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Hub-and-Spoke Regulation and Bank Leverage*

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Abstract

Regulators often delegate monitoring to local supervisors, which can improve information collection, but can also lead to agency problems and capture. We document that following the closure of a US bank regulator's field offices, the banks they previously supervised actively increased their risk of failure by distributing cash, increasing leverage, and lending more than similar banks at the same time and place. Supervisor proximity is a channel through which these effects operate. Our findings suggest that local supervision is an important part of regulation, as it facilitates collection of information imperfectly reflected in reported measures, and that switching from onsite to offsite supervision can increase bank risk.

JEL classification: G21, G28, M41

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1. Introduction

Hub-and-spoke regulation features a central regulator with legal power over firms that formulate rules, but delegate monitoring and enforcement to local supervisors. This local presence can aid in the onsite collection of soft information, which may be imperfectly captured by offsite monitoring of accounting-based risk measures (Laffont and Tirole, 1993; Aghion

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and Tirole, 1997; Colliard, 2020). However, delegation to local agents may introduce agency problems when the objectives of local supervisors differ from those of the central regulator (Dessein, 2002; Foarta, 2018; Carletti, Dell'Ariccia, and Marquez, 2020). We provide evidence from banking to gage this tradeoff and find that monitoring gains from local supervision outweigh any associated agency problems.

In the aftermath of the global financial crisis that started in 2007, financial regulation has largely moved toward centralization. For example, the European Union is currently transitioning from a collection of autonomous local state regulators to a more centralized and uniform regulatory regime, in banking and in other markets (European Central Bank, 2014). US bank regulators are reducing the frequency of onsite examinations and plan to rely more on offsite monitoring (OCC, 2016). Such a transition is supported by previous empirical work that documents that the same regulation can be interpreted or enforced inconsistently by different regulators (Agarwal et al., 2014), and that the funding of regulators affects their incentives to supervise firms (Kisin and Manela, 2014). While such agency problems are clearly present in a delegated regulatory regime, our findings suggest that caution is warranted to avoid the loss of soft information from supervisors in the field.

We study nationally chartered commercial banks in the USA, which are primarily regulated by a decentralized agency called the Office of the Comptroller of the Currency (OCC). Headquartered in Washington, DC, the OCC currently supervises about 1,200 midsize and community banks by delegating much of the day-to-day decision making authority to sixty-six field offices. Local supervisors at each field office determine the appropriate amount of capital for each bank's risk profile, assign supervisory ratings, and often require banks to maintain a higher capital ratio than the minimum requirement set by law (see Section 2.5). Nationally chartered banks interact with one safety and soundness regulator, unlike state-chartered banks, which interact with both a federal and a state regulator. We observe *ex ante* measures of risk, and many bank characteristics from quarterly regulatory filings, as well as *ex post* failures and confidential CAMELS ratings assigned by supervisors, providing a large panel spanning 30 years and thousands of banks. Thus, the OCC provides an ideal setting to investigate the effectiveness of a hub-and-spoke supervisory architecture.

A key parameter of the hub-and-spoke structure for regulation is the proximity between banks and their supervisors, illustrated by the red arrows in Figure 1, which can theoretically improve or worsen risk monitoring. On the one hand, the decentralized architecture on the left means less information asymmetry between a bank and its supervisor regarding bank risk, because it makes it harder for the bank to hide information from the local supervisor (Colliard, 2020), and because delegation increases the supervisor's incentives to collect information (Aghion and Tirole, 1997). A supervisor, who can frequently meet with a bank's management, during regularly scheduled examinations or periodic monitoring meetings, may better assess, for example, whether its leverage is too high given its asset portfolio. These periodic monitoring meetings may occur in addition to scheduled examinations at the discretion of the supervisors. Such a local supervisor may also possess soft information about bank management or about local credit market risk.[1]

1 Periodic monitoring is a formal process implemented by the OCC in which field examiners monitor bank conditions every quarter. Depending upon banks' performance, examiners may supplement formal full scope examinations to travel to bank headquarters outside of the scheduled examinations to check up on several aspects of bank risk. These aspects may include identifying changes

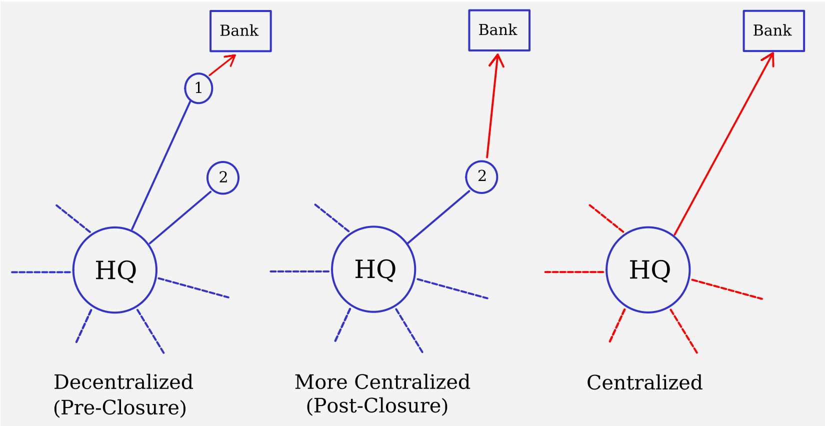


Figure 1. Hub-and-spoke bank supervision before and after field office closure. A conceptual diagram of hub-and-spoke supervisory architectures. On the left is the decentralized case with delegation to a nearby local field office (1). The middle case illustrates the effect of office closure, with supervision responsibilities moving to the next closest field office (2). On the right is the polar opposite case where supervision is centralized at headquarters.

On the other hand, the closer is the supervisor to the bank the more likely are her preferences to align with local banks and to diverge from the objectives of a distant regulatory hub or the broader population it represents. For instance, if the local supervisor is able to meet with management more often, it may improve personal relationships thus increasing the likelihood of revolving door opportunities and regulatory capture, and may distort supervisors' incentives away from that of the central regulator. When this divergence in preferences is large, delegation of control is suboptimal and the centralized architecture on the right is preferred (Dessein, 2002). If the first effect dominates, then close proximity supervision that facilitates onsite monitoring is superior, but if the second effect dominates then offsite examiners can better monitor bank risk from a distance.

The main challenge for identifying supervisor proximity effects is that banks located close to their supervisor may be different from distant ones. For example, risk-loving banks that wish to avoid regulatory scrutiny may locate far from supervising field offices, and regulators could design their field office network to minimize the distance from banks subject to their budgets (Macher, Mayo, and Nickerson, 2011). An estimate from an ordinary least squares regression of firm risk on supervisor proximity could be biased if unobserved heterogeneity increases both distance and risk. We address this concern with a triple-differences empirical design that uses changes in OCC field office locations to isolate plausibly exogenous variation in supervisor proximity.

We construct a novel dataset of OCC field office locations and years of operation by hand-collecting this information from archived internal telephone directories going back to the 1980s. This dataset reveals ample variation in field office proximity to supervised banks. From 1985 to 2014, the OCC opened eighty-three new field offices and closed forty-three existing ones. The OCC establishes new offices, often as satellite offices of

in banks' condition or risk profile, following up on outstanding deficiencies, or discussing matters in greater detail with bank management (OCC, 2018b).

existing large ones, in areas that experience an increase in banking assets under supervision, and therefore an increase in regulatory fee revenue (and potentially supervising costs). One might expect this behavior from a resource-constrained regulator aiming to "achieve maximum efficiency and cost effectiveness" (OCC, 1998; Eisenbach, Lucca, and Townsend, 2016). When these large offices lose banking assets under supervision and have excess capacity, the OCC tends to consolidate the smaller neighboring offices into the larger ones.

We use these consolidations (office closures, henceforth) in a triple-differences framework that compares changes in outcome variables upon closure for OCC-regulated banks whose supervisory offices closed to other nearby OCC banks whose supervisory office did not close and non-OCC banks that would have experienced a decline in supervisor proximity had they been regulated by OCC. As illustrated in Figure 1, this natural experiment is informative about the effects of a move toward a more centralized supervisory architecture, by changing the length of the "spokes."

Along with bank and year-quarter fixed effects, all specifications include field office fixed effects that ensure that coefficients are estimated by comparing banks located near the same office and hence within the same geographic region. Thus, both treated and control banks are subject to similar economic conditions. We also use a more saturated specification for all our tests that includes (Metropolitan Statistical Area) MSA-by-year-quarter fixed effects and office-by-year-quarter fixed effects. This specification estimates our coefficients by comparing changes in outcome for OCC banks whose supervisory office closed to other OCC and non-OCC banks located within the same MSA after controlling for time-varying office level changes. Treatment effect estimates from this specification are unlikely to be biased by local economic conditions or time-varying office level heterogeneity.

Our main finding is that following the closure of OCC field offices, the banks they previously supervised distribute cash to their shareholders, increase their leverage, increase their lending, and increase their likelihood of failure, more than similar banks at the same time and place. We find no change in charge-offs or provisions for loan losses, which could mechanically increase leverage due to a deterioration of a bank's loan portfolio. Instead, our findings are consistent with a deliberate choice by affected banks to increase their leverage. Specifically, our estimates show that banks whose supervising office closes increase leverage by 3.9% more than control banks. While leverage increases around one year after closure and remains elevated for 4 years, a delayed consequence of higher risk in the form of a higher failure probability appears approximately 2 to 3 years after closure. The likelihood of failure in any given quarter increases by 0.08 percentage points, which is economically large when compared to the unconditional mean of 0.2%.[2]

These observed effects of local supervision on bank leverage are potentially surprising for at least two reasons. First, bank supervisors may not have substantial leeway over bank capital beyond the minimum capital requirements set by law. Using confidential supervisory (CAMELS) ratings data to shed light on this, we find that bank examiners exert considerable discretion by assigning different capital adequacy ratings to banks with identical capital ratios that are significantly higher than the minimum capital requirements. We also find anecdotal evidence that examiners set individual minimum capital ratio (IMCR) plans to banks, based on their risk profiles, which often mandate them to maintain capital ratios that are significantly higher than minimum capital requirements.

2 Note that since failure is a binary outcome, the coefficients may go out of bounds in a linear regression framework.

Second, our results suggest that supervisor proximity has large effects on bank risk. Specifically, we find that the effects of office closure are stronger when the corresponding increase in driving time or physical distance between banks and their supervisory offices is larger. The cost of acquiring soft information is lower for supervisors located closer to banks. Our nonparametric analysis reveals that the effects of office closures are *only* present for closures that increase the driving time between the bank and its supervisory office above the sample median in proximity changes. Other office closures have no significant effect on bank outcomes.

A natural question given the advances in information technology experienced over the last few decades is whether the importance of supervisor proximity has diminished over time. The literature studying the importance of proximity between firms and individuals in markets documents that the proximity of banks to their borrowers and the proximity of firm headquarters to their plants have become less important (e.g., Petersen and Rajan, 2002; Giroud, 2013).[3] In contrast, we find treatment effects that are similar in magnitude and statistical significance in the early and latter halves of our sample (before and after the year 2000). Advances in information technology, which reduce information asymmetry between banks and field offices, may have simultaneously reduced information asymmetries between OCC headquarters and supervisors in the field. Our estimates capture the net effect—the difference between the two opposing sides of moral hazard. Thus, if advances in information technology affect both sides similarly, the net effect of distancing supervisors from banks can persist.

Supervisor proximity may not be the only channel. An important alternative channel responsible for our results may be changes in supervisors. In order to evaluate the importance of this channel, we examine the effect of office closures while keeping the local supervisors constant and find even larger effects. This suggests that changes in supervisors likely do not drive our results. In addition, we find no evidence supporting other alternative channels like changes in supervisory relationships, resources, competence, and politically motivated deregulation that may coincide with office closure. This result cannot be explained by mechanisms highlighted in Dessein (2002) and Carletti, Dell'Ariccia, and Marquez (2020), which entail changing authorities between local supervisors and headquarters. Overall, our results are most consistent with a parameterization of the Colliard (2020) model where greater distance makes it harder to verify the bank's information more than it reduces the ability of the bank to capture the supervisor.

Our article contributes to a literature studying the architecture of regulation. To the best of our knowledge, ours is the first article to provide evidence on the effect of regulator proximity on firm risk and document the importance of local supervision in the decentralized regulatory structure. Wilson and Veuger (2017) find that cross-sectional variation in bank proximity to OCC field offices and state banking agencies increases banks' administrative costs. Lim, Hagendorff, and Armitage (2016) use OCC office locations from 2004 to 2013 to study the accounting quality of bank financial reporting. We differ from these

3 Evidence of the proximity channel has been documented in the context of relationship lending (Berger et al., 1998; Strahan and Weston, 1998; Berger and DeYoung, 2001; Petersen and Rajan, 2002), the home bias in portfolio choice (Coval and Moskowitz, 1999), and the internal capital markets of geographically dispersed firms (Giroud, 2013; Giroud and Mueller, 2015). Nguyen (2019) finds that even in the 2000s, bank branch closings lead to a decline in local small business lending, but not in credit products that require less soft information like mortgages.

studies in our focus on firm risk, and in our ability, due to our richer field office data, to control for unobserved heterogeneity that may be correlated with supervisor proximity. Colliard (2020) studies the allocation of supervisory powers to different policy institutions in a model of regulatory architecture and highlight increased distance between the supervisor and the supervised institutions as a friction for centralized regulation.[4]

Our work also contributes to a closely related but parallel literature on regulatory incentives in financial supervision. In this context, Kroszner and Strahan (1996) show that during the S&L crisis in the 1980s, regulators kept insolvent thrifts alive by influencing the allocation of private capital. Agarwal et al. (2014) exploit exogenous rotations between federal and state supervisors of state-chartered banks to show inconsistency in regulatory outcomes. Costello et al. (2019) show that regulatory incentives play an important role in enforcing financial reporting transparency, particularly in periods leading up to economic crises. Granja and Leuz (2017) use the extinction of the Office of Thrift Supervision (OTS) and find that thrifts that were shifted to OCC supervision increase their risk management, internal controls, and credit origination. Kisin and Manela (2014) exploit kinks in fee schedules to show that user fee-funded regulators are more lenient with higher fee paying banks. They argue that the effects they find are consistent with dispersed local supervisors who care about their own fee revenues and budgets. Hirtle, Kovner, and Plosser (2016) show that regulators allocate more supervisory resources to the largest banks in a district, which leads to better performance for these banks. Kandrac and Schlusche (2017) find that, consistent with limited supervisory attention, following an exogenous decrease in the staff of a district of the primary thrift supervisor, thrifts in that district take more risk, fail more, and cost more to resolve. We contribute to this literature by documenting the importance of local supervision to regulating bank risk.[5]

Finally, our article also relates to the broad literature on proximity and corporate governance. Giroud (2013) shows that proximity to plants leads to higher productivity as it makes it easier for headquarters to monitor and acquire information about plants. Kedia and Rajgopal (2011) find that firms located near SEC offices and near areas of past enforcement activities are associated with fewer accounting restatements. Chhaochharia, Kumar, and Niessen-Ruenzi (2012) show that local institutional investors are effective monitors of corporate behavior. Malloy (2005) and Bae, Stulz, and Tan (2008) document that proximate analysts are more accurate than other analysts. Choi et al. (2012) and Jensen, Kim, and Yi (2015) find that more distant auditor selections are associated with low-quality audits.

4 Colliard (2015) detail other costs and benefits associated with difference supervisory architectures.

5 See also Barth, Caprio, and Levine (2004), Lucca, Seru, and Trebbi. (2014), and Shive and Forster (2016) on the "revolving door" between regulatory agencies and the industry, and Lambert (2019; ming) on lobbying and regulatory outcomes. Hirtle and Lopez (1999) study the time decay of bank examinations. Ivanov, Ranish, and Wang (2019) show that banks strategically reduce certain types of syndicated loans in order to avoid supervision. Koetter, Roszbach, and Spagnoloe (2014) find that the separation of powers between single and multiple bank supervisors cannot explain credit risk prior to or during the financial crisis. Rose (2014) is a recent survey. Recent theories suggest information asymmetries between banks and their regulators shape the labor market for regulators (Bond and Glode, 2014) and the separation of regulatory institutions (Foarta and Sugaya, 2017). Nicoletti (2018) shows that regulators and external auditors have differential effects on loan loss provisions for banks.

We contribute to this literature by documenting the effect of supervisor proximity on bank risk and that these effects persist even following the advent of information technology.

The article proceeds as follows. Section 2 describes US banking regulation, the role and organization of OCC, and our data. Section 3 describes our empirical strategy. Section 4 reports our main results and also provides additional results and robustness tests. Section 6 concludes.

2. Institutional Background and Data

Three federal regulatory agencies currently regulate US commercial banks: the OCC, the Federal Reserve (Fed), and the Federal Deposit Insurance Corporation (FDIC). Each regulator supervises different depository institutions and achieves its regulatory objectives by combining offsite monitoring with onsite inspections. The OCC is the primary regulator of nationally chartered banks. The Fed supervises state-chartered banks that are members of the Federal Reserve System, and bank holding companies. The FDIC supervises state-chartered banks that are not members of the Federal Reserve System. While the individual mandates and responsibilities may vary, the goal of all three regulators is to ensure the safety and soundness of the banking system.[6]

2.1 The OCC

The OCC uses a system of field offices dispersed throughout the USA to supervise midsize and community banks. These offices facilitate onsite monitoring by placing regulatory personnel in close proximity to supervised institutions. In general, all OCC field offices are staffed similarly (OCC, 2019).

Each community bank is assigned a portfolio manager who serves as the OCC's primary point of contact for bank management and boards of directors on an ongoing basis. Portfolio managers continuously interact with banks in their purview in order to develop appropriate supervisory actions, contingent upon banks' asset portfolio. Portfolio managers are appointed by the Assistant Deputy Comptroller (ADC).

ADCs are the most senior officials within each field office. ADCs organize and oversee the supervision activity in the geographic area surrounding a field office. Among their duties, ADCs approve supervisory actions for each bank under their purview, oversee and assign portfolio managers, and review conclusions made by local supervisors after examinations end. Moreover, they assign examiners-in-charge (EICs) who lead teams of examiners who conduct individual exams. EICs may be the portfolio manager of the bank, or may be another commissioned bank examiner.

ADCs retain considerable discretion in conducting supervisory responsibilities. First, they must approve reports of examination that include informal enforcement actions and recommendations that banks must undertake in order to remain safe and sound. Informal enforcement actions include approved safety and soundness plans, memoranda of understanding, or commitment letters. These directives entail requirements that banks and their boards must achieve in order to avoid public enforcement (OCC, 2017). Furthermore, they can recommend formal actions within their authority to require banks to remediate asset quality problems, such as issuing formal enforcement actions and changing CAMELS

6 OTS was the primary federal regulator of nationally chartered thrifts, until 2011 when it was closed and subsumed by the OCC.

ratings. While ADCs can recommend enforcement actions, formal enforcement actions are issued by the Director of Special Supervision, who works from the OCC's headquarters in Washington, DC The majority of enforcement actions are formal, with informal action use increasing to about 50% around the 2008 financial crisis (OCC, 2017, p. 22).

2.2 OCC Field Office Locations

We construct a novel dataset of OCC field office locations from 1985 to 2014. We hand-collect this information from archived OCC telephone directories, which list OCC district and field office locations going back to the early 1980s. These directories are published approximately annually until 2010. For the 2010–4 period, we use the *WayBackMachine* website archiving services provided by archive.org to collect field office locations from cached versions of the OCC website.

The telephone directories include detailed information on geographical locations of field offices such as city, state, street address, and zip-code for the time these directories were published. Importantly, these directories distinguish between field office locations within a given metropolitan area. For instance, the OCC had field offices in Fairview Heights, IL and in St Louis, MO, both in the same metropolitan area separated by 15 miles.[7]

Using these telephone directories, we track, which cities host OCC field offices between 1985 and 2014, and are able to identify time-series variation in the geographical dispersion of OCC field offices. We classify a field office as closed if it appears in one of these directories for a particular year-quarter and drops out in the subsequent directories. Conversely, we classify field office openings as offices that appear in directories, which were not there in the previous directory. We do not classify the change of address of an office within the same neighborhood as either a closing or an opening. For example, if an office moves within Manhattan, New York, then we do not classify this as a closing or opening. However, if an office moves from Manhattan to Brooklyn, then we classify this move as a closing and opening. Following this approach, we end up with forty-three field office closures and eighty-three openings spread across 30 years between 1985 and 2014. On average, the OCC has 70.5 offices in any given year during our sample period.

Table I shows office closures over our sample period, which are fairly dispersed over time. This table also reports the OCC district that the office belonged to along with number of closures that occur in MSAs with other offices.

Figure 2 shows that field office openings and closures over our sample period are geographically dispersed. OCC field offices are located in relatively rural areas, unlike those of other federal banking regulators. This may reflect the fact that OCC does not share regulatory oversight with state banking agencies and therefore requires more offices than the Fed and FDIC.

We assume that each bank is supervised by the nearest field office to its headquarters operating at the time.[8] We calculate the physical distance (in miles) between each bank's headquarters and the nearest OCC field office using addresses for bank headquarters from the FDIC's Research Information Systems (RIS) dataset. We use the Texas A&M University geocoding service to convert addresses to geographical coordinates and the geonear

7 While we account for different offices located in different cities within a metropolitan area, we make some simplifying assumptions when accounting for multiple field offices *within* the same city in a particular metropolitan area (i.e., multiple offices within Fairview Heights, IL).

8 Our conversations with assistant deputy comptrollers in charge of several field offices confirmed this assumption.

Table I. OCC field offices

Panel (a): Location changes

Year	Total offices	Closed	District	Same MSA
1986	25	0	–	–
1988	26	0	–	–
1989	27	1	1 W	1
1990	26	1	1C	0
1991	82	1	1S	0
1992	81	0	–	–
1993	85	0	–	–
1994	86	9	1 W, 2C, 1S, 5NE	4
1995	77	0	–	0
1996	83	2	2 W	2
1997	81	4	2 W, 1C, 1NE	2
1998	78	1	1C	0
1999	77	3	1C, 1S, 1NE	1
2000	74	2	2C	0
2001	74	0	–	–
2002	76	3	2C, 1S	1
2003	73	1	1NE	1
2004	72	2	1 W, 1C	1
2005	70	1	1S	0
2006	71	0	–	–
2007	72	2	1C, 1S	1
2008	70	2	1 W, 1C	2
2009	69	5	1 W, 2C, 1S, 1NE	2
2010	66	1	1 W	0
2012	67	1	1S	1
2013	66	1	1C	0

Panel (b): Field Office Summary Statistics

	Mean	Std. Dev.	Median	Min	Max	Obs.
Total Bank Assets (billions)	69.49	220.41	12.50	0.21	2,667.52	2,013
Total Annual Fees (millions)	8.20	14.62	3.40	0.00	96.66	2,013
Distance to Banks (miles)	69.25	41.99	58.15	8.61	274.53	2,013
Driving Time to Banks (min)	157.32	84.82	142.75	24.01	444.39	2,013

Panel (a) reports the number of OCC field offices closed each year over our 1985–2014 sample along with the OCC district that the closed office belonged to was based on OCC's 2013 jurisdiction map (i.e., Western (W), Central (C), Southern (S), or North Eastern (NE)) and number of closures where there is another office located within the same MSA. Panel (b) reports field office level summary statistics. For each field office, we aggregate each quarter the total bank assets and the total annual fee revenue from banks under its supervision. We also report the average distance and driving time from each office to the banks they supervise. Years without changes are omitted.

command in Stata to assign the nearest OCC field office to each national bank headquarters at time t.[9] In addition, we use the Google Maps API to calculate driving time.

9 https://geoservices.tamu.edu/

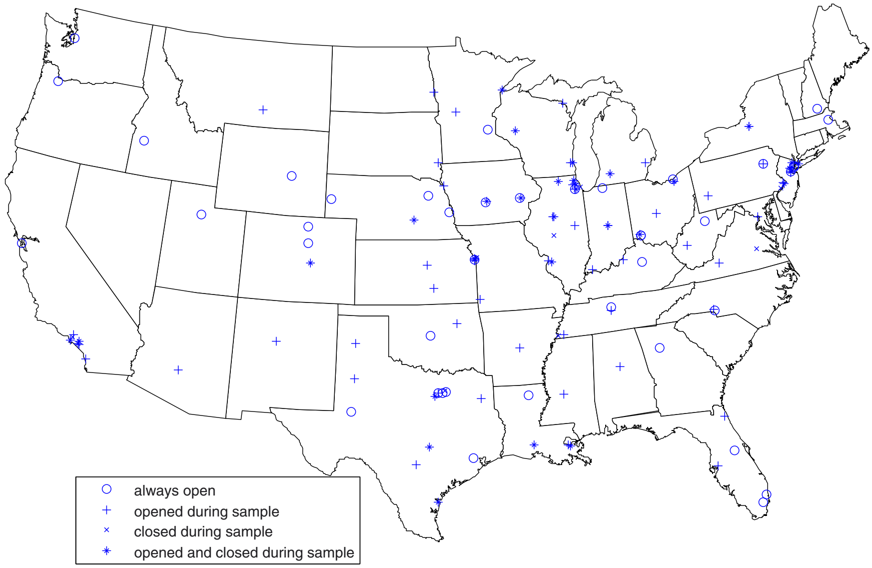


Figure 2. OCC field office changes. This figure plots the geographic locations of various OCC offices that appeared during our sample period, 1985–2014. These offices are characterized into four groups: always open during our sample period, opened during the sample period, closed during the sample period, and offices that opened and closed during our sample period.

2.3 Publicly Available Data

Call reports and RIS data are from the Federal Financial Institutions Examination Council and the FDIC, respectively. Our dependent variables are segmented into three main categories: leverage, changes in equity components, and delayed consequences of higher risk such as failures and enforcement actions. Data on regulatory fees and on firm- and individual-level enforcement actions on bankers and financial institutions are from Kisin and Manela (2014).[10]

Capital ratios are used to measure banks' safety and soundness. While different ratios are calculated differently, they all capture the proportion of bank equity to assets. Higher capital ratios mean banks are less likely to default or enter FDIC receivership, inflicting costs on taxpayers (Granja, Matvos, and Seru, 2017). Through onsite examination and off-site monitoring, supervisors evaluate whether banks' leverage ratios are appropriate given their asset risk.

Bank loan performance ratios capture banks' loan quality. Regulators evaluate banks' asset quality by measuring noncurrent loans: the proportion of loans that are delinquent or not accruing interest. Increases in such measures may eventually lead to greater problems, which require greater regulatory intervention (OCC, 2001). Relatedly, net charge-offs measure the amount of loans that banks believe are uncollectible and therefore realize them as losses.

Loan loss provisions rely heavily on bank discretion. Through their provisioning behavior, banks expense income to plan for impending loan losses. In contrast, banks can also use loan loss provisions to smooth income by shifting income. Thus, while greater

10 The OCC is funded by fees assessed to banks under its supervision.

provisions, unconditionally, may help banks weather downturns more effectively, bank regulators and auditors scrutinize the level of provisions so that it tracks banks' expected credit losses.

We also examine changes in payout policy after supervisor proximity changes. Banks, like any other corporate entity, have the ability to disburse proceeds from operations back to shareholders. However, bank regulators impose unique restrictions on banks' ability to pay dividends that do not exist for nonfinancial firms.

We present summary statistics for these variables in Table II. On average, the banks in our sample are small (mean assets of $262 million), profitable (mean quarterly Return on assets (ROAs) of 0.3%), and well capitalized (mean Tier 1 core capital ratio of 10.0%).[11] Because our sample covers several recessions and banking crises, we witness 1,291 failures of commercial banks, or roughly 7.1% of the 18,104 unique banks in our panel dataset.

2.4 Confidential Supervisory CAMELS Ratings

In addition to variables reported by banks in their publicly available quarterly reports, we also utilize confidential CAMELS ratings. These ratings are the main product from periodic bank examinations and summarize various aspects of banks' performance. The CAMELS composite rating, as well as its components, takes integer values from 1 to 5. Component ratings summarize capital adequacy (C), asset quality (A), managerial quality (M), earnings (E), liquidity (L), and sensitivity to interest rate risk (S). Banks, which have composite ratings of one or two receive little regulatory scrutiny, while those banks, which have ratings of three or above receive more stringent oversight from bank examiners. Table II shows that the average CAMELS composite rating is 1.86, which is slightly greater than the average CAMELS ratings reported in Agarwal et al. (2014).

2.5 Local Supervisors Have Discretion over Capital Requirements

While regulations such as Federal Deposit Insurance Corporation Improvement Act or Basel guidelines stipulate minimum quantitative thresholds on what constitutes "adequately capitalized", local supervisors retain a considerable amount of leeway in ascertaining the appropriate level of equity.[12] Absent such discretion, offsite monitoring by OCC headquarters could suffice and local supervision would not affect reported bank leverage. Bank examiners, however, can and do compel banks to maintain capital ratios higher than the minimum thresholds. The OCC, for instance, explicitly states that it "may impose higher capital requirements if a bank's level of capital is insufficient in relation to its risks; determining the appropriate capital level is necessarily based in part on judgment grounded in agency expertise."[13] The OCC also has legal powers to enforce greater capital levels than regulatory minimum capital ratios. In order to enforce such capital levels, the OCC can downgrade a bank's CAMELS ratings (which may increase its deposit insurance

11 There are fewer observations for risk-based capital ratios because they were implemented by regulators in the mid-1990s.

12 See https://www.fdic.gov/regulations/safety/manual/section2-1.pdf for explicit minimum thresholds set by FDICIA.

13 See OCC's *Guidance for Evaluating Capital Planning and Adequacy*. While this guidance was published only in 2012, the OCC had similar power to raise individual capital requirements above regulatory minimums going back to at least 1994.

Table II. Bank sample summary statistics

Variable Names	Mean	Std. Dev.	Median	Min	Max
Balance sheet variables					
$\frac{\text{Tier1Cap}}{\text{TA}}$	0.100	0.044	0.089	0.033	0.365
$\frac{\text{BEquity}}{\text{TA}}$	0.101	0.042	0.091	0.036	0.338
$\frac{\text{TotCap}}{\text{RWA}}$	0.181	0.104	0.151	0.080	0.806
$\frac{\text{Tier1Cap}}{\text{RWA}}$	0.170	0.105	0.140	0.065	0.796
	0.010	0.020	0.000	0.000	0.123
$\frac{\text{NetEquityIss}}{\text{LaggedEquity}}$	0.017	0.062	0.018	−0.229	0.347
$\frac{\text{NetChargeOff}}{\text{LaggedEquity}}$	0.007	0.026	0.000	−0.008	0.189
$\frac{\text{LLP}}{\text{LaggedEquity}}$	0.012	0.029	0.004	−0.011	0.203
$\frac{\text{NCL}}{\text{LaggedLoans}}$	0.867	1.635	0.240	0.000	0.530
Failure	0.002	0.035	0.000	0.000	1.000
Enforcement	0.002	0.047	0.000	0.000	5.000
CAMELS ratings variables					
CAMELS composite	1.86	0.77	2	1	5
C	1.67	0.76	2	1	5
A	1.81	0.88	2	1	5
M	1.94	0.76	2	1	5
E	2.01	0.94	2	1	5
L	1.61	0.67	2	1	5
S	1.74	0.63	2	1	5
Office closure and other variables					
Closure × OCC	0.021	0.145	0.000	0.000	1.000
Closure	0.038	0.190	0.000	0.000	1.000
OCC	0.305	0.460	0.000	0.000	1.000
Distance (miles)	75.771	65.816	60.431	0.000	329.357
Driving Time (min)	93.320	71.200	77.000	1.000	371.000
TA (millions)	262.150	837.807	65.772	5.961	16,829.95
ROA	0.003	0.006	0.004	−0.039	0.027

This table reports summary statistics for all commercial banks in our sample (1985–2014). The unit of observation is bank-quarter. Book equity (BEquity) over TAs is a non-regulatory capital ratio. Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Tier1Cap over risk-weighted assets (RWAs) is the tier-1 risk-based capital ratio. The more inclusive total capital (TotCap) over RWA is the total tier-1 risk-based capital ratio. Failure is an indicator variable, which takes a value 1 if the commercial bank fails in a particular quarter, 0 otherwise. Enforcement is an indicator variable, which takes a value of 1 if either the bank or an individual at the bank is enforced upon in a given quarter, 0 otherwise. NCL is non-current loans. Dividend is total declared dividend. NetEquityIss is net equity issuance. NetChargeOff is net charge-offs. LLP is loan loss provisions. CAMELS Composite is the assigned CAMELS composite rating at quarter end. Component ratings summarize capital adequacy (C), asset quality (A), managerial quality (M), earnings (E), liquidity (L), and sensitivity to interest rate risk (S). Distance captures the number of miles between commercial bank headquarters and the nearest OCC field office. Closure is an indicator variable that takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Opening is an indicator variable, which takes a value of 1 for banks supervised by newly opened offices during twenty quarters following opening and 0 otherwise. TAs is the size of the bank in millions of dollars. ROA is defined as quarterly net income over TAs. All variables are winsorized at 1 and 99% levels.

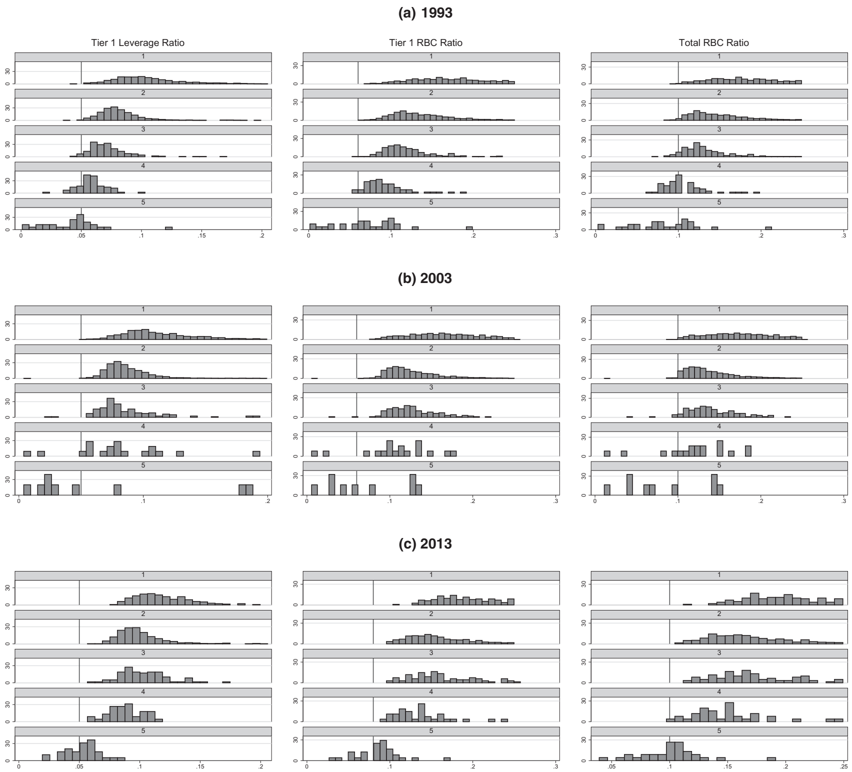


Figure 3. Supervisors have discretion in assigning capital adequacy ratings. This figure plots the distribution of bank leverage by CAMELS "C" component rating for nationally chartered banks. Observations are at the bank-exam level. The first column displays the distribution of Tier 1 Leverage Ratios by CAMELS "C" component rating. The Second column displays the distribution of Tier 1 RBC Ratios by CAMELS "C" component rating. The third column displays the distribution of Total RBC Ratios by CAMELS "C" component rating. The first row displays leverage distributions for all bank OCC exams in 1993. The second row displays leverage distributions for all bank OCC exams in 2003. The third row displays leverage distributions for all bank OCC exams in 2013. In each sub-figure, the *X*-axis is the observed regulatory capital ratio during the most recent Call Report filing before the bank exam observation, while the *Y*-axis in each sub-figure is the density. Vertical lines represent "well-capitalized" thresholds as stipulated by bank regulators in each year. (a) 1993. (b) 2003. (c) 2013.

premium), as well as issue memoranda of understanding, formal written agreements, consent orders, cease-and-desist orders, or prompt corrective action directives.

CAMELS rating data allow us an empirical assessment of supervisory discretion. Figure 3 shows that OCC bank examiners have substantial leeway in assessing capital adequacy by plotting histograms of nationally chartered banks' regulatory capital ratios for each level of capital adequacy (CAMELS "C") ratings. If examiners have little discretion in assessing capital adequacy, then there should exist a little overlap in reported leverage ratios across capital adequacy ratings, and the plots should resemble step functions. Instead, we uncover substantial overlap in reported leverage ratios by capital adequacy ratings. This means that many banks with similar reported capital ratios, in the same year, are assigned different supervisory ratings. This overlap in reported leverage by capital adequacy ratings persists across various definitions of regulatory capital and across time.

Supervisors can also issue public enforcement actions directing an individual bank to increase its capital beyond the regulatory minimums. A clear example of this discretion is provided by an enforcement action taken by the OCC on Integra Bank in Evansville, IN. In August of 2009, the OCC established an IMCR plan, which mandated a Total Risk-based Capital ratio of 11.5% and a Tier 1 Leverage ratio of 8% (both of which are well above regulatory minimums of 8 and 4%, respectively). In May 2010, the OCC followed up with Integra Bank and issued a Capital Directive (or Notice of Intent) to achieve and maintain capital at or above the new minimum ratios set by the IMCR plan. This directive included plans for what the bank had to achieve within 30 days of issuance of the Capital Directive along with a 3-year plan of how Integra Bank would stay above the IMCR minimums.[14]

3. Empirical Methodology

To examine the impact of hub-and-spoke regulation on bank leverage, we use OCC office closures as a source of variation in banks' proximity to their nearest supervisor. In this section, we discuss OCC office openings, closures, and the extent to which they can be used to identify treatment effects of supervisor proximity.

3.1 Field Office Openings and Closures

3.1.a. *Office openings*

The organizational structure of the OCC is such that field offices are generally located in areas close to higher bank activity, which aids in reducing the costs of onsite visits and facilitate regular interactions between OCC personnel and bank managers.[15] We posit that, consistent with this structure, the OCC *opens* offices in areas that experience general growth in banking activity.

We test this conjecture in Figure A2 of the Supplementary Appendix, which plots the trends in banking activity in regions where the OCC opens new offices during the years immediately prior to these openings. The plots indicate a sharp increase in total assets (TAs) supervised by the offices neighboring the newly opened offices along with an increase in the total fees generated by these offices. TAs supervised by an average neighboring office increase by more than 50% during the 5 years preceding OCC office openings. Likewise, the supervisory fees collected by an average neighboring office increases by nearly 16% during this time.[16]

These trends are consistent with the OCC being resource constrained and opening new field offices to alleviate increased supervisory burden on incumbent field offices.

14 OCC Capital Directive #2010-206 available at: https://www.occ.gov/static/enforcement-actions/ea2010-206.pdf

15 Some anecdotal evidence of OCC field offices playing a central role in facilitating regulation comes from the 2008 financial crisis, when assistant deputy comptrollers increased their onsite visits of community nationally chartered commercial banks in order to keep bankers abreast of regulators' supervisory expectations (OCC, 2008).

16 An average neighboring office (to the newly opened offices) supervises more than 120 banks, which is much higher than the number of banks supervised by an average OCC office (i.e., 42 banks).

3.1.b. *Office closures*

The OCC may close offices in areas where banking activity declines. However, our data paint a different picture. Closures tend to occur when the OCC consolidates operations between relatively larger and smaller field offices as depicted in Figure 4. This figure plots trends in supervisory banking activity for the closed and neighboring offices, and highlights two points. First, panels (c) through (f) suggest that neighboring offices are three times larger than closed offices in terms of the total banking assets supervised as well as fees collected by these offices. Second, the banking assets supervised by an average closed office remain relatively constant during the 5 years immediately prior to closure while the assets under the neighboring office significantly declines during this time.[17]

Table III formally tests this trend by employing a likelihood regression framework. We regress an indicator variable that takes a value of one during the quarters that an office closes on different office-level characteristics for the closed and neighboring offices. Columns (1) through (3) report linear probability model estimates, while columns (4) through (6) report logit regression estimates. Similar to the trends in Figure 4, we find that closure of an office is not associated with the changes in its own characteristics but is significantly associated with the characteristics of neighboring offices. Specifically, we find that loss of supervisory banking assets at the neighboring office is strongly associated with office closure.

The consolidations of offices may occur for two reasons. First, a large number of these consolidations occur between a field office and its satellite offices. Satellite offices are field offices that are associated with and controlled by a neighboring larger office (henceforth, parent office), and supplement the resources of their parent office. Satellite offices do not have independent ADCs; rather, they share an ADC with the larger parent office. When the parent office starts losing banking assets, the OCC consolidates the satellite office back to the parent office.[18] In these instances, the ADCs remain at the parent office, while local examination staff potentially must travel longer distances in order monitor banks. Second, the areas, which lose banking assets, may need more supervision, and hence the OCC may consolidate two offices to bring more resources to these regions.

3.2 Empirical Specification

In light of the above discussion, we argue that office closures provide variation to the decentralized structure that is plausibly exogenous to treated bank characteristics. We use these closures in a triple-differences framework that compares changes in outcomes for banks supervised by the OCC whose supervisory offices close to similar changes for other OCC banks whose supervisory office did not close and non-OCC banks located in the same region. Though office closures occur due to changes in banking activity in neighboring office's jurisdiction, these changes may also affect the local economic conditions in the closed office's jurisdiction.[19] Using non-OCC banks located within the same region as the treated

17 In untabulated analysis, we find that average CAMELS ratings for closed and neighboring offices are similar in the five years leading to office closure. Specifically, the average CAMELS rating for closed offices hovers between 1.7 and 1.9, while the average CAMELS ratings for neighboring offices hovers around 1.8.

18 The parent office is usually located in a more convenient location and hence the OCC shuts down the satellite office instead of the parent office.

19 This is especially true given that we are not able to find any systematic patterns that explain the sudden decline in banking activity for the neighboring office.

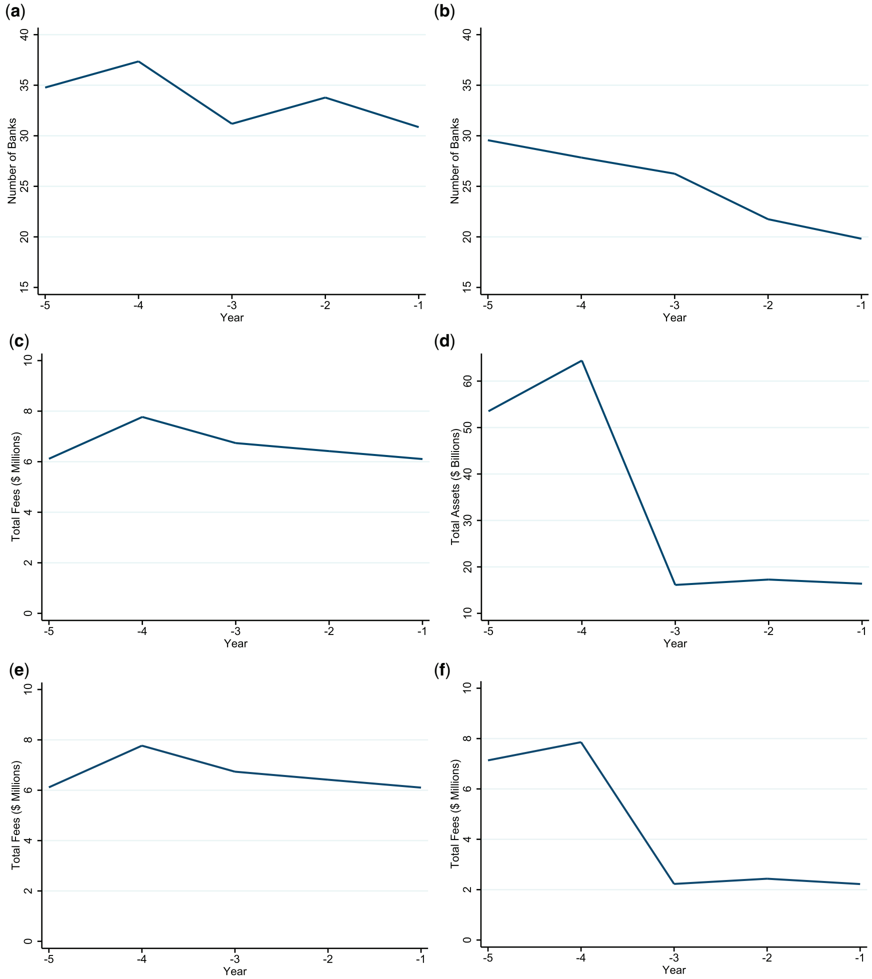


Figure 4. Why does OCC close offices? This figure illustrates time trends in the characteristics of the closed office and the neighboring office located near the closed office during the years prior to closing. (a) Number of Banks—Closed Office, (b) Number of Banks—Neighboring Office, (c) TAs—Closed Office, (d) TAs—Neighboring Office, (e) Total Fees—Closed Office and (f) Total Fees—Neighboring Office.

banks helps us address this concern by allowing us to control for economic conditions in a more localized manner. However, comparisons between OCC treated and non-OCC control banks may be confounded by both persistent and time varying systematic differences across OCC and non-OCC banks. Using nearby OCC banks whose nearest OCC office does not close as a second control group allows us to control for such systematic differences across OCC and non-OCC banks. In particular, we estimate variants of the following specification:

$$y_{it} = \alpha_i + \alpha_t + \alpha_o + \beta \text{Closure}_{it} \times \text{OCC}_{it} + \gamma \text{Closure}_{it} + \theta \text{OCC}_{it} + \varepsilon_{it} \quad (1)$$

where the subscript i indicates bank, t indicates year-quarter, o indicates the nearest OCC field office for bank i at time t, m indicates the MSA where the headquarter for bank i is

Table III. Why does OCC close offices?

	(1) OLS	(2) OLS	(3) OLS	(4) Logit	(5) Logit	(6) Logit
$\frac{CTA_{t-2}}{CTA_{t-3}}$	0.000		0.153	−0.384		−2.248
	(0.19)		(1.28)	(−0.24)		(−1.27)
$\frac{CFees_{t-2}}{CFees_{t-3}}$	−0.002		−0.366	−1.481		1.604
	(−0.52)		(−1.41)	(−0.91)		(0.75)
$\frac{NTA_{t-2}}{NTA_{t-3}}$		−0.046**	−0.040*		−1.619***	−1.006*
		(−1.95)	(−1.67)		(−6.30)	(−1.68)
$\frac{NFees_{t-2}}{NFees_{t-3}}$		0.000	0.000		−0.197	−0.100
		(0.09)	(0.20)		(−1.19)	(−0.62)
Office FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	302	259	258	309	269	268
R^2	0.350	0.368	0.377			

This table reports linear likelihood regression estimates of the probability of office closure based on changes in different characteristics of closed and neighboring offices. Closed assets (CTA) refers to TAs supervised by field offices, which closed while Closed Fees (CFees) refers to the total supervisory fees generated by these offices. Neighbor assets (NTA) refers to the TAs supervised by field offices neighboring to the closed offices while Neighbor fees (NFees) refers to the total supervisory fees generated by these neighboring offices. Standard errors are double-clustered at the office and year level, and *t*-statistics are reported in parentheses. *, **, and *** represent significance at 10%, 5%, and 1% level, respectively.

located at time *t*. The independent variables include $Closure_{it}$, which takes a value of 1 for bank *i* during twenty quarters following closure of the nearest OCC office and zero otherwise, OCC, which takes a value of 1 for bank *i* if the bank is supervised by the OCC at time *t*, and $Closure_{it} \times OCC_{it}$, which constitutes our triple interaction variable. $Closure_{it}$ takes a value of 1 only for twenty quarters following closure because many banks in our sample are treated more than once and we want to capture all these treatments.[20] Since all non-OCC banks are also assigned to the nearest OCC field offices in our setting, some of these banks experience "pseudo" treatment. Thus, the coefficient on $Closure_{it}$ captures the effect of the closure of the nearest OCC field office on non-OCC banks. The main coefficient of interest is on the triple interaction term $Closure_{it} \times OCC_{it}$, which captures the effect of the nearest OCC field office closure on the OCC banks over and above the effect on non-OCC banks. Our main dependent variables include bank capital ratios, equity components (dividends, net equity issuance, and net chargeoffs), bank failure, and non-current loans.

The bank fixed effects (α_i) ensure that treatment effects are estimated using changes within the bank and coefficients are not biased by unobserved persistent bank heterogeneity, while the year-quarter fixed effects (α_t) control for economy-wide time trends. Further, the office fixed effects (α_o) ensure that we compare banks that are located in the same region (i.e., area supervised by the same office) and hence are subject to similar economic conditions. Office fixed effects also control for time invariant heterogeneity across offices, which may bias our estimates in their absence. For instance, banks are supervised by

20 Table A2 of the Online Appendix shows that our main results are robust to defining *Closure* as an indicator variable that takes a value of 1 for all quarters following closure of its supervising office.

neighboring offices following closure, and if these offices are inherently more lenient than closed offices, it may bias our estimates had we omitted office fixed effects.

In the more saturated variation of the specification, we include MSA-by-year-quarter fixed effects (α_{mt}) and office-by-year-quarter fixed effects (α_{ot}) that control for local economic conditions and time-varying office level heterogeneity, respectively:

$$y_{it} = \alpha_i + \alpha_{mt} + \alpha_{ot} + \beta \text{Closure}_{\text{it}} \times \text{OCC}_{\text{it}} + \gamma \text{Closure}_{\text{it}} + \theta \text{OCC}_{\text{it}} + \varepsilon_{\text{it}} \quad (2)$$

The advantage of specification (2) is that it ensures that our results are not biased by local economic conditions or time-varying differences across offices. Its disadvantage is that as we focus on smaller and smaller geographical regions, any variation in supervisor proximity and therefore its importance vanish mechanically. We therefore report results of both specifications in all our tests.

The identifying assumption for this empirical framework is that in the absence of office closures, the changes in mean differences in dependent variables between OCC and non-OCC banks would have been the same across regions that experience and do not experience office closures. To further elaborate on this assumption, consider four banks—bank A supervised by the OCC and bank B not supervised by the OCC located in an area where the nearest office closes while bank C supervised by the OCC and bank D not supervised by the OCC located in an area that does not experience office closure. The identifying assumption states that in the absence of office closures, the differential trends in outcome between banks A and B would have been the same as the differential trends in outcomes between banks C and D. Though this assumption cannot be verified completely, we provide visual evidence supporting it in terms of absence of such differences in the period before closure for different outcome variables in Figure 5. Following Gormley and Matsa (2014, 2016), we do not include endogenous bank level controls. However, we find that our estimates are robust to controlling for bank size, ROA, NCLs, and cash holdings as reported in the online Supplementary Appendix.

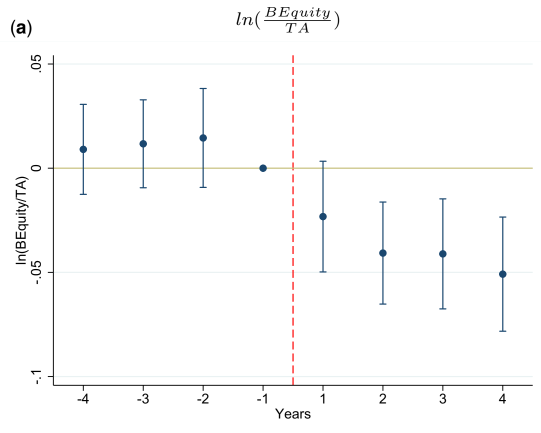
4. Main Results

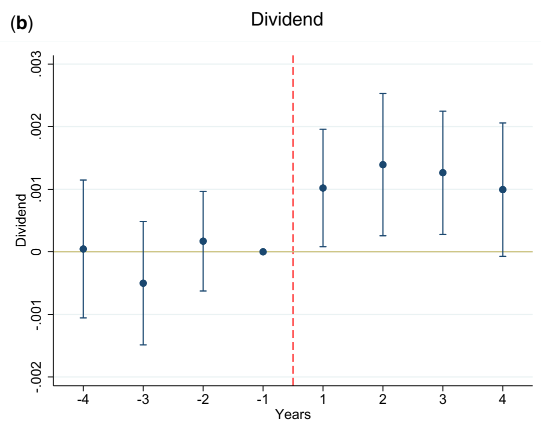
In this section, we describe our main results on the effect of office closures on bank capital and failure, and discuss the different underlying mechanisms for the effect.

4.1 Effects of Office Closures on Bank Leverage

Table IV reports results for regressions of the type described in Equations (1) and (2) with different dependent variables capturing bank capital. We use four different ratios to measure bank capital—three regulatory capital ratios and the ratio of book-equity to TAs. US banks are required to report three capital ratios to their regulator: tier 1 (core) capital over average TAs, tier 1 capital over risk-weighted assets, and total risk-based capital over risk-weighted assets. The non-risk based ratio (i.e., tier 1 capital over average TAs) is available from the beginning of our sample while the two risk-based ratios were introduced later during the mid-1990s and are only available for that sub-sample. To complement these regulatory capital ratios, we also use the ratio of book-equity to TAs because it is available for our entire sample period.[21]

21 Because the distribution of bank capital ratios is skewed, we use log capital ratios throughout as dependent variables in order to make reported ratios more normally distributed. In addition, our





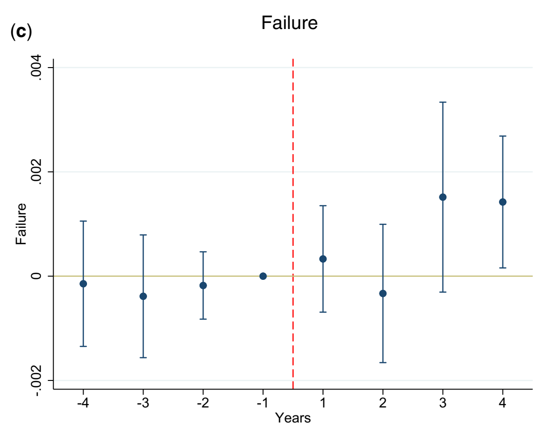


Figure 5. Effect of office closures on bank outcomes: dynamics. This figure plots the coefficients for the dynamic difference-in-differences regressions that estimate the effect of office closures on outcome variables. Each point on the plot corresponds to the difference in outcome variable for treated banks between the given year and the mean during the year prior to office closures relative to the same difference in control banks. Vertical bars represent 90% confidence intervals based on multi-clustered standard errors at the bank and year-quarter level. (a) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$, (b) dividend, (c) failure.

Table IV. Effect of office closures on bank capital

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{Tier1Cap}}{\text{RWA}}\right)$	(4) $\ln\left(\frac{\text{TotCap}}{\text{RWA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $ln\left(\frac{BEquity}{TA}\right)$	(7) $ln\left(\frac{Tier1Cap}{RWA}\right)$	(8) $ln\left(\frac{TotCap}{RWA}\right)$
Closure × OCC	−0.039***	−0.043***	−0.031**	−0.028**	−0.036***	−0.038***	−0.030*	−0.026
	(−3.59)	(−3.94)	(−2.17)	(−2.05)	(−2.65)	(−2.84)	(−1.78)	(−1.58)
Closure	0.005	0.010	−0.008	−0.007	0.011	0.013	−0.005	−0.006
	(0.64)	(1.23)	(−0.75)	(−0.76)	(1.21)	(1.48)	(−0.45)	(−0.56)
OCC	−0.010	−0.004	0.001	0.003	0.034**	0.042**	0.065**	0.063**
	(−1.00)	(−0.38)	(0.06)	(0.19)	(1.98)	(2.54)	(2.34)	(2.46)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	1,049,794	1,044,595	786,746	786,746	1,024,594	1,019,393	764,811	764,811
R^2	0.534	0.562	0.655	0.654	0.592	0.616	0.700	0.699

This table reports difference-in-differences regression estimates of the effect of OCC office closures on bank capital. Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Book equity (BEquity) over TAs is a non-regulatory capital ratio. Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Tier1Cap over RWAs is the tier-1 risk-based capital ratio. The more inclusive total capital (TotCap) over RWA is the total tier-1 risk-based capital ratio. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, **, and *** represent significance at 10, 5, and 1% level, respectively.

Columns (1) through (4) estimate this effect by comparing changes in bank capital for affected OCC banks relative to changes in bank capital for unaffected OCC and non-OCC banks. The coefficients for Closure are statistically indistinguishable from zero showing that closure of the nearest OCC office does not affect bank capital for the non-OCC banks. This suggests that our results are likely not driven by local economic conditions or other geographical level changes. On the other hand, the coefficients for Closure × OCC show that OCC banks increase their leverage following office closures over and above the reaction by non-OCC banks. This increase is both statistically and economically significant. For instance, the estimate reported in Column (1) shows that the change in tier 1 capital to TAs ratio for the treated banks between 5 years following office closures and the period before closure is 3.9% lower than the similar change for the control banks. In Columns (2) through (4), we find similar results for the other three capital ratios.

Columns (5) through (8) estimate a more local treatment effect by comparing treated and control banks located within the same MSA and at the same time and hence subject to similar economic conditions, after controlling for time-varying office level heterogeneity. The coefficients show a similar treatment effect with this more saturated specification. For instance, the estimate reported in Column (5) suggests that the change in tier 1 capital to TAs ratio for the treated banks following office closure is 3.6% lower than for control banks.

Panel (a) of Figure 5 plots the dynamics for the same regressions as in Table IV by interacting the OCC variable with the time in years relative to closure for treated banks after including the base Closure and OCC variables. We plot these dynamics for the book-equity to TAs ratio, and note that we find similar dynamic trends for other regulatory capital ratios. The figure shows that trends in bank leverage are similar for both treated and control banks in the pre-closure period. Importantly, the coefficients decline significantly during the years following office closure. Further, the plot shows that this effect is long-lasting and significant for at least 4 years following closure.

A reasonable potential concern is that our results are driven by local economic conditions. Specifically, the OCC may be more likely to close an office when it has private information, unobservable to us, that the supervised banks in the associated area are likely to do well in the future and do not require as much supervision. Note, however, that in this case we would expect banks to be *better* capitalized post closure. To the extent that closures are driven by supervisors' expectation that banks require less future supervision, the true effect may be stronger than suggested by our estimates.

4.2 How Do Banks Increase Leverage?

Bank leverage may increase if banks actively take more risk by issuing more debt or distributing cash to shareholders. It may also increase passively as a consequence of realized losses, or if banks provision more for expected losses. While in general banks may be permitted to issue dividends as long as the dividend amount does not exceed the sum of net income and retained earnings and does not result in undercapitalization, examiners retain considerable discretion in determining whether dividends should be paid out. For example, in the OCC's handbook on Capital and Dividends, examiners may deem dividends imprudent if banks experience increasing levels of problem assets or plan significant growth—

results are robust to using winsorized capital ratios as reported in Table A3 of the Online Appendix.

Table V. How do banks increase their leverage?

	(1) $\frac{Dividend}{LaggedEquity}$	(2) $\frac{NetEquityIss}{LaggedEquity}$	(3) $\frac{NetChargeOff}{LaggedEquity}$	(4) $\frac{LLP}{LaggedEquity}$	(5) $\frac{Dividend}{LaggedEquity}$	(6) $\frac{NetEquityIss}{LaggedEquity}$	(7) $\frac{NetChargeOff}{LaggedEquity}$	(8) $\frac{LLP}{LaggedEquity}$
Panel (a): Equity components								
Closure × OCC	0.0012***	−0.0103	−0.0027	0.0062	0.0014***	−0.0157	−0.0045	0.0088
	(2.87)	(−1.17)	(−0.38)	(1.63)	(2.96)	(−1.16)	(−0.40)	(0.95)
Closure	0.0006	−0.0030	0.0034	−0.0003	−0.0004	−0.0072	0.0023	0.0001
	(−1.28)	(−0.50)	(1.59)	(−0.14)	(−1.33)	(−0.82)	(0.45)	(0.02)
OCC	−0.0003	0.0154	0.0177***	−0.0037	−0.0007	0.0872	0.0362***	0.0066
	(−0.96)	(0.82)	(3.38)	(−1.24)	(−1.33)	(0.87)	(3.48)	(0.92)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	1,059,176	1,027,593	1,031,495	1,027,591	1,033,589	1,002,868	1,006,767	1,002,867
R^2	0.097	0.059	0.068	0.076	0.170	0.141	0.114	0.121

	(1) $\frac{Asset}{LaggedAsset}$	(2) $\frac{RWA}{LaggedAsset}$	(3) $\frac{Loans}{LaggedAsset}$	(4) $\frac{Cash}{LaggedAsset}$	(5) $\frac{Asset}{LaggedAsset}$	(6) $\frac{RWA}{LaggedAsset}$	(7) $\frac{Loans}{LaggedAsset}$	(8) $\frac{Cash}{LaggedAsset}$
Panel (b): Asset components								
Closure × OCC	−0.000	0.000	0.020***	0.008	−0.000	0.000	0.016*	0.020
	(−0.03)	(1.43)	(2.69)	(1.10)	(−0.00)	(1.07)	(1.72)	(1.20)
Closure	−0.004	−0.000	−0.008	0.000	−0.002	−0.000	−0.005	0.000
	(−1.20)	(−1.27)	(−1.22)	(1.11)	(−0.52)	(−0.94)	(−1.18)	(1.02)

(continued)

Table V. Continued

	(1) $\frac{Asset}{LaggedAsset}$	(2) $\frac{RWA}{LaggedAsset}$	(3) $\frac{Loans}{LaggedAsset}$	(4) $\frac{Cash}{LaggedAsset}$	(5) $\frac{Asset}{LaggedAsset}$	(6) $\frac{RWA}{LaggedAsset}$	(7) $\frac{Loans}{LaggedAsset}$	(8) $\frac{Cash}{LaggedAsset}$
Panel (b): Asset components								
OCC	−0.060	−0.000**	−0.055	0.035	−0.065	−0.000	−0.071	0.047
	(−1.13)	(−2.08)	(−1.60)	(1.22)	(−0.57)	(−0.97)	(−0.95)	(1.14)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	518,348	518,348	518,348	518,348	500,968	500,968	500,968	500,968
R^2	0.018	0.061	0.039	0.305	0.059	0.116	0.078	0.357

This table reports difference-in-differences regression estimates of the effect of OCC office closures on bank equity and asset components. Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Asset is TAs. Loans and Cash are total loans and cash on the balance sheet, respectively. Dividend is total declared dividend. NetEquityIss is net equity issuance. NetChargeOff is net charge-offs. LLP is loan loss provisions. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, **, and *** represent significance at 10, 5, and 1% level, respectively.

even if bank capital would remain well above regulatory minimum thresholds (OCC, 2018a).[22] To better understand the increase in leverage, we investigate various components of equity in Panel (a) of Table V. As before, Columns (1) through (4) estimate the effect with specification (1) that includes bank, year-quarter and office fixed effects, while Columns (5) through (8) use the more saturated specification (2), which includes MSA and office time effects.

We begin by estimating the effect of office closures on bank equity issuance. If banks voluntarily increase risk, distributing dividends or repurchasing equity may be a direct way to increase leverage. Columns (1) and (5) of Panel (a) report the effect of office closures on dividends. We find that the change in dividends issued by treated banks during the 5 years following closure is twelve basis points higher than the change for control banks relative to the sample mean. This suggests that banks actively distribute more dividends following office closure. The estimates reported in Columns (2) and (6) suggest that the change in net equity issuance is statistically similar between treated and control banks following office closures.

Next, we investigate if leverage increases as a consequence of banks losing money. In Columns (3) and (7), we find that net charge offs are not statistically different between treated and control banks suggesting that treated banks are not losing more money than control banks. Further, the coefficients reported in Columns (4) and (8) show statistically similar trends in provisioning for future losses among treated and control banks following office closures.

Panel (b) of Figure 5 plots the dynamics of this effect by interacting the OCC variable with the time in years relative to closure for treated banks after including the base Closure and OCC variables. The figure shows that trends in dividends are similar for both treated and control banks in the pre-closure period. However, the coefficients increase significantly during the first 3 years following office closure before becoming statistically indistinguishable from zero again.

We also estimate the effect of office closures on components of bank assets in Panel (b) of Table V and find that treated banks originate more loans relative to control banks. This increase in loan amounts is economically significant as it corresponds to 3.2% of the sample mean of 0.49. We find no statistical change in risk-weighted assets and cash holdings for treated banks relative to control banks.

Overall, these results suggest that banks actively increase leverage by distributing more dividends and holding more loans, and that the increase in leverage is not a consequence of banks experiencing losses.

4.3 Consequences of Higher Risk

Higher leverage may not necessarily be bad for banks. If banks earn higher profits and remain stable with higher leverage, it may be judicious for them to take on more risk. We next investigate if banks suffer failure, enforcement actions, or loan delinquencies following closures.

Table VI reports coefficients for regressions that estimate the effect of office closures on bank failure, enforcement actions, and noncurrent loans. The reported effect is the average difference for treated relative to control banks in the 5-year period post-closure relative to

22 For further reference, please refer to page 9 of the OCC Comptroller's Handbook on Capital and Dividends.

Table VI. Consequences of higher risk

	(1) Failure	(2) Enforcement Action	(3) $\frac{\text{NCL}}{\text{LaggedLoans}}$	(4) Failure	(5) Enforcement Action	(6) $\frac{\text{NCL}}{\text{LaggedLoans}}$
Closure × OCC	0.0010***	0.0002	−0.0614	0.0008**	0.0012	−0.0781
	(2.52)	(0.22)	(−0.91)	(2.32)	(1.17)	(−1.14)
Closure	−0.0001	0.0007	0.1275	−0.0005	−0.0006*	0.0191
	(−0.28)	(1.54)	(0.83)	(−1.40)	(−1.76)	(0.68)
OCC	0.0009*	0.0083***	1.3828***	0.0006	0.0113***	1.2995***
	(1.78)	(8.10)	(19.33)	(0.92)	(6.48)	(15.22)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	No	No	No
Office FE	Yes	Yes	Yes	No	No	No
MSA × quarter FE	No	No	No	Yes	Yes	Yes
Office × quarter FE	No	No	No	Yes	Yes	Yes
Observations	1,059,176	1,059,176	1,048,151	1,033,589	1,033,589	1,023,041
R^2	0.062	0.029	0.315	0.115	0.118	0.381

This table reports difference-in-differences regression estimates of the effect of OCC office closures on bank failure, enforcement actions, and non-current loans. Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Failure is an indicator variable, which takes a value 1 if the commercial bank fails in a particular quarter, 0 otherwise. Enforcement is an indicator variable, which takes a value of 1 if either the bank or an individual at the bank is enforced upon in a given quarter, 0 otherwise. NCL is non-current loans. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, **, and *** represent significance at 10, 5, and 1% level, respectively.

the difference in outcomes between treated and control banks in the entire pre-closure period. In Columns (1) and (4) of Table VI, we find that treated banks are more likely to fail following office closures. In particular, Column (4) suggests that the difference in likelihood of failure for treated banks between 5 years following office closure and the period before closure is 0.08 percentage points higher than the same difference for control banks. This is economically large when compared to the sample mean likelihood of failure of 0.2%.[23] Next, we look at the effect of field office closures on enforcement actions and non-current loans. Columns (2–3) and (5–6) suggest that the changes in enforcement actions and noncurrent loans are not statistically different between treated and control banks.

Panel (c) of Figure 5 plots the coefficients for dynamic regressions that estimate the effect of office closures on bank failure. The coefficients before office closures are insignificant, suggesting that trends in the likelihood of failure are similar for both treated and control banks before office closure. Importantly, an increase in the likelihood of failure occurs around 3 to 4 years following office closure. The results are consistent with delayed consequences of higher risk taking by banks immediately following office closures.

23 Since the outcome variable is a binary variable, the coefficients may have a tendency to go out of bounds in a linear regression framework.

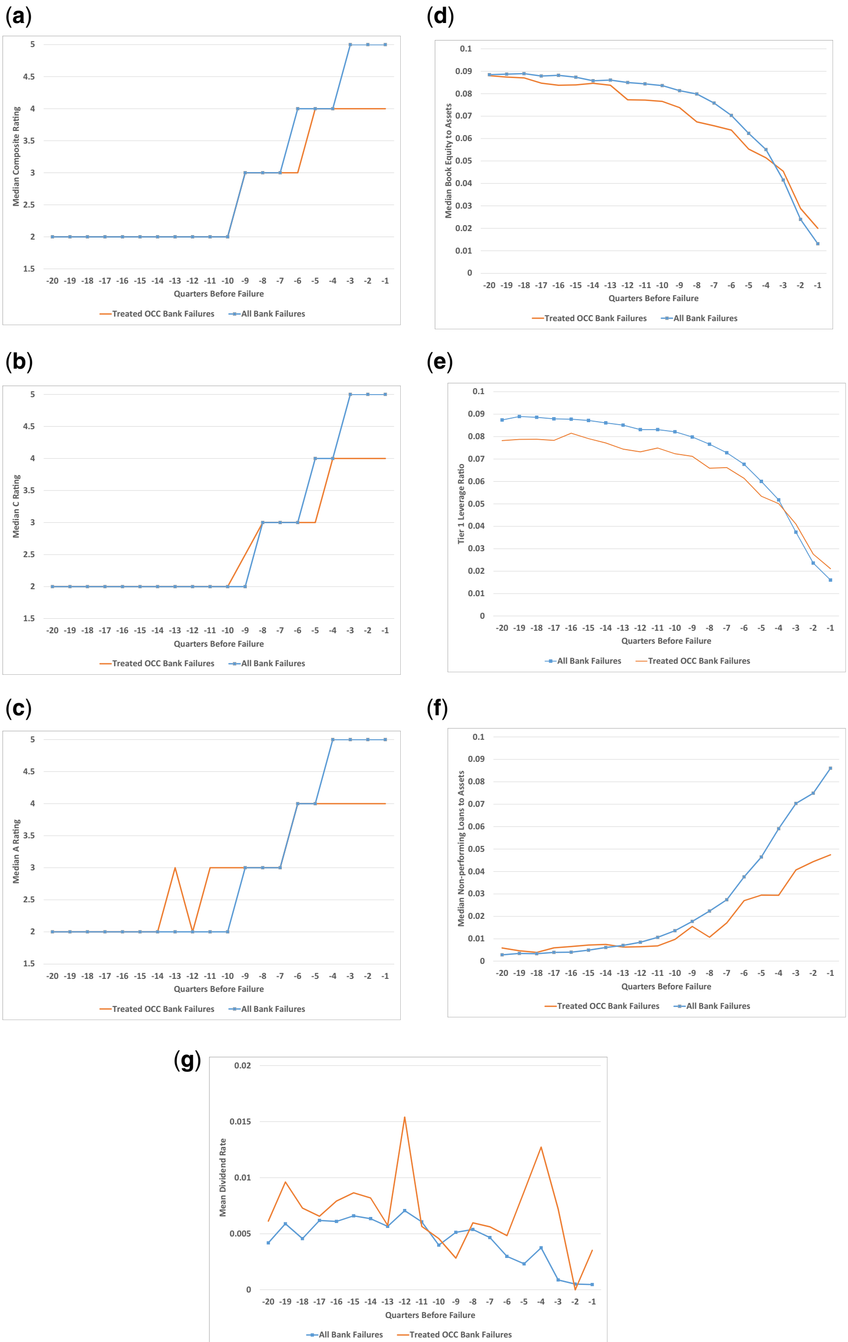


Figure 6. Evolution of characteristics for failed banks. This figure plots the evolution of different characteristics for treated failed banks and compares them to all failed banks in our sample for 5 years prior to failure. (a) CAMELS, (b) C Rating, (c) A Rating $\frac{BEquity}{TA}$ (d) $\frac{Tier1Cap}{TA}$, (e and f) NPLs, and (g) dividend.

4.4 Why Do Seemingly Healthy Banks Fail?

Our findings suggest that treated banks that pay out dividends in our sample are likely healthy banks holding above minimum regulatory capital as they are able to receive regulators' permission to distribute these dividends in the first place. Hence, it is surprising that such seemingly healthy banks fail within a few years following closure.

To help reconcile these results, we compare the dynamics of different characteristics for treated failed banks to all banks that failed in our sample. Figure 6 plots these comparisons where in panel (a) we find that the median failed bank in our sample has a CAMELS composite rating of two from quarters −20 to −10 relative to the quarter of failure (i.e., quarter 0), and supervisors downgrade (i.e., change ratings to a higher number) only in quarter −9 relative to the failure quarter. The median treated failed bank in our sample is indistinguishable from the median failed bank in the USA until seven quarters before failure but has slightly better ratings after that. This latter pattern is consistent with supervisors finding it difficult to evaluate a more distant bank. We find similar patterns for C and A ratings (Panel (b) and (c)) as well. These results show that a median failed bank in the USA and our sample seems to be categorized as a "good" or "healthy" bank by the supervisor up until ten quarters prior to failing.

Following a similar approach, we next examine the dynamics of bank capital (Panel (d)). The median failed bank in the USA had a book equity-to-assets ratio of about 9% 5 years prior to failure. Though this declines over time, it continues to be above the regulatory minimum until five quarters before failure. Failed treated banks in our sample exhibit similar trends to those of a median failed bank in the USA. We also find similar patterns for tier 1 leverage ratio in Panel (e). Finally, we compare differences across treated failed banks to those of all failed banks based on nonperforming assets (Panel (f)) and dividends paid out (Panel (g)). We find similar trends in nonperforming assets across treated and all failed banks until 2 years prior to failure at which point they diverge and treated failed banks have lower levels of nonperforming assets. However, treated failed banks pay out more dividends than untreated failed banks during the 3 years prior to failure. These results are consistent with the conjecture that banks increase or conceal asset risk in a way that is not observable to the examiner through their Call Reports, which allows these banks to issue more dividends.

The above results help reconcile our findings as they show that failed banks have similar characteristics as other banks until 2 to 3 years prior to failure.

4.4.a *Supervisor proximity as a channel*

Proximity to the regulator/supervisor can affect regulatory outcomes owing to a couple of reasons. First, physical proximity can affect information asymmetry between the bank and its supervisor. Being close to the bank, allows the supervisor to gather more soft information, which may not be accessible from a greater distance. Second, an increase in distance may also increase the cost of regulation resulting in a regulatory oversight (Kedia and Rajgopal, 2011).

To examine if supervisor proximity is an underlying mechanism for the effect of office closures on bank leverage, we begin by quantifying the effect of office closures on proximity as measured by driving time and physical distance. To this end, we use a difference-in-differences framework for a sample with only OCC banks because we expect no additional

Table VII. Supervisor proximity as a channel

	(1) DrivingTime	(2) Distance	(3) DrivingTime	(4) Distance
Panel (a): Effect of OCC office closures on supervisor proximity				
Closure	26.211***	55.498***	20.416***	26.884***
	(8.41)	(14.80)	(8.26)	(8.69)
Bank FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	No	No
Office FE	Yes	Yes	No	No
MSA × quarter FE	No	No	Yes	Yes
Office × quarter FE	No	No	Yes	Yes
Observations	224,219	322,868	216,480	287,024
R^2	0.924	0.871	0.976	0.926

	(1) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(2) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(3) $\ln\left(\frac{BEquity}{TA}\right)$	(4) $\ln\left(\frac{BEquity}{TA}\right)$	(5) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{BEquity}{TA}\right)$	(8) $\ln\left(\frac{BEquity}{TA}\right)$
Panel (b): Heterogeneous effect by changes in driving time between bank headquarter and local supervisor								
Closure × OCC	−0.035*	−0.004	−0.044**	−0.024	−0.060*	−0.021	−0.049**	−0.032
	(−1.72)	(−0.23)	(−2.04)	(−1.21)	(−1.74)	(−0.77)	(−1.99)	(−1.17)
Closure	−0.002	−0.015	0.012	−0.001	−0.003	0.010	0.002	0.019
	(−0.09)	(−0.97)	(0.71)	(−0.05)	(−0.11)	(0.45)	(0.10)	(0.89)
OCC	−0.057***	−0.027	−0.046**	−0.019	−0.007	0.022	0.037	0.061
	(−3.13)	(−1.34)	(−2.51)	(−0.94)	(−0.16)	(0.55)	(0.90)	(1.53)
Above or below median	Above	Below	Above	Below	Above	Below	Above	Below
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(continued)

Table VII. Continued

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (b): Heterogeneous effect by changes in driving time between bank headquarter and local supervisor								
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	503,619	511,146	501,684	509,085	478,380	485,922	476,498	483,919
R^2	0.563	0.568	0.588	0.592	0.643	0.647	0.661	0.665

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (c): Heterogeneous effect by changes in physical distance between bank headquarter and local supervisor								
Closure × OCC	−0.035*	−0.004	−0.043**	−0.022	−0.060*	−0.023	−0.048*	−0.026
	(−1.69)	(−0.22)	(−2.01)	(−1.33)	(−1.72)	(−0.97)	(−1.76)	(−1.10)
Closure	−0.002	−0.016	0.012	−0.004	−0.003	0.012	0.002	0.012
	(−0.10)	(−1.31)	(0.71)	(−0.36)	(−0.11)	(0.65)	(0.10)	(0.71)
OCC	−0.057***	−0.017	−0.046**	−0.004	−0.007	0.029	0.037	0.052
	(−3.12)	(−1.10)	(−2.51)	(−0.28)	(−0.17)	(0.90)	(0.90)	(1.62)
Above or below median	Above	Below	Above	Below	Above	Below	Above	Below
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No

(continued)

Table VII. Continued

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (c): Heterogeneous effect by changes in physical distance between bank headquarter and local supervisor								
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	503,531	539,704	501,596	537,498	478,292	513,481	476,410	511,323
R^2	0.563	0.564	0.588	0.589	0.643	0.641	0.661	0.661

Panel (a) of this table reports estimates of the effect of OCC office closures on supervisor proximity for a sample with only OCC banks. Panels (b) and (c) report the heterogeneous effect of office closures on bank capital by change in proximity between the bank and its local supervisor, estimated using different sub-samples based on whether the change in proximity was above or below median. Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Proximity is measured by driving time in minutes (Panel (b)) or by physical distance in miles (Panel (c)). Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, **, and *** represent significance at 10, 5, and 1 level, respectively.

difference in proximity compared with FDIC-regulated banks.[24] Panel (a) of Table VII reports estimates for this effect. Column (1) shows that driving time increases by 26 min, which corresponds to a 28% increase relative to the sample mean. The change in driving time is relatively smaller with the more saturated specification reported in Column (3) because it limits the comparison to treated and control banks located within the same MSA. However, the effect is still economically large as it corresponds to an increase of 21.9% in driving time relative to the sample mean.

We next examine the heterogeneous effect of office closures on bank leverage by different levels of changes in supervisor proximity, and estimate our baseline regressions for different sub-samples based on whether banks experience above or below median levels of change in proximity. Panels (b) and (c) report results for these estimates where proximity is measured by driving time and physical distance, respectively. The intuition for using driving time lies in the fact that physical distance may be more important in some areas than other. For example, 30 miles in a metropolitan area may impose greater travel times on supervisors than the same distance in a country region. Panel (b) shows that the effect of office closure on bank leverage is concentrated for banks experiencing above median levels of change in driving time. In panel (c), we find similar results where the effect of office closure on bank leverage is concentrated for banks experiencing above medial levels of percentage change in physical distance to the supervisor.

Overall, these results suggest that changes in proximity to the supervisor play an important role in driving the effects of office closure on bank leverage.

4.5 Controlling for Supervisory Personnel and Relationships

4.5.a. *Changes in supervisors/examiners*

An emerging literature has documented that heterogeneity among regulators may influence bank behavior (Agarwal et al., 2014; Granja, Matvos, and Seru, 2017; Costello, Granja, and Weber, 2019). These studies suggest that regulators could interpret the same regulatory rules inconsistently, leading to changes in supervisory or bank-reported outcomes. A plausible alternative hypothesis for our results may be that at the time of OCC office closure, new regulatory management personnel supervise treated banks, leading to increases in leverage.

To rule out this plausible alternative, we would ideally hold the examiner-in-charge constant in our pre- and post-periods and conduct our analyses. However, such data are not consistently recorded in a large-sample format to the best of our knowledge. In lieu of this data, we hand-collect the names of ADCs of local OCC offices from archived internal OCC telephone directories. ADCs are the most senior supervisory officials stationed at each field office and manage teams of examiners and supervision support staff that form field office personnel. ADCs are responsible to enforce compliance with stated OCC policies and importantly, review and concur with all examination conclusions before examination reports are transmitted to bank management and boards of directors. They are also designated signatory for the examination reports. Furthermore, ADCs must be present at "exit meetings" between bank examiners and bank management to ensure that results and conclusions are consistently formulated and communicated (OCC, 2019).

24 In particular, both OCC banks affected by office closures and non-OCC banks located in the same region who receive pseudo-treatment will mechanically experience a similar change in proximity. This will significantly bias the first stage downwards.

TABLE VIII. Controlling for supervisory personnel

	(1) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(2) $\ln\left(\frac{BEquity}{TA}\right)$	(3) $\ln\left(\frac{Tier1Cap}{RWA}\right)$	(4) $\ln\left(\frac{TotCap}{RWA}\right)$	(5) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(6) $\ln\left(\frac{BEquity}{TA}\right)$	(7) $\ln\left(\frac{Tier1Cap}{RWA}\right)$	(8) $\ln\left(\frac{TotCap}{RWA}\right)$
Panel (a): Bank leverage								
Closure × OCC	−0.054***	−0.053***	−0.049**	−0.043**	−0.049**	−0.044**	−0.082***	−0.074***
	(−3.62)	(−3.61)	(−2.57)	(−2.36)	(−2.42)	(−2.21)	(−3.28)	(−3.19)
Closure	0.006	0.009	−0.004	−0.004	0.011	0.012	−0.003	−0.005
	(0.76)	(1.21)	(−0.39)	(−0.43)	(1.20)	(1.36)	(−0.29)	(−0.42)
OCC	−0.009	−0.001	0.008	0.010	0.042**	0.051***	0.095***	0.091***
	(−0.86)	(−0.12)	(0.48)	(0.65)	(2.17)	(2.76)	(2.95)	(3.06)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	986,766	981,786	738,739	738,739	967,102	962,093	721,483	721,483
R^2	0.535	0.564	0.654	0.653	0.596	0.620	0.702	0.701
	(1) $\frac{Dividend}{LaggedEquity}$	(2) $\frac{NetEquityIss}{LaggedEquity}$	(3) $\frac{NetChargeOff}{LaggedEquity}$	(4) $\frac{LLP}{LaggedEquity}$	(5) $\frac{Dividend}{LaggedEquity}$	(6) $\frac{NetEquityIss}{LaggedEquity}$	(7) $\frac{NetChargeOff}{LaggedEquity}$	(8) $\frac{LLP}{LaggedEquity}$
Panel (b): Equity components								
Closure × OCC	0.0013	−0.0079	0.0086	0.0139*	0.0017**	−0.0275	−0.0027	0.0235
	(1.57)	(−0.63)	(1.15)	(1.86)	(2.38)	(−1.19)	(−0.11)	(1.54)
Closure	−0.0005*	−0.0026	0.0027	−0.0004	−0.0005	−0.0071	0.0017	−0.0004
	(−1.76)	(−0.42)	(1.32)	(−0.20)	(−1.57)	(−0.85)	(0.41)	(−0.10)

(continued)

TABLE VIII. Continued

	(1) $\frac{Dividend}{LaggedEquity}$	(2) $\frac{NetEquityIss}{LaggedEquity}$	(3) $\frac{NetChargeOff}{LaggedEquity}$	(4) $\frac{LLP}{LaggedEquity}$	(5) $\frac{Dividend}{LaggedEquity}$	(6) $\frac{NetEquityIss}{LaggedEquity}$	(7) $\frac{NetChargeOff}{LaggedEquity}$	(8) $\frac{LLP}{LaggedEquity}$
Panel (b): Equity components								
OCC	−0.0005	0.0233	0.0157*	−0.0059	−0.0012*	0.1067	0.0442***	0.0147
	(−1.35)	(1.09)	(1.79)	(−1.20)	(−1.96)	(0.86)	(4.25)	(1.50)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	994,356	965,643	969,281	965,642	974,479	946,337	950,000	946,336
R^2	0.095	0.060	0.069	0.076	0.169	0.146	0.119	0.123

	(1) $\frac{Asset}{LaggedAsset}$	(2) $\frac{RWA}{LaggedAsset}$	(3) $\frac{Loans}{LaggedAsset}$	(4) $\frac{Cash}{LaggedAsset}$	(5) $\frac{Asset}{LaggedAsset}$	(6) $\frac{RWA}{LaggedAsset}$	(7) $\frac{Loans}{LaggedAsset}$	(8) $\frac{Cash}{LaggedAsset}$
Panel (c): Asset components								
Closure × OCC	−0.017*	−0.000	0.010	0.001	−0.038	−0.000	0.001	−0.006
	(−1.83)	(−0.10)	(1.04)	(0.39)	(−1.39)	(−0.53)	(0.07)	(−0.80)
Closure	−0.002	−0.000**	−0.006	0.000	−0.002	−0.000	−0.005	0.000
	(−0.56)	(−2.40)	(−1.56)	(0.00)	(−0.77)	(−1.21)	(−1.28)	(0.00)
OCC	−0.089	−0.001	−0.073	0.000	−0.128	−0.001	−0.115	0.000
	(−1.04)	(−1.54)	(−1.32)	(.)	(−0.81)	(−1.19)	(−1.11)	(.)

(continued)

TABLE VIII. Continued

	(1) $\frac{Asset}{LaggedAsset}$	(2) $\frac{RWA}{LaggedAsset}$	(3) $\frac{Loans}{LaggedAsset}$	(4) $\frac{Cash}{LaggedAsset}$	(5) $\frac{Asset}{LaggedAsset}$	(6) $\frac{RWA}{LaggedAsset}$	(7) $\frac{Loans}{LaggedAsset}$	(8) $\frac{Cash}{LaggedAsset}$
Panel (c): Asset components								
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	487,581	492,817	487,581	106,284	473,542	478,711	473,542	90,644
R^2	0.017	0.059	0.038	0.386	0.059	0.113	0.078	0.483

	(1) Failure	(2) Enforcement action	(3) $\frac{NCL}{LaggedLoans}$	(4) Failure	(5) Enforcement action	(6) $\frac{NCL}{LaggedLoans}$
Panel (d): Bank failure						
Closure × OCC	0.0009*	0.0017	0.370***	0.0007*	0.0012	0.0315
	(1.70)	(1.50)	(2.42)	(1.82)	(0.96)	(0.27)
Closure	−0.0001	0.0006	0.1008**	−0.0005	−0.0004	0.0194
	(−0.29)	(1.14)	(1.95)	(−1.63)	(−1.12)	(0.71)
OCC	0.0011*	0.0084***	1.4349***	0.0007	0.0125***	1.2865***
	(1.73)	(7.58)	(18.40)	(0.97)	(6.27)	(14.23)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	No	No	No

(continued)

TABLE VIII. Continued

	(1) Failure	(2) Enforcement action	(3) $\frac{NCL}{LaggedLoans}$	(4) Failure	(5) Enforcement action	(6) $\frac{NCL}{LaggedLoans}$
Panel (d): Bank failure						
Office FE	Yes	Yes	Yes	No	No	No
MSA × quarter FE	No	No	No	Yes	Yes	Yes
Office × quarter FE	No	No	No	Yes	Yes	Yes
Observations	994,356	994,356	985,347	974,479	974,479	965,765
R^2	0.063	0.029	0.309	0.119	0.128	0.372

This table reports triple differences regression estimates of the effect of OCC office closures on all bank outcomes we examine, controlling for the ADCs in charge of supervising treated banks. Closure takes a value of 1 for banks whose supervising office closes during 20 quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during 20 quarters following closure and 0 otherwise. Book equity (BEquity) over TAs is a non-regulatory capital ratio. Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Tier1Cap over RWAs is the tier-1 risk-based capital ratio. The more inclusive total capital (TotCap) over RWA is the total tier-1 risk-based capital ratio. Standard errors are double-clustered at bank and year-quarter level, and *t*-statistics are reported in parentheses. *, ** and *** represent significance at 10, 5, and 1% level, respectively.

Given this active role that ADCs play in local supervision, we re-estimate all our primary results for the subsample of treated banks for which they remained constant in the pre- and post-periods. This specification helps isolate closures in which satellite offices consolidate into larger field offices. In addition, sub-sample is likely to have similar supervision before and after office closures by holding ADCs constant, while only changing examiners' travel times. If our results are driven by differences in enforcement across supervisory personnel within the OCC in the pre- and post-period, we expect to observe no change in bank outcomes in the sample for which we hold ADCs constant. Instead, results reported in Table VIII show that even after holding the ADC constant, treated banks increase leverage (Panel (a)), pay out more dividends (Panel (b)), lend more (Panel (c)), and are more likely to fail relative to control banks (Panel (d)). The point estimates are either similar or of greater magnitude than our baseline estimates. For instance, Tier 1 capital declines by 4.9% for treated banks relative to the control group, which corresponds to a change of ∼2% relative to the sample mean. This magnitude implies that for the average bank in our sample with Tier 1 capital of 10%, their capital ratio would decline to 9.51% after closure of a field office. These results suggest that differences in supervision likely do not drive our results.

4.5.b. *Supervisory relationships*

Another somewhat related potential channel through which office closure may affect bank leverage could be supervisory relationships and regulatory capture. Specifically, supervisors may be more lenient towards banks they have been supervising for a long period of time because they may have developed a relationship with them.[25] Though plausible, results discussed in Section 4.5.a highlight that the treatment effects are not driven by changes in supervisors. Hence, changes in supervisory relationships do not explain our effects either. Nonetheless, we re-estimate our baseline effects after controlling for supervisory relationship length. Supplementary Appendix Table A4 reports results for this estimation where we find stronger effects than our baseline estimates. This further suggests that supervisory relationships is not an important channel at play in our setting otherwise one would expect to find weaker treatment effects after controlling for this channel.

Alternatively, the change in supervising personnel could lead to similar findings if supervisors take time to learn about the banks after they are newly assigned to them. We expect that such adjustment costs would be relatively short lived as newly assigned examiners are likely experienced supervisors themselves with portable expertise. Instead, we find in Figure 5 that the effect of office closures on bank leverage and failures lasts for at least 3 years following closure. This suggests that the effect is not driven by supervisory learning or adjustment costs associated with banks being assigned to new supervisors, or that newly assigned supervisors require decades of bank-specific experience to assess its risks.

4.6 Other Potential Explanations

4.6.a. *Supervisory resources*

An alternative channel through which OCC office closures may affect bank leverage is lack of supervisory resources. Post closures and consolidations of offices, the amount of

25 Hertzberg, Liberti, and Paravisini (2010) and Fisman, Paravisini, and Vig (2017) find loan officer rotation affects moral hazard in firms. In a similar vein, it is possible that less experienced and skilled examiners are sent to distant banks, which may result in lower quality supervision for the treated banks following office closure.

supervisory resources available in the regions where closures occur may decrease. This may lead to a decline in supervisory attention for treated banks leading to increased risk and higher likelihood of failure. However, our specification controls for this channel by including office-by-quarter and MSA-by-quarter fixed effects. These fixed effects ensure that the coefficients are estimated by comparing banks supervised by the same office or located in the same region where only some of them were previously supervised by the closed office. Thus, if resources are stretched thin at a given office or region following closures, these fixed effects would ensure that both treated and control groups are exposed to this decline in supervisory resources and that the estimates are not driven by such declines.

4.6.b. *Supervisory competence*

Our results are unlikely to be driven by differences in supervisory competence across offices. If closed offices are more competent and treated banks are assigned to less competent offices following closures, one could expect to see increases in leverage and subsequent failures among these banks. However, the inclusion of office-by-quarter fixed effects in our saturated specification controls for such time-varying unobserved changes at the office level. Similar treatment effects with this specification suggest that the effect of office closures that we document is not driven by differences in competence across offices or by other office level (fixed or time-varying) heterogeneity.

4.6.c. *Targeted deregulation*

An omitted variable that could be driving both office closures and supervisory leniency is deregulation targeted at banks near closed field offices. For example, if policymakers choose to ease the regulatory burden on more rural community banks by closing satellite field offices in rural areas, while simultaneously relaxing capital requirements for these same banks, we could find similar leverage increases post-closure. Though plausible, our finding that state-chartered banks (not regulated by OCC), which are located in the same time and place do not experience a leverage increase do not support this channel. Nonetheless, we examine this channel by estimating the heterogeneous effects of closures during years when a Republican President was in power and those when Democratic President was in power. Supplementary Appendix Table A5 reports these estimates where we find no evidence for this channel in the form of heterogeneity across these political regimes.

4.7 Heterogeneity by Bank Health and Size

In a decentralized framework, local supervisors may be lenient towards banks in their regions that might present outside employment opportunities. These opportunities are increasing in bank health (Lucca, Seru, and Trebbi, 2014) and hence, local supervisors may be incrementally lenient towards these banks, relative to poorly performing institutions.

Alternatively, banks have an incentive to conceal asset risks or increase risks in ways not visible to distant supervisors. Healthier banks may have greater incentives to conceal risks and reduce their capital since they are farther away from failure and hence bear lower costs of reducing capital in the form of increase in likelihood of distress. These banks may also receive less stringent oversight from distant supervisors as regulatory agencies with limited resources may incrementally allocate more supervisory resources toward supervising poorly

TABLE IX. Heterogeneity by bank health and size

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (a): CAMELS composite ratings								
Closure × OCC	−0.045***	0.037	−0.051***	0.031	−0.039***	0.034	−0.046***	0.016
	(−4.10)	(0.70)	(−4.57)	(0.60)	(−2.84)	(0.47)	(−3.35)	(0.23)
Closure	0.011	0.021	0.016**	0.023	0.016*	0.009	0.021**	0.010
	(1.33)	(0.59)	(2.02)	(0.68)	(1.82)	(0.19)	(2.44)	(0.25)
OCC	0.005	−0.109**	0.013	−0.080*	0.010	−0.124*	0.015	−0.138*
	(0.38)	(−2.37)	(1.04)	(−1.76)	(0.79)	(−1.80)	(1.16)	(−1.93)
CAMELS ratings	≤ 2	> 2	≤ 2	> 2	≤ 2	> 2	≤ 2	> 2
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	750,028	49,119	745,704	48,831	725,710	37,374	721,533	37,163
R^2	0.554	0.429	0.574	0.460	0.621	0.645	0.638	0.669

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (b): CAMELS C component ratings								
Closure × OCC	−0.047***	0.079	−0.052***	0.092	−0.042***	0.015	−0.050***	0.049
	(−4.24)	(1.27)	(−4.73)	(1.48)	(−3.06)	(0.12)	(−3.59)	(0.43)

(continued)

TABLE IX. Continued

	(1) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(2) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(3) $\ln\left(\frac{BEquity}{TA}\right)$	(4) $\ln\left(\frac{BEquity}{TA}\right)$	(5) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{BEquity}{TA}\right)$	(8) $\ln\left(\frac{BEquity}{TA}\right)$
Panel (b): CAMELS C component ratings								
Closure	0.009	0.047	0.015*	0.031	0.015	0.013	0.019**	0.001
	(1.16)	(1.16)	(1.86)	(0.80)	(1.66)	(0.22)	(2.25)	(0.01)
OCC	0.002	−0.101*	0.011	−0.081	0.006	−0.163	0.012	−0.166
	(0.20)	(−1.85)	(0.92)	(−1.42)	(0.46)	(−0.92)	(0.90)	(−0.99)
C Ratings	≤ 2	> 2	≤ 2	> 2	≤ 2	> 2	≤ 2	> 2
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	770,033	29,114	765,577	28,958	745,666	18,993	741,359	18,906
R^2	0.547	0.389	0.567	0.424	0.614	0.640	0.631	0.662

	(1) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(2) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(3) $\ln\left(\frac{BEquity}{TA}\right)$	(4) $\ln\left(\frac{BEquity}{TA}\right)$	(5) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{BEquity}{TA}\right)$	(8) $\ln\left(\frac{BEquity}{TA}\right)$
Panel (c): Bank size								
Closure × OCC	−0.013	−0.046**	−0.024*	−0.045**	−0.007	−0.039*	−0.017	−0.036*
	(−1.14)	(−2.35)	(−1.97)	(−2.37)	(−0.50)	(−1.75)	(−1.14)	(−1.73)
Closure	−0.006	0.008	0.003	0.010	−0.006	0.008	0.002	0.007
	(−0.67)	(0.64)	(0.36)	(0.84)	(−0.63)	(0.58)	(0.16)	(0.55)
OCC	−0.005	−0.046***	0.000	−0.048***	0.002	−0.127	0.014	−0.067
	(−0.53)	(−2.78)	(0.01)	(−2.92)	(0.14)	(−0.82)	(0.77)	(−0.51)

(continued)

TABLE IX. Continued

	(1) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(2) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(3) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(4) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(5) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(6) $\ln\left(\frac{\text{Tier1Cap}}{\text{TA}}\right)$	(7) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$	(8) $\ln\left(\frac{\text{BEquity}}{\text{TA}}\right)$
Panel (c): Bank size								
Size relative to median	Above	Below	Above	Below	Above	Below	Above	Below
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	522,418	521,488	522,542	521,694	505,305	503,627	505,432	503,824
R^2	0.628	0.628	0.630	0.659	0.690	0.706	0.691	0.727

This table reports triple differences regression estimates of the effect of OCC office closures on bank capital for sub-samples segmented on *ex ante* CAMELS composite (Panel (a)), C ratings (Panel (b)), and bank size (Panel (c)). Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Book equity (BEquity) over TAs is a nonregulatory capital ratio. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, ** and *** represent significance at 10%, 5%, and 1% level, respectively.

performing institutions. Lower oversight may further help facilitate asset risk concealment and reduction in capital for these banks.

We test these alternatives by examining heterogeneity in banks' responses based on *ex ante* CAMELS composite and CAMELS C ratings. Banks with ratings of 1 or 2 are considered to be in good standing while those with ratings of 3 through 5 are considered to be poorly performing and receive greater supervisory attention. Following this argument, we re-estimate our baseline result on bank leverage for two subsamples: banks with satisfactory ratings (of 1 or 2) and banks with unsatisfactory ratings (of 3, 4, and 5). Results presented in Panel (a) and (b) of Table IX show that the decline in capital is concentrated in banks with satisfactory *ex ante* ratings.

In a decentralized framework, differences in preferences across local supervisors and regulatory hub may arise owing to capture or revolving door opportunities. Large banks may provide more attractive potential opportunities, which may make local supervisors incrementally more lenient towards large banks. This incremental leniency may also arise owing to higher fees paid by larger banks as shown in Kisin and Manela (2014). Hence, distancing local supervisors may lead to incrementally higher capital at larger banks.

On the other hand, distancing supervisors from banks may increase information asymmetry between banks and regulators leading to a loss of soft information. Large literature on bank lending and contracting argues that soft information is more relevant for smaller organizations. Hence, if loss of soft information is more important, distancing local supervisors would lead to incrementally lower capital at smaller banks.

We evaluate these alternatives in Panel (c) of Table IX by estimating the heterogeneity in banks' responses based on size. The results are stronger for banks with below median levels of size, suggesting that soft information is an important part of bank supervision. Furthermore, distancing local supervisors may affmy impede efforts to gather information imperfectly captured in Call Reports.

4.8 Information Technology and Regulatory Proximity

Advances in information technology have made it easier to collect new information and to monitor distant agents. For example, banks can now electronically share confidential documents, which were previously only available in hard copies. These advances have had an impact on how banks are supervised and regulated. For instance, in 2002, the OCC restructured their district offices so that they can better respond to advances in information technology and increase the efficiency of their supervisory processes (OCC, 2002). In the context of our study, advances in information technology could mitigate the effects of changes in proximity that we document.

We test this conjecture by splitting our sample in two halves: from 1985 to 1999 and from 2000 to 2014. If advances in information technology mitigate the effects of changes in proximity, one would expect to see a diminished effect of office closures on bank leverage for the second half of the sample. Table X presents results for this estimation where we find that our results are strong and indistinguishable across both subsamples.

One explanation for the stability of our treatment estimates is that our setting features two-sided moral hazard or hidden action (Dybvig and Lutz, 1993; Bhattacharyya and Lafontaine, 1995). Risk-taking by banks is not perfectly observable to supervisors in the field. On the other side, monitoring efforts by supervisors may be hidden from the regulator's headquarters. Advances in information technology, which may allow for greater

Table X. Does supervisor proximity still matter?

	(1) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(2) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(3) $\ln\left(\frac{BEquity}{TA}\right)$	(4) $\ln\left(\frac{BEquity}{TA}\right)$	(5) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(6) $\ln\left(\frac{Tier1Cap}{TA}\right)$	(7) $\ln\left(\frac{BEquity}{TA}\right)$	(8) $\ln\left(\frac{BEquity}{TA}\right)$
Closure × OCC	−0.053***	−0.055***	−0.055***	−0.067***	−0.064***	−0.060***	−0.061***	−0.071***
	(−3.04)	(−3.85)	(−3.25)	(−4.83)	(−2.88)	(−2.82)	(−2.90)	(−3.51)
Closure	0.026*	−0.011	0.006	0.004	0.009	0.005	0.004	0.015
	(1.85)	(−1.16)	(1.17)	(0.50)	(1.58)	(0.43)	(1.35)	(1.42)
OCC	−0.017	−0.028	−0.018	−0.039	0.051	0.102	0.053	0.134**
	(−1.51)	(−1.23)	(−1.54)	(−1.64)	(1.31)	(1.54)	(1.51)	(2.13)
Sample	Pre 2000	Post 2000	Pre 2000	Post 2000	Pre 2000	Post 2000	Pre 2000	Post 2000
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	No	No	No	No
Office FE	Yes	Yes	Yes	Yes	No	No	No	No
MSA × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Office × quarter FE	No	No	No	No	Yes	Yes	Yes	Yes
Observations	661,483	388,160	661,799	382,646	642,435	374,462	642,738	369,089
R^2	0.605	0.590	0.629	0.616	0.661	0.661	0.680	0.682

Pre- versus post-2000 subsamples. This table reports difference-in-differences regression estimates of the effect of OCC office closures on bank capital for pre- and post-2000 subsamples. Closure takes a value of 1 for banks whose supervising office closes during twenty quarters following closure and 0 otherwise. OCC takes a value of 1 for banks that are supervised by the OCC at time t and equals 0 for non-OCC supervised banks. Closure × OCC takes a value of 1 for OCC banks whose supervising office closes during twenty quarters following closure and 0 otherwise. Tier-1 capital (Tier1Cap) over TAs is the tier-1 core (leverage) capital ratio as reported by banks or calculated by the FDIC for earlier periods. Book equity (BEquity) over TAs is a non-regulatory capital ratio. Standard errors are double-clustered at bank and year-quarter level, and t-statistics are reported in parentheses. *, **, and *** represent significance at 10, 5, and 1% level, respectively.

distances between banks and supervisors, may have simultaneously reduced information asymmetries between OCC headquarters and supervisors in the field. With such two-sided moral hazard, even today, we find that the net effect of distancing supervisors from banks is an increase in bank risk.

5. Discussion

The empirical findings are consistent with some theories of delegation but not others. We next discuss the related theory in more detail to provide guidance to regulatory agencies choosing their structure.

When supervising a geographically dispersed industry like banking in the USA or in Europe, the design of the regulatory agency must determine what should be done, by whom, how, when, and where (Gibbons, Matouschek, and Roberts, 2013). Our natural experiment is most informative about this last decision—where good supervision depends on the decision maker's having the relevant information, but this information is often naturally dispersed as well and may require effort to collect (Hayek, 1945; Aghion and Tirole, 1997). Strategic communication within the organization can lead to information withholding or misrepresentation (Dessein, 2002).[26]

When comparing the decentralized supervisory architecture illustrated in the left panel of Figure 1 with its centralized polar opposite on the right, two sources of agency frictions determine the optimal mix of these two extremes: (i) the relationship between the bank and its closest supervisor (red arrows) and (ii) the relationship between the headquarters and the local supervisor (blue lines). These frictions generally arise due to information asymmetry and divergence of preferences, both of which are likely to increase as function of geographic distance.

Our natural experiment shocks both relationships, as can be seen from the middle panel. Closing a field office increases the distance between the bank and its closest supervisor, but also decreases the gap between the new supervisor and headquarters. Our evidence that post-closure bank leverage and risk of failure increase are likely undesirable to the regulator, and therefore suggest that the friction between the bank and its local supervisor is more severe than the one within the regulatory agency.

In a general principal–agent model, Dessein (2002) shows that delegation of control is suboptimal when the divergence in preferences is large. Building on this framework in a bank regulation setting, Carletti, Dell'Ariccia, and Marquez (2020) emphasize the agency problem between the local supervisor and headquarters where the local supervisor collects information. Centralization in these models, however, entails shifting the authority to intervene (but not information collection) from the local supervisor to headquarters, without changing the gap between the bank and the local supervisor. Our evidence that distance matters even when the supervisor in charge remains the same cannot be explained by this mechanism, unless the supervisor's preferences change as well.

Our setting and findings are most consistent with the Colliard (2020) model, where local supervisors internalize less externalities but are also more lenient than a central supervisor—their preferences are more aligned with the bank than with the headquarters. This

26 We cover only the literature closest to our setting, and refer the interested reader to recent surveys of the broader literature on organizational economics to Gibbons, Matouschek, and Roberts (2013) and Garicano and Rayo (2016).

leniency channel encourages banks to reveal useful information to the local supervisor that they would hide from the central one. The optimal mix of local and central supervision then depends on the strength of the externalities and on the cost for the bank of hiding information. Importantly, centralization shifts the information collection responsibility to the central supervisor as well. Our evidence that increasing the distance between the bank and the supervisor leads to higher leverage and failure risk is consistent with a parameterization of this model where greater distance makes it harder to verify the bank's information more than it reduces the ability of the bank to capture the supervisor.

Our results are informative about a potential shift from onsite to offsite bank examinations (Colliard, 2015). Offsite monitoring can better align the incentives of the supervisor in charge with those of headquarters, and save on the physical cost of onsite examination. Especially during exigent circumstances like pandemics or natural disasters, offsite examinations offer clear advantages to the safety of examiners and bank staff. But, our findings that office closure leads to greater bank risk suggest that the loss of soft information collected by local supervisors outweighs these benefits.

One might expect this calculation to change with better information technology. But, our findings that the effects are quite similar pre- and post-2000 appear at odds with this conjecture (Section 4.8). It is possible that the shift toward video communications that occurred after 2015, and which accelerated due to theCOVID-19 pandemic will reduce the cost of collecting information even offsite, but this requires a conscious effort to identify the reasons why local supervision is advantageous, and finding good substitutes in offsite interactions (Allen and Mark, 2020). We note, however, that such technological improvements are also likely to reduce the information gap between headquarters and a distant field office. Thus, on net, local supervision and onsite exams may still be optimal.

6. Conclusion

We provide evidence that proximity to supervisory field offices affects the risk-taking incentives of banks. Field offices and decentralized points of supervisory contact are a common feature of regulatory systems in the USA, Europe, and elsewhere. Using a novel panel dataset of field office locations for a major federal banking regulator, we examine whether office closures result in heightened risk-taking behavior.

We find that banks increase their leverage after the nearest supervisory field office closes. These decreases in bank equity are driven by managerial choices to increase dividends and issue more loans, rather than being driven by mechanical changes, such as loan loss provisioning or write downs. As a result, these banks are more likely to fail 2 to 3 years following closure. We document that newly assigned local supervisors tend to upgrade their supervisory rating immediately after closure, which facilitates these leverage increases. Supervisor proximity is an important channel for these effects. Our findings suggest that localized supervisory presence is an important part of bank regulation, and that switching from onsite to offsite supervision to prevent regulatory capture or save on costs can inadvertently increase bank risk. Whether such increases in bank risk are socially desirable, is left for future work.

Data availability

Confidential supervisory ratings are owned by the Federal Reserve System and are available for any user who has access to confidential supervisory information. OCC Office Locations are available through the OCC. Bank financial information are available through the FDIC.

Supplementary Material

Supplementary data are available at *Review of Finance* online.

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