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THE DEATH OF A REGULATOR:  
STRICT SUPERVISION, BANK LENDING AND BUSINESS ACTIVITY

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**ABSTRACT**

An important question in banking is how strict supervision affects bank lending and in turn local business activity. Supervisors forcing banks to recognize losses could choke off lending and amplify local economic woes. But stricter supervision could also change how banks assess and manage loans. Estimating such effects is challenging. We exploit the extinction of the thrift regulator (OTS) to analyze economic links between strict supervision, bank lending and business activity. We first show that the OTS replacement indeed resulted in stricter supervision of former OTS banks. Next, we analyze the ensuing lending effects. We show that former OTS banks increase small business lending by roughly 10 percent. This increase is concentrated in well-capitalized banks, those more affected by the new regime, and cannot be fully explained by a reallocation from mortgage to small business lending after the crisis. These findings suggest that stricter supervision operates not only through capital but can also correct deficiencies in bank management and lending practices, leading to more lending and a reallocation of loans.

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# 1 Introduction

A recurring story line in banking crises is the public backlash against bank supervisors for their failure to take prompt and decisive action to unearth and correct problems of weak banks. These allegations often play an important role in justifying policy interventions that overhaul the regulatory oversight of the banking system, including tighter rules and stricter monitoring of financial institutions (e.g., Financial Institutions Reform, Recovery, and Enforcement Act of 1989; Dodd-Frank Act of 2010). Despite the importance of such interventions, we have limited evidence on the economic trade-offs associated with reforms that aim to limit regulatory forbearance and promote stricter bank supervision.

In this paper, we study a reform of the U.S. banking system that forced a large number of banks to transition from a more lenient to a stricter supervisor. A stricter regulatory stance with respect to loss recognition could put pressure on banks' balance sheets, and in turn, force them to cut lending (e.g., [Agarwal, Lucca, Seru, and Trebbi \(2014\)](#)). But the transition to a stricter supervisor could also prompt banks to correct deficiencies in other key areas of bank management, such as loan risk ratings, stress testing, risk and loan portfolio management, leading to improvements in banks' lending practices and possibly to increases in lending. Thus, the economic consequences of stricter supervision, particularly for credit supply, are worth studying, but typically difficult to identify, especially when supervisory changes follow crises.

Effective July 2011, Title III of Dodd Frank abolished the Office of Thrift Supervision (OTS) and transferred its powers to other regulators, i.e., the Office of the Comptroller of the Currency (OCC) and the Federal Deposit Insurance Corporation (FDIC). This regulatory change was prompted in part by a well-founded perception that lax prudential supervision by the OTS played a significant role in the demises of Washington Mutual, IndyMac, and Countrywide.<sup>1</sup> The extinction of the OTS was a major change in prudential supervision in the US banking system, affecting roughly 10% of all depository institutions with 8.5% of all U.S. deposits. It applied to banks across a wide spectrum of capital and liquidity levels, operating in different geographies.

The extinction of the OTS is a unique opportunity to examine how bank supervision shapes local access to credit and business activity. First, the associated changes in bank supervision are economically meaningful and their timing is well defined. Second, in this setting, it is possible to distinguish the effects of stricter supervision from local economic shocks that also affect the performance of banks and local business activity because former OTS banks operate in geographies in which competing banks have other supervisors. Third,

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<sup>1</sup>See [Committee on Homeland Security and Governmental Affairs \(2011\)](#) for details on the turf war between FDIC and OTS and evidence on the regulatory failure and leniency of the OTS.

the transition is externally imposed on all thrifts, irrespective of their financial condition. Moreover, we show that charter switches before and after the OTS extinction are rare and do not influence our analysis. However, the setting also comes with challenges. The biggest one is that the residential mortgage market was the epicenter of the financial crisis, and this market represents the key area of lending for thrifts. Thus, it is important to control for crisis-induced changes in lending markets and business models, which hit thrifts especially hard.

We begin our analysis by validating that the replacement of the OTS by the OCC and FDIC in 2011 indeed implied (relatively) stricter supervision.<sup>2</sup> We show that, after the transition, former OTS banks experience significant changes in loan classifications, loss provisioning, and loss recognition, which are areas of scrutiny in any supervisory exam. Former OTS banks are also more likely to receive enforcement actions following the regulatory transition. Our findings show that loan loss provisions, charge-offs, and nonperforming loan ratios of former OTS banks exhibit sharp “on-impact” increases following the OTS extinction, relative to control banks without changes in supervision. These sharp increases for several measures are indicative that the supervisory change prompted former OTS banks to recognize losses and problem loans. For instance, the ratio of nonperforming loans increases by approximately 0.4 percentage points for former OTS banks upon transition, which represents roughly 30% of the average ratio of nonperforming loans for all depository institutions.

Next, we analyze the economic effects of stricter bank supervision on lending. Forcing thrifts to increase loan loss provisions and recognize problem loans could induce them to de-lever to conserve capital, which likely hurts lending and could create a credit crunch. This is the capital channel shown in prior work (e.g., [Caballero, Hoshi, and Kashyap, 2008](#)). However, a more rigorous supervisory approach could also question thrifts’ existing practices, prompting them to improve their lending and risk management systems, implement stress testing, and adopt alternative or more diversified lending strategies.<sup>3</sup> Such changes, prompted by stricter supervision, could lead to more lending (e.g. [Hirtle, Kovner, and Plosser, 2018](#)) but also a reallocation of lending toward areas that require better screening and monitoring capabilities. In the end, it is an empirical question, which channel dominates and hence whether stricter supervision hurts or boosts lending and local business activity.

We examine this empirical question using the Community Reinvestment Act (CRA) small

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<sup>2</sup>To be clear, we do not claim that the OCC and FDIC are flawless, but rather that, on average, they enforce the same banking regulations more strictly than the OTS. On this point, see also the Online Appendix of [Agarwal et al. \(2014\)](#) for evidence that the OTS performs relatively worse than other regulators.

<sup>3</sup>A SageWorks poll of former OTS bankers ([SageWorks, 2013](#)) shows that over 50 percent of responding bankers indicated that they had to strengthen their risk rating system as a result of feedback from OCC examiners, 38 percent indicated that they had to implement stress testing, and 25 percent indicated that they had to diversify their lending portfolios. We provide further evidence on such changes in Section 7.2.

business lending data set, which contains information on new small business loans originated by each reporting banks in each U.S. county during a year. This data set is especially well suited to study how the OTS extinction shaped bank lending because its reporting guidelines did not change over time, thus, providing consistent and fairly granular information on new loans originated both before and after the transition. Furthermore, small business loans are a substantial fraction of the commercial and industrial lending portfolio of commercial banks and thrifts representing, on average, more than 50% of all commercial and industrial (C&I) loans in the balance sheets of banks.

We show that former OTS banks increase the total amount of small business loans originations by roughly 10% relative to the period prior to the OTS extinction. We obtain this result after the inclusion of county-by-year fixed effects and bank-by-county fixed effects. Thus, the lending effect is not driven by former OTS banks being located in counties with better economic conditions (and higher loan demand) but instead implies an increase in the supply of small business loans by former OTS banks relative to the supply of other banks operating in the same county and year. We show that these effects occur right after the extinction of the OTS and that they are unlikely to be driven by systematic differences in the location of former OTS banks *within* a county. Furthermore, we rule out a number of other potential explanations for our main results, namely that our results are driven by: (i) business model differences between former OTS banks and control banks; (ii) differences in the frequency of mergers and acquisitions; (iii) other regulatory changes included in the Dodd-Frank Act. Importantly, we also conduct a battery of tests to show that our results are not explained by a pull-back of other banks, notably the Top-4 banks, given the evidence in [Chen, Hanson, and Stein \(2017\)](#).

Having established that former OTS banks increase their small business lending following the extinction of the OTS, we proceed to examine the economic channels that explain this increase in lending. By the time of this regulatory transition most former OTS banks had already weathered the 2008–2009 financial crisis and were, at least on average, well-capitalized. Thus, unlike other settings where such interventions coincide with systemic financial distress, the OTS setting provides significant variation in the capitalization of former OTS banks prior the supervisory change. This feature enables us to differentiate effects by bank capitalization and observe the effects of OTS extinction when the capital channel is less likely to be the dominant force. Consistent with this reasoning, we find that the positive lending effect of stricter supervision is concentrated in former OTS banks with above-average capitalization ratios prior to the OTS extinction. Thrifts with below-average capital ratios exhibit a decline in their small business lending, consistent with a capital crunch.

The fact that many former OTS banks had sufficient loss-absorbing capacity to deal with

a sudden increase in loss recognition explains why we do not observe a credit crunch for well-capitalized banks, but it does not necessarily imply that these banks increase lending following the OTS extinction. One potential explanation that we put forth is that thrifts experienced significant shake-ups in internal bank management practices that resolved lingering deficiencies and culminated in a greater ability to extend credits, especially in the area of small business lending where borrowers are typically hard to evaluate.

To examine this conjecture, we start by establishing that the regulatory transition was indeed associated with significant changes in banks' internal management practices. We first provide descriptive evidence from regulatory documents and 10-Ks, showing that immediately following the regulatory transition, the OCC demanded significant improvements in multiple areas of bank management for former OTS banks. Such improvements included, but were not limited to, better loan and collateral documentation, new risk rating systems and early problem loan identification, and even went as far as forcing the board to ensure competent management. Further, we provide differences-in-differences analyses documenting that former OTS banks saw abnormally high executive and board turnover and were more likely to adopt formal risk modeling following the OTS extinction.

Next, we use these findings and show that increases in commercial lending around the OTS extinction were more pronounced in former OTS banks that underwent significant changes in internal management practices. In particular, we show that increases in small business lending are concentrated in former OTS banks that (i) show above-median board turnover following the regulatory transition; (ii) replace executive directors following the transition; and (iii) adopt formal risk modeling after the OTS extinction. This collection of results is consistent with the explanation that stricter supervision triggered broad changes and improvements in the internal management practices of former OTS banks, which in turn increased their supply of small business loans.

Another (and not mutually exclusive) conjecture is that the OCC and FDIC were accustomed to a different portfolio mix and saw the high concentration of former OTS banks in residential loans with concern. The OCC and FDIC could, therefore, have pushed former OTS banks to reduce their exposures to residential lending and to diversify towards commercial lending. To explore this conjecture, we first analyze the mortgage originations of former OTS banks. We find a broader trend away from residential lending for these banks after the financial crisis. In addition, former OTS banks reduce their origination of mortgage loans following the regulatory transition. The latter reduction is consistent with a supervisor-induced shift in lending strategies away from residential lending and toward commercial lending. To drill deeper, we exploit the idea that some local OCC field offices had greater experience supervising commercial banks with larger concentrations of residential loans. These local

OCC field offices are arguably more familiar or comfortable with the business models of former OTS banks and hence less likely to steer them away from mortgages toward commercial lending. We find that the increase in small business lending after the supervisory transition is indeed less pronounced in jurisdictions where the OCC field offices oversee commercial banks with significant concentrations in residential lending.

Given we find evidence consistent with a portfolio reallocation in the direction of supervisor preferences, we explore whether a supervisor-induced change away from residential lending for former OTS banks can account for most or all of the increase in small business lending documented earlier. Towards this end, we include variables for the level of *residential* lending as well as changes in the supply of *mortgages* in the small business lending analyses around the OTS extinction. The idea is to see if the OTS effect on business lending is substantially attenuated in the presence of these variables. The results indicate that the main coefficients are not attenuated when we include a battery of different indicators of bank supply of mortgages in the main empirical specification. We interpret these results as suggesting that a reallocation from mortgage to small business lending after the crisis cannot fully explain the main results. Thus, it appears that there are two supervisory effects coming out of the OTS extinction.

Our paper is most closely related to the findings in [Agarwal et al. \(2014\)](#). They exploit the mandatory rotation of the federal and state regulators in the on-site supervision of state-chartered banks and find that the institutional design and incentives of bank regulators affect the supervisory assessments and banks' corrective actions. However, in this setting, it is difficult to observe how changes in regulatory strictness shape bank lending and economic outcomes over a longer horizon as the supervision by the stricter federal regulators is, by construction, short-lived. We contribute to this line of research by examining the effects of strict supervision on lending and business activity around a regulatory change.

More broadly, we contribute to a large literature that analyzes the impact of bank regulators on lending (e.g. [Eisenbach, Lucca, and Townsend, 2017](#); [Hirtle et al., 2018](#); [Kandrac and Schlusche, 2018](#); [Altavilla, Boucinha, Peydró, and Smets, 2020](#)) and their role in facilitating regulatory forbearance ([Kroszner and Strahan, 1996](#); [Brown and Dinç, 2005](#); [Brown and Dinç, 2011](#); [Costello, Granja, and Weber, 2016](#); [Lucca, Seru, and Trebbi, 2014](#); [Bonfim, Cerqueiro, Degryse, and Ongena, 2016](#)). Our work is also related to papers that examine how evergreening affects the allocation of capital in an economy (e.g. [Caballero et al., 2008](#); [Bian, Haselmann, Kick, and Vig, 2017](#)). We examine the economic consequences of a well-defined change in the strictness of bank supervision. The novel message of our paper is that stricter supervisors can induce changes in bank management that increase bank lending suggesting that its economic effects go beyond the capital channel.

Finally, our paper contributes to the emerging literature on the economic effects of the

Dodd-Frank Act. Examining the effects of Dodd Frank has been challenging because its provisions are often difficult to isolate from one another as well as concurrent macroeconomic changes. We follow a recent stream of literature (e.g., [Dimitrov, Palia, and Tang, 2015](#); [Buchak, Matvos, Piskorski, and Seru, 2018a](#); [Buchak, Matvos, Piskorski, and Seru, 2018b](#); [Cortés, Demyanyk, Li, Loutskina, and Strahan, 2019](#)) that exploits granular datasets as well as pre-determined variation in banks' exposure of different geographic regions to overcome these challenges. In doing so, we provide novel evidence on the economic consequences of a key element of the Dodd-Frank Act, i.e., the provisions in Title III that eliminated the OTS.<sup>4</sup>

## 2 Institutional Setting

Savings and Savings & Loans banks, also called thrifts, specialize in supplying residential mortgages to U.S. consumers. These banks are required by their charter to invest 65 percent of their asset portfolio in qualified thrift investments, which include residential real-estate loans, home-equity loans, mortgage-backed securities, credit card, and small business loans. In return for these restrictions, these banks enjoyed favorable regulatory treatment that included privileged access to financing through the Federal Home Loan Banks, preemption of state law, and unlimited interstate branching.

The Savings & Loans (S&L) crisis in the 1980s and early 1990s hit the thrift industry hard and was blamed, in part, on lenient supervision (e.g., [Kane, 1989](#)). The OTS was created in the aftermath of the S&L crisis to replace the Federal Home Loan Bank Board (FHLBB) as the primary regulator of the thrift industry. Initially, the OTS was perceived as strict, cracking down on insolvent thrifts that had been left unscathed by the FHLBB ([Wayne, 1992](#)).

Over the next decades, however, sweeping industry and regulatory changes undermined the competitive advantages of the thrift charter. Federal thrifts were the first financial institutions entitled to open new branches across state borders and benefited from the preemption of state law pursuant to the Depression-era Home Owners' Loan Act (HOLA). The passage of the Riegle-Neal Act of 1994 eroded this regulatory advantage, giving the Office of the Comptroller of the Currency (OCC) the power to adopt preemption rules for national banks. In 1995, several unsuccessful bills proposed to abolish the OTS and to consolidate the regulation for thrifts and commercial banks, arguing that the thrift charter had become obsolete ([MacDonald, Schwartz, and Day, 2011](#)). The Treasury Department's 2008 blueprint for a modernized

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<sup>4</sup>In studying how supervision affects loan loss provisioning, our paper is also related to studies on the timeliness of loan loss provisioning and its economic effects (e.g., [Beatty and Liao, 2011](#); [Bushman and Williams, 2012](#); [Bhat, Ryan, and Vyas, 2018](#)). Further, the paper relates to the broader literature on enforcement of financial regulation (e.g., [La Porta, Lopez-de Silanes, and Shleifer, 2006](#); [Jackson and Roe, 2009](#); [Christensen, Hail, and Leuz, 2016](#).)



financial regulatory structure also recognized that the thrift charter no longer had a special role in providing residential mortgage loans to US consumers. The business models of commercial banks and thrifts had converged substantially and the commercial banks' share of the U.S. residential mortgage market surpassed that of the thrifts. As a result, the blue print concluded that the thrift charter had lost its *raison d'être* and recommended phasing it out.

Consistent with these developments, the number of thrifts regulated by the OTS declined from 1,628 in 1994 to 815 in 2007. Between 1998 and 2010, 120 thrifts converted to commercial banks whereas only 43 commercial banks converted to a thrift charter (MacDonald et al., 2011). These trends resulted in a decline in the share of depository institutions regulated by the OTS from 12.5% in 1994 to less than 9.5% in the wake of the 2008 financial crisis. At the same time as its share of the regulatory market declined, the OTS became increasingly associated with initiatives that promoted the reduction of regulations and "red tape." This pro-industry stance is epitomized in its five-year strategic plan released in 2007, which stated that the "OTS listens to, learns from, and collaborates with the institutions it regulates and the public it serves on how best to address their needs."

The failures of two large OTS-regulated entities, Washington Mutual and IndyMac Federal Savings Bank during the 2008–2009 financial crisis occurred against this backdrop of greater regulatory competition and perceived regulatory leniency by the OTS.<sup>5</sup> These failed banks jointly represented approximately 3.2% of all US branch deposits and are two of the largest bank failures ever. Countrywide Financial, which changed its charter in 2006 to be supervised by the OTS, was forced to merge with Bank of America to avoid failure (Appelbaum and Nakashima, 2008a). Following the public and media backlash against the OTS due to its failure to properly supervise these institutions (Appelbaum and Nakashima, 2008b), President Obama asked Congress to fold the OTS into the OCC.

Subsequently, Title III of the Dodd-Frank Act of 2010 stipulated the closure of the OTS and the transfer of OTS powers and duties to the Federal Reserve, OCC, and FDIC. The transfer of functions occurred on July 21, 2011, one year after the passage of the Dodd-Frank Act. Under the Act, the OCC and FDIC acquired supervisory and rulemaking authority over federally-chartered thrifts and state-chartered thrifts, respectively. In total, 649 federal thrifts automatically transitioned to the OCC, whereas 59 state-chartered thrifts transitioned to the FDIC on July 21st, 2011.<sup>6</sup> The Dodd-Frank Act included other provisions that could

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<sup>5</sup>There is significant evidence of regulatory leniency by the OTS. For example, the Office of the Inspector General found that the OTS not only authorized but also directed the backdating of capital contributions from holding companies at IndyMac and BankUnited, thereby allowing these thrifts to stay above the "well-capitalized" threshold (Office of Inspector General, 2009).

<sup>6</sup>These numbers result from our computations based on Summary of Deposits data collected on June 30th of each year. No thrifts banks were automatically transferred to the Federal Reserve, but following the regulatory transition a small number of former OTS banks switched their charter from the OCC to the FED.

potentially affect the operations and lending portfolios of banks. For instance, it created a new regulator, the Consumer Financial Protection Bureau (CFPB), which is responsible for the area of consumer financial protection and supervises banks whose assets are above \$10 billion. It also eliminated restrictions to *de novo* interstate branching in states that had not been removed following the passage of Riegle-Neal Act. These other rules were not implemented at the same time as Title III as they were enacted at the time of the passage of Dodd-Frank into law. Nevertheless, we evaluate and report on the robustness of our results to the adoption of these other Dodd-Frank provisions in the [Online Appendix](#).

As [Agarwal et al. \(2014\)](#) show, there is significant variation in regulatory strictness across US regulators. Industry documents and SEC filings of many thrift holding companies suggest that the OCC supervision was perceived as relatively more demanding than OTS supervision, affecting key areas of bank and loan management. In the area of loss recognition, the OTS did not require partial or complete charge-offs for troubled loans. Charge-offs were required at foreclosure only. Thrifts were allowed to establish specific valuation allowances for estimated losses on troubled real-estate loans. By contrast, the OCC required earlier charge-off as soon as a loan was deemed uncollectible. In addition, the regulatory transition also implied significant changes in how banks determined their Allowance for Loan and Lease Losses and hence their provisioning, which in turn could have significant impact on bank profitability around the transition (e.g., [Peirce, Robinson, and Stratmann, 2014](#)). These changes made it, among other things, harder for thrifts to renew or evergreen loans. The 2012 10-K of Bank Financial, a SEC-registered thrift holding company, illustrates these changes by stating: "The OCC maintains a number of operating policies and practices that are different from the OTS, including in the areas of loan classification and the timing of charge-offs...we revised our classification of asset policies and practices to complete our transition to the OCC's loan risk rating practices. The OCC's practices will make it more difficult to renew performing classified loans...at December 31, 2011 approximately \$3.5 million of our non-accrual loan balances reflected our decision to liquidate or not renew performing classified loans."<sup>7</sup>

A potential concern is that former OTS banks responded to the stricter OCC supervisory standards by voluntarily switching charter to other regulators. We examine avoidance behavior, in [Table 1](#), which details the operating status and charter of the 708 former OTS banks

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See [Table 1](#) for more details. We check below that such switches do not influence our results.

<sup>7</sup>There are many examples of thrift holding companies discussing the transition from the OTS to the OCC in their 10-Ks, expressing more demanding requirements. For instance, the 2012 10-K of WSFS Financial Inc. states: "Lastly, in late 2011, ... we undertook a project to reduce the number of Pass grades in our loan rating system with a goal of recalibrating our loan rating classifications to current OCC and FRS standards ... This resulted in the elimination of our last Pass grade or our "pass/watch" grade. The result of this grade elimination resulted in \$67 million being reclassified to Criticized or Classified, with none going to nonaccrual status. The impact of this project contributed to an incremental \$2.1 million to the provision and allowance for loan losses in 2011."

that mandatorily transitioned from the OTS to the OCC/FDIC on July 21st, 2011. By our computation, 39 of the 649 former OTS institutions that automatically transitioned to the OCC switched to the Federal Reserve or the FDIC by June 30, 2012, and in the four years that followed the OTS extinction an additional 49 institutions decided to switch from the OCC to another primary regulator. This small flow from the OCC to the other regulators suggests that the other supervisors are perceived as similar and that regulatory shopping is unlikely to be a substantive force affecting our empirical analyses.<sup>8</sup> Table 1 further suggests that the attrition rates due to merger, failure, or closure in the OTS sample are similar to those of the sample of commercial bank, alleviating concerns about survivorship bias.

### 3 Data and Key Variables

We obtain data on the financial characteristics of all commercial banks and savings banks operating in the United States from the Quarterly Reports of Condition and Income and from the Thrift Financial Reports that banks file with the FDIC and the OTS, respectively. Financial information on savings banks prior to 2012 is obtained from the Thrift Financial Report data available for download from SNL Financial. To build consistent time-series of financial characteristics and financial ratios for thrifts, we rely on the TFR-to-Call mapping prepared by the OTS staff using the Research Information System (RIS) Data Warehouse Dictionary maintained by the FDIC.<sup>9</sup>

We collect data on all enforcement actions issued by the main federal regulators (OTS, OCC, FDIC, and FED) from their regulatory websites. We use BoardEx to obtain data on board turnover of publicly-listed banks. We follow [Bhat et al. \(2018\)](#) and conduct textual analysis of all publicly-listed banks' 10-Ks to create a proxy for whether banks employ or introduce (new) credit risk models to assist their management and lending practices.

Small business lending data for each commercial and savings bank come from the Community and Reinvestment Act (CRA) small business loans database provided by the Federal Financial Institutions Examination Council (FFIEC) pursuant to Regulations 12 parts 25, 228, 345, and 195 of the aforementioned Act. This data set contains information on the total number and volume of small business loans originated by each reporting financial institutions in each US county during a calendar year. We focus on local lending within the counties covered by each bank's branch network because as shown in [Granja, Leuz, and Rajan \(2018\)](#), lending in counties outside banks' branch networks is cyclical and volatile. Since 2005, all

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<sup>8</sup>We check and find that state-chartered thrifts transitioning to the FDIC and federal thrifts transitioning to the OCC saw similar increases in their provisioning and nonperforming loan ratios following the OTS extinction (Table OA.1).

<sup>9</sup>The document is available online at the following address: [http://www.ots.treas.gov/\\_files/4830092.pdf](http://www.ots.treas.gov/_files/4830092.pdf)

commercial and savings banks whose total assets exceed \$1 billion dollars must report this data to the FFIEC. The CRA small business lending dataset also includes aggregate information on the total number and volume of small business loans originated by all reporting institutions at the census-tract level during each calendar year, which we use in robustness analyses. We collect information on mortgage originations of banks through the Home Mortgage Disclosure Act (HMDA) data set. The HMDA provides geographic and demographic information on all mortgage applications that a bank receives over a calendar year and we use that information to study portfolio reallocation in former OTS banks.

To provide evidence on local economic effects of the OTS extinction, we use county-level data on entry and exit of establishments in a given year from the Census Bureau’s Statistics on US Businesses (SUSB) dataset. The SUSB is carried out on March 12th of each year. Following [Chen et al. \(2017\)](#), we call the entry and exit rate from March 12th of year X to March 12th of year X+1, the entry and exit rate of year X. In the context of our main analysis, we compute the entry and exit rates at the county level for all counties included in the SUSB.

## 4 Descriptive Statistics

The abolishment of the OTS affected 708 federal and state-chartered thrifts whose primary regulator as of June 30, 2011 was the Office of Thrift Supervision (Table 1). Panel A of Table 2 presents descriptive statistics for the key variables in our analyses, separately for commercial banks and former OTS banks. On average, commercial banks are substantially greater than thrifts. However, the median and the quartiles are larger for thrifts. These differences exist because the larger systemically important financial institutions organize as commercial banks, creating a substantial right skew in the size distribution of commercial banks.

The lending portfolio of former OTS banks is tilted toward residential mortgage lending, which comprises approximately 40% of their asset portfolio. This portfolio allocation suggests that former OTS banks are still influenced by their historical role in the supply of residential mortgage loans to US consumers. Commercial banks have more diversified loan portfolios with C&I loans and commercial real estate (CRE) loans accounting for 9.5% and 23% of their total assets, respectively. These loan categories account for only 3.3% and 17.2% of the total assets of thrifts. These patterns highlight important differences across two groups of banks, which we address explicitly in our empirical analyses.

In spite of the differences in the composition of the loan portfolios across commercial banks and thrifts, the average loan quality of the lending portfolios does not differ substantially across the two groups. The average nonperforming loan ratios of commercial and former OTS

banks over the sample period are 1.2% and 1.3%, respectively, and their ratios of provisions to total assets are also very similar. The capital ratios of former OTS banks are, nevertheless, substantially higher than the ratios of commercial banks. The relatively high capitalization rate of former OTS banks is an important feature of our setting and allows us to examine the effects of strict supervision through channels other than (low) capitalization.

In Panel B of Table 2, we report additional descriptive statistics for the sample of CRA-reporting banks. We see that commercial banks originate on average more small business loans than former OTS banks, which is consistent with the discussion above. The patterns in the size distribution between commercial and former OTS banks are similar in the CRA-reporting sample, although they are not as pronounced when measured in terms of total deposits and number of branches. We also compare the mean annual house-price appreciation in counties where commercial banks and former OTS banks originate loans and find that the house-price appreciation is, on average, higher for commercial banks. These statistics suggest that controlling for differences in loan demand across counties is important for our analysis.

## 5 OTS Extinction and Strict Supervision

In this section, we provide evidence that the transition from the OTS to the OCC and FDIC indeed resulted in stricter supervision of former OTS banks. We begin by examining the evolution of loan loss ratios and enforcement actions at former OTS banks. Aside from loan loss provisioning for potential losses, a key role for banking supervisors is to ensure that delinquent loans are adequately classified and that incurred loan losses are properly recognized. Thus, a sharp increase in various loan loss ratios following the OTS extinction would indicate that the new supervisors are stricter, correcting weaknesses in the loan loss accounting of former OTS banks. Moreover, when banks fail to take actions or to address deficiencies, regulators can issue formal enforcement actions forcing such banks to take corrective actions. An increase in enforcement actions issued to former OTS banks following the regulatory transition is, therefore, a direct measure that the OCC and FDIC actively and perhaps forcefully prompted changes at former OTS banks.

We begin with a simple descriptive analysis. In Figure 1, we plot the average loan loss provision and average nonperforming loan ratios of banks that were formerly regulated by the OTS and those of all other commercial banks. Throughout most of the pre-crisis years, the average provisioning ratios of commercial banks exceeded those of former OTS banks, with the exception of the provisioning effort of OTS banks during the third quarter of 2008. After the extinction of the OTS, however, there is an increase in provisioning of former OTS banks relative to that of other commercial banks. This wedge persists until the fourth quarter of

2012 and then disappears as the provisioning ratios of former OTS banks converge to those of other commercial banks. There is a similar pattern in the time series of the nonperforming loan ratios for both groups. The nonperforming loan ratio is systematically lower for former OTS banks throughout the crisis year but increases sharply with the OTS extinction and remains above that of commercial banks until the end of the sample period. These figures suggest that the loan loss recognition of former OTS banks was more lenient and then became stricter around the regulatory change.

To formally examine whether the OTS extinction is associated with stricter supervision, we estimate the following linear regression model:

$$Y_{i,t} = \beta OTS_i \times Post_t + \theta X_{i,t} + \gamma_i + \delta_t + \epsilon_{i,t} \quad (1)$$

where  $Y_{i,t}$  is the loan loss provisioning ratio, nonperforming loans ratio, charge-off ratio of bank  $i$  in quarter  $t$  or a dummy variable indicating that bank  $i$  received an enforcement action during quarter  $t$ , respectively.  $OTS$  is a dummy variable that takes the value of one if the bank was formerly regulated by the OTS and  $Post$  is a dummy variable taking the value of one following the OTS extinction in the third quarter of 2011, inclusive. As the average size and loan portfolio composition of former OTS banks and commercial banks are very different, we also include a vector  $X_{i,t}$  containing financial characteristics such as size, portfolio composition and bank capitalization. A concern is that the assets of former OTS banks have worse unobserved quality (e.g. lower collateral values) than those of other banks. We deal with this possibility by including bank fixed effects,  $\gamma_i$ , which control for time-invariant, unobserved characteristics of each bank. We also add quarter fixed effects,  $\delta_t$ , to control for changes in aggregate economic conditions, which could be correlated with the extinction of the OTS. We cluster standard errors at the level of banks' county headquarters.

Table 3 reports the results of this analysis and confirms the interpretation of Figure 1. The results indicate that the regulatory transition is associated with statistically significant increases in all loan loss accounting ratios. The loan loss provision ratios, nonperforming loan ratios, and charge-off ratios of former OTS banks increase by .018, .369, and .026 percentage points, respectively, after the OTS extinction. In every case, these magnitudes are economically meaningful and correspond to an increase between 20 and 30 percent relative to the unconditional average of the respective variable over the entire sample period. We also analyze whether the OCC and FDIC are more likely to issue enforcement actions against former OTS banks compared to the OTS prior to the regulatory transition. Columns (7) and (8) report results that once again indicate that former OTS banks faced stricter supervision following the OTS extinction. Former OTS banks become 0.2 percentage points more likely to receive an enforcement action following the OTS extinction. This increase compares with an

average quarterly rate of enforcement actions of 0.7 percent over the entire sample period. We further note that conditioning on measures of size, portfolio composition, and capitalization does not attenuate the coefficients of interest relative to the specifications that do not include any additional controls for bank characteristics. This observation suggests that it is unlikely that differences in business models between former OTS and commercial banks drive our results. We expect that the change in supervisory strictness manifests in loan loss accounting ratios starting with the first supervisory examination cycle following the OTS extinction. Towards this end, we investigate whether the OTS extinction generates a sharp “on-impact” effect on the accounting and loan loss recognition variables. To trace out the effects around the OTS extinction over time we estimate the following linear regression model:

$$Y_{i,t} = \sum_t \beta_t(OTS_i \times \delta_t) + \theta X_{i,t} + \gamma_i + \delta_t + \epsilon_{i,t} \quad (2)$$

which expands the model of equation (1) with an interaction of the OTS dummy with a set of quarter dummies that take the value of one in each quarter of the sample period.

Figure 2 plots the series of coefficients,  $\beta_t$ , and corresponding standard errors. The plots suggest that, during and after the financial crisis period, the OTS was more permissive than the regulators of commercial banks, consistent with anecdotal evidence. The provisioning ratio and especially the nonperforming loan ratios of former OTS banks were significantly below those of commercial banks with the same characteristics. These ratios experienced a sharp turnaround immediately following the OTS extinction. At that point, both the provisioning and nonperforming loan ratios see significant relative increases for thrifts. The plots also suggest that the accounting and reporting adjustments are completed around the start of 2013, when the provisioning efforts of thrifts converge to those of other commercial banks and the difference in the levels of nonperforming loan ratios across banks plateaus. This normalization around 2013 is also a first indication that the thrifts are not taking new or greater risks after the regulatory transition.

We perform a battery of robustness tests to confirm that the regulatory transition drives the documented effects. In the [Online Appendix](#), we find that the effect of the OTS extinction persists when we restrict attention to the subsamples that were exposed to areas with high and low house price declines suggesting that the effect is not confined to the subsample of banks that experienced a greater economic shock during the crisis. We also add interactions between the *Post* dummy and the financial characteristics vector,  $X$ , and find that the results and inferences remain similar. Some attenuation of the main coefficient of interest is expected if the regulatory transition also affects banks’ financial characteristics (e.g., lending composition). Thus, it is not clear that these interactions should be included in the model,

which is why we perform this test as sensitivity analysis only. We also find that the results are statistically and economically similar in the subsample of federally-chartered thrifts, which were automatically transferred to the OCC upon the OTS extinction, and in the subsample of state thrift charters, which were automatically transferred to the FDIC, again alleviating concerns that banks' charter choices influence our results.

Overall, we interpret the evidence as confirming the anecdotal evidence reported in Section 2 and as supporting the notion that the transition of former OTS banks to the OCC or the FDIC implied stricter supervision.

## 6 OTS Extinction and Bank Lending

In this section, we analyze how the supervisory transition affected bank lending. We use a data set of small business loans collected under the Community Reinvestment Act. This data set is especially well suited to examine the evolution of C&I lending around the regulatory transition. The reporting guidelines of this data set did not change around the regulatory transition and, therefore, it offers consistent information on new loans originated during a year. Moreover, it provides information on the number and amounts of new loans originated over time rather than slow-moving stocks of existing loans. Finally, the small business lending portfolio comprises, on average, more than 50% of all C&I loans in the balance sheets of banks. Thus, small business loans are an economically meaningful fraction of the total lending portfolio of commercial banks and thrifts.

A simple plot of the time-series of small business loan originations by former OTS banks and commercial banks presented in Figure 3 shows that *total* small business lending of thrifts increases following the OTS extinction. Although commercial banks also grew their total small business lending, their increase is rather modest. The small business lending of former OTS banks outpaces that of their commercial bank counterparts after the OTS extinction (but exhibits very similar trends before). This simple plot already suggests a positive effect of the regulatory transition on small business lending. Of course, Figure 3 does not address that lending of thrifts could increase more rapidly because of differences in banks' business models or because former OTS banks are located in areas that experienced higher growth in demand for small business credit relative to areas where commercial banks are located.

We control for these effects by exploiting information on the amount of small business loans that CRA-reporting banks originate by county during a calendar year. Thus, we are able to compare the small business lending of thrifts in a county relative to the small business lending of commercial banks that operate in the same county during the same year. The empirical strategy relies on the idea that banks operating in the same counties are subject



to similar shocks to and trends in credit demand. Hence, by comparing lending of former OTS banks and commercial banks in the same county and year, we should be able to isolate the effect of the OTS extinction on the supply of credit. We estimate this effect with the following specification:

$$\text{Ln}(\text{TotalLoans})_{i,c,t} = \beta \text{OTS}_i \times \text{Post}_t + \theta X_{i,c,t} + \gamma_{c,t} + \delta_{i,c} + \epsilon_{i,c,t} \quad (3)$$

where  $\text{Ln}(\text{TotalLoans})_{i,c,t}$  is the natural logarithm of the total amount of small business loans originated by bank  $i$  in county  $c$  in calendar year  $t$ .  $\text{OTS}$  is a dummy variable that takes the value of one if the bank was regulated by the OTS prior to the OTS extinction and  $\text{Post}$  is a dummy variable that takes the value of one following the OTS extinction starting in the calendar year 2011.  $X_{i,c,t}$  is a vector of characteristics of the bank that includes quadratic controls for the branch presence and total deposits collected by a bank in a county. The county-by-year fixed effects,  $\gamma_{c,t}$ , control for unobserved common shocks that affect a county during a calendar year. In addition, we introduce bank-by-county fixed-effects,  $\delta_{i,c}$ , which control for unobserved time-invariant characteristics of each bank in each county, including differences in banks' business models. Standard errors are clustered at the county level. The inclusion of county-by-year and bank-by-county fixed effects ensures that we examine the evolution of a bank's lending within a given county and at the same time compare loan originations for thrifts and commercial banks in the same county and year. Therefore, the results are not driven by changes in the samples of thrifts and commercial banks across time and counties or by greater demand for small business loans in counties where former OTS banks are located.

We report the results of this analysis in Table 4. In Column (1) we estimate a specification that includes year, bank, and county fixed effects. In Column (2), we present our preferred specification, expressed by equation (3), which includes county-by-year and bank-by-county fixed effects. The coefficient on the main variable of interest,  $\text{OTS}_i \times \text{Post}_t$ , is statistically significant in all specifications and the coefficient estimates are economically meaningful. In our preferred specification, Column (2), the OTS extinction is associated with an 8.8% increase in the volume of small business loans originated by former OTS banks. The decline in the magnitude of the main coefficient between Columns (1) and (2) suggests that not properly controlling for differences in potentially unobserved demand shocks across thrifts and commercial banks inflates the estimated effect of OTS extinction.

We recognize that bank size and holdings of C&I loans can differ substantially across thrifts and commercial banks. As a result, commercial banks could respond differently to economic shocks, for instance, because they specialize in different types of loans. Thus, a potential concern is that commercial banks are not an adequate control group for former OTS

banks, i.e., they do not satisfy the parallel-trends assumption. To gauge and mitigate this concern, we use coarsened exact matching (Iacus, King, and Porro, 2012) to ensure that we compare the lending of former OTS banks with the lending of commercial banks of similar size and similar share of C&I holdings. The results reported in column (3) suggest that, if anything, the magnitude of the estimated effect increases when we match on these dimensions.

Another concern is that former OTS banks and commercial banks locate in different areas *within* a county, which would not be addressed by the fixed effects in the model. We address this concern in two ways. First, we compute a bank- and county-specific house price index that captures house price changes in the zip codes, in which a bank has branches. We re-estimate the model including this additional control. As this variable reflects systematic differences in the location strategies of former OTS and commercial banks within a county at the zip level, it should help to absorb potential unobserved heterogeneity in *within-county* loan demand. The results, reported in Columns (4)-(6), are quantitatively very similar to those in Columns (1)-(3). Importantly, we see little attenuation in the OTS coefficient, suggesting that our results are not driven by within-county differences in local credit demand.

Second, we draw on Nguyen (2019) and exploit an alternative CRA dataset that contains aggregate information on the total small business loans originated at the finer census-tract level by all CRA-reporting banks. We compare changes in aggregate small business lending in census tracts with a significant share of deposits held by former OTS banks with changes in aggregate small business lending in other census tracts within the same county but with a smaller share of deposits held by former OTS banks. The results, reported in Table OA.5 of the Online Appendix, suggest that aggregate small business lending increases significantly in census tracts with larger exposures to branches of thrifts relative to census tracts with lower exposures. This finding corroborates our results in Table 4 and again mitigates concerns about within county differences in loan demand.

Next, we augment the model of equation (3) to include a series of interactions between the OTS dummy and the year dummies. This analysis serves two purposes: i) it examines whether the relation between the OTS extinction and small business lending is relatively sharp around the regulatory transition rather than an ongoing trend towards small business lending, and ii) it addresses concerns that the effects could reflect mean reversion in the performance of former OTS banks. We plot the series of coefficients and corresponding standard errors from estimating this model in Figure 4. The plot shows that i) there are no significant pre-trends, which suggests that commercial banks operating in a county are an adequate control group for thrifts operating in the same county, and that ii) the main coefficients increase sharply following the OTS extinction. These patterns supports the interpretation that the increase in small business lending is a direct cause of the regulatory change in supervision, rather than

mean reversion in the performance of former OTS banks.

In light of the evidence presented in [Chen et al. \(2017\)](#) that the largest banks pulled back from small business lending following the Great Recession, another significant concern is that our main results are driven not by larger small business lending of thrifts, but rather by reduced lending of the top commercial banks. The lending trends presented in [Figure 3](#) already make this explanation unlikely as they show that both thrifts and commercial banks increased their origination of small business loans and that thrifts increased small business lending at a faster pace. To properly analyze this issue, we re-estimate the empirical specification of equation (3) but restrict the sample and exclude the top-4 banks as in [Chen et al. \(2017\)](#) and the top-20 largest small business lenders in our sample, most of which were subject to formal stress tests by the Federal Reserve (e.g. [Cortés et al., 2019](#)).<sup>10</sup> We report our results in [Table 5](#). The reported coefficients not only remain statistically significant but have very similar magnitudes. This finding is remarkable considering that the top-4 and top-20 banks represent a considerable fraction of our sample. The fact that our results are essentially unchanged after removing these observations suggests that the effect of the regulatory transition on thrifts' small business lending is not an artifact of business lending trends for large banks in the control group.

Additionally, we examine whether the relation between the OTS extinction and thrifts' small business lending survives a battery of robustness tests. Specifically, we confirm that the results are robust to (i) controlling for the total assets of banks, the interaction of this variable with the Post dummy and weighing the observations by total amounts lent by banks in the county ([Table OA.6](#)), (ii) controlling for the participation of the bank in Troubled Asset Relief Program (TARP) ([Table OA.7](#)) (iii) adjusting for mergers and acquisitions of banks to make sure the results are not driven by changes in sample composition ([Table OA.8](#)), (iv) controlling for the impact of other Dodd-Frank provisions that might have affected small business lending such as the creation of the Consumer Financial Protection Bureau or the removal of the remaining interstate branching regulations ([Table OA.9](#)), (v) accounting for the potential parallel impact of the regulatory transition on the stringency of the Community and Reinvestment Act (CRA) examinations of thrifts ([Table OA.10](#)), and (vi) alternative definitions of the dependent variable to address potential issues with its skewness ([Table OA.11](#)).

Overall, we conclude that the change in supervision led to an increase in small business lending by former OTS banks. Furthermore, we refer back to [Figure 2](#) and note that despite this increase in lending following the OTS extinction, the non-performing loan ratios of former

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<sup>10</sup>In the [Online Appendix](#), [Table OA.7](#), we further examine whether controlling for the evolution of lending by the top-4 banks changes our results. It does not.

OTS banks are converging, albeit slowly, to those exhibited by the commercial banks. This convergence suggests that thrifts' additional lending is not at the expense of greater loan delinquencies. We revisit the implications of this additional C&I lending in Section 7.4.

## 7 Potential channels

### 7.1 Bank Capitalization and Credit Crunch

The lending results, together with the earlier loss recognition results, are seemingly inconsistent with a large literature showing that financial institutions cut lending in response to loan losses that negatively affect their balance sheets and capital (e.g. [Peek and Rosengren, 2000](#); [Ivashina and Scharfstein, 2010](#); [Gambacorta and Marques-Ibanez, 2011](#); [Chodorow-Reich, 2013](#); [Bord, Ivashina, and Taliaferro, 2017](#); [Granja and Moreira, 2019](#)). Based on this literature, stricter supervision that forces banks to recognize existing loan losses and to expand their loan provisioning is expected to lead to less lending, for instance, because banks need to conserve capital to avoid costly regulatory interventions. We call this effect the capital channel.

However, the descriptive statistics for our sample show that most thrifts that survived the financial crisis were relatively well-capitalized at the time their regulatory transition and hence were able to easily absorb the extra loan loss provisioning and recognition imposed by their new supervisors. Thus, in our setting, the capital channel is less likely to be prevalent. This is different from many other settings in the literature, in which regulatory interventions coincide with banks' financial distress or systemic crises. Thus, the OTS extinction allows us to study whether there are the effects of stricter supervision that go beyond the capital channel. To illustrate that the latter channel is nevertheless present for some banks in our setting, we examine whether the impact of regulatory strictness on bank lending depends on thrifts' loss-absorbing capacity, using variation in their capitalization prior to OTS extinction.

In Columns (1) and (2) of [Table 6](#), we stratify the sample based on the Tier 1 Capital ratio reported by each financial institution in the last quarter of 2010. The results are striking: thrifts with above-median regulatory capital (within the sample of former OTS banks) increase small business lending while thrifts with below-median ratios significantly reduce their total small business lending following the OTS extinction. In columns (3) and (4), we repeat the empirical exercise but partition the sample based on the Tier 1 leverage ratios defined as Tier 1 Capital divided by total assets rather than risk-weighted assets as in the commonly used Tier 1 Capital Ratio. The results further support the idea that well-capitalized thrifts increase small business lending while less well-capitalized thrifts do not.<sup>11</sup> These results reconcile our

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<sup>11</sup>In [Table OA.12](#) of the Online Appendix, we show that the effects of the OTS extinction are concentrated

findings with the literature on the capital channel but should, nonetheless, be interpreted with caution as the regulatory capital of banks could capture other unobservable characteristics related to banks' willingness to lend.

We further explore the interplay between the capital ratios of former OTS banks and the impact of strict supervision on bank lending by examining how such impact varies across different levels of bank capitalization. We create six groups based on each bank's Tier 1 capital ratio as of the fourth quarter of 2010. The groups stratify banks based on whether their Tier 1 Capital ratio is below 10, between 10 and 12.5, between 12.5 and 15, between 15 and 17.5, between 17.5 and 25, and more than 25 percent, respectively. Next, we augment the model of equation (3) to include a series of interactions between the former OTS bank indicator and dummy variables that take the value of one for the capitalization group to which a given bank belongs.

We plot the results of this analysis in Figure 5. The results further support our conjecture that less well-capitalized banks decrease lending following the transition to a stricter regulator that puts pressure on their capital ratios. In the group of banks with Tier 1 capital ratio below ten percent, former OTS bank decrease small business lending substantially following the regulatory transition. Banks with Tier 1 capital ratios between 10 and 12.5 percent also see their small business lending decline, albeit not nearly as much. The estimated impact of the regulatory transition on small business lending is positive for all other groups.

The results for less well-capitalized banks are largely consistent with prior literature that emphasizes the role of bank capital for lending. Based on this literature, banks that are capital constrained are likely to scale back lending when they are forced to recognize losses or build up provisions. Our results, therefore, indicate that the consequences of a policy intervention that mandates bank supervisors to enforce the recognition of loan losses depends on the ability of financial institutions to absorb losses in their portfolios. These results, therefore, suggest caution in implementing such policies when the financial system as a whole is substantially undercapitalized.

## 7.2 Changes in Bank and Loan Management

The capital channel that we examined in the previous subsection explains the significant decline in small business lending of less well-capitalized former OTS banks. However, it cannot explain why former OTS banks that are well capitalized increase their small business lending following the OTS extinction. We posit that the transition to the OCC and FDIC induced a

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in areas where commercial banks, as local competitors, were more capital constrained and, therefore, less willing to extend credit, which in turn allowed former OTS banks to expand their lending after the regulatory transition.

significant shake-up of management and lending practices for former OTS banks regardless of their capitalization. This shake-up resolved lingering deficiencies in bank management that were left unaddressed by the OTS. Stricter supervision forced thrifts to resolve such deficiencies, which in turn improved their ability to extend credits to hard-to-evaluate small business borrowers. In this subsection, we explore this channel. We first examine whether the regulatory transition is associated with significant changes in bank management practices and then study to what extent such organizational changes are associated with increases in bank lending.

In Section 2 and in the Online Appendix to this paper, we offer anecdotal evidence that the new supervisory regime induced significant changes in key areas of loan and risk management. Many thrifts purchased new software solutions or hired consultants to assist with the new OCC requirements (Bayer, 2014). In Figure OA.1, we report a bar chart from a poll of former OTS bankers conducted by Sageworks (SageWorks, 2013) showing that over 50 percent of responding bankers indicated that they had to strengthen their risk rating system as a result of feedback from OCC examiners and 38 percent indicated that they had to implement stress testing.<sup>12</sup> Moreover, an examination of OCC enforcement actions received by former OTS banks also shows that the OCC forced these banks to make wide-ranging and fundamental changes pertaining to (i) banks' key management personnel and executive directors, (ii) loan portfolio management (e.g., the procedures to document loan collateral or to ensure that credit extensions are granted only after obtaining satisfactory credit information), and (iii) credit risk management (e.g., the procedures for establishing loan officer accountability, credit risk training and stress testing).<sup>13</sup>

To make sure these are not just isolated examples, we investigate more formally whether the regulatory transition led to palpable changes in bank management for former OTS banks using three proxies. First, we examine whether the regulatory transition is associated with greater rates of board turnover, defined as the ratio between the sum of entry of new directors and exit of existing directors and the average number of directors in the bank during the year. Second, we analyze if the transition is associated with a higher likelihood of exit of executive directors of former OTS banks. An increase in management turnover is indicative that the new regulators pressured for changes in the composition of the board, either explicitly through enforcement actions (see Figure OA.2) or implicitly through conversations with current management, the board, or shareholders. Finally, we follow Bhat et al. (2018) and create a disclosure-based proxy for the use of formal credit risk modeling by financial institutions.

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<sup>12</sup><https://www.sageworks.com/blog/post/2013/11/14/biggest-areas-of-change-transitioning-from-OTS-to-OCC.aspx>

<sup>13</sup>In the appendix to this paper (Figure OA.2), we illustrate such requirements with passages taken from formal written agreements completed during 2012 between the OCC and multiple former OTS banks.

Changes in this proxy following the OTS extinction would be indicative that former OTS banks updated their risk modeling and credit risk management in response to the regulatory transition.

We present the results of this analysis in Figure 6 and Panel A of Table 7. Figure 6 plots the evolution of board turnover and risk modeling for thrifts and commercial banks separately. The results are striking. Prior to the OTS extinction, thrifts' board turnover rates and use of credit risk models are consistently below those of commercial banks. Following the OTS extinction, however, these patterns flip and thrifts see greater rates of board turnover and increased use of credit risk modeling. Panel A of Table 7 presents regression results using the difference-in-differences framework of equation (1) on the outcome variables described above. These variables are available only at the bank level, with annual frequency and for the subset of publicly-listed banks, which explains the lower number of observations for this analysis. We find that the OTS extinction is associated with significantly higher rates of board turnover (Columns (1) and (2)) and of executive director exit (Columns (3) and (4)), relative to commercial banks over the same time period. In particular, the exit rates of executive directors increase by four percentage points, which compares with an unconditional likelihood of exit of an executive director around eight percent. Finally, in Columns (5) and (6), we find that former OTS banks significantly increase the use of credit risk models by eight percentage points following the regulatory transition. Overall, this collage of evidence suggests that the forced transition of thrifts to stricter supervisors triggered significant and wide-ranging changes to multiple areas of bank loan and risk management as well as their management team.

Next, we examine whether such changes in management and lending practices could explain the documented increase in small business lending of former OTS banks following the regulatory transition. The idea is to build on the results of Figure 6 and Panel A of Table 7 and to assess whether the lending effects are stronger in the subset of former OTS banks that saw greater board and executive director turnover and that adopted more formal risk modeling following the regulatory transition.

Again, the analysis is limited to a smaller sample of publicly-listed banks. Despite this smaller sample, the empirical results presented in Panel B of Table 7 largely support the conjecture that the increases in small business lending are more pronounced in the subset of former OTS banks that experienced changes in their management, lending, and risk modeling practices. Specifically, the results in Columns (1)–(4) suggest that the increase in small business lending following the regulatory transition was more pronounced in the subsample of former OTS banks that experienced greater board turnover and saw at least one member of its executive team exit following the regulatory transition. Furthermore, the results reported

in Columns (5) and (6) suggest that the increase in small business lending is larger for banks that adopted (new or more extensive) credit risk modeling after the OTS extinction.

Our results are silent on what precluded the OTS from addressing these bank management deficiencies prior to its demise. Perhaps it lacked resources to detect and correct these issues at former OTS banks. Perhaps it took a softer stance than the other regulators because it was captured by special interests or because it wanted to hide its own past failures.<sup>14</sup> Regardless of what explains the inaction of the OTS, our findings suggest that the transition to stricter supervisors triggered a broad set of changes to the internal management practices of thrifts and that these improvements, in turn, played a key role for the observed increase in small business lending. In addition, one might ask why the thrifts themselves did not address their deficiencies in bank management prior to the regulatory transition, especially if these shortcomings constrained their lending. Our analysis does not provide a definitive answer, but points to frictions in bank management and governance as a potential explanation.<sup>15</sup> The turnover analyses are consistent with the notion that entrenched executives and board members are an important part of the story. Regardless of what was holding back the thrifts, the novel message of our paper is that stricter supervisors can induce changes in bank management that increase bank lending.

### 7.3 Lending Portfolio Reallocation

Former OTS banks were significantly more concentrated in residential lending than other commercial banks. The regulatory transition meant that former OTS banks were “passed” from a regulator that was familiar with their business model (i.e., the OTS) to new regulators (i.e., the OCC and FDIC) that were less familiar and perhaps even uncomfortable supervising financial institutions with a large portfolio concentration in residential lending. Hence, an alternative (but not mutually exclusive) explanation for our results is that the OCC and FDIC pushed former OTS banks to change their lending strategies toward a lending portfolio mix that was closer in line with that of the commercial banks that they supervised. Consistent with this possibility, the poll of former OTS bankers conducted by Sageworks that we refer to in Figure OA.1 reports that approximately 25% of respondents identified “diversification of portfolio/change in lending strategy” as the biggest area of change that resulted from the

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<sup>14</sup>We do not have data on the resources and capabilities of the OTS, which would be necessary to shed light on whether lack of resources explains the differences across supervisory approaches. In Tables OA.3 of the Online Appendix, we report empirical analyses showing that the corrective actions imposed by the OCC were more pronounced in banks headquartered in states that were formerly under the jurisdiction of the Western Division of the OTS, whose regional director, Darrel W. Dochow, received significant negative attention for having cozy ties with the thrifts that his regional division monitored (e.g. Story and Morgenson, 2011).

<sup>15</sup>For instance, bank managers could be fairly insulated from competition due to scarce managerial talent in local labor markets or due to legal restrictions to bank competition (e.g., Bertrand and Mullainathan, 2003).



supervisory transition.

This conjecture implies that former OTS banks reduced their exposure to the residential lending market following the regulatory transition. We examine whether there is empirical support for this idea using the HMDA data set. We estimate an empirical specification akin to equation (3), comparing changes in mortgage lending by former OTS banks with changes in mortgage lending by commercial banks operating in the same narrowly-defined geographic regions (census tracts).<sup>16</sup> The results, reported in Table 8, show that former OTS banks originate fewer mortgage loans following the regulatory transition. Depending on the specification, we estimate that the origination of mortgage loans by former OTS banks declines, on average, between four and fifteen percent after the regulatory transition, relative to commercial banks in the same census tract and year.<sup>17</sup> These results are consistent with the idea that former OTS banks shifted some lending from mortgages to small businesses.

Next, we tighten the analysis to more firmly establish that the observed portfolio reallocation reflects supervisory pressures to make thrifts conform to lending strategies that fit the mold of what the new supervisors typically oversee. Towards this end, we exploit pre-existing cross-sectional variation in the similarity between the average portfolio mix of commercial banks supervised by a local OCC field office and the average portfolio mix of former OTS banks located in the same area, all prior to OTS extinction. The idea is that bank examiners of local OCC field offices have different degrees of comfort and familiarity with the portfolios of former OTS banks depending on how (dis)similar these portfolios are to the portfolios of the other (commercial) banks that they supervise.

We assign each commercial bank and each former OTS bank to the closest OCC field office. We then compute, for each OCC field office, the difference between the pre-OTS extinction portfolio mix of national banks supervised by the OCC and former OTS banks that are close by and would likely be in the same jurisdiction. Specifically, we compute the difference, at the end of 2010, between the average share of C&I loans of all commercial banks supervised by a local OCC field office (national banks) and the average share of C&I loans of former OTS banks that we assign to the same local OCC field office. Using a similar procedure, we compute a similar measure of distance in portfolio allocation using the share of residential loans. We then stratify our sample based on whether a bank is supervised by a local OCC field office with above- or below-median distance in the respective portfolio allocations and

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<sup>16</sup>We use census tracts because this finer geographic demarcation is available from HMDA. We also estimate models comparing at the county level and the results are quantitatively and qualitatively similar.

<sup>17</sup>Further empirical analyses reported in the Online Appendix (Figures OA.4 and OA.5 and Table OA.13) suggest that the decline in mortgage lending is not necessarily sharp around the regulatory transition, unlike what we see for small business lending. Moreover, we find that rejection rates for mortgage applications increase between 0.2 and 1 percentage points, but the effect is not always statistically significant. Thus, the results for mortgages are less aligned with the OTS extinction.

re-estimate the main results of Table 4 in each of these subsamples.

We report the results from this empirical analysis in Table 9. In Columns (1) and (2), we partition the sample based on whether a bank is in the jurisdiction of an OCC field office with large or small difference in the average shares of C&I lending between commercial banks and former OTS banks. In Columns (3) and (4), we partition the sample in a similar way, but using differences in residential lending shares. The results in Columns (1) and (2) of Table 9 suggest that the positive impact of the regulatory transition on small business lending is concentrated in former OTS banks located in the jurisdictions of local OCC field offices that supervised commercial banks, which have much larger concentrations of C&I lending compared to the thrifts. For former OTS banks located in jurisdictions of local OCC field offices where commercial (national) banks and thrifts have relatively similar shares of C&I lending shares on their lending portfolios, the regulatory transition does not have a positive effect.<sup>18</sup>

Similarly, the results in Columns (3) and (4) suggest that the impact of the OTS extinction on small business lending is more pronounced when the former OTS banks are located in the jurisdictions of local OCC field offices where the difference in residential lending shares between commercial banks and thrifts are larger.

As with previous sample splits, these results should be interpreted with caution as the split variable could capture other unobservable characteristics related to banks' willingness to lend. Nevertheless, the results in Table 9 are consistent with the idea that OCC field offices accustomed to a different *modus operandi* are more likely to push former OTS banks to adapt their lending strategies, so that they are closer in line with the portfolio mix of the commercial banks the OCC field office supervises. This finding is interesting because it suggests that supervisory preferences or familiarity could play a role in regulatory outcomes.

Given this evidence consistent with a supervisor-induced portfolio reallocation away from residential lending, we analyze whether this explanation can account for most or all of the thrifts' increase in small business lending. Towards this end, we include variables for the level of *residential* lending as well as changes in the supply of *mortgages* in the small business lending analyses around the OTS extinction. The idea is to see if the OTS effect on small business lending is substantially attenuated in the presence of these variables. The results reported in Table 10 indicate that the coefficient of interest is not attenuated when we include a battery of different indicators for thrifts' supply of mortgages. The lack of attenuation is

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<sup>18</sup>The significantly negative coefficient in Column (2) is accounted by a relatively greater share of banks with poor capitalization in that subsample, which are scaling back lending as shown in Table 6. If we focus on well-capitalized banks and split as in Table 9, then the coefficient on OTS×Post is positive in both partitions, but still larger in the partition with a large difference in CI. We checked that other splits in the paper do not exhibit such imbalances with respect to capitalization.

consistent with the evidence in Figure OA.1 suggesting that only 25% thrifts report pressures to diversify their portfolios. This relatively small fraction could explain why some thrifts exhibit a supervisor-induced reallocation from mortgage to small business lending, but the latter cannot account for the thrifts' overall increase in small business lending. That is, only thrifts that, on the margin, had high exposure to residential mortgages or whose OCC field offices were less familiar with their business models ended up diversifying their portfolios.

## 7.4 Other Effects of the Regulatory Transition

In this section, we take a deeper look into what type of small business lending is unlocked after the regulatory transition. The purpose of the analysis is to evaluate changes in the characteristics of the loans originated by former OTS banks and to see if those changes are consistent with the economic channels that we proposed to explain the surge in small business lending following the OTS extinction.

### 7.4.1 Regulatory Transition and Lending Rates

Our analysis shows an increase in the small business loans originated by former OTS banks and also a decline in the origination of mortgage loans. But, up until now, we have focused on the volume and have not examined what happens to the loan interest rates set by former OTS banks relative to those set by commercial banks. Here, we examine the evolution of the loan rates around the regulatory transition for different types of loan products. The RateWatch dataset of loan interest rates obtains weekly advertised loan rates on multiple loan products from a survey of 100,000 bank branches. We use loan rate information on the most common residential loan product, the 30-Year Fixed Rate Mortgage with principal amount of \$175,000, and the most common commercial loan product, the commercial equipment secured loan with a \$250,000 principal amount to better understand what the regulatory transition meant for loan pricing.

We implement a difference-in-differences empirical specification similar to that used in previous analyses to gauge the impact of the regulatory transition on the interest rates for residential and commercial lending. We report the results of this analysis in Table 11. We find that following the regulatory transition, former OTS banks increase their advertised mortgage lending rates relative to commercial banks by approximately 9–10 basis points, whereas they reduce their interest rates on commercial lending products relative to commercial banks by 23–30 basis points.

These results mirror our findings for the loan volumes and are consistent with our interpretation that following the regulatory transition, former OTS banks expanded their

supply of commercial loans and contracted their supply of residential mortgages. The rate results also do not suggest that the new business loans are riskier and, hence, that the regulatory transition induced thrifts to make riskier business loans.

#### 7.4.2 Regulatory Transition and Local Business Activity

A remaining question is whether the documented increase in small business lending after thrifts' regulatory transition reflects more lending to new firms or more lending to firms with existing relationships. The economic mechanism related to bank management implies that the increase in small business lending is not driven by thrifts' evergreening bad loans with existing business customers but rather that they expand their commercial lending activities to new customers and potentially to new businesses in the same county. That is, under the bank management channel, we expect to see thrifts cut their troubled lending and make new and better loans.

While we cannot directly observe the identities of loan recipients, we can investigate how greater exposure to former OTS banks following the OTS extinction is associated with changes in the aggregate entry and exit rates of businesses at the county level. Entry of new businesses is likely to be sensitive to changes in the availability of credit to small businesses as their owners are typically credit constrained. At the same time, business exits could be an indication that banks are less willing to extend or rollover existing credits for troubled borrowers. Thus, corresponding increases in the entry and exit rates in counties with greater exposure to former OTS banks would be consistent with the idea that thrifts are terminating delinquent loans and financing new businesses following the OTS extinction.

We compute the exposure of a county to former OTS banks as the share of deposits in a county that is held in branches of former OTS banks as of June 30, 2010.<sup>19</sup> We plot the spatial distribution of the county exposure to former OTS banks in Figure OA.6. We draw two insights from the plot. First, it suggests that spatial correlation or regional clustering is not a great concern in this setting. The counties with high exposure to former OTS banks are scattered throughout the United States. Second, the plot shows that more than half of the U.S. counties have no exposure to former OTS banks. As these counties comprise a majority of the sample and could be structurally different from counties with OTS exposure, we exclude them from the analysis.

We calculate the entry (exit) rate as the ratio of new entrants (exits) in the county to the number of existing businesses in the county. We formally examine the relation between these two variables using the following regression specification:

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<sup>19</sup>We compute the county exposure to former OTS banks using the deposit levels of 2010, rather than those of an earlier year to avoid including WaMu and Indymac in these computations.

$$Y_{c,t} = \beta \text{ShareOTS}_c \times \text{Post}_t + \theta X_{c,t} + \gamma_c + \delta_t + \epsilon_{c,t} \quad (4)$$

where  $Y_{c,t}$  represents the entry and exit rate of new establishments in county  $c$  during year  $t$ ,  $\text{ShareOTS}$  is the share of deposits held in branches of former OTS banks as of June 30th, 2010,  $\text{Post}$  is a dummy variable taking the value of one following the OTS extinction during the calendar year 2011, inclusive.  $X_{c,t}$  is a vector of characteristics comprising the number of bank branches and level of deposits held in the county, the number of establishments in the county, and the size composition of the establishments operating in the county measured by the number of establishments in the county that employ 1–4, 5–9, 10–19, 20–49, 50–99, 100–249, and 250–499 people. The year fixed effects,  $\delta_t$ , control for overall trends in the evolution of entry and exit rates and the county fixed effects,  $\gamma_c$ , control for time-invariant, unobservable characteristics of each county. As before, we cluster the standard errors at the county level.

We report the results of this analysis in Table 12. We present results for an OLS specification as well as a weighted least squares (WLS) specification, in which we weigh each observation by the level of employment in the county. We find considerable increases in business dynamism in counties most exposed to OTS banks. The main coefficients of interest,  $\beta$ , are statistically significant and suggest that the OTS extinction is positively related to local entry and exit rates for business establishments. The economic magnitudes are also meaningful: the semi-elasticities of the entry and exit rates of establishments in response to a standard deviation increase in the share of former OTS deposits in the county are 0.60% and 0.55%, respectively. These findings suggest that the increase in small business lending does not simply translate into greater flow of credit to all existing establishments, but rather is consistent with a pattern in which former OTS banks reduce the extent to which they evergreen loans of troubled incumbents and instead supply credit to new businesses.<sup>20,21</sup>

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<sup>20</sup>We further examine if the effects occur sharply around the OTS extinction in Figure OA.7. Consistent with the notion that stricter supervision increased lending and business dynamism, we find that greater exposure to former OTS banks is significantly and positively associated with corresponding increases in the entry and exit rates following the OTS extinction, but not prior to the regulatory transition.

<sup>21</sup>To examine whether these effects can be meaningfully attributed to an expansion of small business lending by former OTS banks, we also investigate if the results are particularly pronounced in industries that are more dependent on external sources of financing. We sort industries by below- and above-median levels of dependence on external financing. Using data on entry and exit rates at the industry-county level, we find that the effect of greater county exposure to former OTS banks on entry rates is greater in industries that require greater access to external sources of finance. We report these results in Table OA.14.

## 8 Conclusion

An important question in banking is how strict supervision affects bank lending and in turn local business activity. Bank supervisors face a tradeoff between, on one hand, protecting the financial system by forcing banks to correct weaknesses in their loan management, to recognize troubled loans, and to ensure adequate provisioning for future loan losses and, on the other hand, causing a credit crunch for the real economy by being too strict with banks, especially shortly after a financial crisis.

We study this tradeoff by examining the elimination of the OTS, which was stipulated by the Dodd-Frank Act and took place shortly after the Great Recession. The OTS extinction meant that former OTS banks were transferred to the OCC and the FDIC, which have a much stricter regulatory approach, affecting key areas of bank management, including loan loss recognition, loan risk ratings, stress testing, and risk management. This forced regulatory transition allows us to analyze the economic links between strict prudential supervision, bank lending and business activity.

We confirm first that the regulatory transition resulted in stricter supervision, documenting significant changes in loan loss recognition and loan provisioning shortly after the OTS extinction. Next, we analyze bank lending and do not find evidence that stricter supervision led to a credit crunch, except for those former OTS banks that were thinly capitalized. On average, former OTS banks increase their lending to small businesses following the regulatory transition by approximately 10 percent. The increase is concentrated in well-capitalized banks as well as in banks that underwent significant changes in internal management practices. In particular, we show that increases in small business lending are concentrated in former OTS banks that (i) show above-median board turnover following the regulatory transition; (ii) replace executive directors following the transition; and (iii) adopt formal risk modeling after the OTS extinction. This collection of results is consistent with the explanation that stricter supervision triggered broad changes and improvements in the internal management practices of former OTS banks, which in turn increased their supply of small business loans.

In addition, we find that thrifts reduce their origination of mortgage loans following the regulatory transition. For at least some, this reduction is consistent with a supervisor-induced reallocation from residential to small business lending. However, this reallocation does not explain the overall increase in small business lending and appears to be a separate effect. Overall, our evidence shows that stricter supervision operates not only through capital but can also spur improvements in loan and risk management, leading to more lending and a reallocation of loans.

There are two important caveats to our analysis. First, we document economic effects for

the years after the regulatory transition. But we do not know how the elimination of the OTS will play out in the long run. It is, for instance, an open question whether the decline in the number of supervisors and corresponding increase in regulatory concentration benefits the financial system in the long haul. Second, the US banking system features many small banks. Our analysis is, therefore, more likely to be relevant for smaller and perhaps less sophisticated banks. However, there are several banking systems around the world that feature a significant fraction of smaller banks (e.g., Germany and Italy), for which our findings could be relevant.

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Figure 1: Loan Loss Recognition over Time

Figure 1 plots the average loan loss provision ratio (loan loss provision divided by total assets) and average nonperforming loan ratio (nonperforming loans divided by total assets) of former OTS banks and all other commercial banks during the period 2005Q1 to 2015Q4. Data are from the FFIEC Call Reports and from the Thrift Financial Reports. The shaded period is the financial crisis as defined by the NBER recession period.

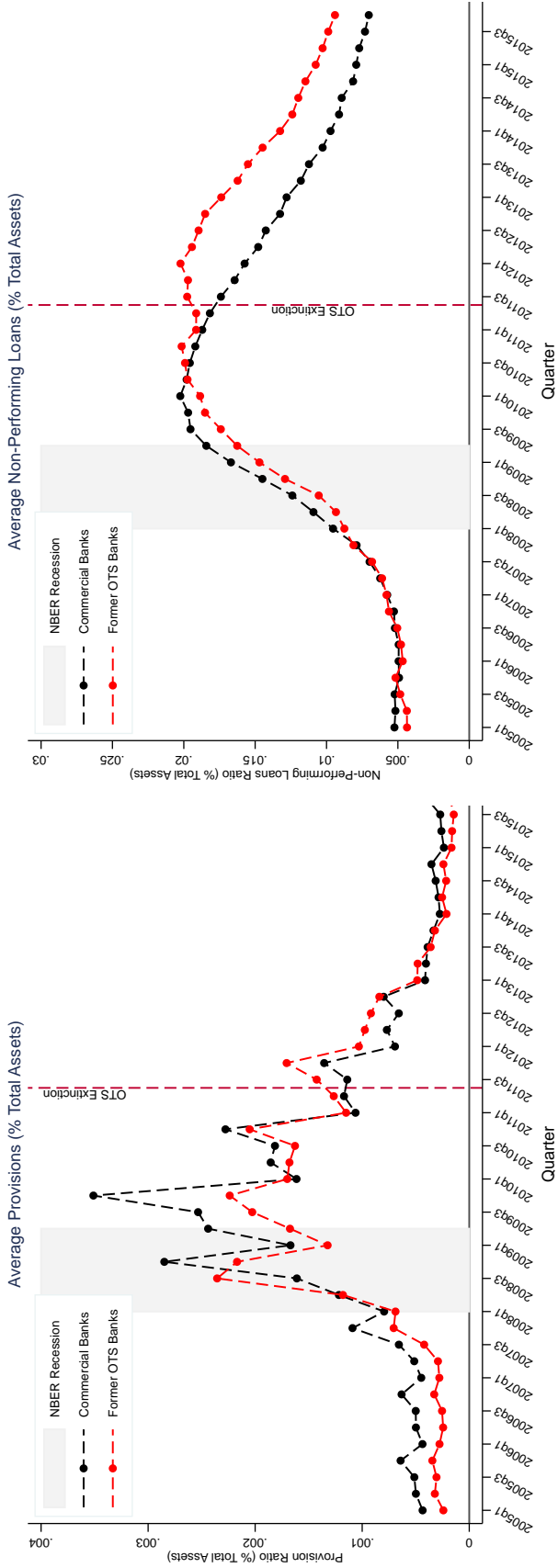


Figure 2: OTS Extinction and Loan Loss Recognition over Time

Figure 2 plots the estimated impact of OTS supervision on the loan loss provision ratio and nonperforming loan ratio in each quarter of the sample period using OLS regressions. The shallow circles represent the series of coefficients  $\beta_t$  from interacting a set of dummy variables representing each quarter in the sample with a dummy variable taking the value of one if the depository institution's primary supervisor in the first and second quarter of 2011 was the Office of Thrift Supervision in the following model specification:  $Y_{it} = \gamma_t + \theta_i + \sum_t \beta_t OTSExtinction_{it} \times \gamma_t + \delta X_{it} + \epsilon_{it}$  and the vertical bands represent 90% confidence intervals for the point estimates in each quarter. The figure on the left represents the series of coefficients in a model, for which the loan loss provision ratio is the dependent variable. The figure on the right represents the series of coefficients in a model that uses nonperforming loan ratio as the dependent variable. The shaded period is the financial crisis as defined by the NBER recession period.

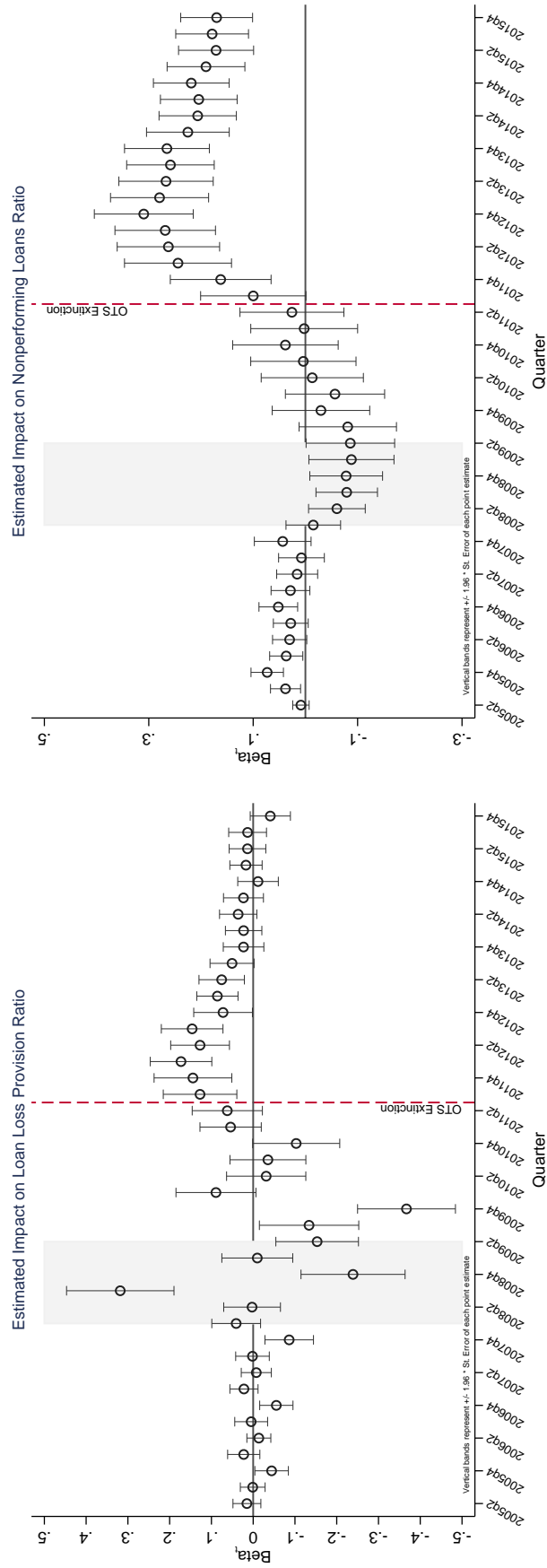


Figure 3: Total Annual Origination of Small Business Loans by Thrifts and Commercial Banks

Figure 3 plots an index of the total volume of small business loans originated by former OTS banks and commercial banks. Former OTS Banks are banks that reported the OTS as their primary regulator during 2010. Commercial Banks are all other banks that report to the CRA dataset. To avoid that composition effects influence the figure, we define a balanced sample using only commercial banks and former OTS banks that were part of the CRA-reporting sample for the entire sample period.

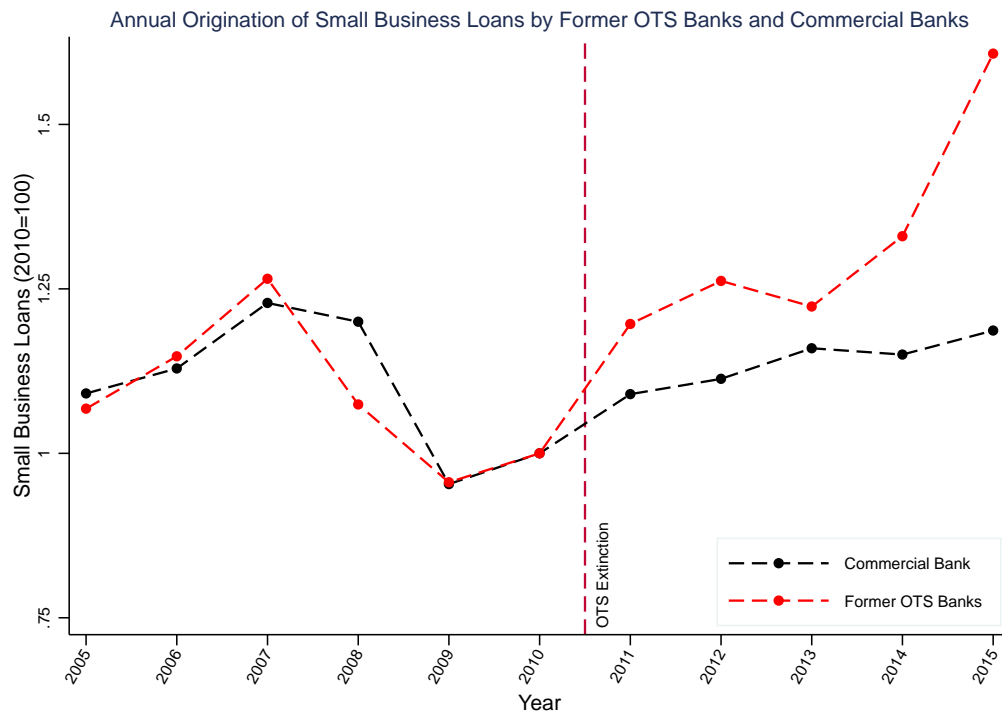


Figure 4: Small Business Lending and OTS Extinction: Impact over Time

Figure 4 plots the estimated impact of OTS supervision on small business lending in each year of the sample period. The shallow circles represent the series of coefficients  $\beta_t$  from expanding the model specification in Column (3) of Table 4 to include a set of interaction variables between year dummies and a dummy variable taking the value of one if the depository institution's primary regulator in 2010 was the Office of Thrift Supervision and the vertical bands represent 90% confidence intervals for the point estimates in each quarter. Data on small business lending come from the Community Reinvestment Act Small Business Lending Dataset.

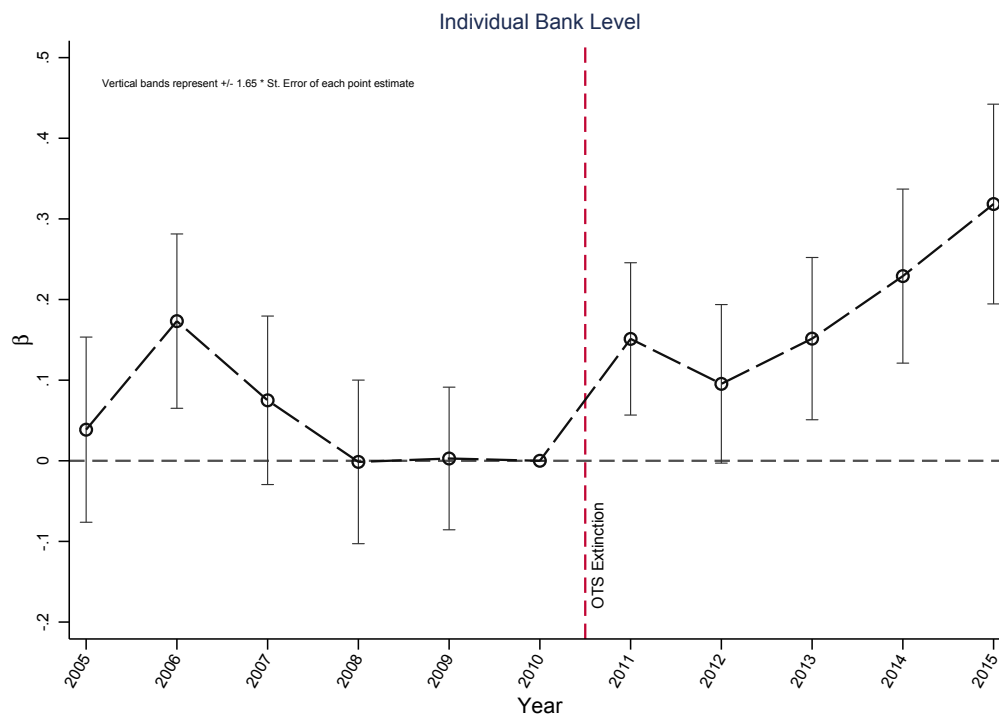


Figure 5: Small Business Lending and OTS Extinction: Impact by Capitalization

Figure 5 plots the impact of OTS supervision on small business lending across different levels of capitalization defined by the Tier 1 capital ratio of each bank in the fourth quarter of 2010. The shallow circles represent the series of coefficients  $\beta_i$  from expanding the model specification in column (3) of Table 4 to include a set of interaction variables between a dummy variable taking the value of one if the depository institution's primary regulator in 2010 was the Office of Thrift Supervision and each of six indicator variables that take the value of one if the Tier 1 capital in the fourth quarter of 2010 is below 10, between 10 and 12.5, between 12.5 and 15, between 15 and 17.5, between 17.5 and 25, and more than 25 percent, respectively. The vertical bands represent 90% confidence intervals for the point estimates in each Tier1 bin. Data on small business lending come from the Community Reinvestment Act Small Business Lending Dataset and data on Tier 1 capital ratios come from Call Reports and Thrift Financial Reports.

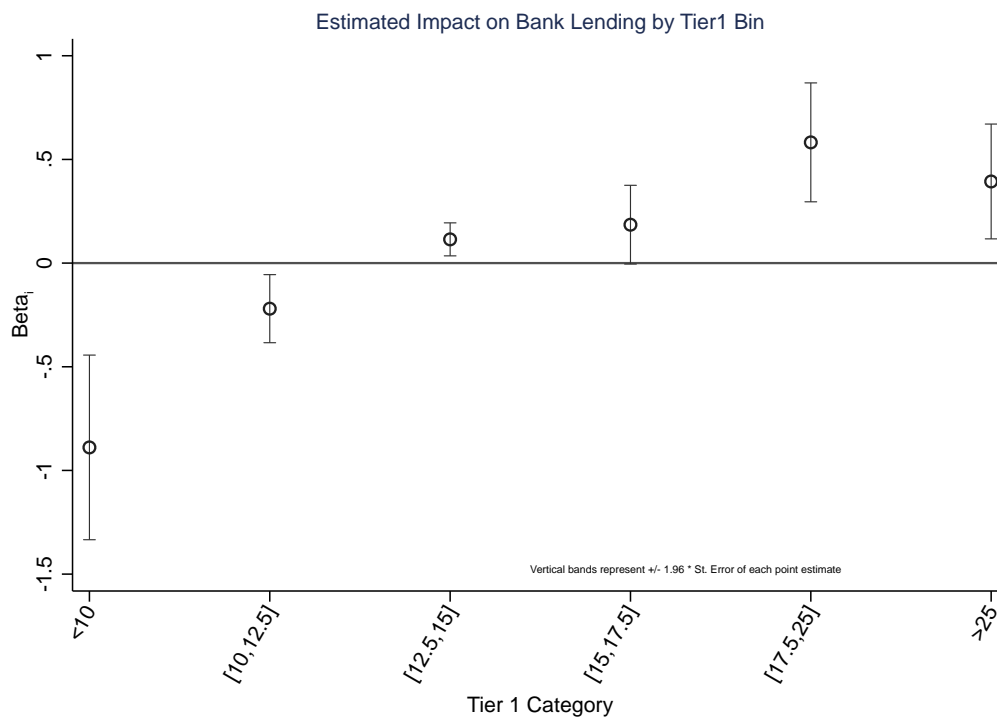
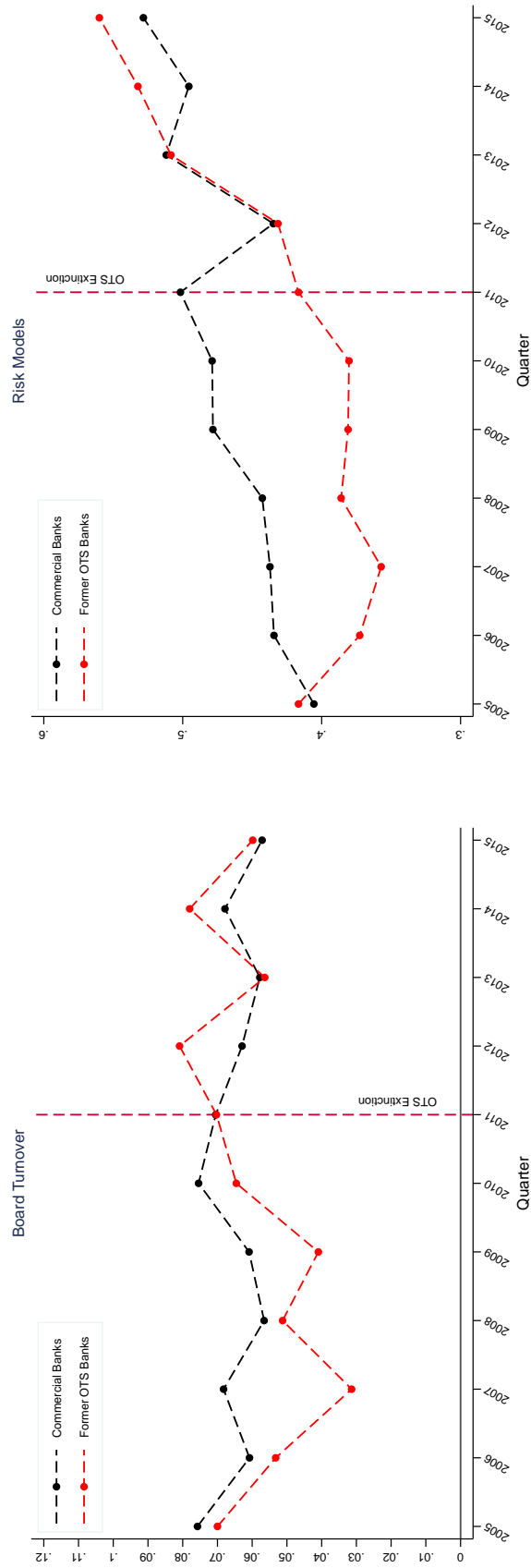




Figure 6: Impact of Regulatory Transition on Board Turnover and Credit Risk Modeling over Time

Figure 6 plots the average board turnover (sum of entries and exits of board directors divided by average number of board directors) and share of banks using formal risk models and disclosing this practice in their 10-Ks (defined as mentions of the words "risk" and "model" within ten words of each other in the annual 10-K of the bank), separately for former OTS banks and commercial banks during the period 2005–2015. Data are from the FFIEC Call Reports and from the Thrift Financial Reports, regulatory filings, BoardEx, and 10-Ks of publicly traded banks.



**Table 1: Transition Matrix for Former OTS Banks and Commercial Banks**

Table 1 reports on the status of former OTS banks that mandatorily transitioned regulators following the OTS extinction. The Table shows how many former OTS banks voluntarily changed to other charters as of June 30th of the subsequent years and how many former OTS banks dropped out of the sample due to failure, merger, or closure. The numbers for each year are cumulative counts since June 30, 2011. We also report a similar migration analysis to the control group of commercial banks.

	Former - OTS Banks						Commercial Banks						
	Mandatory Transition from OTS to OCC/FDIC on 07/21/2011	Voluntary change to different Regulator or institution class after OTS extinction:					Drop out	Commercial banks supervised by OCC or FDIC	Voluntary change to other regulator		Drop out		
Date	708 OTS regulated Banks required to switch to OCC or FDIC regulator	Cum. Δ from OCC to FDIC - Mutual Savings Bank	Cum. Δ to OCC - Commercial Bank	Cum. Δ to FDIC - Commercial Bank	Cum. Δ to FRB or Savings Banks	% of voluntary changes within each year	Cumulative number of banks that Failed, Merged, or Closed	% of drop out within each year	OCC - Federal Charter	FRB Commercial or Saving Banks	% of voluntary changes within each year	Cumulative number of banks that Failed, Merged, or Closed	% of drop out within each year
6/30/2011	708	0	0	0	0				5590	0		0	
6/30/2012	633	16	5	17	6	6.02%	32	4.38%	5361	35	0.63%	194	3.47%
6/30/2013	579	27	6	24	9	3.25%	63	4.73%	5093	67	0.62%	430	4.37%
6/30/2014	522	36	11	28	13	3.41%	98	5.43%	4845	106	0.82%	639	4.05%
6/30/2015	480	35	15	34	19	2.45%	125	4.43%	4586	133	0.63%	871	4.69%
<b>% of banks 06/30/2015 Compared to 6/30/2011</b>	67.80%	4.94%	2.12%	4.80%	2.68%		17.66%		82.04%	2.38%		15.58%	

Table 2: Descriptive Statistics for Sample Banks

Table 2 presents descriptive statistics for the main sample used in the analysis. Panel A presents financial characteristics and ratios of the entire sample of banks using call report and thrift financial report data. Panel B reports summary statistics for the sample of Community Reinvestment Act (CRA) Small Business Lending reporting banks. *Total Assets* are total assets of the depository institution (measured in \$000s) (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share C&I* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCFD2746) and total assets (RCFD2170). *Loan Loss Provision Ratio* is defined as the ratio between Loan Loss Provisions (RIAD4230) and total assets (RCFD2170). *Charge-Off Ratio* is the ratio of total charge-offs (RIAD435) and total assets (RCFD2170). *Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *ALLL Ratio* is the ratio of the allowance for loan and lease losses (RIAD3123) and total assets (RCFD2170). *Total SBL Originations* is the total amount of small business loans (measured in \$000s) originated by a bank over a calendar year. *Number Branches* is the total number of branches operated by a bank as of June 30th of each year. *Total Deposits* is the total deposits held in domestic branches of a bank as of June 30th of each year (measured in \$000s). *HPI* is the average of the HPI of each zip code where the bank has a branch weighted by the share of county deposits that the bank holds in that zip code. The zipcode HPI is calculated using the all-transactions indexes at the zip code level provided by the Federal Housing Finance Agency.

Panel A: Banks' Financial Characteristics and Ratios

	Count	Mean	Std. Dev.	p25	p50	p75
<b>Commercial Banks</b>						
Total Assets	276,222	1,980,338	31,310,266	66,037	142,466	337,932
Share CRE	265,682	0.233	0.170	0.091	0.207	0.346
Share C&I	273,895	0.095	0.0885	0.041	0.075	0.122
Share Residential	265,682	0.17	0.129	0.082	0.151	0.234
Tier1 Capital Ratio	265,681	22.27	120.3	11.27	13.91	18.48
Loan Loss Provision Ratio	267,250	0.0011	0.00369	0	0.00034	0.00096
Charge-Off Ratio	265,680	0.0011	0.00350	0	0.00020	0.00084
Nonperforming Loan Ratio	273,827	0.012	0.0197	0.0013	0.0056	0.0145
ALLL Ratio	264,776	0.010	0.0069	0.0064	0.0087	0.0116
<b>Former OTS Banks</b>						
Total Assets	24,689	1,175,943	5,858,742	79,662	167,900	427,344
Share CRE	24,689	0.172	0.152	0.050	0.137	0.258
Share C&I	24,689	0.033	0.051	0	0.012	0.048
Share Residential	24,689	0.418	0.209	0.271	0.426	0.568
Tier1 Capital Ratio	24,689	29.63	66.96	13.61	18.38	28.13
Loan Loss Provision Ratio	24,689	0.0010	0.00313	0	0.00021	0.00081
Charge-Off Ratio	24,688	0.0009	0.0026	0	0.00009	0.00067
Nonperforming Loan Ratio	24,689	0.013	0.0210	0.0017	0.0064	0.0164
ALLL Ratio	22,486	0.007	0.0067	0.0031	0.0058	0.0091

Panel B: Small Business Loan and Deposit Market Characteristics of CRA Reporting Banks

	Count	Mean	Std. Dev.	p25	p50	p75
<b>Commercial Banks</b>						
Total SBL Originations	8,505	214,504	963,641	21,938	55,692	125,576
Number Branches	8,505	350.6	1,626.7	36	74	173
Total Assets	8,505	4,138,426,192	54,375,080,904	1,642,812	5,828,784	28,301,078
Total Deposits	8,505	7,741,388	51,713,920	515,872	1,023,661	2,192,585
HPI	8,298	1.114	0.137	1.039	1.107	1.189
<b>Former OTS Banks</b>						
Total SBL Originations	668	56,886	115,515	5,302	24,070	59,403
Number Branches	668	275.3	639.0	55	111	213
Total Assets	668	132,904,676	687,671,861	4,068,040	10,161,059	34,254,948
Total Deposits	668	3,666,661	7,167,811	928,023	1,343,974	2,987,659
HPI	646	1.094	0.143	1.002	1.090	1.182

Table 3: OTS Extinction and Loan Loss Recognition: Impact of Stricter Supervision

Table 3 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on loan loss recognition. The dependent variables are the *Loan Loss Provision Ratio*, *Nonperforming Loan Ratio*, *Charge-Off Ratio*, and *ALLL Ratio*, respectively. *Loan Loss Provision Ratio* is defined as the ratio between Loan Loss Provisions (RIAD4230) and total assets (RCFD2170). *Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *Charge-Off Ratio* is the ratio of total charge-offs (RIAD435) and total assets (RCFD2170). *Enf. Act* is an indicator variable if the bank received a cease and desist or a consent order during the quarter. *OTS* is an indicator variable that takes the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all quarters between 2011:Q3 and 2015:Q4 and zero for all quarters between 2005:Q1 and 2011:Q2. *Ln(Assets)* is the natural logarithm of total assets (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCFD2746) and total assets (RCFD2170). *Tier1 Capital Ratio* is the bank's Tier 1 capital ratio (RCFD7206). Standard errors are presented in parentheses, and are clustered at the level of the county, assigning banks to counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Loan Loss Provision Ratio							
	Loan Loss Provision Ratio	Nonperforming Loan Ratio	Charge-Off Ratio	Enf. Act				
OTS × Post	0.018*** (0.002)	0.018*** (0.002)	0.333*** (0.017)	0.369*** (0.019)	0.023*** (0.002)	0.026*** (0.002)	0.002*** (0.000)	0.003*** (0.000)
Ln(Assets)	0.003 (0.003)	0.003 (0.003)	-0.016 (0.046)	-0.016 (0.046)	0.011*** (0.004)	0.011*** (0.004)	0.004*** (0.001)	0.004*** (0.001)
Residential Share	0.020 (0.014)	0.020 (0.014)	1.299*** (0.207)	1.299*** (0.207)	0.051** (0.023)	0.051** (0.023)	0.003 (0.003)	0.003 (0.003)
C&I Share	0.144*** (0.022)	0.144*** (0.022)	-0.793*** (0.232)	-0.793*** (0.232)	-0.056** (0.022)	-0.056** (0.022)	-0.012** (0.006)	-0.012** (0.006)
CRE Share	0.108*** (0.012)	0.108*** (0.012)	0.147 (0.145)	0.147 (0.145)	-0.061*** (0.014)	-0.061*** (0.014)	-0.005 (0.003)	-0.005 (0.003)
Tier1 Capital Ratio	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Observations	343712	341700	350287	341700	342142	341698	352720	341701
Adjusted R <sup>2</sup>	0.294	0.294	0.507	0.510	0.304	0.304	0.018	0.017
Quarter Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4: OTS Extinction and Small Business Lending

Table 4 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the supply of small business lending by former OTS banks. The dependent variable  $\text{Ln}(\text{Total Loans})$  is the total amount of small business loans (i.e., loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year.  $\text{OTS}$  is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision.  $\text{Post}$  is an indicator variable that takes the value of one for all years between 2011 and 2015 and zero for all years between 2005 and 2010.  $\text{Ln}(\text{HPI})$  is the natural logarithm of a house price index (HPI) calculated for each bank and each county where that bank has a branch network presence. The HPI is calculated using the all-transactions indexes at the zip code level provided by the Federal Housing Finance Agency. We calculate the HPI for each bank in each county by weighting the HPI of each zip code where the bank has a branch by the share of county deposits that the bank holds in that zip code. The index is designed to capture potential and absorb potential systematic differences in the location strategies of former OTS and commercial banks within a county location. Baseline controls include linear and quadratic terms for the number of branches and the total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\text{Ln}(\text{Total Loans})$					
OTS $\times$ Post	0.206*** (0.041)	0.088** (0.039)	0.152*** (0.041)	0.204*** (0.041)	0.094** (0.039)	0.158*** (0.042)
Ln(HPI)				0.266*** (0.041)	0.206 (0.159)	0.450** (0.203)
Observations	139277	130989	116550	129310	123123	109740
Adjusted $R^2$	0.755	0.864	0.881	0.754	0.865	0.883
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	No	No
County Fixed Effects	Yes	No	No	Yes	No	No
Bank Fixed Effects	Yes	No	No	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes	No	No	Yes

Table 5: OTS Extinction and Small Business Lending: Excluding the Largest Banks

Table 5 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the supply of small business lending by former OTS banks after excluding the top 4 banks in the United States (columns (1)–(3)) or alternatively excluding the top 20 banks by volume of small business lending over the entire period of analysis (columns (4)–(6)). The dependent variable  $\text{Ln}(\text{Total Loans})$  is the total amount of small business loans (i.e., loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years after 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Loans)					
OTS $\times$ Post	0.226*** (0.040)	0.134*** (0.040)	0.152*** (0.041)	0.199*** (0.040)	0.119*** (0.042)	0.147*** (0.043)
Observations	115891	106988	95445	84719	73760	61495
Adjusted $R^2$	0.755	0.859	0.875	0.761	0.853	0.865
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	No	No
County Fixed Effects	Yes	No	No	Yes	No	No
Bank Fixed Effects	Yes	No	No	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes	No	No	Yes
Excluded Observations?	Top4	Top4	Top4	Top20 SBL	Top20 SBL	Top20 SBL

Table 6: OTS Extinction and Small Business Lending: Role of Capitalization

Table 6 reports the coefficients of OLS regressions. Columns (1) and (2) repeat the analysis of Column (2) of Table 4 after stratifying the sample based on above- and below-median levels of Tier 1 Capital Ratio of the former OTS banks subsample prior to the OTS extinction and Columns (3) and (4) repeat the analysis of Column (2) of Table 4 after stratifying the sample based on above- and below-median levels of the Tier 1 leverage ratio (Tier 1 Capital divided total non-risk weighted assets) of the former OTS banks subsample prior to the OTS extinction. The dependent variable  $\ln(\text{Total Loans})$  is the total amount of small business loans (i.e., loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years between 2011 and 2015 and zero for all years between 2005 and 2010. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Ln(Total Loans)			
	High Tier1	Low Tier1	High T1 Lev. Ratio	Low T1 Lev. Ratio
OTS × Post	0.265*** (0.061)	-0.227*** (0.070)	0.382*** (0.077)	-0.062 (0.063)
Observations	19197	88309	13984	93989
Adjusted $R^2$	0.838	0.868	0.865	0.859
Baseline Controls	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes

Table 7: OTS Extinction, Changes in Bank Management, and Lending

Panel A of Table 7 reports coefficients of OLS regressions investigating the direct effect of the OTS extinction on changes in bank and loan management. *Board Turnover* is the ratio between the number of entries and exits in the board of the bank and the average number of board members over the year, *Exec.Exit* is an indicator variable that takes the value of one if an executive director of the bank exits during the year, and *Risk Model* is an indicator variable that takes the value of one if the bank discloses risk modeling, i.e., the 10-K mentions the words "risk" and "model" within ten words of each other, similar to [Bhat et al., 2018](#). *OTS* is an indicator variable that takes the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all quarters between 2011:Q3 and 2015:Q4 and zero for all quarters between 2005:Q1 and 2011:Q2. The empirical specifications of Columns (2), (4), and (6) include baseline controls for  $\ln(\text{Assets})$ , *Share Residential*, *Share C&I*, *Share CRE*, and *Tier1 Capital Ratio*, which we define in Table 3. These variables are measured at an annual frequency as of the fourth quarter of the respective year. We control for the board size non-parametrically by including board size fixed-effects in equations (1)–(4) and we also control for the natural logarithm of number of words in the 10-K in Columns (5) and (6). Panel B of this Table investigates the role that changes in bank management play in mediating the association between the OTS extinction and small business lending. Columns (1) and (2) of Panel B repeat the analysis of Column (2) of Table 4 after stratifying the sample based on below- and above-median post-OTS extinction board turnover. Columns (3) and (4) of Panel B repeat the analysis of Column (2) of Table 4 after stratifying the sample based on whether an executive director of the bank left the company following the regulatory transition. Columns (5) and (6) of Panel B repeat the analysis of Column (2) of Table 4 after stratifying the sample based on whether the bank adopted credit risk modeling after the regulatory transition. We code a bank as *adopting* risk modeling if it discloses risk modeling (as defined in Panel A) in at least one year after the OTS extinction but *not* in any of the years prior to the regulatory transition. All variables in this analysis are defined in Table 4. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. In Panel A, we assign banks to counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

**Panel A: Changes in Bank and Loan Management following OTS Extinction**

	(1)	(2)	(3)	(4)	(5)	(6)
	Board Turnover		Exec. Exit		Risk Model	
OTS × Post	0.021*** (0.004)	0.021*** (0.004)	0.040*** (0.011)	0.040*** (0.012)	0.076*** (0.022)	0.084*** (0.023)
Observations	3462	3436	3462	3436	3790	3749
Adjusted $R^2$	0.072	0.073	0.041	0.036	0.668	0.669
Baseline Controls	No	Yes	No	Yes	No	Yes
Quarter Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

**Panel B: Bank Lending following OTS Extinction: Role of Management Changes**

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Loans)					
	Low Brd Turn.	Hi Brd Turn.	No Exec.Exit	Exec.Exit	No Model	Model Adopt
OTS × Post	0.145 (0.121)	0.386*** (0.138)	0.073 (0.087)	0.806*** (0.261)	0.359*** (0.106)	1.045*** (0.357)
Observations	13043	12584	27217	1691	11922	563
Adjusted $R^2$	0.864	0.850	0.865	0.800	0.838	0.851
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes



Table 8: OTS Extinction and Mortgage Lending (Census Tract)

Table 8 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the volume of mortgage loans. The dependent variable,  $\ln(\text{Total Mortgage Loans})$ , is the total amount of mortgage loans originated by a depository institution in a census tract over a calendar year. *OTS* is an indicator variable that takes the value of one if the primary regulator of the depository institution in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years after 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Ln(Total Mortgage Loans)		
OTS $\times$ Post	-0.037**	-0.129***	-0.159***
	(0.017)	(0.021)	(0.022)
Observations	5289970	4835833	4818314
Adjusted $R^2$	0.527	0.672	0.650
Baseline Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No
Census-Tract Fixed Effects	Yes	No	No
Bank Fixed Effects	Yes	No	No
Census-Tract $\times$ Year Fixed Effects	No	Yes	Yes
Bank $\times$ Census Tract Fixed Effects	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes

Table 9: OTS Extinction and Small Business Lending: Portfolio Reallocation

Table 9 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on small business lending after partitioning the sample based on the difference in the portfolio allocations of commercial banks and former OTS banks within the jurisdiction of each OCC field office. Columns (1) and (2) repeat the empirical specification of Column (2) of the main table in the paper after partitioning the sample based on whether a bank belongs to the jurisdiction of an OCC field office with below- or above-median differences in the C&I lending shares of commercial banks (national banks) and former OTS banks. Columns (3) and (4) repeat the empirical specification of Column (2) of the main table in the paper after partitioning the sample based on whether a bank belongs to the jurisdiction of an OCC field office with below- or above-median differences in the real estate lending shares of commercial banks (national banks) and former OTS banks. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years between 2011 and 2015 and zero for all years between 2005 and 2010. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Ln(Total Loans)			
	Large Diff. C&I	Small Diff. C&I	Large Diff. Residential	Small Diff. Residential
OTS × Post	0.194*** (0.047)	-0.214** (0.085)	0.197*** (0.060)	-0.014 (0.055)
Observations	56035	54049	54711	55640
Adjusted $R^2$	0.859	0.864	0.859	0.863
Baseline Controls	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes

Table 10: OTS Extinction and Small Business Lending: Controlling for Mortgage Lending

Table 10 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on small business lending after controlling for changes in the volume of mortgage originations and the likelihood of rejection for mortgage applications. The dependent variable  $\ln(\text{Total Loans})$  is the total amount of small business loans (i.e., loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year.  $OTS$  is an indicator variable that takes the value of one if the primary regulator of the depository institution in the first and second quarter of 2011 was the Office of Thrift Supervision.  $Post$  is an indicator variable that takes the value of one for all years after 2011 (inclusive).  $\% \text{ Residential} + \text{ CRE}$  is the percentage of the portfolio of loans that is allocated to residential and CRE loans.  $\ln(\text{Mortgage Originations})$  is natural logarithm of the volume of mortgage loans originated by a bank in each county during the year obtained from the HMDA data set.  $\text{Av. Bank Mort. Rej. Rate}$  is the average fraction of mortgage applications that a bank rejects during a year computed from the HMDA data set.  $\text{Av. Bank-County Mort. Rej. Rate}$  is the average fraction of mortgage applications that a bank rejects in a county during a year computed from the HMDA data set. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Ln(Total Loans)				
OTS $\times$ Post	0.088** (0.039)	0.087** (0.038)	0.089** (0.038)	0.094** (0.038)	0.095** (0.038)
% (Residential + CRE)		-0.256** (0.099)	-0.552*** (0.101)	-0.586*** (0.101)	-0.592*** (0.101)
Ln(Mortgage Originations)			0.101*** (0.005)	0.100*** (0.005)	0.101*** (0.005)
Av. Bank Mort. Rej. Rate				-0.325*** (0.029)	-0.340*** (0.031)
Av. Bank-County Mort. Rej. Rate					0.042 (0.028)
Observations	130989	129389	125314	124959	124959
Adjusted $R^2$	0.864	0.865	0.866	0.866	0.866
Baseline Controls	Yes	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 11: OTS Extinction and Lending Rates

Table 11 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on interest rates of the most common mortgage lending and commercial lending product in the RateWatch dataset. The dependent variables are *Rate 30 Yr.* and *Rate Com. Equip.*. *Rate 30 Yr.* is the interest rate reported by a rate setter office of a depository institution on a 30 year fixed rate mortgage loan with principal amount of \$175k. *Rate Com. Equip.* is the interest rate reported by a rate setter office of a depository institution on a loan secured by commercial equipment whose loan principal amount is \$250k. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all months after July 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Rate 30 Yr. Fixed	Rate Com. Equip.		
OTS × post	0.090** (0.039)	0.104** (0.044)	-0.231* (0.139)	-0.304** (0.146)
Observations	128404	128168	14038	13978
Adjusted $R^2$	0.895	0.909	0.742	0.775
Baseline Controls	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	No	Yes	No
Branch (Rate-Setter) Fixed Effects	No	Yes	No	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes

Table 12: OTS Extinction and Entry and Exit of Local Business Establishments

Table 12 reports the coefficients of OLS and WLS regressions. The specifications Columns (2) and (4) present coefficients from specification where each county observation is weighted by the total employment in that county. The dependent variable in Columns (1) and (2),  $\ln(\text{Entry Rate})$ , is the natural logarithm of the entry rate of new establishments in a given county and year. Entry rate is the ratio between the number of new establishments and the number of existing establishments at the beginning of the year. The dependent variable in Columns (3) and (4),  $\ln(\text{Exit Rate})$ , is the natural logarithm of the exit rate of establishment in a given county and year. Exit rate is defined as the ratio between the number of establishment that exit the market and the total number of establishments at the beginning of the year. *Share OTS* is the share of county deposits held in former OTS institution as of June 30th, 2010. *Post* is an indicator variable that takes the value of one for all years between 2006 and 2013 and zero for all years between 2006 and 2010. Baseline controls include linear and quadratic terms for the total number of branches and total amount of deposits held in each county and controls for the logarithm of the number of establishments in the county that employ 1–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499 people, and total number of establishments in the county.

	(1)	(2)	(3)	(4)
	Ln(Entry Rate)		Ln(Exit Rate)	
Share OTS $\times$ Post	0.055*	0.064**	0.090***	0.056**
	(0.031)	(0.025)	(0.026)	(0.022)
Observations	9,593	9,593	9,593	9,593
Adjusted R-squared	0.792	0.936	0.738	0.919
Baseline Controls	Yes	Yes	Yes	Yes
Employment Weighted	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes

# Online Appendix for "The Death of a Regulator: Strict Supervision, Bank Lending, and Business Activity"

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**Table OA.7:** Robustness - OTS Extinction and Small Business Lending controlling for Top 4 Banks and TARP Recipient Banks

**Table OA.8:** Robustness - OTS Extinction and Small Business Lending - Proforma Banks after Mergers and Acquisitions

**Table OA.9:** Robustness - OTS Extinction and Small Business Lending - Impact of Other Dodd-Frank Provisions

**Table OA.10:** Robustness - OTS Extinction and Small Business Lending - CRA Ratings

**Table OA.11:** Robustness - OTS Extinction and Small Business Lending - Addressing Skewness in the Dependent Variable

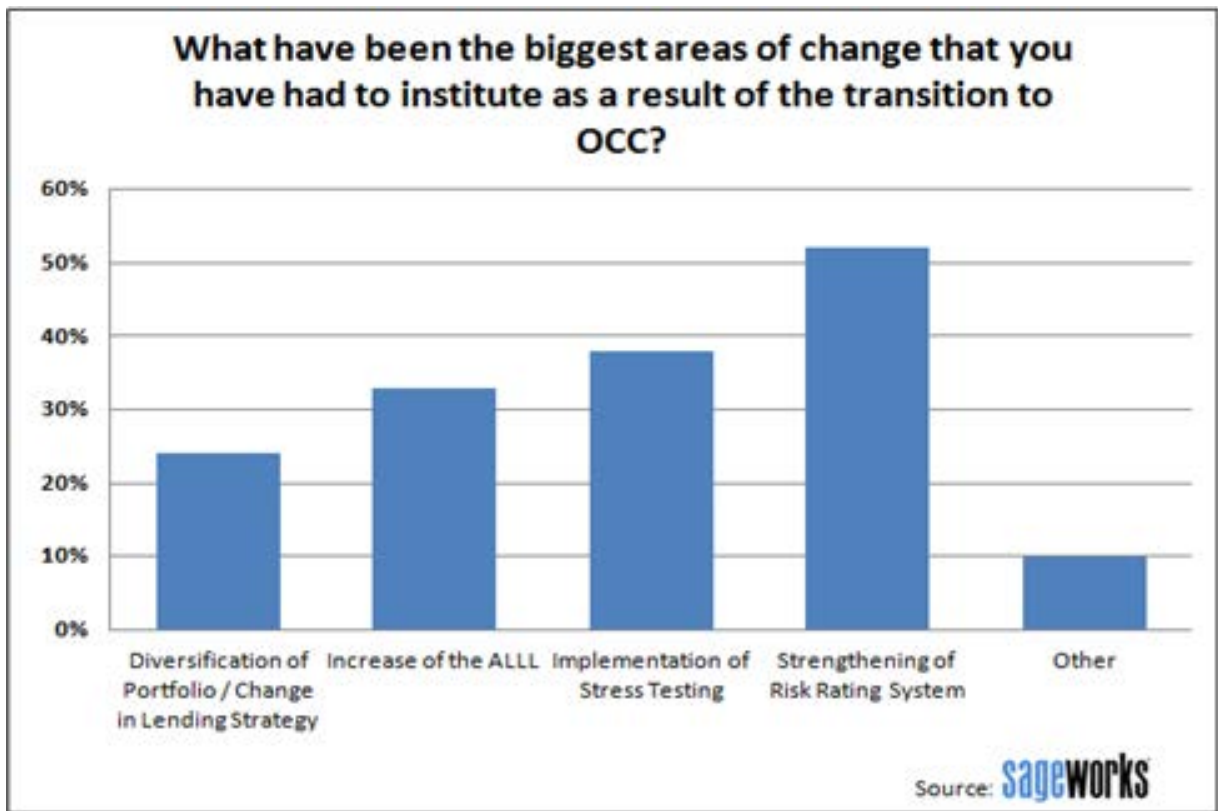
**Table OA.12:** OTS Extinction and Small Business Lending: Local Credit Supply by Competitors

**Table OA.13:** OTS Extinction and Mortgage Lending (Likelihood of Application Rejection)

**Table OA.14:** OTS Extinction, Entry and Exit and Dependence on External Sources of Finance

Figure OA.1: Sageworks Survey

Figure OA.1 is a bar chart obtained from a survey of bankers that asked “What have been the biggest areas of change that you have had to institute as a result of the transition to OCC?”. The survey was made in the context of a webinar by Sageworks covering the topic of “OTS to OCC: What ALLL Challenges Still Exist”.



## Figure OA.2: Example passages from OCC Enforcement Action on Former OTS

In this appendix, we show passages from OCC Enforcement Actions and formal written agreements between the OCC and former OTS banks. Panel A shows the third section of the formal written agreement between the OCC and Delanco Federal Savings Bank of November 21st, 2012 requiring Delanco's Board to ensure competent management by means of hiring new managers or providing additional training to existing managers that continue in their position. Panel B shows shows the sixth section of the formal written agreement between the OCC and Amory Federal Savings & Loans Association of July 19th, 2012 requiring Amory's management to implement new loan portfolio management practices. Panel C shows shows the sixth section of the formal written agreement between the OCC and Community Bank, Staunton, Virginia of August 9th, 2012 requiring Community Bank's management to implement new credit risk management practices.

### **Panel A:** Formal Written Agreement between OCC and Delanco, FSB.

#### ARTICLE III

##### BOARD TO ENSURE COMPETENT MANAGEMENT

(1) The Board shall ensure that the Bank has competent management in place on a full-time basis in its Chief Executive Officer, Chief Financial Officer, and Vice President of Commercial Lending positions to carry out the Board's policies, ensure compliance with this Agreement, applicable laws, rules and regulations, and manage the day-to-day operations of the Bank in a safe and sound manner.

(4) If the Board determines that an officer will continue in his/her position but that the officer's depth of skills needs improvement, the Board will within sixty (60) days develop and implement a written program, with specific time frames, to improve the officer's supervision and management of the Bank. At a minimum, the written program shall include:

- (a) an education program designed to ensure that the officer has skills and abilities necessary to supervise effectively;

### **Panel B:** Formal Written Agreement between OCC and Amory Federal Savings & Loans Association.

#### ARTICLE VI

##### LOAN PORTFOLIO MANAGEMENT

(1) The Board shall, within sixty (60) days, develop, implement, and thereafter ensure Bank adherence to a written program to improve the Bank's loan portfolio management. The program shall include, but not be limited to:

- (a) procedures to ensure satisfactory and perfected collateral documentation;
- (b) procedures to ensure that extensions of credit are granted, by renewal or otherwise, to any borrower only after obtaining and analyzing current and satisfactory credit information;



**Panel C:** Formal Written Agreement between OCC and Community Bank, Staunton, Virginia.

Article VI

CREDIT RISK MANAGEMENT

(1) Within sixty (60) days, the Board shall develop, implement, and thereafter ensure Bank adherence to a written program to improve the Bank's credit risk management consistent with the guidance set forth in the OCC Handbook "Rating Credit Risk". The program shall include, but not be limited to:

- (a) procedures to ensure accurate and timely risk grades, including loss recognition and identification of nonaccrual loans;
- (b) procedures for early problem loan identification;
- (c) procedures for establishing loan officer and credit administration accountability for failure to assign accurate and timely risk grades on loans, including recognition of nonaccrual status under their respective supervision;
- (d) implementation of an effective credit risk training program for all lending staff, internal loan review staff, financial analysts, and members of the Directors Loan Committee;
- (e) stress testing of higher risk loan concentration categories (non-owner occupied, commercial real estate (CRE), land, and construction loans),

Figure OA.3: Small Business Lending and OTS Extinction: Estimated Impact over Time in the Census Tract sample

Figure OA.3 plots the average impact of OTS supervision on small business lending in each year of the sample period. The shallow circles represent the series of coefficients  $\beta_t$  from expanding the model specification in column (2) of Table OA.5 to include a set of interaction variables between year dummies and the share of deposits held in former OTS institution in each census tract as of June 30th, 2010. Data on small business lending is from the Community Reinvestment Act Small Business Lending Dataset

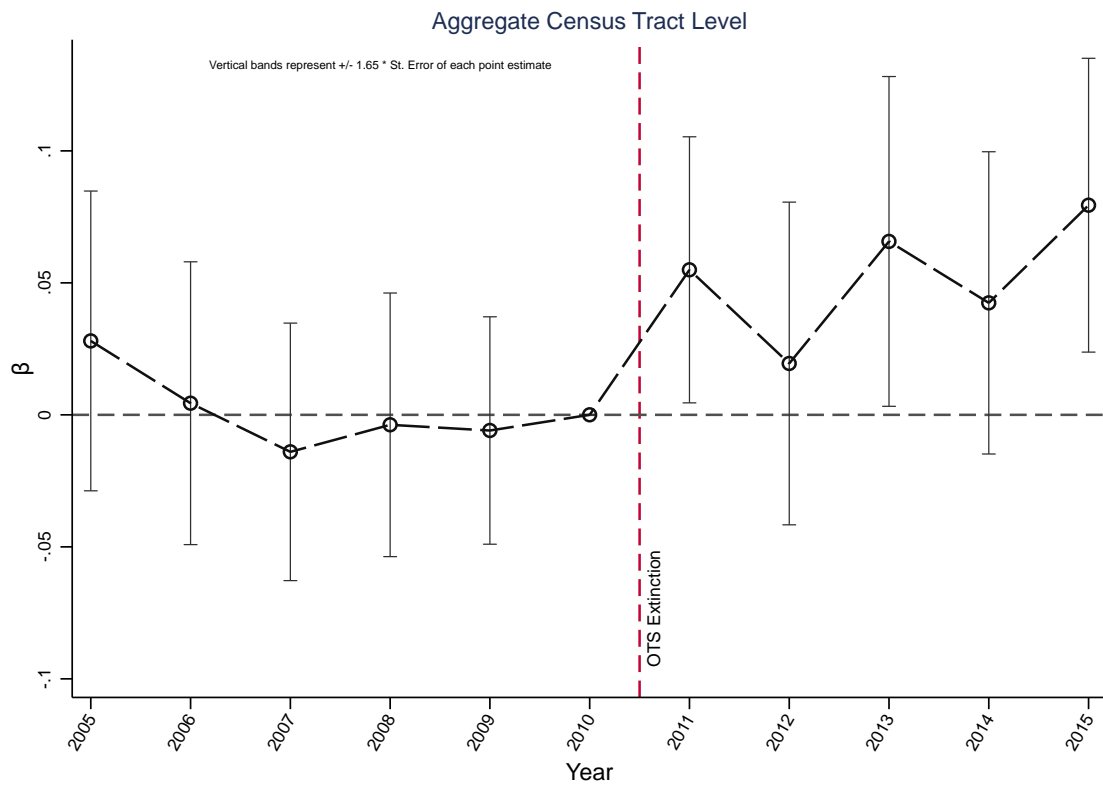


Figure OA.4: OTS Extinction and Mortgage Lending (Census Tract): Estimated Impact over Time

Figure OA.4 plots the average impact of OTS supervision on mortgage lending in each year of the sample period. The shallow circles represent the series of coefficients  $\beta_t$  from expanding the model specification in column (4) of Table ?? to include a set of interaction variables between year dummies and a dummy variable taking the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision and the vertical bands represent 90% confidence intervals for the point estimates in each quarter.

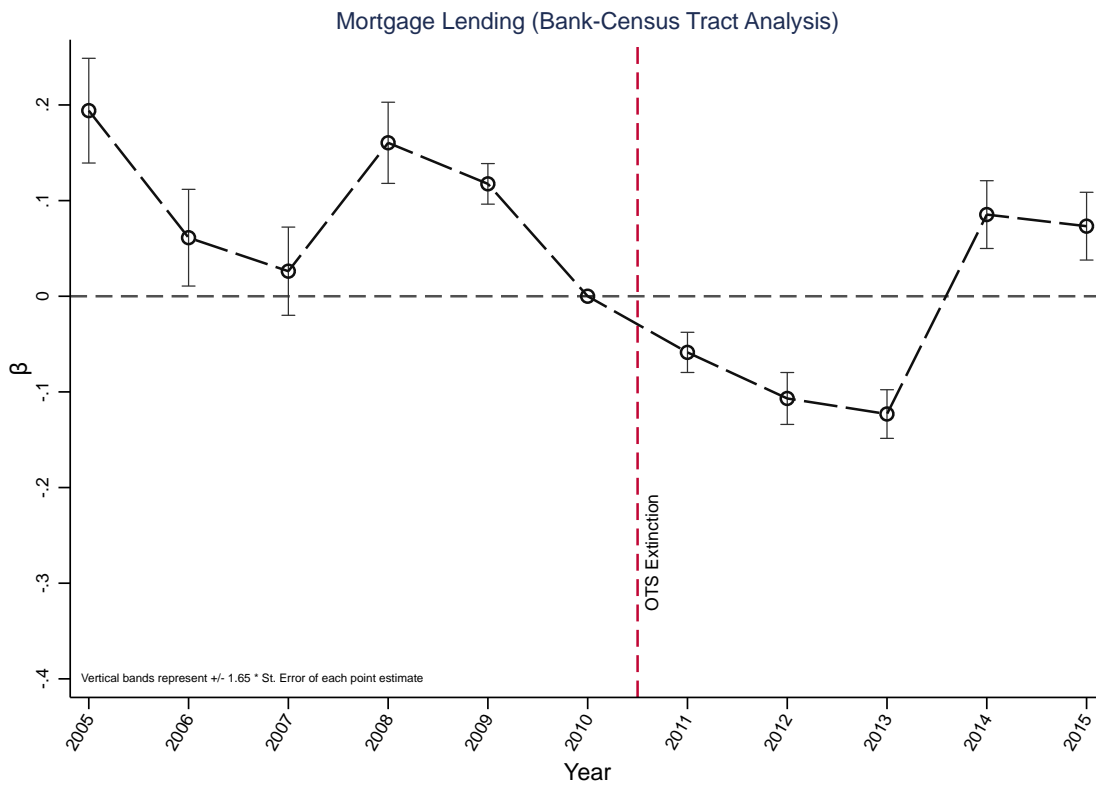


Figure OA.5: OTS Extinction and Mortgage Lending (Likelihood of Application Rejection): Impact over Time

Figure OA.5 plots the average impact of OTS supervision on the rejection rate of mortgage loans in each year of the sample period. The shallow circles represent the series of coefficients  $\beta_t$  from the following model specification:  $Reject_{ibct} = \alpha_{bc} + \gamma_{ct} + \delta X_i + \sum_t \beta_t OTS_b \times Year_t + \epsilon_t$ , where  $i$  indexes for the mortgage application  $i$  in census tract  $c$  to bank  $b$  during year  $t$ . The vector  $X_i$  includes a number of characteristics of the application, namely loan occupancy status, property type, lien status, loan-to-income ratio, applicant's ethnicity, and applicant's race.  $OTS$  is an indicator variable that takes the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision and the vertical bands represent 90% confidence intervals for the point estimates in each quarter.  $Year$  is a series of indicator variables that takes the value of one for each year between 2005 and 2015.

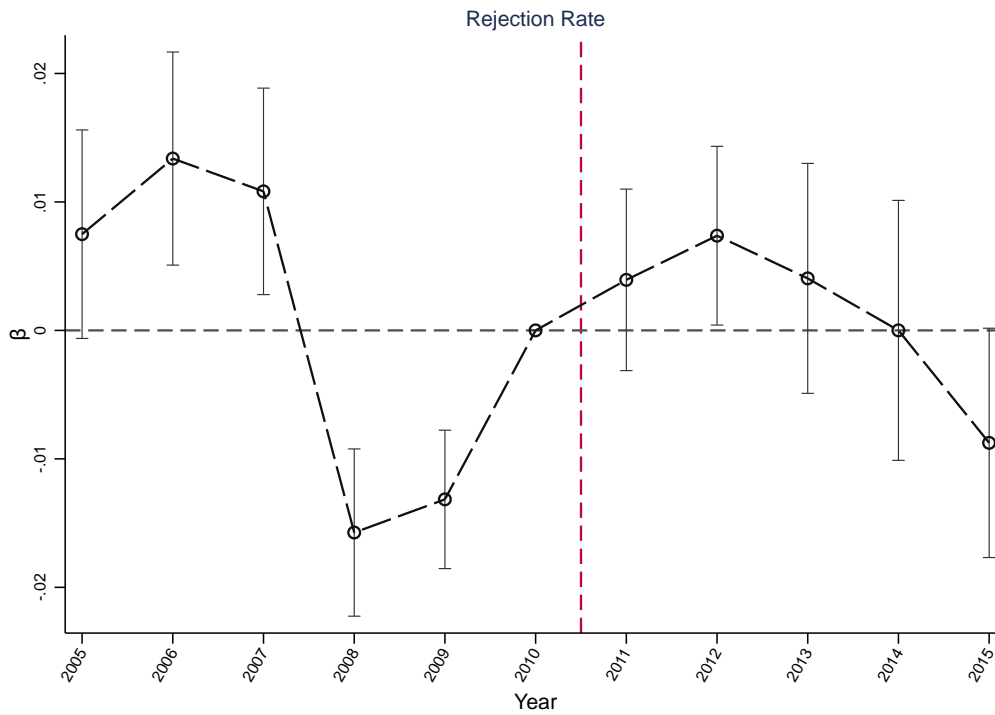


Figure OA.6: Geographic Distribution of OTS Deposit Share

Figure OA.6 represents the fraction of total bank deposits in a county accounted for by depository institutions whose primary regulator was the OTS in 2010. Data on branch deposits of OTS banks is from the Federal Deposit Insurance Corporation's Summary of Deposits Database.

### Share of Deposits held in Branches of former OTS banks (2010) All U.S. Counties

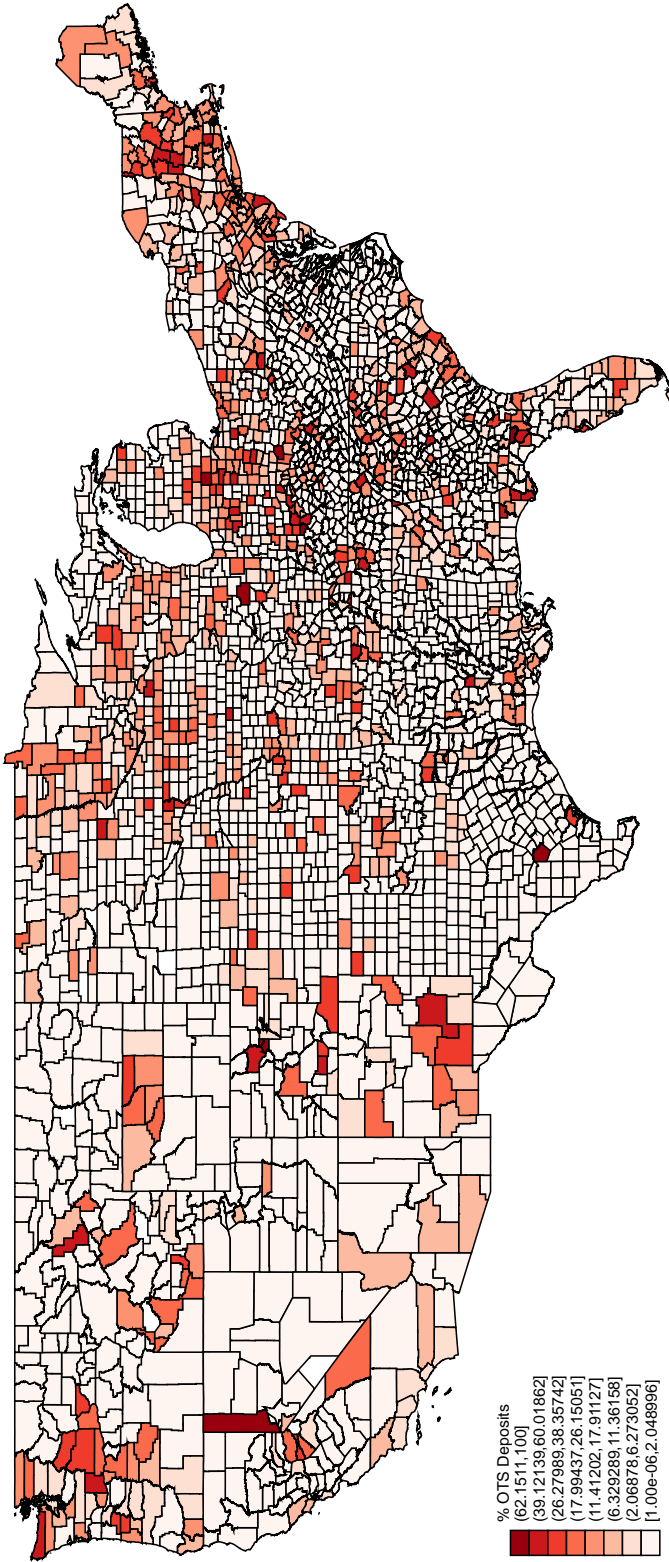


Figure OA.7: OTS Extinction and Business Entry and Exit Rates: Impact over Time

Figure OA.7 plots the average impact of exposure to OTS commercial banks on entry and exit of (business) establishments at the county level in each year of the sample period. In the left figure, the shallow circles represent the series of coefficients  $\beta_t$  from expanding the model specification in column (2) of Table 12 to include a set of interaction variables between year dummies and the share of deposits held in former OTS institution in each county as of June 30th, 2010, and the vertical bands represent 90% confidence intervals for the point estimates in each quarter. In the right figure, the shallow circles represent the series of coefficients  $\beta_t$  from expanding the model specification in column (4) of Table 12 to include a set of interaction variables between year dummies and the share of deposits held in former OTS institution in each county as of June 30th, 2010. Data on entry and exit of businesses at the county level is from the Census Bureau's Statistics of US Businesses and data on the share of deposits in former OTS institutions is from the FDIC's Summary of Deposits.

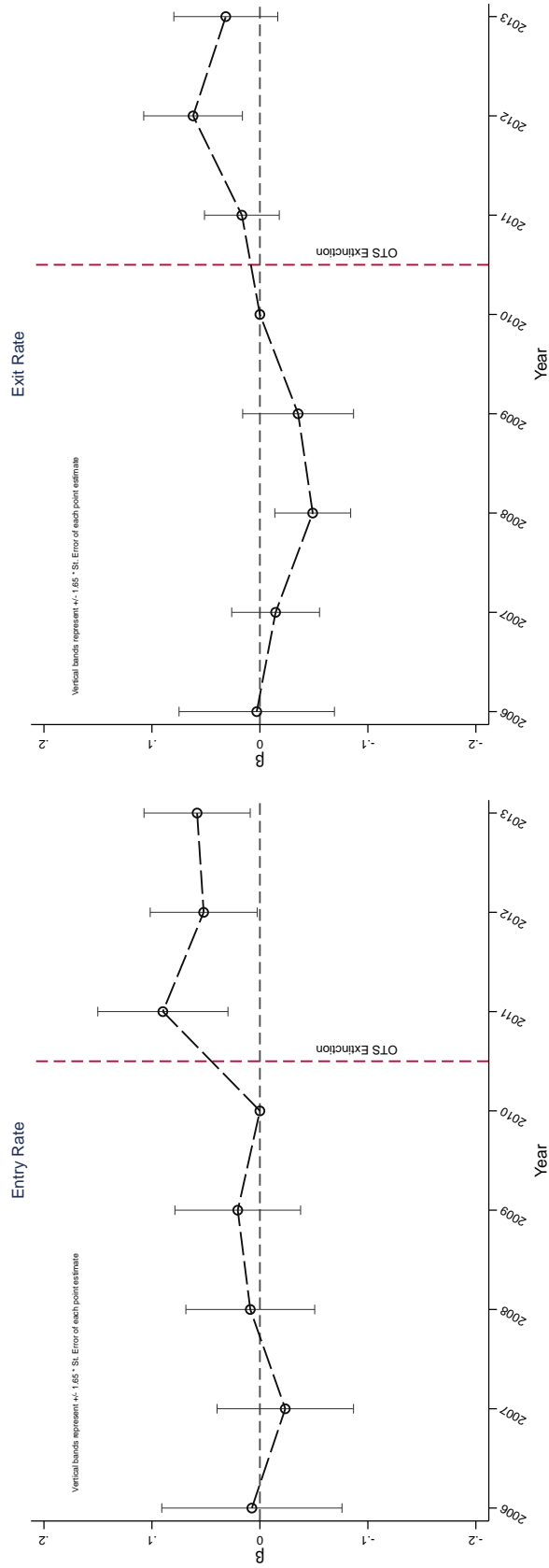


Table OA.1: OTS Extinction and Loan Loss Recognition - Transition to OCC or FDIC

Table OA.1 reports the coefficients of OLS regressions investigating whether the effect of the OTS extinction on loan loss recognition depends on whether the new regulator of the former OTS banks was the OCC or the FDIC. The dependent variables are the *Loan Loss Provision Ratio*, *Nonperforming Loan Ratio*, *Charge-Off Ratio*, and *ALLL Ratio*. *Loan Loss Provision Ratio* is defined as the ratio between Loan Loss Provisions (RIAD4230) and total assets (RCFD2170). *Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *Charge-Off Ratio* is the ratio of total charge-offs (RIAD435) and total assets (RCFD2170). *Enf. Act* is an indicator variable if the bank received a cease and desist or a consent order during the quarter. *OTS* → *OCC* is an indicator variable that takes the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision and it transitioned to the OCC following the OTS extinction. *OTS* → *FDIC* is an indicator variable that takes the value of one if the depository institution's primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision and it transitioned to the FDIC following the OTS extinction. *Post* is an indicator variable that takes the value of one for all quarters after 2011Q3 (inclusive). *Ln(Assets)* is the natural logarithm of total assets (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share C&I* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCFD2746) and total assets (RCFD2170). *Tier1 Capital Ratio* is the Tier 1 capital ratio of the financial institution (RCFD7206). Standard errors are presented in parentheses, and are clustered at the level of the county, where banks are assigned into counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Loan Loss Provision Ratio	Nonperforming Loan Ratio	Charge-Off Ratio	Enf. Act
OTS → OCC × Post	0.016*** (0.002)	0.393*** (0.019)	0.026*** (0.002)	0.003*** (0.000)
OTS → FDIC × Post	0.041*** (0.002)	0.073*** (0.021)	0.026*** (0.002)	0.001** (0.000)
Ln(Assets)	0.002 (0.003)	-0.024 (0.040)	0.011*** (0.004)	0.004*** (0.001)
Residential Share	0.014 (0.014)	1.215*** (0.214)	0.044** (0.021)	0.003 (0.003)
CRE Share	0.137*** (0.010)	0.429*** (0.134)	-0.024* (0.012)	0.001 (0.003)
C&I Share	0.170*** (0.020)	-0.602*** (0.215)	-0.030 (0.020)	-0.007 (0.006)
Tier1 Capital Ratio	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Observations	312734	312734	312732	312735
Adjusted R <sup>2</sup>	0.279	0.515	0.300	0.015
Quarter Fixed-Effects	Yes	Yes	Yes	Yes
Bank Fixed-Effects	Yes	Yes	Yes	Yes

Table OA.2: OTS Extinction and Strict Supervision: The Role of Local Economic Conditions

Table OA.2 reports the coefficients of OLS regressions investigating whether the effect of the OTS extinction depends on the exposure of the bank to areas with significant house price decline in the 2007–2010 period. We stratify the sample based on a bank-specific measure of exposure to house price declines in the 2007–2010 period. The house price decline measure is computed as the weighted average on the house price declines in the counties where banks have a branch presence and the weighted are defined by the share of deposits of each bank in the county in 2007. The Hi. HPI decline sample is defined as banks whose weighted house price index fell by more than 17% between 2007 and 2010. The Med. HPI decline sample is comprised of banks whose weighted house price index fell between two and seventeen percent between 2007 and 2010. The Low HPI decline sample are those banks whose weighted house price index either rose or fell less than two percent between 2007 and 2010. The dependent variables are the *Nonperforming Loan Ratio* and *Enf. Act. Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *Enf. Act.* is an indicator variable if the bank received a cease and desist or a consent order during the quarter. *Post* is an indicator variable that takes the value of one for all quarters after 2011Q3 (inclusive). *Ln(Assets)* is the natural logarithm of total assets (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share C&I* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCON2746) and total assets (RCFD2170). *Tier1 Capital Ratio* is the Tier 1 capital ratio of the financial institution (RCFD7206). Standard errors are presented in parentheses, and are clustered at the level of the county, where banks are assigned into counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	Nonperforming Loan Ratio						Enf. Act.		
	Hi. HPI Shock	Med. HPI Shock	Low HPI Shock	Hi. HPI Shock	Med. HPI Shock	Low HPI Shock	Hi. HPI Shock	Med. HPI Shock	Low HPI Shock
OTS × Post	0.383*** (0.052)	0.227*** (0.021)	0.305*** (0.024)	0.008*** (0.001)	0.000 (0.000)	0.004*** (0.001)			
Ln(Assets)	-0.055 (0.057)	-0.023 (0.052)	-0.080 (0.057)	0.005*** (0.001)	0.003** (0.001)	0.004** (0.002)			
Residential Share	1.675*** (0.388)	0.750*** (0.183)	0.599** (0.255)	0.011 (0.009)	-0.006 (0.004)	0.007 (0.007)			
CRE Share	0.828*** (0.270)	0.392** (0.164)	0.611** (0.260)	0.001 (0.006)	0.005 (0.004)	-0.000 (0.006)			
C&I Share	-1.161*** (0.422)	-0.788** (0.309)	0.439 (0.324)	-0.020 (0.013)	0.001 (0.008)	0.002 (0.009)			
Tier1 Capital Ratio	-0.000 (0.000)	-0.000 (0.000)	-0.003*** (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)			
Observations	68359	137036	68692	68359	137036	68693			
Adjusted R <sup>2</sup>	0.561	0.515	0.476	0.016	0.013	0.008			
Quarter Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes			
Bank Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes			



Table OA.3: OTS Extinction and Strict Supervision: Heterogeneity across OTS Divisions

Table OA.3 reports the coefficients of OLS regressions investigating whether the effect of the OTS extinction varies across the different OTS regional divisions. We stratify the sample based on whether the headquarters of the bank is located in one of the states covered by the West regional division of the OTS. The dependent variables are the *Nonperforming Loan Ratio* and *Enf. Act.* *Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *Enf. Act.* is an indicator variable if the bank received a cease and desist or a consent order during the quarter. *Post* is an indicator variable that takes the value of one for all quarters after 2011Q3 (inclusive).  $\ln(\text{Assets})$  is the natural logarithm of total assets (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share C&I* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCFD2746) and total assets (RCFD2170). *Tier1 Capital Ratio* is the Tier 1 capital ratio of the financial institution (RCFD7206). Standard errors are presented in parentheses, and are clustered at the level of the county, where banks are assigned into counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	Nonperforming Loan Ratio		Enf. Act.	
	Central & NE & SE	West	Central & NE & SE	West
OTS $\times$ Post	0.301*** (0.028)	0.421*** (0.022)	0.002*** (0.001)	0.005*** (0.000)
Ln(Assets)	-0.008 (0.064)	0.003 (0.046)	0.003*** (0.001)	0.006*** (0.001)
Residential Share	1.618*** (0.355)	0.944*** (0.222)	0.007* (0.004)	-0.000 (0.006)
CRE Share	0.079 (0.204)	0.059 (0.253)	-0.007* (0.004)	-0.004 (0.005)
C&I Share	-1.276*** (0.329)	-0.282 (0.336)	-0.008 (0.007)	-0.018** (0.007)
Tier1 Capital Ratio	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000** (0.000)
Observations	204938	136762	204938	136763
Adjusted $R^2$	0.529	0.472	0.016	0.018
Quarter Fixed-Effects	Yes	Yes	Yes	Yes
Bank Fixed-Effects	Yes	Yes	Yes	Yes

Table OA.4: OTS Extinction and Strict Supervision: Interaction of Post with Composition Variables

Table OA.4 reports the coefficients of OLS regressions investigating whether the effect of the OTS extinction depends on the exposure of the bank to areas with significant house price decline in the 2007–2010 period. We stratify the sample based on a bank-specific measure of exposure to house price declines in the 2007–2010 period. The house price decline measure is computed as the weighted average on the house price declines in the counties where banks have a branch presence and the weighted are defined by the share of deposits of each bank in the county in 2007. The Hi. HPI decline sample is defined as banks whose weighted house price index fell by more than 17% between 2007 and 2010. The Med. HPI decline sample is comprised of banks whose weighted house price index fell between two and seventeen percent between 2007 and 2010. The Low HPI decline sample are those banks whose weighted house price index either rose or fell less than two percent between 2007 and 2010. The dependent variables are the *Nonperforming Loan Ratio* and *Enf. Act.* *Nonperforming Loan Ratio* is defined as the sum of total loans that are 90 days past due and still accruing (RCFD1407) and total nonaccrual loans (RCFD1407) divided by total assets (RCFD2170). *Enf. Act.* is an indicator variable if the bank received a cease and desist or a consent order during the quarter. *Post* is an indicator variable that takes the value of one for all quarters after 2011Q3 (inclusive). *Ln(Assets)* is the natural logarithm of total assets (RCFD2170). *Share Residential* is the ratio of residential real estate loans (RCON1797+RCON5367+RCON5368) and total assets (RCFD2170). *Share C&I* is the ratio of commercial and industrial loans (RCFD1766) and total assets (RCFD2170). *Share CRE* is the ratio of commercial and real estate loans (RCON1415+RCON1460+RCON1480+RCFD2746) and total assets (RCFD2170). *Tier1 Capital Ratio* is the Tier 1 capital ratio of the financial institution (RCFD7206). Standard errors are presented in parentheses, and are clustered at the level of the county, where banks are assigned into counties by the location of their headquarters. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	Nonperforming Loan Ratio		Enf. Act.					
OTS × Post	0.196*** (0.025)	0.360*** (0.019)	0.434*** (0.013)	0.231*** (0.025)	0.002*** (0.001)	0.003*** (0.000)	0.002*** (0.000)	0.001*** (0.001)
Residential Share	1.079*** (0.212)	1.290*** (0.222)	1.106*** (0.202)	0.892*** (0.204)	0.005* (0.003)	0.007** (0.003)	0.008** (0.003)	0.006* (0.003)
C&I Share	-0.838*** (0.220)	-0.756*** (0.235)	-0.761*** (0.219)	-0.662*** (0.224)	-0.008 (0.005)	-0.009 (0.006)	-0.008 (0.006)	-0.011** (0.006)
CRE Share	0.108 (0.143)	0.133 (0.143)	-0.118 (0.148)	-0.140 (0.151)	-0.000 (0.003)	-0.000 (0.003)	0.001 (0.003)	0.001 (0.003)
Residential Share × Post	0.747*** (0.097)			0.777*** (0.083)	0.005*** (0.002)			0.005*** (0.002)
C&I Share × Post	-0.194 (0.191)			-0.477** (0.194)	0.003 (0.004)			0.010** (0.005)
CRE Share × Post			1.308*** (0.113)	1.387*** (0.118)				-0.007*** (0.002)
Observations	341700	341700	341700	341700	341701	341701	341701	341701
Adjusted R <sup>2</sup>	0.511	0.510	0.513	0.514	0.017	0.017	0.017	0.017
Quarter Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table OA.5: OTS Extinction and Aggregate Small Business Lending by Census Tract

Table OA.5 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on small business lending at the census tract level. The dependent variable  $\text{Ln}(\text{Aggregate Total Loans by Tract})$  is the aggregate total amount of small business loans (loans whose principal amount is below \$1 million) originated by all depository institutions in a census tract over a calendar year.  $\text{Share OTS}$  is the share of deposits held in former OTS institution in each census tract as of June 30th, 2010. We map each branch in the Summary of Deposits (SOD) to its respective census tract using the Census Geocoder available in the United Census Bureau website. We drop 1,773 branch addresses that account for 1.15% of the total number of branches because their latitude and longitude data are missing or their address is improperly recorded. We use the census tract of each branch location to compute measures of the exposure of each census tract to former OTS banks.  $\text{Post}$  is an indicator variable that takes the value of one for all years after 2011 (inclusive).  $\text{Ln}(\text{HPI})$  is the natural logarithm of a house price index (HPI) at the census tract level. The HPI is calculated using the all-transactions indexes at the census tract level provided by the Federal Housing Finance Agency. Baseline controls include linear and quadratic terms for the total number of branches and total amount of deposits held in each census-tract. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Ln(Aggregate Total Loans by Tract)			
Share OTS $\times$ Post	0.054*** (0.021)	0.051*** (0.019)	0.046* (0.024)	0.038* (0.022)
Ln(HPI)			0.424*** (0.025)	0.250*** (0.031)
Observations	241,922	236,254	193,608	188,845
Adjusted R-squared	0.843	0.858	0.839	0.853
Baseline Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	Yes	No
County-Year Fixed Effects	No	Yes	No	Yes
Census Tract Fixed Effects	Yes	Yes	Yes	Yes

Table OA.6: Robustness - OTS Extinction and Small Business Lending Interaction with Size and Weighting Observations

Table OA.6 reports the coefficients of OLS regressions investigating the effect of the OTS extinction after controlling for the effects of bank size. Columns (1) and (2) report results after controlling for the total assets of banks and interactions of this variable. Columns (3) and (4) report coefficients of a WLS regression where each bank-county pair is weighted by the total amount of lending that a bank makes in the county during the sample period. The dependent variable  $Ln(\text{Total Loans})$  is the total amount of small business loans (loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year.  $OTS$  is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision.  $Post$  is an indicator variable that takes the value of one for all years after 2011 (inclusive).  $Ln(\text{Total Assets})$  is the natural logarithm of the total assets of the bank. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Ln(Total Loans)			
OTS $\times$ Post	0.228*** (0.041)	0.135*** (0.039)	0.243*** (0.050)	0.162*** (0.049)
Ln(Total Assets)	0.002 (0.017)	0.198*** (0.019)		
Post $\times$ Ln(Total Assets)	0.009*** (0.003)	0.008*** (0.003)		
Observations	137953	129393	139277	130989
Adjusted $R^2$	0.756	0.865	0.894	0.935
Baseline Controls	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes

Table OA.7: Robustness - OTS Extinction and Small Business Lending controlling for Top 4 Banks and TARP Recipient Banks

Table OA.7 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the supply of small business lending by former OTS banks after conditioning on indicator variables representing whether the bank is among the top 4 banks in the United States and whether the bank received TARP funds. The dependent variable  $\ln(\text{Total Loans})$  is the total amount of small business loans (loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years after 2011 (inclusive). *Top 4* is an indicator variable that takes the value of one for the top 4 banks in the United States (Chen, Hanson, Stein, 2018) *TARP Recipient Bank* is an indicator variable that takes the value of one if the bank or its bank holding company received funds from the TARP program. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Loans)					
OTS $\times$ Post	0.233*** (0.041)	0.122*** (0.039)	0.152*** (0.041)	0.200*** (0.041)	0.079** (0.039)	0.072* (0.043)
Top 4 $\times$ Post	0.155*** (0.017)	0.185*** (0.017)	0.040 (0.082)			
TARP Recipient Bank $\times$ Post				-0.010 (0.014)	-0.016 (0.015)	-0.157*** (0.020)
Observations	139277	130989	116550	139277	130989	116550
Adjusted $R^2$	0.756	0.865	0.881	0.755	0.864	0.882
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	No	No
County Fixed Effects	Yes	No	No	Yes	No	No
Bank Fixed Effects	Yes	No	No	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes	No	No	Yes

Table OA.8: Robustness - OTS Extinction and Small Business Lending - Proforma Banks after Mergers and Acquisitions

Table OA.8 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the supply of small business lending by former OTS banks using the proforma lending of banks that accounts for mergers and acquisitions throughout the period. The dependent variable  $\ln(\text{Total Loans})$  is the total amount of small business loans (loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year.  $OTS$  is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision.  $Post$  is an indicator variable that takes the value of one for all years after 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Ln(Total Loans)		
OTS $\times$ Post	0.229*** (0.043)	0.155*** (0.039)	0.177*** (0.042)
Observations	135384	127890	117019
Adjusted $R^2$	0.746	0.855	0.866
Baseline Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No
County Fixed Effects	Yes	No	No
Bank Fixed Effects	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes

Table OA.9: Robustness - OTS Extinction and Small Business Lending - Impact of Other Dodd-Frank Provisions

Table OA.9 reports the coefficients of OLS regressions investigating the effect of the OTS extinction on the supply of small business lending by former OTS banks after conditioning on indicator variables representing whether the bank holds total assets above \$10 billion and as a result is subject to the regulation of the Consumer Protection Financial Bureau (CFPB) and whether the county is located in a state that allowed *de novo* branching. The dependent variable  $\ln(\text{Total Loans})$  is the total amount of small business loans (loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years after 2011 (inclusive). *Post Dodd-Frank (2010)* is an indicator variable that takes the value of one for all years after 2010 (inclusive). The CFPB and the interstate branching deregulation were enacted immediately after the passage of Dodd-Frank into law on July, 21st, 2010. *Above 10bi* is an indicator variable that takes the value of one if the bank is over \$10 billion in assets and therefore subject to the supervision of the CFPB. *DeNovo Branching State* is an indicator variable that takes the value for all bank-county combinations that are part of a state that did not allow *de novo* interstate branching prior to the passage of Dodd-Frank. We obtain this list of states from Strahan and Rice (2010) and also exclude New York from this list because it deregulated *de novo* branching in 2008. Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
OTS × Post						
	0.202***	0.084**	0.150***	0.204***	0.089**	0.153***
	(0.041)	(0.039)	(0.041)	(0.041)	(0.039)	(0.041)
Above 10bi × Post Dodd-Frank (2010)						
	-0.040***	-0.027*	-0.033*			
	(0.015)	(0.015)	(0.019)			
DeNovo Branching State × Post Dodd-Frank (2010)						
				-0.061***	0.555***	0.702***
				(0.014)	(0.053)	(0.064)
Observations	137953	129393	116096	139277	130989	116550
Adjusted $R^2$	0.756	0.865	0.882	0.755	0.864	0.881
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	Yes	No	No
County Fixed Effects	Yes	No	No	Yes	No	No
Bank Fixed Effects	Yes	No	No	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes	No	No	Yes

Table OA.10: OTS Extinction and CRA Ratings

Panel A of Table OA.10 reports the coefficients of OLS regressions. The dependent variable in columns (1) and (2), *Bad CRA Rating* takes the value of one if the bank was assigned less than a satisfactory CRA Rating (Rating of 3 or 4) in the aftermath of the CRA examination. The dependent variable in columns (3) and (4), *CRA Rating Downgrade* is an indicator variable that takes the value of one if the bank's CRA rating was downgraded in the last examinations. Panel B follows Agarwal, Benmelech, Bergman, and Seru (2012) and examines if the relation between OTS Extinction and CRA examinations is more pronounced during examination years. All other variables are defined as in previous tables. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

**Panel A: Impact of OTS Extinction on CRA Ratings**

	(1)	(2)	(3)	(4)
	Bad CRA Rating		CRA Rating Downgrade	
OTS × Post	0.007 (0.007)	0.006 (0.007)	0.065 (0.063)	0.062 (0.062)
Ln(Assets)		0.001 (0.004)		-0.023 (0.025)
Residential Share		-0.037 (0.033)		-0.115 (0.182)
C&I Share		-0.001 (0.057)		0.012 (0.209)
CRE Share		-0.021 (0.027)		-0.073 (0.118)
Tier1 Capital Ratio		-0.000 (0.000)		0.000 (0.002)
Observations	7594	7563	2113	2105
Adjusted $R^2$	0.038	0.039	-0.009	-0.011
Baseline Controls	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

**Panel B: OTS Extinction and Small Business Lending - Controlling for CRA Exam Years**

	(1)	(2)	(3)
	Ln(Total Loans)		
OTS × Post	0.230*** (0.044)	0.122*** (0.042)	0.222*** (0.045)
CRA Exam Year	-0.001 (0.005)	0.003 (0.005)	-0.025*** (0.008)
OTS × Post × CRA Exam Year	-0.095* (0.055)	-0.130** (0.052)	-0.252*** (0.054)
Observations	139277	130989	116550
Adjusted $R^2$	0.756	0.864	0.881
Baseline Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No
County Fixed Effects	Yes	No	No
Bank Fixed Effects	Yes	No	No
County-Year Fixed Effects	No	Yes	Yes
Bank-County Fixed Effects	No	Yes	Yes
Coarsened Exact Matching	No	No	Yes



Table OA.11: Robustness - Addressing Skewness in the Dependent Variable

Table OA.11 repeats the main analysis in the paper and investigates the relation between the OTS extinction and small business lending for different sample horizons. The specifications of columns (1) and (2) uses the log growth rate of originations as dependent variables, (3) and (4) defines total originations in a county and year scaled by total bank assets and (5) and (6) trims the distribution of originations at the 95th percentile. *OTS* is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision. *Post* is an indicator variable that takes the value of one for all years after 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta$ SBL Amount	SBL Amount	SBL Amount/Total Assets	SBL Amount/Total Assets	Trimmed Ln(Amount)	Trimmed Ln(Amount)
OTS $\times$ Post	0.044* (0.025)	0.055** (0.028)	0.001*** (0.000)	0.001*** (0.000)	0.197*** (0.041)	0.072* (0.040)
Observations	116605	108508	137962	129402	132290	123881
Adjusted $R^2$	0.032	-0.039	0.667	0.876	0.711	0.835
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	Yes	No	Yes	No
County Fixed Effects	Yes	No	Yes	No	Yes	No
Bank Fixed Effects	Yes	No	Yes	No	Yes	No
County-Year Fixed Effects	No	Yes	No	Yes	No	Yes
Bank-County Fixed Effects	No	Yes	No	Yes	No	Yes

Table OA.12: OTS Extinction and Small Business Lending: Local Credit Supply by Competitor

Table OA.12 reports the coefficients of OLS regressions. Columns (1) and (2) repeat the analysis of column (2) of Table 4 after stratifying the sample based on above- and below-median levels of the weighted average Tier1 Capital Ratio of local competitors, where the weights assigned to each local competitor are based on the share of deposits of that competitor in the county. Columns (3) and (4) repeat the analysis of column (2) of Table 4 after stratifying the sample based on above- and below-median level of the predicted negative lending shock in the county, which is measured using the same methodology as in Greenstone, Mas, and Nguyen (2015). The dependent variable  $Ln(Total\ Loans)$  is the total amount of small business loans (loans whose principal amount is below \$1 million) originated by a depository institution in a county over a calendar year.  $OTS$  is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision.  $Post$  is an indicator variable that takes the value of one for all years after 2011 (inclusive). Baseline controls include linear and quadratic terms for the number of branches and total amount of deposits of each bank in each county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Hi Competitor Cap.	Low Competitor Cap.	Ln(Total Loans)	Hi Neg Lending Shock
OTS × Post	0.043 (0.060)	0.097* (0.056)	0.047 (0.055)	0.119** (0.054)
Observations	65320	55614	65575	65414
Adjusted $R^2$	0.859	0.866	0.862	0.866
Baseline Controls	Yes	Yes	Yes	Yes
County-Year Fixed Effects	Yes	Yes	Yes	Yes
Bank-County Fixed Effects	Yes	Yes	Yes	Yes

Table OA.13: OTS Extinction and Mortgage Lending (Likelihood of Application Rejection)

Table OA.13 reports the results of empirical analyses investigating the relation between the OTS extinction and the probability of rejection of a mortgage loan application. The coefficients are obtained from the OLS estimation of the following specification model:  $Reject_{ibct} = \delta X_i + \beta OTS_b \times Post_t + FixedEffects + \epsilon_t$ , where the subscripts index for the mortgage application  $i$  in census tract  $c$  to bank  $b$  during year  $t$ . The vector  $\delta X_i$  includes a number of characteristics of the application, namely loan occupancy status, property type, lien status, loan-to-income ratio, applicant's ethnicity, and applicant's race.  $OTS$  is an indicator variable that takes the value of one if the depository institution primary regulator in the first and second quarter of 2011 was the Office of Thrift Supervision.  $Post$  is an indicator variable that takes the value of one for all years after 2011 (inclusive). Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, represent statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Application Rejection		
OTS $\times$ Post	0.009*** (0.003)	0.010*** (0.003)	0.002 (0.004)
Loan to Income Ratio	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Observations	38684393	38683683	38675108
Adjusted $R^2$	0.110	0.123	0.136
Application Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No
Bank Fixed Effects	Yes	Yes	No
Census-Tract Fixed Effects	No	Yes	No
Bank $\times$ Census-Tract Fixed Effects	No	No	Yes
Census-Tract $\times$ Year Fixed Effects	No	No	Yes

Table OA.14: OTS Extinction, Entry and Exit, and Dependence on External Finance

Table OA.14 reports the coefficients of WLS regressions in which each observation is weighted by the total employment in that county. The dependent variable in columns (1) and (2),  $\ln(\text{Entry Rate})$ , is the natural logarithm of the entry rate of new establishments in a given county and year. Entry rate is the ratio between the number of new establishments and the number of existing establishments at the beginning of the year. The dependent variable in columns (3) and (4),  $\ln(\text{Exit Rate})$ , is the natural logarithm of the exit rate of establishment in a given county and year. Exit rate is defined as the ratio between the number of establishment that exit the market and the total number of establishments at the beginning of the year. The models of specifications (1) and (3) use entry and exit rates in the subset of 2-digit NAICS industries with high dependence of external sources of finance and the models of specifications (2) and (4) use entry and exit rates in the subset of 2-digit NAICS industries with low dependence of external sources of finance. Industries are classified as high/low dependence on external sources of finance based on their above/below-median use of external financial capital according to the Census Bureau's 2010 Survey of Business Owners. We define external capital to include bank and government loans, loans from family and friends, credit cards, venture capital investment or grants and only consider employer firms in the Survey of Business Owners dataset. *Share OTS* is the share of county deposits held in former OTS institution as of June 30th, 2010. *Post* is an indicator variable that takes the value of one for all years between 2006 and 2013 and zero for all years between 2006 and 2010. Baseline controls include linear and quadratic terms for the total number of branches and total amount of deposits held in each county and controls for the logarithm of the number of establishments in the county that employ 1–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499 people, and total number of establishments in the county. Standard errors are presented in parentheses, and are clustered at the county level. \*\*\*, \*\*, and \*, repr esent statistical significance at 1%, 5%, and 10% levels, respectively.

	Hi Ext. Fin.	Low Ext. Fin.	Hi Ext. Fin.	Low Ext. Fin.
	Ln(Entry Rate)		Ln(Exit Rate)	
Share OTS $\times$ Post	0.096** (0.040)	0.033 (0.023)	0.060** (0.025)	0.056** (0.024)
Observations	8381	8388	8385	8392
Adjusted $R^2$	0.786	0.856	0.744	0.842
Baseline Controls	Yes	Yes	Yes	Yes
Employment Weighted	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes