, corresponding to 202 bank-years and 21, 135, 314 OTD loans. The total amount of loans in our sample is $3.6 trillion. In Table 1, we outline the sample selection procedure in detail.

4. Empirical analysis

4.1. Research design

To test whether negative PCAOB inspection outcomes influence OTD activities, we use a specification similar to that of Gilje et al. (2016) where the growth in local lending is regressed on treatment variables, bank-level explanatory variables, and county-year fixed effects. Specifically, we compare changes in OTD lending in a county by banks audited by the Big 4 before and after PCAOB inspections that identify OTD audit deficiencies. The treated sample consists of banks audited by KPMG,

[15] The HMDA database provides the type of purchasers for mortgages sold, coded as "Fannie Mae," "Ginnie Mae," "Freddie Mac," "commercial savings bank/savings association," "life insurance/mortgage banks/finance company," "private securitization," and "others." However, this information does not allow us to distinguish between sales and securitizations of mortgages. In particular, "private securitization" is used "If an institution selling a loan knows or reasonably believes that the loan will be securitized by the institution purchasing the loan … regardless of the type or affiliation of the purchasing institution" (https://www.ffiec.gov/hmda/faqreg.htm). Thus, loans in this category include (1) those sold to special purpose entities set up by the seller to issue mortgage-backed securities, indicating securitizations of mortgages by the seller, and (2) those sold to independent institutions that securitize the purchased mortgages, indicating sales of mortgages by the seller. Moreover, for the second case, the purchasing agreement between a seller and a buyer may not specifically say the purchase is for the intent of securitization, leaving the seller with no idea what happens beyond the individual sale. As a result, there appears to be some miscoding surrounding this category. We confirm this with a lawyer who assisted banks with their HMDA filings. Notably, the inability to distinguish between loan sales and securitizations does not affect our final sample selection as our predictions apply to both.

[16] The Respondent ID corresponds to Charter numbers for OCC supervised banks (Agency Code = 1), RSSD numbers for Federal Reserve supervised banks (Agency Code = 2), and FDIC certificate numbers for FDIC supervised banks (Agency Code = 3), all of which are available in the Call Reports.

[17] The growth of OTD lending at the bank-county-year level is influenced by bank mergers and acquisitions (M&As) We take advantage of our link table and identify lenders that are linked to more than one parent bank during our sample period, indicative of these lenders engaging in M&As. We search for the exact M&A years and remove the bank-county-years for which the growth in OTD lending is directly affected by such transactions. For example, Provident Bank was a subsidiary of Provident Financial Group until 2003 and a subsidiary of National City Corp from 2004, because Provident Bank was acquired by National City Corp in February 2004. Provident Bank extended OTD loans to 1869 counties in 2004. We remove observations for Provident Financial Group and National City Corp in these counties in 2004 because the growth in OTD lending is directly affected by such a transaction. We keep observations in subsequent years because the growth adjusts for the change in scale due to M&As. For example, Bank A extends $10 million of OTD loans each year from 2002 to 2004, and $100 million of OTD loans each year during 2005−2007 in a county due to its acquisition of another bank's subsidiary in 2005. The growth in OTD lending is non-zero only in 2005 due to the M&A and we eliminate such an observation. We also notice that some lenders that are acquired continue to use the old Respondent ID in the subsequent year. For example, Hibernia National Bank was acquired by Capital One in 2005 and did not change its Respondent ID in 2006. Since we obtain the RSSD ID from the Call Reports using the Respondent ID and Hibernia National Bank no longer exists in the Call Reports in 2006, all the OTD loans of Hibernia National Bank are unmatched to Capital One in 2006. We manually adjust for this issue by assigning these loans to the acquirer in that year.

[18] The outliers may arise from (1) data errors or (2) a very small number of OTD loans initially originated in a particular bank-county-year. For example, a bank-county experiencing a growth (decline) from 1 to 10 (10−1) OTD loans would experience a 900% growth (90% decline) in OTD lending. Such bank-county-years may unduly influence our inferences, despite their little economic importance. Trimming eliminates such cases. We also consider alternate forms of trimming to deal with the second type of outliers, where we restrict the sample to bank-counties with at least 8, 12, and 16 loans originated. The results remain robust (untabulated).

Table 1
Sample selection.

	# Banks	# Bank-years	# Bank-county-years	# OTD Loans	Total Amount of OTD Loans (in $ thousands)
Bank Regulatory-Audit Analytics-HMDA merged dataset (2002–2007)	186	673	93,467	27,319,827	4,719,929,767
Missing bank characteristics	(4)	(16)	(353)	(74,338)	(8,998,739)
Missing loan characteristics	(0)	(1)	(2251)	(39,429)	(15,181,968)
Zero gains/losses on loan sales and securitizations	(127)	(454)	(21,069)	(3,156,200)	(465,092,557)
OTD Growth truncated at 2.5 and 97.5 percentiles	(0)	(0)	(3488)	(2,914,546)	(590,990,413)
Final sample	55	202	66,306	21,135,314	3,639,666,090

This table presents the detailed sample selection procedure. The main sample in the analyses is at the bank-county-year level, except for Table 9 where the sample is at the bank-year level. The final sample has 55 banks, corresponding to 202 bank-years, 66,306 bank-county-years, and $3.6 trillion of OTD loans.

Deloitte, and PwC, and the control sample consists of banks audited by Ernst & Young. In addition, the treatment is staggered depending on when the PCAOB identifies OTD audit deficiencies and communicates those to the audit firm. We estimate regressions of the following form:

$$OTD\ Growth_{i,j,t+1} = \beta \times PCAOB\ Deficiency_{i,t} + \gamma \times Bank\ Controls_{i,t} + \delta \times Loan\ Controls_{i,j,t} + Auditor\ FE_i + County\ Year\ FE_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

where the subscripts *i*, *j*, and *t* correspond to banks, counties, and years, respectively. Our unit of analysis is at the bank-county-year level. This particular level of aggregation helps us better account for local county-level credit demand that could influence a bank's mortgage lending decisions. We cluster standard errors at the bank level to account for the potential lack of independence of OTD activity across different counties within the same bank. Following Gow et al. (2010), we use critical values based on the *t*-distribution with degrees-of-freedom equal to the number of clusters (55) for inferences.

The dependent variable, $OTD\ Growth_{i,j,t+1}$, is the change in the natural logarithm of total amounts of mortgages in county *j* that are originated and subsequently sold or securitized by bank *i* from year *t* to *t*+1. We use the growth in as opposed to levels of OTD lending for two reasons. First, normalizing OTD lending by last year's lending in a respective bank-county allows us to remove all bank-specific time-invariant factors within a county (e.g., the distance from a county to a bank's headquarters or to a regulator's field offices) that affect the local OTD business and effectively exploit temporal variation within the same bank-county. Second, the growth measure helps to difference out bank-specific trends within a county that began even before the inspections and carried over into the post-inspection period. These trends potentially present a threat to our inferences.[19]

Our explanatory variable of interest is $PCAOB\ Deficiency_{i,t}$, an indicator variable equal to one for bank *i* in year *t* after the year of release of the inspection report in which its auditor received an OTD audit deficiency. Panel A of Table 2 shows how this variable is coded in our sample. Taking banks audited by Deloitte as an example, *PCAOB Deficiency* equals one beginning in 2005, the release year of the inspection report that identifies the deficiency. We then test whether the inspection outcome influences the banks' OTD lending growth from 2005 to 2006, 2006 to 2007, and 2007 to 2008, compared with the growth from 2002 to 2003, 2003 to 2004, and 2004 to 2005. We predict a negative coefficient on $PCAOB\ Deficiency_{i,t}$ in Equation (1) if banks curtail their OTD activities following increased auditor scrutiny of their OTD accounting after the inspection.

We consider the effect of PCAOB deficiencies starting after the inspection report is released because prior studies find that the strongest audit firm-wide effects of PCAOB inspections typically occur after the release of the inspection report, specifically during the remediation period, which takes place within 12 months of the release of the inspection report (e.g., DeFond and Lennox, 2017; Aobdia and Shroff, 2017; Aobdia, 2018; 2020; Shroff, 2020). Therefore, we initially do not assess OTD lending growth for the inspection or report years for which the OTD audit deficiency is identified (for banks audited by Deloitte, this would correspond to OTD growth from 2003 to 2004 and 2004 to 2005). It is unlikely that the real effect would occur immediately after an inspection given that changes in OTD audits and lending subsequent to the inspection often take

[19] For example, during 2004–2007 in a county, Bank A extends $10 million of OTD loans every year, Bank B extends $10 million OTD loans in 2004 and that amount drops annually by half during 2005–2007 (i.e., $5 million, $2.5 million, and $1.25 million), and Bank C extends $10 million OTD loans in 2004 and 2005 and $2.5 million in 2006 and 2007. Let's assume Banks B and C are treated at the beginning of 2006 and take the natural log of the OTD lending. The *OTD Growth* is 0 (−0.693 = ln(0.5)) throughout 2005–2007 for Bank A (B). For Bank C, *OTD Growth* is 0, -1.386 (=ln(2.5)-ln(10)), and 0 for 2005, 2006, and 2007, respectively. Under the level specification, the difference-in-differences (DD) between Banks A and B is −2.77 (= {[ln(2.5) + ln(1.25)] − [ln(10) + ln(5)]} − {[ln(10) + ln(10)] − [ln(10) + ln(10)]}), the same as the DD between Banks A and C (−2.77 = {[ln(2.5) + ln(2.5)] − [ln(10) + ln(10)]} − {[ln(10) + ln(10)] − [ln(10) + ln(10)]}). Clearly, we cannot attribute the former estimate to the treatment, whereas we can do so for the latter. Under the growth specification where there is only one year (2005) in the pre-period, the DD between Banks A and B is 0 (= [0.5 × (-0.693 − 0.693) − (−0.693)] − [(0 + 0) − 0]), whereas the DD between Banks A and C is −0.693 (= [0.5 × (0–1.386) − 0] − [(0 + 0) − 0]).

Table 2
Auditors and inspections with deficiencies in OTD audits.

		2002	2003	2004	2005	2006	2007
Panel A Auditors with Deficient OTD Audits							
Treated	Deloitte	0	0	0	1	1	1
	PwC	0	0	0	1	1	1
	KPMG	0	0	1	1	1	1
Control	E&Y	0	0	0	0	0	0

	# Bank-year			# Bank-county-year		
	Treated	Control	Total	Treated	Control	Total
Panel B Sample Distribution by Calendar Year						
2002	23	9	32	10,633	1960	12,593
2003	25	14	39	6725	4338	11,063
2004	23	13	36	3159	3897	7056
2005	23	13	36	6611	4661	11,272
2006	18	11	29	6390	4575	10,965
2007	19	11	30	8549	4808	13,357
Total	131	71	202	42,067	24,239	66,306

Panel A of this table presents the coding of the main explanatory variable of interest, *PCAOB Deficiency*, which equals one after the report release year of a PCAOB inspection where a deficiency in the audit of financial reports regarding OTD transactions is identified. Panel B presents a breakdown of the sample by calendar-year. Treated banks are audited by Deloitte, KPMG, and PwC, and Control banks are audited by Ernst &Young.

some time. Nevertheless, in additional analyses, we trace the timing of the effect of PCAOB inspections that identified OTD audit deficiencies.[20]

Panel B of Table 2 shows the sample distribution by year for treated and control banks. The numbers of bank-years and bank-county-years in the control group are sizable, indicating that banks audited by Ernst & Young capture a considerable market share and thus serve as an adequate control group. The sample is also reasonably stable over time, both in terms of bank-years and bank-county-years, but tends to be larger (smaller) for the treatment (control) group in 2002. We assess the sensitivity of our analyses by eliminating 2002 from the sample in supplemental analyses and find robust results (see Section 4.5).

Because bank-specific characteristics could influence a bank's change in OTD lending, our specifications incorporate several bank-level controls. Following prior studies (e.g., Dagher and Kazimov, 2015; Gilje et al., 2016; Xie, 2016), we control for the following variables in the regressions: *Ln(Total Assets)*, the natural logarithm of the bank's total assets; the proportion of nonperforming loans, *NPL*, equal to nonperforming loans scaled by lagged total loans; *RG Sec.*, realized gains and losses from available-for-sale and held-to-maturity securities scaled by lagged total assets; *Ret. Vol.*, return volatility defined as the idiosyncratic standard deviation of the monthly stock returns over the past 12 months; *Charge Off*, the total loan charge-offs scaled by the lagged total loans; *Loan Mortgage*, total residential mortgage loans scaled by total assets; *Loan Consumer*, consumer loans scaled by total assets; *Loan Foreign*, loans to foreign governments and official institutions scaled by total assets; *Tier 1*, the tier 1 capital ratio; *ICMW*, the presence of internal control material weaknesses; and *Earnings before Gains on Loan Sale and Sec*, earnings before gains on loan sales and securitizations scaled by the lagged book value of equity, following Dechow et al. (2010).

We also control for loan and applicant characteristics measured at the bank-county-year level. Specifically, we include *% Sold*, the proportion of originated loans that are sold or securitized; *Loan-to-income*, the average loan-to-income ratio; *Male*, the proportion of male loan applicants; *Black* and *White*, the proportions of African American and Caucasian loan applicants, respectively; and *%Refinance*, the proportion of loans for refinancing. All the control variables are lagged by one year (i.e., measured in year *t*) to avoid mechanical relations. Detailed variable definitions are in Appendix C.[21]

Our research design also incorporates two important features. First, we add county-year fixed effects to capture shocks to local demand for mortgages. In other words, we compare changes in OTD lending growth within the same county-year across banks influenced disparately by PCAOB inspection outcomes. Second, we include auditor-fixed effects to control for time-invariant attributes of each auditor. Thus, our empirical specification constitutes a generalized difference-in-differences design (Angrist and Pischke, 2009). Our design is comparable with the empirical strategies employed in Boone et al. (2015), Drake et al. (2016), and DeFond and Lennox (2017). All of them exploit shocks at the auditor level and consider the client-level implications of this shock.

[20] Inspectors share comment forms (the precursor of PCAOB inspection deficiencies) with the auditor shortly after the completion of the field work, and this might increase auditors' scrutiny. Hence, a reduction in *OTD Growth* one year after the inspection might occur. Alternatively, if, in line with prior research, auditors become more vigilant only after the official release of the inspection report, which typically takes place one year after the inspection field work, the reduction in *OTD Growth* should manifest two years subsequent to the inspection year, which is 2005–2006 for banks audited by Deloitte.

[21] We do not include the loan-to-value ratio because the total value of the property is unavailable in the HMDA database. Nevertheless, we merge the annual House Price Index from the Federal Housing Finance Agency with the HMDA database at the county-level and construct a proxy for the annual loan-to-value ratio as the total dollar amount of OTD loans originated in a county by a bank scaled by the House Price Index in that county (*Loan-to-Value*). Controlling for this variable does not alter our subsequent inferences.

Table 3
Descriptive statistics.

Variable	Mean	Std Dev	25th Pctl	50th Pctl	75th Pctl
Panel A Bank characteristics (N = 202 bank-year observations)					
Ln(Total Assets)	16.622	2.015	15.413	16.610	17.816
NPL	0.010	0.008	0.005	0.008	0.012
RG Sec.	0.000	0.001	0.000	0.000	0.001
Ret. Vol.	0.054	0.028	0.034	0.046	0.066
Charge Off	−0.001	0.002	−0.001	0.000	0.000
Loan Mortgage	0.090	0.058	0.052	0.075	0.114
Loan Consumer	0.060	0.041	0.025	0.058	0.088
Loan Foreign	0.000	0.001	0.000	0.000	0.000
Tier 1	0.107	0.031	0.085	0.098	0.117
ICMW	0.045	0.207	0.000	0.000	0.000
Gains on Loan Sale and Sec	0.043	0.093	0.006	0.018	0.043
Earnings before Gains on Loan Sale and Sec	0.100	0.109	0.064	0.117	0.154

Variable	Mean	Std Dev	25th Pctl	50th Pctl	75th Pctl
Panel B Loan and applicant characteristics (*N* = 66,306 bank-county-year observations)					
OTD Growth	0.008	0.963	−0.562	0.000	0.565
%Sold	0.727	0.277	0.500	0.800	1.000
Loan-to-Income	2.021	1.421	1.587	1.972	2.373
Male	0.573	0.280	0.400	0.611	0.756
Black	0.039	0.108	0.000	0.000	0.022
White	0.673	0.301	0.500	0.750	0.933
%Refinance	0.509	0.280	0.333	0.500	0.700

Variables	Treated Banks		Control Banks		Difference (*t*-stat.)
	Mean	Std Dev	Mean	Std Dev	
Panel C Summary statistics for treated and control banks in 2002					
Bank characteristics					
Ln(Total Assets)	16.892	1.922	16.332	1.826	0.560
					(0.79)
NPL	0.014	0.009	0.014	0.018	−0.000
					(−0.06)
RG Sec.	0.001	0.001	0.000	0.001	0.001*
					(1.89)
Ret. Vol.	0.055	0.018	0.058	0.031	−0.003
					(−0.30)
Charge Off	−0.001	0.001	−0.003	0.005	0.002
					(1.44)
Loan Mortgage	0.085	0.065	0.104	0.061	−0.020
					(−0.82)
Loan Consumer	0.065	0.038	0.079	0.040	−0.014
					(−0.97)
Loan Foreign	0.000	0.001	0.000	0.000	0.000*
					(1.71)
Tier 1	0.105	0.023	0.096	0.017	0.008
					(1.03)
Gains on Loan Sale and Sec	0.000	0.000	0.000	0.000	0.000
					(0.85)
Earnings before Gains on Loan Sale and Sec	0.080	0.178	0.051	0.054	0.029
					(−0.06)
Loan and applicant characteristics					
OTD Growth	0.336	6.668	0.184	3.842	−0.153
					(−0.53)
%Sold	0.640	4.119	0.731	3.342	−0.091
					(−0.84)
Loan-to-Income	1.787	4.518	1.925	2.613	−0.137
					(−1.21)
Male	0.586	3.230	0.539	3.545	0.047
					(0.85)
Black	0.033	0.311	0.041	0.263	−0.008
					(−1.14)
White	0.637	3.879	0.599	3.869	0.038
					(−0.60)
%Refinance	0.635	2.969	0.644	0.984	−0.009
					(−0.44)

This table presents descriptive statistics for all the variables that are used in the regressions. Panel A presents descriptive statistics of bank characteristics based on 202 bank-year observations. Panel B presents descriptive statistics of loan and applicant characteristics based on 66,306 bank-county-year observations. Panel C presents the descriptive statistics for treated and control banks in the first year of the sample period (i.e., 2002), before OTD audit deficiencies are uncovered. See Appendix C for detailed variable definitions. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

Table 4
Inspections with OTD audit deficiencies and OTD lending growth.

Variables	(1)
	OTD Growth
PCAOB Deficiency	−0.156*
	(−1.803)
Ln(Total Assets)	0.052*
	(1.816)
NPL	−17.935
	(−1.539)
RG Sec.	−83.353**
	(−2.569)
Ret. Vol.	−4.573*
	(−1.973)
Charge Off	−24.072
	(−0.673)
Loan Mortgage	0.336
	(0.440)
Loan Consumer	−0.224
	(−0.201)
Loan Foreign	31.798
	(1.529)
Tier 1	0.802
	(0.306)
ICMW	0.477
	(1.505)
Earnings before Gains on Loan Sale and Sec	−0.243
	(−0.368)
%Sold	−0.447***
	(−6.269)
Loan-to-Income	−0.053***
	(−2.702)
Male	−0.101*
	(−1.904)
Black	0.095
	(0.785)
White	−0.018
	(−0.257)
%Refinance	−0.001
	(−0.016)
Observations	66,306
R-squared	0.164
Auditor-Fixed Effects	Yes
Year-County Fixed Effects	Yes
Clustered by	Bank

This table presents the regression results of Equation (1), where the change in the log of OTD loan amounts is regressed on an indicator variable equal to one for the years since the PCAOB reports OTD audit deficiencies. The coefficient is presented above the *t*-statistic, which is in parentheses. See Appendix C for variable definitions. The standard errors are clustered at the bank level. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

4.2. Descriptive statistics

Panel A of Table 3 reports descriptive statistics of bank characteristics based on 202 bank-year observations, while Panel B presents descriptive statistics of loan and applicant characteristics based on the 66,306 bank-county-year observations. An average bank has assets of $17 billion.[22] Thus, our sample is composed of large banks, which is unsurprising since small banks do not significantly engage in OTD lending (Chen et al., 2008). The proportion of nonperforming loans during the period was low, at 1%, consistent with high expectations during the housing bubble and limited defaults during the period. For an average bank, mortgage loans account for 9% of total assets, while consumer loans represent 6% of total assets. About 4.5% of bank-years disclose internal control material weaknesses.

Panel B indicates that the average OTD growth in the sample is 0.8%, which corresponds to increased OTD activity from 2002 to 2007. On average, 73% of the mortgage loans are sold or securitized, consistent with active OTD lending during the

[22] This number is computed as $e^{16.622}$, rounded to the nearest billion.

Table 5
Dynamic effects of inspections with OTD audit deficiencies.

Variables	(1)
	OTD Growth
PCAOB Deficiency$_{[+2+]}$	−0.062
	(−0.297)
PCAOB Deficiency$_{[+2]}$	−0.075
	(−0.680)
PCAOB Deficiency$_{[+1]}$	−0.393**
	(−2.420)
PCAOB Deficiency$_{[0]}$	−0.026
	(−0.176)
PCAOB Deficiency$_{[-2]}$	−0.023
	(−0.130)
Observations	66,306
R-squared	0.167
Controls	Yes
Auditor-Fixed Effects	Yes
Year-County Fixed Effects	Yes
Clustered by	Bank

This table extends the analysis of Table 4 to the years immediately preceding and following the PCAOB reporting OTD audit deficiencies. *PCAOB Deficiency*$_{[0]}$ is an indicator variable equal to one for the year when the PCAOB releases its report that identifies OTD audit deficiencies. *PCAOB Deficiency*$_{[+1]}$, *PCAOB Deficiency*$_{[+2]}$, and *PCAOB Deficiency*$_{[+2+]}$ are indicator variables equal to one for the first year after, the second year after, and the remaining years after the PCAOB releases its report that identifies OTD audit deficiencies, respectively. *PCAOB Deficiency*$_{[-2]}$ is an indicator variable equal to one for two years before the PCAOB releases its report that identifies OTD audit deficiencies. In these specifications, the year immediately prior to the year of release of the PCAOB inspection report (t-1) serves as the benchmark year. All control variables from Table 4 are included but not tabulated, for brevity. The coefficient is presented above the t-statistic, which is in parentheses. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

boom period. The average loan-to-income ratio is 2. Of the mortgage applicants, 57% are males, 4% are African American, and 67% are Caucasians. About half of the loans are for refinancing, consistent with the refinancing boom before the financial crisis (Khandani et al., 2013).

Panel C presents the summary statistics for the first year of our sample for treated and control banks to determine whether systematic differences exist between these two types of banks prior to the first inspection period (i.e., June 2003 to December 2003 for KPMG). The two groups of banks are statistically indistinguishable in bank characteristics and in loan and applicant attributes, except for *RG Sec.* and *Loan Foreign*. Compared with control banks, treated banks have more realized gains from available-for-sale and held-to-maturity securities, and more foreign loans. We do not include *ICMW,* since none of our sample banks disclose internal control material weaknesses in 2002. We include all the variables in subsequent regression analyses to control for remaining heterogeneity between these two groups of banks.

4.3. Primary results

Table 4 presents the results from the estimation of Equation (1). The coefficient on *PCAOB Deficiency* is negative and significant at the 10% level. The estimated coefficient is −0.156, which implies that the clients of auditors with OTD audit deficiencies exhibit a 14% reduction in their OTD lending growth relative to the clients of auditors without such deficiencies.[23] This result is consistent with our primary Hypothesis that banks curtail their OTD activities following the PCAOB criticisms of their auditor.

Regarding control variables, we find that larger banks exhibit higher OTD growth, consistent with larger banks being involved in OTD lending during our sample period (Chen et al., 2008). Banks with more realized gains from available-for-sale and held-to-maturity securities experience lower growth in OTD lending. This is consistent with these banks having a lower need to record gains on loan sales and securitizations. Banks with a higher proportion of loans being sold exhibit less OTD

[23] Because our dependent variable is the change in the natural logarithm in mortgage securitizations, the percentage change can be computed as $e^{(-0.156)} - 1 = -14\%$.

Table 6
Effects of inspections with OTD audit deficiencies by auditor.

Variables	(1)
	OTD Growth
PCAOB Deficiency$_{Deloitte}$	−0.336**
	(−2.522)
PCAOB Deficiency$_{KPMG}$	−0.124
	(−0.805)
PCAOB Deficiency$_{PwC}$	−0.102
	(−0.861)
Observations	66,306
R-squared	0.164
P-value of *PCAOB Deficiency*$_{Deloitte}$ = *PCAOB Deficiency*$_{KPMG}$	0.317
P-value of *PCAOB Deficiency*$_{Deloitte}$ = *PCAOB Deficiency*$_{PwC}$	0.096
P-value of *PCAOB Deficiency*$_{KPMG}$ = *PCAOB Deficiency*$_{PwC}$	0.918
Controls	Yes
Auditor FE	Yes
Year-County FE	Yes
Clustered by	Bank

This table extends the analysis of Table 4 to each auditor that receives OTD audit deficiencies. *PCAOB Deficiency*$_{Deloitte}$, *PCAOB Deficiency*$_{KPMG}$, and *PCAOB Deficiency*$_{PwC}$ are indicator variables equal to one for the years since the PCAOB reports OTD audit deficiencies at Deloitte, KPMG, and PwC, respectively. Three *F*-tests below the table assess whether each one of these coefficients is significantly different from another. All control variables from Table 4 are included but not tabulated, for brevity. The coefficient is presented above the *t*-statistic, which is in parentheses. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

growth in the following year. The coefficient on *ICMW* is insignificant, indicating that we fail to find a reduction in OTD lending growth following the disclosure of internal control material weaknesses.[24]

A key assumption underlying our empirical strategy is that the treated and control banks would have exhibited parallel trends in OTD lending growth in the absence of the inspections that identified OTD audit deficiencies. We assess the validity of this parallel-trends assumption by tracing the timing of OTD growth (e.g., Christensen et al., 2017). We replace *PCAOB Deficiency* in Equation (1) with five indicator variables for the years around the disclosure of OTD-related audit deficiencies in the PCAOB inspection report. Specifically, the five indicators equal one for two years before (*PCAOB Deficiency*$_{[-2]}$), the year of (*PCAOB Deficiency*$_{[0]}$), the first year after (*PCAOB Deficiency*$_{[+1]}$), the second year after (*PCAOB Deficiency*$_{[+2]}$), and the remaining years after (*PCAOB Deficiency*$_{[+2+]}$) the inspection report. The year prior to the release of the report (that is *PCAOB Deficiency*$_{[-1]}$) serves as the benchmark period and cannot be included as it is not identified. If OTD lending activities of treated and control banks evolve similarly before the PCAOB inspections that identify OTD audit deficiencies, we expect that *PCAOB Deficiency*$_{[-2]}$ does not load in the regressions. In addition, because of the evidence in DeFond and Lennox (2017), Aobdia and Shroff (2017), and Shroff (2020) that it takes time for the effect of PCAOB inspections to materialize, we expect that *PCAOB Deficiency*$_{[0]}$ does not load. Nevertheless, if auditors and their clients react immediately after they receive a comment form from the PCAOB and before the publication of the official PCAOB inspection reports, then *PCAOB Deficiency*$_{[0]}$ would load negatively in the regression. If auditors react to the deficiencies identified by the PCAOB following the release of the inspection report and their clients reduce OTD lending accordingly, then we expect *PCAOB Deficiency*$_{[+1]}$ to load negatively.

Table 5 presents the results of this analysis. Consistent with our expectations, *PCAOB Deficiency*$_{[-2]}$ and *PCAOB Deficiency*$_{[0]}$ do not load in the regression (two-tailed p-value > 0.1). This result suggests that prior to the release of the PCAOB reports with deficiencies, OTD growth trends are parallel, which provides comfort regarding the validity of the parallel-trends assumption. We also find that *PCAOB Deficiency*$_{[+1]}$ loads negatively (two-tailed p-value < 0.01), whereas neither *PCAOB Deficiency*$_{[+2]}$ nor *PCAOB Deficiency*$_{[+2+]}$ loads (two-tailed p-value > 0.1). Thus, auditors are made aware of OTD audit deficiencies at the time of release of the inspection report, and increase their scrutiny during the remediation period, which leads to clients' reductions in OTD lending. This timing is consistent with prior studies about the audit firm-wide effects of PCAOB inspections. As our dependent variable is the growth in OTD lending, the insignificant coefficients on *PCAOB Deficiency*$_{[+2]}$ and *PCAOB Deficiency*$_{[+2+]}$ imply that the changes after the inspections do not reverse and thus are permanent. We graphically present these results in Fig. 2. Overall, these results enhance confidence that our

[24] Lim et al. (2018) find that banks reduce loan approval rates after the disclosure of internal control material weaknesses as the remediation improves loan-loss estimation processes. The estimation of loan-loss provisions applies to loans held on the book as opposed to OTD loans. After reading the disclosures, we find that only one bank's internal control weakness is related to OTD transactions. As such, it is unsurprising that *ICMW* does not influence the growth in OTD loans.

Table 7
Cross-sectional tests.

Variables	*OTD Growth*		
	(1) High-risk management index		(2) Low risk-management index
Panel A Partition by bank management's understanding of risks.			
PCAOB Deficiency	−0.156		−0.447**
	(-0.649)		(−2.067)
Observations	26,914		29,218
R-squared	0.238		0.308
P-value of diff. in *PCAOB Deficiency*		0.067	
Controls	Yes		Yes
Auditor FE	Yes		Yes
Year-County FE	Yes		Yes
Clustered by	Bank		Bank
	OTD Growth		
Variables	(1) High earnings before gains on loan sales and securitizations		(2) Low earnings before gains on loan sales and securitizations
Panel B Partition by incentives to manage earnings			
PCAOB Deficiency	−0.021		−0.295**
	(-0.175)		(−2.188)
Observations	27,351		38,955
R-squared	0.223		0.231
P-value of diff. in *PCAOB Deficiency*		0.005	
Controls	Yes		Yes
Auditor FE	Yes		Yes
Year-County FE	Yes		Yes
Clustered by	Bank		Bank

This table extends the analysis of Table 4 by partitioning the sample into two halves. In Panel A, we split the sample based on whether the bank-county-year observation has below- or above-median risk-management index. In Panel B, we split the sample based on whether the bank-county-year observation has below- or above-median earnings management incentives measured by the earnings before gains on loan sales and securitizations. An *F*-test below the table assesses whether the coefficients on *PCAOB Deficiency* are significantly different from each other. All control variables from Table 4 are included but not tabulated, for brevity. The coefficient is presented above the *t*-statistic, which is in parentheses. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

inferences are driven by PCAOB inspection outcomes and not by other explanations, such as divergent trends in OTD growth prior to the inspections.

As the nature of the Part I Findings is different for each of the three audit firms that receive OTD audit deficiencies, we consider the effects of PCAOB inspections separately for each one. We replace *PCAOB Deficiency* in Equation (1) with three indicator variables: *PCAOB Deficiency*$_{Deloitte}$, *PCAOB Deficiency*$_{KPMG}$, and *PCAOB Deficiency*$_{PwC}$ for the post-PCAOB deficiency years for Deloitte, KPMG, and PwC, respectively.

Table 6 reports the results. We find a negative coefficient on *PCAOB Deficiency*$_{Deloitte}$, significant at the 5% level. This is likely because the Part I Finding identified at Deloitte led to a material restatement at the client. In contrast, *PCAOB Deficiency*$_{KPMG}$ does not load (two-tailed p-value > 0.1), which is not too surprising considering that the Part I Findings at KPMG, despite departures from GAAP, are immaterial. Nevertheless, an *F*-test reported below the table indicates that these two coefficients are not significantly different from each other (two-tailed p-value = 0.317).

We also observe an insignificant coefficient on *PCAOB Deficiency*$_{PwC}$ (two-tailed p-value > 0.1). Two *F*-tests confirm that the coefficient on *PCAOB Deficiency*$_{PwC}$ is significantly smaller than *PCAOB Deficiency*$_{Deloitte}$ (two-tailed p-value = 0.096) and insignificantly smaller than *PCAOB Deficiency*$_{KPMG}$ (two-tailed p-value = 0.918). The results on PwC are consistent with our expectations for two reasons. First, the Part I Finding does not appear to be too severe. Second, the nature of the Part I Finding is less related to mortgage lending than others in our sample. Therefore, it is plausible that post-PCAOB deficiency, PwC did not take an audit firm-wide action to increase its scrutiny of OTD accounting.

4.4. Cross-sectional tests

Next, we explore the cross-sectional variation in two factors that underlie the reduction in OTD growth. First, we use Ellul and Yerramilli (2013) risk-management index to capture the strength and independence of the bank's risk-management function. Banks with a low index score do not appreciate risks well and thus can learn more about the risks of OTD lending from better-audited financial reports. We expect a larger reduction in OTD growth for these banks post-PCAOB deficiency. We partition the sample based on the median of this variable. As shown in Table 7 Panel A, *PCAOB Deficiency* loads significantly negatively for banks with low (i.e., below the median) risk-management indices (two-tailed p-

Table 8
Robustness tests.

Variables	(1)	(2)	(3)
	Big 4 and Tier 2 Auditors	Restricted to banks that do not switch auditor	Exclude 2002
Panel A Alternative Samples			
PCAOB Deficiency	−0.154*	−0.236**	−0.233**
	(−1.793)	(−2.312)	(−2.480)
Observations	66,798	51,454	53,713
R-squared	0.164	0.207	0.154
Controls	Yes	Yes	Yes
Auditor FE	Yes	Yes	Yes
Year-County FE	Yes	Yes	Yes
Clustered by	Bank	Bank	Bank

Variables	(1)	(2)	(3)	(4)
	$\%Sold_{t+1}$	*Retained Growth*	First-Differenced Indep. Variables	Growth in the Number of OTD Loans
Panel B Alternative Specifications				
PCAOB Deficiency	−0.113*	−0.073	−0.363**	−0.215**
	(−1.820)	(−0.463)	(−2.412)	(−2.130)
Observations	121,049	38,915	64,907	66,306
R-squared	0.393	0.259	0.154	0.186
Controls	Yes	Yes	Yes	Yes
Auditor FE	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	Yes	Yes
Clustered by	Bank	Bank	Bank	Bank

Variables	(1)	(2)
	Private OTD Growth	GSE OTD Growth
Panel C Additional Dependent Variables		
PCAOB Deficiency	−0.405**	0.193
	(−2.248)	(1.510)
Observations	21,013	35,325
R-squared	0.277	0.245
Controls	Yes	Yes
Auditor FE	Yes	Yes
Year-County FE	Yes	Yes
Clustered by	Bank	Bank

This table presents several robustness tests of the results in Table 4. In Panel A, we focus on alternative samples. In column (1), we include banks audited by the Tier-two auditors. In column (2), we restrict the sample to banks that are audited by the same auditor during the sample period. In column (3), we exclude 2002 from the sample. Panel B focuses on alternative specifications. In column (1), we use *%Sold*, the proportion of loans that are sold or securitized, as the dependent variable. In column (2) we carry out a placebo test by using *Retained Growth*, the growth of mortgage loans retained on the book, as an alternate dependent variable. In column (3) we take the first-difference of all independent variables instead of using their levels as in Table 4. In column (4) we use the growth in the number of OTD loans instead of their amount used in Table 4. In Panel C, we focus on additional dependent variables. In columns (1) and (2) we partition OTD growth into private OTD growth and government-sponsored enterprise (GSE) OTD growth, respectively. All control variables from Table 4 are included but not tabulated, for brevity. The coefficient is presented above the *t*-statistic, which is in parentheses. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

value < 0.05), but does not load for banks with high (i.e., above the median) risk-management indices (two-tailed *p*-value > 0.1). The difference in the coefficient on *PCAOB Deficiency* across the two subsamples is statistically significant (two-tailed *p*-value = 0.067). These results suggest that the improved audit of OTD accounting helps banks with poor risk management better understand risks of OTD lending.

Second, we examine whether banks with stronger incentives to inflate earnings through gains on loan sales and securitizations experience a larger reduction in OTD growth after the PCAOB criticisms. Following Dechow et al. (2010), we use earnings before gains on loan sales and securitizations to capture such incentives, as when this variable is low, "managers likely face greater scrutiny from investors and regulators, are less likely to receive bonuses and options, and will have more trouble attracting employees and customers" (Dechow et al., 2010, 3). We partition the sample based on the median of this

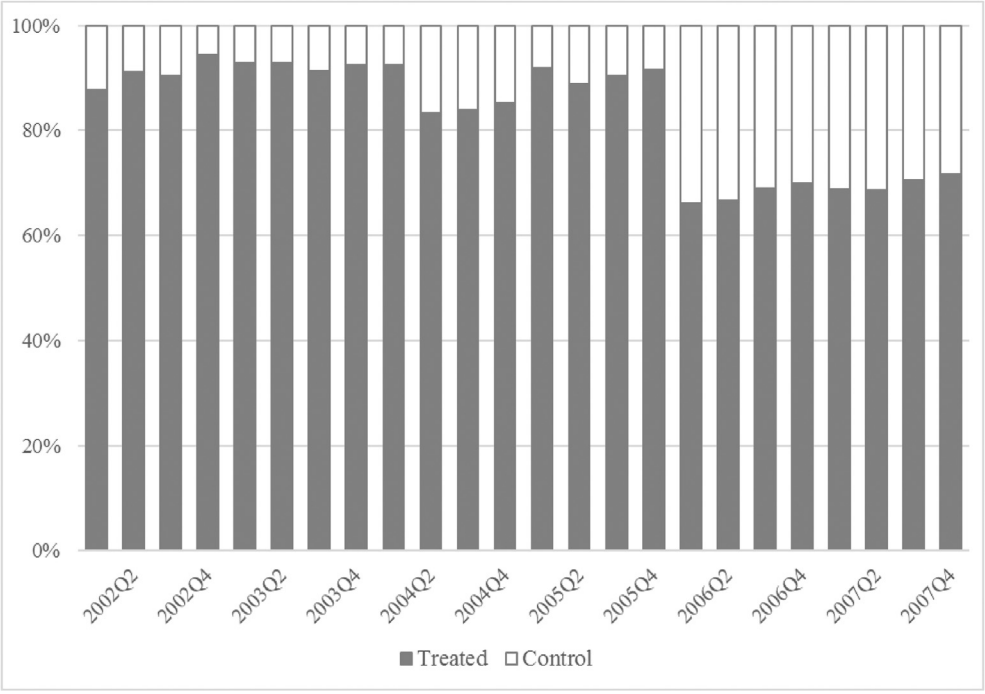


Fig. 3. Market Share in Outstanding OTD Mortgage Loans. This figure shows the market share in outstanding OTD mortgage loans of treated and control banks in the sample using quarterly bank regulatory Y–9C filings. The treated banks are clients audited by PwC, Deloitte, and KPMG. The control banks are clients audited by Ernst & Young.

variable.[25] As shown in Table 7 Panel B, *PCAOB Deficiency* loads significantly negatively for banks with low (i.e., below median) earnings before gains on loan sales and securitizations (two-tailed p-value < 0.05) but does not load for other banks (two-tailed p-value > 0.1). The difference in the coefficient on *PCAOB Deficiency* across the two subsamples is statistically significant (two-tailed p-value $= 0.005$). These results suggest that better auditing of OTD accounting limits the accounting discretion used by banks to conceal the risks of OTD lending.

4.5. Additional analyses

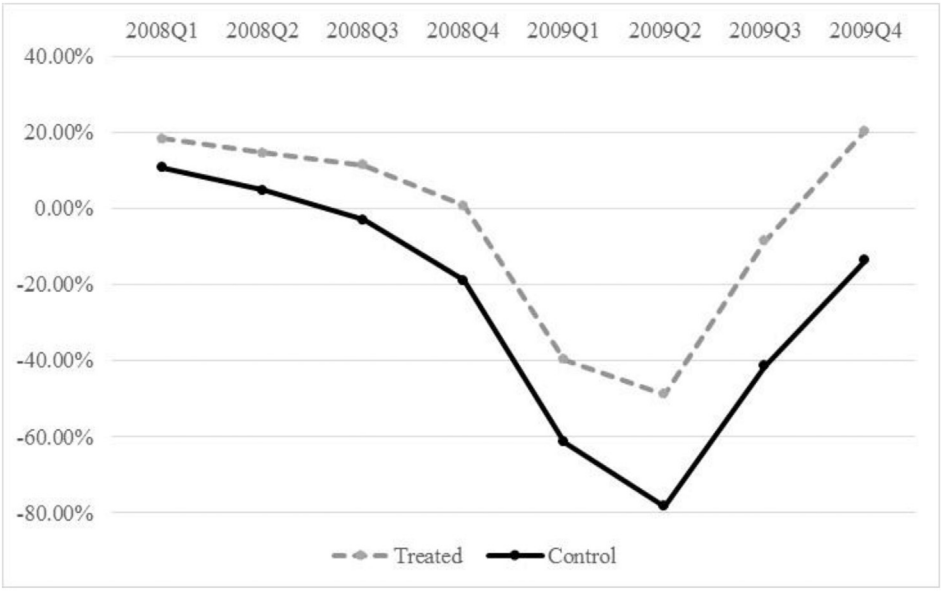
We conduct multiple robustness tests. First, we assess the sensitivity of our results to alternative samples, and report the results in Panel A of Table 8. We add to the sample banks audited by the four tier-two auditors (BDO, Grant Thornton, Crowe Chizek, and McGladrey & Pullen) and re-estimate Equation (1). The sample size does not increase materially when we include these auditors, likely because they audit small or medium-sized banks that typically do not engage in sizable OTD lending. As shown in column (1) of Table 8 Panel A, *PCAOB Deficiency* continues to load (two-tailed p-value < 0.1).

We also focus on the stability of the sample in columns (2) and (3). We restrict the sample to banks that do not switch auditors during our sample period and find robust results in column (2). In addition, as reported in Panel B of Table 2, the sample distribution between treated and control samples differs in 2002, relative to other years. To ensure that our results are not affected by changes in the sample distribution, we eliminate 2002 from the sample and continue to find robust results in column (3).

Second, we assess the sensitivity of the results to alternative specifications. We change the dependent variable to *%Sold*, measured in year $t+1$, the proportion of originated loans that are sold or securitized. About 73% of the originated loans are sold or securitized during our sample period (see Panel B of Table 3). As shown in column (1) of Panel B in Table 8, *%Sold* declines following the PCAOB identifying OTD deficiencies at the auditor.[26]

[25] Splitting the sample allows the coefficients on control variables to vary across the partitions. Indeed, we find that the coefficients on 11 (12) out of 17 control variables differs at the 10% level or better across the two subsamples in Panel A (B). The coefficients on the 17 control variables also jointly differ across the two subsamples at the 1% level in both panels. Nevertheless, we also estimate an expanded Equation (1) that includes an indicator set to one for banks with low risk-management indices (low earnings before gains on loan sales and securitizations), and zero otherwise, and an interaction between *PCAOB Deficiency* and this indicator, using the full sample. The interaction loads significantly negatively for the low risk-management index indicator but, while directionally consistent, does not load for the low earnings before gains on loan sales and securitizations indicator.

[26] The sample is larger since we do not need two consecutive years of observations for a bank within a county to calculate *OTD Growth*.



Cumulative size-adjusted returns	2008 Q1	2008 Q2	2008 Q3	2008 Q4	2009 Q1	2009 Q2	2009 Q3	2009 Q4
Treated	18.30%	14.70%	11.40%	0.76%	-39.79%	-48.89%	-8.61%	20.46%
Control	10.70%	4.90%	-2.95%	-18.88%	-61.30%	-78.30%	-41.47%	-13.58%
Difference	7.60%	9.80%	14.35%	19.64%	21.51%	29.41%	32.86%	34.04%
(*t*-stat.)	(0.96)	(0.97)	(1.44)	(1.63)	(1.76)*	(2.02)*	(2.16)**	(2.19)**

Fig. 4. Bank performance during the financial crisis. This figure presents the buy-and-hold size-adjusted returns from the beginning of 2008Q1 to each subsequent quarter end during the financial crisis of treated banks (audited by Deloitte, KPMG, and PwC), and control banks (audited by E&Y). The *t*-statistics assess whether these returns are significantly different from each other.

The decline in $\%Sold_{t+1}$ can be driven by either a decrease in OTD mortgages or an increase in mortgages originated and retained on the book. To further rule out the latter, we conduct an additional analysis with *Retained Growth*, the growth in mortgages that are originated and retained on the book, as the dependent variable. We report the results in column (2) of Panel B in Table 8. The coefficient on *PCAOB Deficiency* does not load, suggesting that the reduction in $\%Sold_{t+1}$ results from fewer OTD loans as opposed to more originations of loans that are retained on the book. This test also helps to rule out two alternative interpretations for our primary results using *OTD Growth* as the dependent variable. (1) Holding the number of originated loans constant, the reduction in *OTD Growth* is unlikely explained by a change in mix between retained and sold loans due to fewer opportunities to sell or securitize loans. Otherwise, we should observe a significant positive relation between *Retained Growth* and *PCAOB Deficiency*. (2) The reduction in *OTD Growth* is unlikely explained by omitted bank-level variables, such as bank-wide tightening of credit standards. Otherwise, we should observe a significant negative relation between *Retained Growth* and *PCAOB Deficiency*.

We explore the sensitivity of our results to additional specifications, such as using first-differenced explanatory variables instead of levels as in Table 4, and find robust results (two-tailed p-value < 0.05) in column (3). We also replace the dependent variable *OTD Growth*, which is based on the total amount of loans originated and sold or securitized, with the growth in the number of OTD loans, and continue to find robust results, as shown in column (4).

We next break down the dependent variable *OTD Growth* into the growth in loans that are originated and sold to government-sponsored entities (*GSE OTD Growth*) and others (*Private OTD Growth*). We find in column (1) of Panel C in Table 8, that *PCAOB Deficiency* loads negatively (two-tailed p-value < 0.01) for *Private OTD Growth* but does not load in column (2) for *GSE OTD Growth*. This evidence suggests that the disciplinary effects take place among more "toxic" loans.

We also use the bank-level data in Y−9C filings to triangulate our primary finding. In the filings, each bank reports the amount of unpaid principal balance of home mortgages that it has sold as of the end of each quarter. We aggregate the amounts for the treated and control groups and compute their respective market share. Fig. 3 shows a drop in the market share of the treated group in 2006Q1, consistent with a reduction in OTD lending after the release of PCAOB inspection reports.

While the results imply that auditors and the PCAOB could have done more to curb the proliferation of OTD lending prior to 2008, the implications of our findings for the magnitude or severity of the financial crisis are probably unknowable. Nevertheless, in an exploratory analysis, we calculate buy-and-hold size-adjusted stock returns from the beginning of 2008Q1

Table 9
Inspections with OTD audit deficiencies and gains on loan sales and securitizations.

Variables	(1)
	Gains on Loan Sale and Sec
PCAOB Deficiency	−0.030**
	(−2.029)
Ln(Total Assets)	0.002
	(0.680)
NPL	0.645
	(0.841)
RG Sec.	−0.040
	(−0.011)
Ret. Vol.	−0.388
	(−1.270)
Charge Off	1.838
	(0.409)
Loan Mortgage	0.157
	(1.332)
Loan Consumer	−0.102
	(−0.845)
Loan Foreign	−10.636*
	(−1.965)
Tier 1	−0.178
	(−0.813)
ICMW	0.024
	(1.368)
Earnings before Gains on Loan Sale and Sec	−0.702***
	(−3.849)
%Sold	−0.020
	(−0.748)
Loan-to-Income	0.003
	(0.203)
Male	0.061
	(1.073)
Black	−0.006
	(−0.036)
White	−0.103**
	(−2.210)
%Refinance	0.059
	(1.141)
Observations	202
R-squared	0.753
Auditor FE	Yes
Year FE	Yes
Clustered by	Bank

This table presents the regression results of Equation (2), where gains on securitization and loan sales are regressed on an indicator variable equal to one for the years since the PCAOB reports OTD audit deficiencies. The coefficient is presented above the *t*-statistic, which is in parentheses. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% levels, respectively.

to each subsequent quarter end of our sample banks during the financial crisis period (2008Q1-2009Q4). Fig. 4 reports the results. We find that the treated banks (audited by Deloitte, KPMG, and PwC) performed significantly better than control banks (audited by E&Y) from the beginning of 2008Q1 to each quarter end of 2009 (two-tailed p-value <0.1). We interpret this result as consistent with the reduction in OTD lending mitigating some of the effects of the financial crisis. Nevertheless, this is a simple cross-sectional univariate comparison (rather than a generalized difference-in-differences specification as in our primary analyses). Readers should interpret it with caution as other reasons could explain these results.

4.6. PCAOB inspections and gains on loan sales and securitizations

Our Hypothesis relies on the premise that the inspections finding OTD audit deficiencies pressure auditors to curb deliberate or unintentional misapplications of accounting rules for OTD lending. Such a premise is consistent with Drake et al. (2016), DeFond and Lennox (2017), Aobdia (2018, 2020), and Hanlon and Shroff (2020), who find archival and survey evidence that PCAOB deficiencies change auditor behavior, leading to improvements in audit quality. To confirm this idea in our setting, we test whether banks, as clients of the auditors receiving OTD audit deficiencies, report lower gains on loan sales and securitizations. Following Dechow et al. (2010), we estimate the following model using observations at the bank-year level:

$$Gains\ on\ Loan\ Sale\ and\ Sec_{i,t} = \beta \times PCAOB\ Deficiency_{i,t} + \gamma \times Bank\ Controls_{i,t} + Auditor\ FE_i + Year\ FE_t + \varepsilon_{i,t} \quad (2)$$

where the subscripts *i* and *t* correspond to banks and years, respectively.

Our dependent variable, *Gains on Loan Sale and Sec*, is equal to the sum of gains on loan sales and securitizations, scaled by the lagged book value of equity. The explanatory variable of interest is *PCAOB Deficiency*, defined previously. We predict a negative coefficient on *PCAOB Deficiency* if PCAOB inspections result in a reduction in gains on loan sales and securitizations for banks with auditors with PCAOB deficiencies.

We also incorporate a vector of control variables to control for other elements that may influence the gains on loan sales and securitizations. Following Dechow et al. (2010), we control for *Earnings before Gains on and Loan Sale and Sec*, earnings before gains or losses on loan sales and securitizations, scaled by the lagged book value of equity. We expect this variable to load negatively since Dechow et al. (2010) find that discretionary securitization gains are larger in corporations with low pre-securitization income. We also include all control variables used in the primary analyses.[27] Following DeFond and Lennox (2017), we incorporate auditor- and year-fixed effects. Standard errors are clustered at the bank level.

Table 9 presents the results. Consistent with our expectations, we find that *PCAOB Deficiency* loads negatively (two-tailed p-value < 0.05). This result suggests that banks audited by KPMG, Deloitte, and PwC experience a decrease in gains on loan sales and securitizations following PCAOB criticisms of their auditors. We also find that *Earnings before Gains on Loan Sale and Sec* loads negatively (two-tailed p-value < 0.01), consistent with Dechow et al. (2010). As we have a small number of observations that limits our ability to provide many corroborating tests, we urge caution in interpreting this result.

5. Conclusion

In this study, we investigate whether PCAOB inspections that identify audit deficiencies related to accounting for the OTD model of lending influence such lending. We find that banks curb their OTD lending activities after the PCAOB criticizes their auditor on audits of OTD accounting. Our results are stronger when the PCAOB criticisms are more severe, when banks can learn more about the risks of OTD lending from better-audited financial reports, when banks have more incentive to inflate earnings through gains on loan sales and securitizations, and when the loans are not sold to government-sponsored entities and are arguably more "toxic." We also find evidence of lower reported gains on loan sales and securitizations following the inspections.

Our results are consistent with public audit oversight influencing OTD lending by promoting more vigilant audits of the financial reports of originators. However, we cannot completely rule out that after the release of PCAOB inspection reports or public restatements, the banks of auditors with OTD deficiencies become more vigilant with their OTD accounting. Regardless of the channel, our inferences that client behavior is ultimately influenced by the outcome of PCAOB inspections remain unchanged.

Overall, our evidence shows a real economic effect in the United States of PCAOB inspections that identify OTD audit deficiencies and suggests a link between lax auditing practices in 2002–2007 and the financial crisis of 2008. Our study extends a growing line of studies that examine the role of PCAOB inspections on audit quality and auditor market share and suggests that audit regulators take a more proactive role in regulating financial markets after they identify legitimate issues. As such, PCAOB inspections, by adopting a more proactive approach, may have the capability to moderate financial meltdowns when accounting and auditing issues are involved.

Appendix A. OTD-related audit deficiencies in PCAOB reports

Auditor Name	PCAOB report	OTD-related audit deficiencies
KPMG	2003 Inspection (June 2003–December 2003) Report released on August 26, 2004	(6) One issuer did not include loan origination fees and costs in its calculation of gains and losses on mortgage loans sold. The staff concluded that the failure to do so was inconsistent with SFAS 91, *Accounting for Nonrefundable Fees and Costs Associated with Originating or Acquiring Loans and Initial Direct Costs of Leases* ("SFAS 91"), and would affect the comparability of the issuer's financial results with those of its peers. KPMG initially resisted this conclusion but, after further consideration, acknowledged that to be consistent with the intent of SFAS 91, the unamortized portion of deferred loan origination fees and costs should be recognized upon the sale of the related loan and included as a component of the gain or loss on sale of loans in the income statement. (8) An issuer improperly included in "loan administration" income the gains on sales of certain loans. KPMG agreed with the staff's conclusion that the gains should instead be classified as part of the issuer's overall gains on sales of loans.

(*continued on next page*)

[27] For this specification, all loan characteristics are averaged at the bank-year level instead of the bank-county-year level.

(*continued*)

Auditor Name	PCAOB report	OTD-related audit deficiencies
		(9) An issuer failed to classify as part of the gain on the sale of loans certain direct loan origination fees and costs that were related to successful mortgage loan originations. In the staff's view, under SFAS 91, the direct loan origination fees and costs should have been classified as part of the issuer's investment in the loans until sold, and, once the loans were sold, the unamortized portion of deferred fees and costs should have been included in the gain on sale of loans. The failure to properly classify these items would affect the comparability of the issuer's financial results to those of its peers.
Deloitte	2004 Inspection (May 2004–November 2004) Report released on October 6, 2005	Issuer A The issuer is a wholly-owned subsidiary of another issuer (the "Parent"). Two days before the anticipated date of the issuer's filing of the Firm's audit report with the SEC, the issuer informed the Firm that the recorded value of its interest-only strip assets ("I/Os") and the related interest income were overstated. At the time that the issuer told the Firm of the overstatement, the issuer changed the assumptions it used to calculate the gains for three securitization transactions completed during the fiscal year (two of which had been previously reported in interim filings with the SEC and the third was included in the entire year's financial results that were disclosed in an earnings release), resulting in additional gains on those transactions and offsetting the correction of the income overstatement on its I/Os and interest income. As a result, the issuer's net income for the year, which had previously been disclosed in the earnings release, remained unchanged. The Firm devoted less than two days to completing audit procedures related to these issues, and allowed the issuer to proceed with the revised accounting for the securitization transactions. The Firm told the inspection team that adjustments for two of the transactions represented corrections of errors caused by the issuer's use of erroneous assumptions, but the Firm's work papers included no indication that those assumptions had been erroneous.[7/] In addition, formal communications from both the Firm and the issuer to the audit committee of the issuer's Parent did not characterize the adjustments as error corrections, nor were these adjustments disclosed as corrections of errors in the financial statements filed by the issuer. During the inspection fieldwork, the issuer informed the Firm that a portion of the error in interest income had previously been corrected and, therefore, a portion of the year-end adjustment the issuer had already recorded was not necessary.[8/] In addition, the work papers failed to evidence that the Firm evaluated whether the issuer accounted for the I/Os at fair value and the accounting policy disclosure in the financial statements did not indicate whether the I/Os were accounted for at fair value after securitization. Moreover, the financial statements did not disclose certain information regarding key assumptions used to measure the fair value of the I/Os retained at the balance sheet date, as required by Statement of Financial Accounting Standards ("SFAS") No. 140, *Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities*, and the Firm should have identified and addressed the issuer's failure to disclose the required information. [7/]The Firm had previously audited one of these transactions during the fiscal year 2002 financial statement audit in connection with a "subsequent events" disclosure regarding a transaction completed in the first quarter of fiscal 2003. [8/]The issuer has restated certain of it financial statements to make changes relating to each of the matters described here. The Board inspection process did not include any review of any additional audit work or the restated financial statements.
PwC	2004 Inspection (May 2004–January 2005) Report released on November 17, 2005	Issuer DD The issuer executed a securitization arrangement under which it sold its investment in bonds to an investment broker who transferred the bonds into a qualified special purpose entity. In assessing whether this transfer qualified as a sale under SFAS No. 140, Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities, the Firm inappropriately relied on a legal opinion that was addressed to the investment broker and that described the transaction from the perspective of the investment broker.

Appendix B. Accounting treatment for OTD-related audit deficiencies in PCAOB reports

This appendix provides additional accounting details about two major accounting malpractices and audit failures related to the originate-to-distribute model. These issues are reflected in the OTD audit deficiencies identified by the PCAOB for KPMG and Deloitte in Appendix A.

First, deferred fees and costs associated with loan origination are not properly considered in loan sale transactions. SFAS 91 mandates that banks defer loan origination fees and certain direct loan origination costs and then amortize over the life of the related loan. Any unamortized portion of deferred loan origination costs (fees) is recognized when the related loan is sold, decreasing (increasing) the gains from the transaction.

In a hypothetical numerical example below, on January 1, 2004, a bank originated a five-year loan of $1000 and incurred costs associated with the loan origination of $10. These costs are not expensed at this time and instead deferred.[28] One year later, the bank amortized one-fifth of the deferred costs.

Loan Origination (January 1, 2004)		
Loan	1000	
Deferred Costs	10	
Cash		1010
Amortization (12/31/2004)		
Loan Expense	2	
Deferred Costs		2

Instead of retaining the loan over its entire life, the bank decided to sell the loan. The bank received $1200 and removed $1000 from the balance sheet for the loan but mistakenly left the unamortized deferred costs on their balance sheet, resulting in the gain on loan sale of $200. The auditor of the bank failed to correct this inaccurate accounting practice. Assume that PCAOB inspectors identified the mistake and commented that the unamortized deferred costs of $8 should be included in the calculation of the gain on loan sale. The error led to an overstatement of the gain on loan sale by $8.

Loan Sale (January 1, 2005; bank/auditor's perspective)		
Cash	1200	
Loan		1000
Gain		200

Loan Sale (January 1, 2005; PCAOB inspectors' perspective)		
Cash	1200	
Loan		1000
Deferred Fees and Costs		8
Gain		192

Second, to increase securitization gains, banks often use optimistic assumptions to inflate the fair value of their retained interest (e.g., interest-only strips) in securitization. For example, assume a portfolio of loans is securitized, the carrying value of the loans is $1000, securities backed by these loans are sold for $950 cash, and securities with an estimated fair value of $250 are retained by the bank. The fair value of the loans is the proceeds plus the fair value of the retained interest (i.e., $1200 = $950 + $250). The percentage of the fair value of the loans that is attributable to the retained interest is 21% = $250/$1200. Reflecting this percentage, the portion of the carrying value of the loans allocated to the retained securities is $210 = $1000 × 21%. The gain is the $950 proceeds plus the $210 allocated to the retained interest minus the $1000 carrying value, or $160. Because estimating the fair value of retained interest is inherently complicated and subjective by nature, banks often use optimistic assumptions to inflate this fair value. Auditors should express professional skepticism about how the valuation varies with different assumptions, but they often fail to refute managerial claims about the fair value.

Securitization (bank/auditor's perspective)		
Cash	950	
Retained Interest	210	
Loan		1000
Gain		160

Assume that, following PCAOB-inspector criticisms, the auditor identifies that the estimated fair value of retained interest is overstated by $100. Now the fair value of the loans is the proceeds plus the corrected fair value of the retained interest (i.e., $1100 = $950 + $150). The percentage of the fair value of the loans that is attributable to the retained interest is 13.6% = $150/$1100. Reflecting this percentage, the portion of the carrying value of the loans allocated to the retained securities is

[28] We do not consider deferred loan origination fees in this example. Deferred loan origination fees are treated as deferred revenue and recognized ratably over the lifetime of the loan, unless the loan is sold, in which case the revenue recognition is accelerated at the time of sale.

$136 = $1000 × 13.6%. The securitization gain is the $950 proceeds plus the $136 allocated to the retained interest minus the $1000 carrying value, or $86. Compared with the above journal entry, the bank recognizes $74 less gain from the transaction.

Securitization (PCAOB inspector's perspective)		
Cash	950	
Retained Interest	136	
Loan		1000
Gain		86

Appendix C. Variable definitions

Variable		Definition
OTD Growth	=	The natural logarithm of the amount of loans that are originated in a county and sold or securitized by a bank in the current year minus the same variable in the previous year.
Ln(Total Assets)	=	The natural logarithm of total assets [Log (bhck2170)].
NPL	=	Nonperforming loans scaled by lagged total loans [(bhck5525 + bhck5526)/lagged bhck2122].
RG Sec.	=	Realized gains and losses from available-for-sale and held-to-maturity securities scaled by lagged total assets [(bhck3196 + bhck3521)/lagged bhck2170].
Ret. Vol.	=	Return volatility defined as the idiosyncratic standard deviation of the monthly stock returns over the past 12 months.
Charge Off	=	Loan charge-offs scaled by the lagged total loans [(bhck5411 + bhckc234 + bhckc235 + bhck3588)/lagged bhck2122].
Loan Mortgage	=	Mortgage loans scaled by total assets [(bhdm1797 + bhdm5367 + bhdm5368 + bhdm1460)/ bhck2170].
Loan Consumer	=	Consumer loans scaled by total assets [(bhckb538 + bhckb539 +bhck 2011)/bhck2170].
Loan Foreign	=	Loans to foreign governments and official institutions scaled by total assets [bhck2081/ bhck2170]
Tier 1	=	Tier 1 capital ratio [bhck7206/100].
ICMW	=	An indicator variable equal to one for banks with internal control material weaknesses in that year, and zero otherwise.
Gains on Loan Sale and Sec	=	The sum of gains on loan sales and securitizations scaled by lagged book value of equity [(bhckb492 + bhckb493 + bhck8560)/lagged bhck3210].
Earnings before Gains on Loan Sale and Sec	=	Earnings before the sum of gains on loan sales and securitizations scaled by the lagged book value of equity [(bhck4340 - bhckb492 - bhckb493 - bhck8560)/lagged bhck3210].
%Sold	=	The proportion of originated loans that are sold or securitized, measured at the bank-county-year level.
Loan-to-Income	=	The application amount scaled by the applicant's income, averaged to the bank-county-year level.
Male	=	The proportion of male loan applicants, measured at the bank-county-year level.
Black	=	The proportion of African American loan applicants, measured at the bank-county-year level.
White	=	The proportion of Caucasian loan applicants, measured at the bank-county-year level.
%Refinance	=	The proportion of loans refinanced, measured at the bank-county-year level.

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