**Finance and Economics Discussion Series**
**Divisions of Research & Statistics and Monetary Affairs**
**Federal Reserve Board, Washington, D.C.**

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**2017-079**

Please cite this paper as:
Kandrac, John, and Bernd Schlusche (2017). "The Effect of Bank Supervision on Risk Taking: Evidence from a Natural Experiment," Finance and Economics Discussion Series 2017-079. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2017.079.

# The Effect of Bank Supervision on Risk Taking: Evidence from a Natural Experiment

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June 27, 2017

**ABSTRACT**

In this paper, we exploit a natural experiment in which thrifts in several states witnessed an exogenous reduction in supervisory attention to assess the effect of supervision on financial institutions' willingness to take risk. We show that the affected institutions took on much more risk than their unaffected counterparts in other districts that were subject to identical regulations. Subsequent to the emergency enlistment of examiners and supervisors from other parts of the country two years later, additional risk taking by the affected thrifts ceased. We find that the expansion in risk taking resulted in a higher incidence of failure as well as more costly failures. None of these patterns are present in commercial banks subject to a different primary supervisory agent but otherwise similar to the thrifts in our sample.

**JEL classification:** G01, G21, G28

**Keywords:** bank supervision, risk taking, S&L crisis, lending, resolution costs

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We are grateful for helpful comments from Sriya Anbil, James Barth, Bastian von Beschwitz, Richard Brown, Mark Carlson, Scott Frame, Sean Hundtofte, Robert Kurtzman, Marcelo Rezende and seminar participants at the Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve Board. We thank Kristin Meier and Luke Pardue for excellent research assistance. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of anyone else associated with the Federal Reserve System.

# 1. Introduction

The effect of financial regulation on the banking system has been an area of intense study over the past few decades (Jayaratne and Strahan (1996), Kroszner and Strahan (1996), Barth et al. (2004), Buch and DeLong (2008), and Laeven and Levine (2009), among others). A somewhat less studied but crucial companion to financial regulation is ongoing supervision and enforcement of established rules, which are often carried out by field agents. How important is bank supervision *per se* to the stability of the financial system? The answer to this question is the focus of this paper, and has important implications for the formulation and implementation of an optimal regulatory framework.

Effective supervision does not merely consist of the enforcement of prudential limitations. As described by Dudley (2016), banking supervision works in concert with regulation as a more flexible element of banking policy, and supervisory standards may evolve over time as the banking industry and financial markets change. Relatedly, supervisory moral suasion may be an important component of banks' willingness to approach the limits of regulatory guidelines.

Drawing causal inference regarding the importance of effective bank supervision can be difficult for a few reasons. First, variation in supervision across banks is frequently tied to differences at the banks or the environment in which they operate. Second, identifying exogenous shocks to supervisory capacity and determining the exact timing of a shock is generally challenging. Third, it may be difficult to separate the effects of supervision *per se* from the effects of microprudential regulation. For instance, the practices of "regulator shopping," wherein financial institutions may to some extent choose their regulator, and of "regulatory capture," wherein financial institutions attempt to influence their regulator to advance the institutions' interests rather than the public's can cause risky banks to select into a particular regulator/supervisor, and also influence regulatory and supervisory pressures simultaneously (Rezende (2014)).[1] These types of issues not only frustrate attempts to measure the effects of bank supervision, but also

[1]For example, during the recent financial crisis, the Office of Thrift Supervision had oversight responsibility of the insurance giant American International Group (AIG).

make it difficult to disentangle the effects of supervision from the effects of regulation, which can interact in complex ways (Ongena et al. (2013)).

We overcome these threats to causal inference by examining a natural experiment in which some institutions subject to the same regulations witnessed an exogenous decline in supervisory oversight. In 1983, the 9th district Federal Home Loan Bank (FHLB) was hastily relocated from Little Rock, Arkansas to Dallas, Texas. The move was spurred by a desire to be located in the largest metropolitan area in the district with its attendant status as a transportation hub, which allowed for easier travel both throughout the region and to Washington, D.C. During this time, each of the twelve FHLBs maintained a role as the primary supervisory agent of the savings and loan associations (S&Ls) in its district. As a consequence of the move, the vast majority of employees in the 9th district's division of supervision, including the chief, quit their jobs rather than relocate to Dallas. Of the eleven employess that made the move, nine were clerical and administrative staff with only two supervisory agents choosing to relocate. We demonstrate that the disruption caused by the move produced a reduction in supervision and examination for 9th district thrifts.[2] This decline in supervisory capacity was not just acute, but also enduring, as normal supervision and examination scrutiny did not return for years after the relocation.

The primary goal of this study is to assess whether changes in supervisory capacity alter the risk taking behavior of financial institutions. Specifically, we investigate whether a reduction in supervisory oversight causes banks to amass riskier types of assets. In the case of S&Ls, institutions may shift their activities away from the traditional business of residential real estate finance in favor of more risky real estate investments, which they were authorized to hold under the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) of 1980 and the Garn-St Germain Act (GSG) of 1982. In a difference-in-differences framework, we compare the increase in risky investments of institutions located in the 9th district (the treatment group) to that of institutions located in other districts (the control group).

[2]We occasionally use the terms thrift and bank interchangeably throughout the paper to refer to S&Ls. When the distinction with commercial banks is important, we are explicit.

We find that institutions in the 9th district increased their risky real estate investments as a share of assets by as much as 5 percentage points on average. An analysis of the components of higher risk investments reveals that the risk taking response affected various types of risky real estate investments. The size of the treatment effect is economically large. Delinquency rates on these higher risk loans were exceptionally high, and thrifts maintained extraordinarily low capital positions in the mid 1980s. Consequently, even modest charge-offs on the additional investments made as a result of lax supervision in the 9th district could bring many banks to the brink of insolvency.

Our results are robust to alternative control groups. Limiting the control group to thrifts in the neighboring 4th district with similar traits to the 9th district and constructing a matched-thrift control sample yield very similar treatment effects to those achieved for the baseline control group. Furthermore, we are unable to find any evidence that the differential risk taking behavior can be explained by the oil price dynamics in the mid 1980s and their associated spillover into local real estate markets, or that the additional risk taking in the 9th district was driven by risk-shifting behavior in response to a current or expected shock to capital. We additionally rule out the possibility that our results are driven by thrifts in the district's "outlier states." A placebo test using commercial banks that are similar to the thrifts in our sample but subject to a different primary supervisory agent bolsters the conclusion that our findings are indeed driven by lower supervisory attention among S&Ls in the 9th district. In total, our results are consistent with the hypothesis that bank risk taking is a function of supervisory attention.

In addition, we find evidence that the expansion in risk taking paired with a delay in the resolution of failed institutions as a result of low supervisory capacity resulted in a higher incidence of failures, as well as more costly failures. Using a sample of failed commercial banks for a placebo test, no similar pattern exists, demonstrating that the results achieved for S&Ls are specific to these institutions and are not driven by the lending environment in the 9th district, which is shared by commercial banks.

Our work is related to the small but growing literature that aims to estimate the effects

of supervision—narrowly defined to exclude regulation—on bank-level outcomes such as credit growth, risk taking, and performance. Delis and Staikouras (2011) conduct a cross-country study in which they relate the frequency of on-site examinations and sanctions to bank-level risk taking, and find a generally negative association. Gopalan et al. (2016) use the opening and closing of field offices to show that a bank's distance to its supervisor is positively related to leverage and probability of failure. In a pair of related studies, Kiser et al. (2012) document slower loan growth in response to CAMELS ratings downgrades, while Bassett et al. (2015) estimate time-varying supervisory standards manifested in CAMELS ratings and show that these standards are predictive of lending activity with tighter standards leading to slower credit growth. Agarwal et al. (2014) exploit a rotation policy that assigns federal and state regulators to state-chartered banks on an exogenously set schedule and show that an assignment to a more stringent regulator leads banks to pursue corrective actions. In a related study, Rezende and Wu (2014) exploit the discontinuity of examination frequency that stems from regulatory requirements, and find that more examinations are associated with fewer loan losses and delinquencies, suggesting that supervisors are able to keep bank risk taking in check. Finally, Hirtle et al. (2016) employ a dataset of allocated supervisory hours to identify an apparent discontinuity based on a bank's regional size rank. Using size rank as a plausibly exogenous instrument for supervisory attention, the authors show that banks subject to greater supervision keep similar levels of reserves for loan losses despite witnessing lower delinquency rates.

Our results generally conform to the overall thrust of the results achieved in the aforementioned studies, pointing to a beneficial role for supervision. This paper contributes to the literature in three ways. First, by examining the response of financial institutions around a change in supervision that was exogenous to regional developments and characteristics of regulated institutions, our identification strategy allows us to assert a causal effect of supervision and examination on bank-level risk taking. Second, in the same spirit as Rezende and Wu (2014) and Hirtle et al. (2016), rather than focusing on enforcement actions, we show that in the absence of routine and ongoing supervisory oversight and examination, banks will seek to accumulate riskier

lending portfolios. Lastly, we show that conditional on failure, infrequently-supervised banks are ultimately resolved at a greater cost to the government insurance fund, and thus, taxpayers.

The remainder of the paper proceeds as follows: Section 2 provides details on the regulatory and supervisory environment in which our affected institutions operated. Section 3 describes the natural experiment that we exploit for identification. Section 4 outlines the data, discusses the empirical methodology, and presents our findings on the effects of supervision on risk taking. Section 5 extends the analysis by demonstrating slower resolution action and ultimately higher costs of failure among 9th district thrifts. Section 6 concludes.

## 2. Institutional Background: The S&L Supervisory and Regulatory Environment

The fallout from the Great Depression spurred the federal government to restructure the way in which the S&L industry was regulated.[3] In 1932, the Federal Home Loan Bank (FHLB) Act established the FHLB System, which consisted of twelve regional banks owned by their member thrifts and operated under the supervision of the Federal Home Loan Bank Board (FHLBB) in Washington, D.C. The FHLB System—a government-sponsored enterprise (GSE)—was created primarily to provide funding to member thrifts for the purpose of promoting home ownership, and to provide liquidity to otherwise solvent institutions during stress events. In 1933, Congress granted the ability for thrifts to organize under a federal charter, and in 1934 the National Housing Act created the Federal Savings and Loan Insurance Corporation (FSLIC), which provided deposit insurance to S&Ls. Rather than operating as a stand-alone institution like the Federal Deposit Insurance Corporation (FDIC) established around the same time for commercial banks, the FSLIC was administered by the FHLBB. This series of legislation set the S&L industry on a path for growth that resulted in S&Ls accounting for roughly 26 percent of U.S. depository institution assets by 1980 from roughly 10 percent just after the Great Depression. Also by 1980,

[3]This section draws heavily from Strunk and Case (1988), Barth (1991), and White (1991). We are grateful to the authors of these texts for providing crucial institutional details regarding the S&L industry.

mortgage loans at S&Ls amounted to about 80 percent of assets, which represented roughly half of all mortgages outstanding in the United States (FDIC (1997)).

Although many saw the frequent failures of financial institutions during the Great Depression as a justification for a more expansive supervisory and regulatory regime, the U.S. League of Savings Institutions (the League) took a different lesson from the Great Depression. In particular, the leadership of the League viewed many of the financial institution failures during the Great Depression as an unnecessary consequence of excessive discretion bestowed upon examiners to determine thrifts' asset quality and solvency. Lobbying pressure from the industry gave rise to a unique supervisory regime in which the examination and supervision functions of the FHLBB were separate.[4]

Examiners reported to and were employees of the Office of Examination and Supervision (OES) of the FHLBB in D.C., with teams of examiners sitting in offices at the regional FHLBs. In keeping with the League's misgivings regarding examiner discretion, examiners in the FHLB System remained largely fact finders that did not typically stray from rote analysis of financial statements. In the words of a *Washington Post* article from the time, examiners were "green-eyeshade accountants who scrutinized a thrift's books, segregated from supervisors." Examiners were not asked to make judgments on the value of S&Ls' assets, permitted to ask for corrections, or given the authority to either suggest loan write-downs or demand that a thrift post reserves against nonperforming assets. Into the 1980s, examiners simply pored through financial reports looking for technical compliance of regulations with little concern for the overall safety and soundness of the thrift under review.

Supervisory oversight of S&Ls was the purview of the regional FHLBs, as the FHLBB conferred the designation of principal supervisory agent upon each regional FHLB president. Thus, supervisors reported to their regional bank presidents, and were employees of the regional

[4]Some of the aspects of the organization of S&L supervision and examination in the discussion that follows began to change around 1986, after the period covered by our main analysis. Thus, we limit the description of the examination and supervisory environment faced by S&Ls to the one that largely prevailed from the 1930s through the years relevant for our study. In 1989, the FHLBB was abolished and replaced by the Office of Thrift Supervision (OTS), a newly established bureau within the U.S. Treasury Department.

FHLBs. Supervisors served as field agents that would take action on the basis of facts revealed by examiners' reports, though the communication between the two groups was reportedly poor and occasionally hostile (Atkinson and Maraniss (1989)). Supervisors would routinely visit thrifts in their region, and had much more latitude to use discretion by, for example, evaluating the quality of thrift assets and managerial expertise. Supervisors were also in a position to contact thrifts' boards of directors to request and ensure compliance with corrective actions based on their findings. In other words, S&L supervisors had a broader mandate that was more similar to modern-day supervisors, and would make an effort to identify all financial practices that represented a threat to the safety and soundness of regulated thrifts.

This system of separate examiners and supervisors not only led to mistrust between the two groups, but also brought about other difficulties in remediating any misbehavior that was unearthed by complicating and stratifying the response of the FHLB. Although cease-and-desist orders and removal proceedings could only be issued by FHLBB officials in D.C., this ostensible centralization of the response to problem institutions was short-circuited by the D.C. staff's preference that the regional supervisors obtain a supervisory agreement or "consent decree" whenever possible. Even in cases of flagrant safety-and-soundness abuses, all efforts were made to correct the problem at the regional FHLB level rather than involve officials at the FHLBB in D.C. Thus, regional FHLBs carried much of the oversight responsibility for the S&Ls in their districts.

The regulatory framework faced by thrifts was also a multi-layered system as a result of a dual-charter system similar to that of commercial banks. That is, thrifts can hold either a state or federal charter, which subjects the institution to the regulatory jurisdiction of either its home state or the FHLBB. However, as noted in White (1991), jurisdictions are not exclusive, as federal thrifts would be subject to state laws regarding interstate branching. Similarly, state-chartered S&Ls would be subject to federal information requirements, nondiscrimination policies, and community service regulations.

Federally-chartered thrifts were regulated by the FHLBB, which established the permissable types of loans and investments, liabilities, and activities of the thrift and its affiliates.

State-specific regulations on assets, liabilities, and related activities applied to state-chartered institutions. Deposit insurance carried with it additional regulations. All federally-chartered institutions were covered by the FSLIC, while state-chartered thrifts were typically required to obtain deposit insurance as a condition of their charter authorization. Outside of nine states that maintained their own deposit insurance funds, state-chartered thrifts typically opted for FSLIC coverage. State-chartered institutions that were FSLIC-insured were also subject to FHLB supervision. Most state-chartered S&Ls were therefore subject to FSLIC regulations on net worth and other safety-and-soundness requirements as well as unharmonized state-level regulations. Thus, the regulatory environment could vary somewhat for state-chartered S&Ls, while it was nearly identical for all federally-chartered S&Ls. For this reason our focus is on federally-chartered S&Ls, as they faced a common regulatory framework with, for example, identical capital requirements and limits on permissible assets and liabilities.

## 3. Identification: The Relocation of the 9th District Federal Home Loan Bank as a Natural Experiment

The Federal Home Loan Bank of Little Rock was established upon the founding of the FHLB System in 1932. Since that time, the principal office of the Bank in Little Rock, Arkansas was responsible for the 9th district of the FHLB System, which comprised the states of Arkansas, Louisiana, Mississippi, New Mexico, and Texas. As early as the 1950s, Texas attempted to secure the relocation of the principal office for the 9th district on the premise that Dallas was the financial capital of the region. However, the political influence of the Arkansas congressional delegation was able to effectively resist this campaign until its eventual weakening allowed supporters of the move to prevail.[5]

In 1983, a vote to move the district headquarters to Dallas was approved by the FHLBB. Amending the 9th district's organization certificate in response to the vote to relocate, the FHLBB

[5]Senator John McClellan of Arkansas, the chair of the Appropriations Committee and second most senior member of the Senate, reportedly played a large role in resisting the move. After his death in 1977, however, the relative influence of the move's supporters grew.

wrote that Little Rock's board of directors expressed its desire to relocate to a city from which it could better serve the district, "where transportation facilities better facilitate frequent personal discussion and visits between Bank officers and members on a routine basis," adding that, "the Dallas metropolitan area is one of the largest in the 9th District, having one of the nation's major airports in terms of passenger emplanements with non-stop service or through-plane connections to numerous cities." With these statements, the 9th district FHLB was directed to move its facilities and personnel from Little Rock to Dallas "as rapidly as possible," and change its name to the Federal Home Loan Bank of Dallas upon the date of the move (FHLBB (1983)).

A report compiled by the Comptroller General prior to the move corroborated the primary reason for relocating which, importantly for our purposes, was unrelated to any changes in the banking conditions within the 9th district. In fact, the Comptroller surveyed all 9th district S&Ls and reported that, "the savings and loan associations do not clearly favor or oppose the move," and that this should be weighed against "the sole principal advantage of improved accessibility."

Nevertheless, the 9th district's relocation took place in September 1983, only a few months after the request was approved. As a consequence of both the rapid move to Dallas and the relatively meager relocation packages offered to employees, an overwhelming majority of the employees in the bank's division of supervision chose to resign rather than relocate. Specifically, 37 of the 48 employees left, including the division's chief. The remaining eleven employees were almost all clerical staff or low-level assistants. Just two of the employees worked in the field as supervisory agents, and were responsible for monitoring the nearly 500 S&Ls operating in the 9th district, including state-chartered FSLIC-insured S&Ls. The two field agents—Bill Churchill and Charles Brooks—decided to split up the 550,000 square-mile district by geography, as indicated in Figure 1, each having responsibility for roughly 85 federally-chartered institutions.[6]

The resignation of the Bank's supervisors did not occur as a result of a calculation that they could be easily replaced in the deeper job market of Dallas, or that the supervisors' function was not essential. Joseph Settle, the president of the 9th district FHLB, corresponded with the

[6]In the later years of the S&L crisis, no more than three thrifts per supervisor was considered normal.

chairman of the FHLBB prior to the move and stated that, "We must be effective in retaining our employees if we are able to relocate successfully and maintain the operating efficiency of the Bank. Retention is especially important for a Federal Home Loan Bank *because of the unique skills required, such as supervision, which are not routinely available in any job market.* (emphasis added)" Nearly the exact opposite of this goal came to pass, with the overwhelming majority of the Bank's supervisors choosing to leave.[7]

The federally-employed examination staff at the Little Rock FHLB did not face such steep and immediate losses of personnel, but as detailed in White (1991), the disruption of the move caused a sharp decline in the number of 9th district's examinations. In fact, the number of examinations in the district did not return to pre-move levels until 1986.

The restaffing effort also faced some special hurdles. Besides the time involved in the search for and training of new supervisors, the Office of Management and Budget ordered a so-called "reduction in force" at the end of 1983, in keeping with the Reagan administration's push for a smaller government and less regulation. While these factors ultimately did not prevent the FHLB from hiring additional supervisory staff, it reportedly had a chilling effect on the recruitment effort and an exemption was required to recruit more examiners. Examination and supervisory capacity in the district remained low enough over the subsequent two years that, at the beginning of 1986, the chairman of the FHLBB convened the presidents of the eleven other FHLB districts and secured commitments from ten of them to offer a total of 250 supervisory and examination staff for an intensive six-week examination blitz in the 9th district.[8] At this time, many institutions had not had a comprehensive examination in the prior two or three years, and enforcement actions against institutions and management that followed represented a 76% increase over levels for the previous calendar year (Selby (1989)). Corroborating this evidence, the FDIC reported that supervisory examinations fell and remained low during 1984 and 1985

[7] Joseph Settle—the president of FHLB Little Rock and thus the primary supervisory agent of the S&Ls in the district—made the move to Dallas.

[8] Due to mounting problems with S&Ls in California, the San Francisco supervisory staff were kept in their home district.

(FDIC (1997)). Evidently, the diminished supervisory capacity in the 9th district persisted for at least two years after the relocation to Dallas.

This negative shock to the supervisory capacity—encompassing supervisory, examination, and enforcement actions—in the 9th district is evident in the data. For instance, the percentage of trainee examiners for the fiscal year 1984, as shown in Table 1, was much larger than the percentages in the 4th (Atlanta), 7th (Chicago), and 10th (Topeka) districts and about twice the percentage across all FHLB districts. A comparison of the number of examinations per institution in the 9th district and the entire FHLB System provides additional evidence for the drop in supervision and examination. As shown in Figure 2, while the average number of examinations for the FHLB System held steady around the date of the relocation of the Little Rock office to Dallas, S&Ls in the 9th district experienced a notable reduction in examinations following the move. Similarly, as illustrated in Figure 3, supervisory fees paid by S&Ls in the 9th district fell sharply following the move of the FHLB headquarters, while fees paid by S&Ls in other districts remained within their prior range.[9]

Thus, the move of the 9th district FHLB to Dallas engendered an exogenous reduction in supervisory oversight for federally-chartered S&Ls operating within the district, while S&Ls in all other districts were unaffected by the decrease in supervision and examination. Importantly, the affected institutions were subject to the same prudential regulations as those federally-chartered S&Ls operating in states that were part of other FHLB districts. We therefore treat the relocation of the Little Rock office as a natural experiment in which the exogenous decline in supervisory capacity can be used to measure the effects of supervision on banks' risk taking activities.

[9]Note that the reporting item "supervisory fees" is only available in the financial reports through 1983, and in part reflects reimbursements for on-site examinations that are crucial for information gathering (Berger et al. (2000)).

# 4. The Effects of a Decrease in Supervisory Capacity on Bank Risk Taking

## 4.1. Data and Summary Statistics

We assess the effect of the decrease in supervisory capacity on (1) commercial real estate (CRE) loans; (2) acquisition, development, and construction (ADC) loans; and (3) service corporation investments. It is now well understood that thrifts' foray into these investments contributed importantly to the severity of the S&L crisis. While thrifts were authorized to engage in these investments under the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) and the Garn-St Germain Act (GSG), these markets were outside of most managers' area of expertise and represented an accumulation of risk over their traditional business of residential real estate lending.[10] These assets were also recognized as risky prior to the relocation of the FHLB. Until the time of its repeal in 1980, an FHLBB risk-weighted capital requirement assigned minimum net worth requirements to different categories of assets using the Asset Composition and Net Worth Index. While the minimum capital requirement for single-family mortgages was only 3 percent, CRE and ADC loans carried minimum weights of 7 and 8 percent, respectively. The higher risk-weights assigned to CRE and ADC loans reflected the perception that these investments were riskier, a notion supported by their elevated rates of delinquency and default relative to traditional residential mortgages. The acknowledgment of the risk associated with these loans is also documented in an article in the January/February 1988 issue of the *Outlook of the Federal Home Loan Bank System*. Discussing the way the FHLBB recognizes imprudent speculation, the author of the article states that, "thrifts with a relatively high percentage of single-family mortgages in portfolio will generally suffer much smaller losses than those with nontraditional lending," and argues that, "thrifts with significant amounts of equity investments and land development loans [...] are biased toward the speculative."

Throughout the paper, our primary outcome variable is higher risk real estate investments,

[10]The legislative changes as part of DIDMCA and GSG raised the statutory limit on commercial real estate loans to 40 percent of assets; expanded S&Ls' powers to make acquisition, development, and construction loans; and authorized S&Ls to invest up to three percent of assets in service corporations.

which is simply the sum of the three categories mentioned above, as a percent of assets. All outcome variables are obtained from S&Ls' financial reports from December 31, 1981 through June 30, 1985. During this period, these institutions were regulated by the FHLBB and required to file financial disclosure form FHLBB 770 semiannually until December 31, 1983 and form FHLBB 1313 quarterly thereafter.

For our estimation results to be valid, the assumption of parallel trends in the investment behavior of treated and untreated institutions in the absence of the exogenous shock must hold. In Figure 4, we therefore plot the averages of higher risk real estate loans, as a share of assets, of S&Ls in the 9th district against those of S&Ls in all other FHLB districts for the two quarters before and after the relocation of the 9th district FHLB. The figure clearly illustrates that higher risk real estate investments for treated and untreated institutions exhibit parallel trends prior to the decrease in supervisory oversight in the 9th district. Following the exogenous shock, institutions in that district sharply increase their exposure to these loans, while the level of higher risk loans at S&Ls outside the 9th district remains nearly flat. Analogous plots for the various components of higher risk real estate loans, shown in Panels (a)-(c) of Figure 5, underscore the similar behavior of treated and untreated institutions in the absence of the shock, with all components of higher risk real estate investments exhibiting parallel trends prior to the relocation of the 9th district's headquarters. We show further evidence of parallel trends below, incidental to our depiction of the time path of the treatment effect in Section 4.3.

Panel A of Table 2 reports summary statistics for the outcome variables, as of December 31, 1982, for S&Ls in the 9th district, in all other FHLB districts, and in the 4th district (the latter two will serve as two of our control groups in the analysis below). While thrifts in the 9th district had a somewhat larger exposure to higher risk real estate loans than those in other FHLB districts, the exposures in the 9th and 4th districts were nearly identical. With the exception of a somewhat higher share of CRE loans for thrifts in the 9th district compared to all other districts, the share of various components of higher risk loans were similar across the treatment and control groups.

We collect additional information on bank-level controls—total assets as well as net worth, nonperforming loans, net income, and cash investments, all expressed as a share of assets—from the S&Ls' financial reports. Panel B of the table summarizes this information. While thrifts in the 9th district were smaller and held slightly fewer nonperforming loans than their counterparts in the control groups, institutions were otherwise very similar across treatment and control groups. The outcome variables, along with other variables from the S&L financial reports that are used in the paper, are defined in the Appendix.

Lastly, we obtain state- and county-level controls from a number of sources: Unemployment and labor force participation rates are taken from the Bureau of Labor Statistics (BLS) and the urban percentages of the population are obtained from the U.S. Census Bureau's decennial census. The GDP shares of the mining, construction, and manufacturing industries; the per-capita income as well receipts of medical benefits (predominantly Medicare) and income maintenance (sometimes referred to as welfare); and population numbers are collected from the Bureau of Economic Analysis (BEA). As evidenced by the state and county characteristics in Panels C and D of Table 2, there were some economic and demographic differences between the 9th district and the control groups. Most notably, the industry mix in the 9th district was more tilted toward mining, which primarily includes oil and gas extraction, and less toward manufacturing.

### 4.2. Empirical Methodology

In order to empirically examine the effect of the decrease in supervisory capacity on S&Ls' risk taking behavior, we use a difference-in-differences (DiD) estimation framework. Specifically, in our main analysis, we estimate the following institution-level OLS regressions over the period from December 31, 1981 to June 30, 1985:

$$Y_{i,t} = \alpha + \gamma(Post_t \times Treatment_i) + \boldsymbol{\phi'(Post_t \times B_{i,1982})} + \boldsymbol{\zeta' S_{i,t-1}} + \boldsymbol{\theta' C_{i,t-1}} + \eta_t + \psi_i + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ is the outcome variable of interest measured for bank $i$ every six months prior to 1984 and quarterly thereafter; $Post_t$ is a dummy variable that indicates all observations from December

1983 onward; and $Treatment_i$ is a dummy variable that equals one if S&L $i$ is located in the 9th district, and zero if S&L $i$ is located outside that district. The primary variable of interest is the interaction term, $Post_t \times Treatment_i$, which loads for observations in the 9th district in the post-treatment period beginning in December 1983 and measures the change in $Y_{i,t}$ following the decrease in supervision for treated S&Ls relative to the untreated S&Ls (the control group).

$B_{i,1982}$ is a vector of bank-level controls including the log of total assets as well as net worth, nonperforming loans, net income, and cash investments, all expressed as a percent of assets. In order to avoid a bad control problem, we measure bank-level controls as of December 31, 1982 (prior to the announcement of the relocation) and interact each with our $Post_t$ dummy (Barrot (2016)). $S_{i,t-1}$ and $C_{i,t-1}$ are vectors of lagged state and county controls. $S_{i,t-1}$ includes the state unemployment rate; the GDP shares of the mining (oil extraction), construction, and manufacturing industries; and the urban percentage of the population. $C_{i,t-1}$ includes the county per capita income; the log of the county population; the county labor force participation rate; the county unemployment rate; the county per-capita receipts of medical benefits; and the county per-capita receipts of income maintenance benefits. More localized state- and county-level controls can help capture demand conditions faced by banks that, in the 1980s, faced a prohibition on interstate branching. In fact, in 1983, statewide branching was not permitted in most states. Each 9th district state imposed either severe limitations on branching or, in the case of Texas, unit banking with no branching.

Including these covariates to capture economic conditions and bank characteristics is intended to mitigate possible biases that may occur if these variables affect $Y_{i,t}$ and are correlated with $Post_t \times Treatment_i$, but not considered in the estimation. Finally, we include a full complement of bank and time fixed effects, denoted $\psi_i$ and $\eta_t$, respectively.

### 4.3. Results

In this section, we present our main results on the effect of a decrease in supervisory capacity on the risk taking activity of S&Ls.

As our baseline, we estimate equation (1) with a sample of all federally-chartered S&Ls in the 9th district, as well as their counterparts from all other districts in the contiguous United States. As discussed earlier, our main outcome variable is the sum of thrifts' higher risk real estate investments. The top panel of Table 3 reports the results for several different specifications, with standard errors clustered at the county level. In our baseline specification with no covariates—reported in column (1)—we find that the drop in supervision caused institutions in the 9th district to increase higher risk lending as a share of assets by approximately 5 percentage points. In columns (2)-(4), we add state-, county-, and bank-level controls, as indicated at the bottom of the table. In these specifications, our estimate of the treatment effect remains roughly steady at about 3.5 percentage points. The results indicate that treated S&Ls—that is, institutions that experience a decrease in supervisory oversight—increase their exposure to higher risk assets in the post-treatment period significantly more than the control group.

In order to investigate whether the increase in risk taking was evident in many investment categories, we disaggregate the higher risk lending measure into its consituent parts. In the remaining panels of Table 3, we find that treated institutions increase CRE and ADC loans by similar amounts. Point estimates on service corporations are noticeably smaller, reflecting tighter regulatory limits on these investments and the smaller average share of thrifts' assets composed by this category. Despite the lower power vis-a-vis the other higher risk lending components, the effects nevertheless achieve conventional levels of statistical significance. In total, these results suggest that the risk taking response affected various types of higher risk real estate investments.

Figure 6 plots the time path of the treatment effect from our baseline regression for the higher risk loan share of 9th district S&Ls, using a slightly longer sample than in our regressions. The parallel trends in the pre-period are evident in the graph. The increase in risk taking subsequent to the relocation is also clear, with the estimated treatment effect rising to over 7 percent by the end of 1985. This value is greater than that reported in Table 3, which measures the average treatment effect over the entire post-treatment period. Upon the arrival of additional supervisory and examination staff from other FHLB districts, the additional risk taking by 9th

district S&Ls ceased. This pattern follows precisely what one would expect if risk taking responds to the intensity of supervisory oversight.

The size of the treatment effect is economically large. Delinquency rates on these higher risk loans were exceptionally high, and were at the heart of the S&L crisis. Moreover, regulatory net worth at thrift institutions by the mid 1980s had fallen to about 3.5 percent on average. More conservative measures of capital adequacy were even lower, with tangible net worth ratios below 1 percent on average (Barth et al. (1990)). Consequently, even modest charge-offs on the additional loans extended as a result of lax supervision in the 9th district would cause many banks to face insolvency.

Next, we narrow our set of untreated S&Ls to only those institutions in the neighboring 4th district, headquartered in Atlanta and comprising several other southern states adjacent to the 9th district. The 4th district contained more federally-chartered S&Ls than any other district (which, in the FHLB system, could be quite small), while also possessing relatively similar traits to 9th district thrifts at the beginning of our sample. For example, at the start of our sample, higher risk loans averaged 7.9% of assets for 4th district S&Ls compared with 7.5% for 9th district S&Ls. Corresponding figures for the ratios of net worth to total assets were 5.0% versus 4.7%. Moreover, as we will show below in a matching exercise, Atlanta thrifts are over-proportionally matched to Dallas thrifts due to similar balance sheet and income characteristics.

Table 4 reports the results using this narrower control group, with broadly similar results. The point estimates are often slightly smaller than for the full sample, with no clear increase in service corporation investments. As before, Figure 7 plots the time path of the treatment effect for this comparison group, with results that are again similar to those achieved for the full sample.

Next, we focus our attention on an even smaller set of thrifts outside the 9th district by matching each of the 167 federally-chartered S&Ls in the 9th district with its nearest neighbor among all S&Ls located in other districts from our main sample. We match each S&L across a number of different characteristics as of December 1982, including age, assets, capital, net income, securities investments, cash investments, single-family mortgages, multi-family mortgages,

consumer loans, CRE loans, ADC loans, deposits, FHLB advances, loan loss reserves, and non-performing loans.[11] We match each thrift according to a propensity score from a logit regression without replacement, such that our sample includes a total of 334 institutions just prior to the relocation of the Little Rock office to Dallas. As demonstrated in Table 5, matched institutions are on the whole very similar to 9th district thrifts, with no statistically significant differences.[12] Matched thrifts are drawn from each of the other eleven FHLB districts, with the largest representation from the Atlanta (39%), Cincinnati (13%), and Des Moines (8%) districts.[13]

The treatment effects estimated using the matched-thrift control sample are reported in Table 6. The smaller sample size notwithstanding, statistical significance remains, with point estimates very similar to those reported for the full sample. The time path of the treatment effect also evolves in a similar fashion to the full sample. Figure 8 demonstrates parallel trends prior to the relocation of the Little Rock office, with a subsequent rapid expansion of risk taking by the thrifts that faced less supervisory oversight. Thus, our previous results cannot be explained by any systematic differences of 9th district institutions in terms of age, size, asset composition, capital adequacy, etc.

### 4.4. Robustness Checks

In this section, we report robustness checks to the results detailed above. For brevity, we limit the analysis to our main outcome variable of total higher risk loan share.

One of the most salient features of the economic environment in the mid 1980s was the continuation of the decline in the price of oil after its rapid rise through the 1970s, which contributed to the so-called oil bust. Although we control for local measures of oil production in our main results, petroleum extraction was an important industry for some states in the 9th district, and the oil boom-bust cycle that began in the 1970s may possibly explain our results. For example, although we interpret our estimated treatment effects as driven by bank preferences,

[11] Except for age and assets, all variables are measured as a share of assets.

[12] 12 of the 15 variables are statistically different at the 10 percent level prior to matching, with a much higher standardized mean bias (25% versus 6% after matching).

[13] Atlanta S&Ls compose nearly 24% of all federally-chartered S&Ls among the eleven districts.

demand differences correlated with the timing of the FHLB relocation could explain our results. Of course, the state and county controls along with the fixed effects included in our specifications aim to capture these effects.

In order to rule out an energy-related explanation of our results, we first limit our focus to S&Ls located in two states: Arkansas and Missouri. Arkansas had the lowest contribution from oil extraction to gross state product (GSP) of all states in the 9th district. From the late 1970s through 1990, the average contribution of oil to GSP was less than 2 percent, and never rose higher than 3.5 percent. Missouri, located in the district of the FHLB Des Moines, had a similarly low contribution of oil to GSP. Not only are these states in close geographical proximity, but they are also of similar size and have Mississippi river ports along their eastern borders.

In Panel A of Table 7, it is clear that Arkansas S&Ls took on a disproportionate amount of risk relative to Missouri S&Ls immediately after the decline in supervisory oversight.

As an alternate means of ruling out an explanation related to oil, we compare 9th district S&Ls to those from other top oil producing states. In particular, we follow Hamilton and Owyang (2012), who use the number of barrels of crude oil produced in 1984 to identify five oil-intensive states besides Texas and Louisiana: Kansas, Montana, North Dakota, Oklahoma, and Wyoming. The estimates reported in Panel B of Table 7 show similar magnitudes to those achieved for the full sample. Consequently, we are unable to find any evidence that the oil price dynamics during the mid 1980s contributed to the differential risk taking behavior we observe.

As a final robustness check, we consider the possibility that our results could be explained by a shock to thrifts that occured at the same time as the shock to supervisory capacity. Specifically, if 9th district thrifts faced a current or expected capital shock at this time, risk-shifting motivations would spur an increase in risk taking at these institutions. In such an event, poorly capitalized thrifts in the 9th district would be expected to engage in more risk-shifting activity than their better capitalized counterparts. Conversely, the decline in supervision subsequent to the relocation of the 9th district FHLB headquarters did not represent a capital shock, and our estimated treatment effect would hence not differ across banks with different levels of capital.

To this end, we estimate a "triple difference" specification in which we interact the interaction term $Post_t \times Treatment_i$ with each thrift's net worth at the time of the move. The results, reported in Panel C of Table 7, show that there was in fact no difference in the treatment effect for high or low net worth thrifts. Such a pattern is inconsistent with an alternate explanation of our results that relies on a shock to capital that is unique to 9th district thrifts. Instead, these results are fully consistent with the hypothesis that risk taking is itself a function of supervisory attention, as we have argued.

### 4.5. Falsification and Placebo Tests

In this section, we offer additional evidence that our DiD estimates are in fact driven by lower supervisory attention throughout the entire 9th district.

The oil boom had a noticeable effect on the oil-heavy economies of the 9th district, which spurred profit windfalls and land speculation. This dynamic unwound in later years, with declining real estate values in the energy states. Texas was especially known for its energy-driven property boom in the early 1980s.

To demonstrate that risk taking by S&Ls in the 9th district was widespread and not driven by thrifts in outlier states that are often portrayed as some of the worst offenders during the S&L crisis, we perform a falsification test wherein Texas institutions compose the treatment group while the remaining 9th district thrifts compose the control group. Panel A of Table 8 reports a null result for this test.[14]

Lastly, we perform a placebo test using commercial banks. Commercial banks were not subject to FHLB supervision, but were able to invest in all of the components of our measure of higher risk lending. If our results could be explained by, for instance, other regional factors that were not captured by our controls, commercial banks in the area would be subject to the same factors and should exhibit similar behavior. Therefore, we construct a sample of commercial banks for which we perform otherwise identical tests to those above.

[14]Louisiana's economy was the most reliant in the district on oil extraction, with around 33 percent of GSP coming from this sector. Using Texas and Louisiana thrifts for the treatment group generates very similar results and identical conclusions.

Commercial banks could differ quite substantially from thrifts, especially in total assets. In order to generate a sample of commercial banks for which we can perform meaningful placebo tests, we take advantage of the fact that there were many more commercial banks operating in the United States than federally-chartered S&Ls. In the early 1980s, commercial banks numbered approximately 14,000. Thus, it is possible to match commercial banks to our sample of federally-chartered thrifts within each district. In this way, we can ensure that any differential effects owing to size class or capital adequacy are neutralized.

Specifically, we perform nearest-neighbor matching, selecting the two nearest neighbors of each S&L based on assets, the share of single-family mortgages, the share of deposit funding, and the capital-to-asset ratio as of December 1982. We additionally require exact matching along two criteria: (1) the FHLB district and (2) a dummy variable indicating whether an S&L's home county is classified as metropolitan or nonmetropolitan as determined by the Office of Management and Budget. The rationale for exact matching on the latter dimension is that a financial institution's opportunity to engage in CRE and ADC lending would be influenced by whether or not it resides in a metropolitan area. Matching is performed with replacement in order to avoid poor matches that would potentially result from the strict district-metropolitan exact matching criteria. However, commercial banks that are matched with more than one S&L appear in our dataset only once.

Panel B of Table 8 reports the DiD results for the commercial bank placebo test using all twelve FHLB districts. Consistent with the hypothesis that the drop in supervisory capacity is responsible for our main results, none of the estimates are statistically different from zero. Moreover, the point estimates are three orders of magnitude smaller than the estimated treatment effects for thrifts. In Panel C, we compare only the matched commercial banks in the 9th district to those in the 4th district. As before, there is no evidence of any difference in risk taking behavior by commercial banks in the period after the relocation of the FHLB office.

In summary, we have shown that the increase in risk taking by S&Ls in the 9th district was broad-based, and that similar financial institutions in the district did not exhibit the same

behavior. Therefore, our results cannot be explained by anything common to S&Ls and commercial banks, such as location, size, capitalization, or the ability to invest in CRE loans, ADC loans, or service corporations.

## 5. Consequences of Bank Risk Taking

While we have shown a contemporaneous increase in thrifts' risk taking upon the decline in supervisory oversight, the effects of weaker supervision can, of course, have farther-reaching and more lasting consequences. In this section, we turn our focus to the consequences of risk taking activity on the likelihood and costs of failure.

To identify thrift failures, we use the comprehensive Failure Transaction Database (FTDB), provided by the FDIC. In the FTDB, failure is assumed to occur when the government provides financial assistance to an institution, closes an institution, or takes over the institution's operations. Voluntary liquidations, or mergers of distressed institutions without financial assistance from the FSLIC are not treated as failures. We treat an institution as failed when it first appears in the FTDB and remove any future observations.[15] For the analysis below, our focus is on failures between 1983 and 1990. Of course, some banks in our sample as of 1990 were still in operation despite inevitable failure. To account for this, we code a December 1990 failure for any bank that failed before the end of 1992.

As a first exercise, we estimate a logit regression to understand how bank-level characteristics affect the probability of failure:

$$\Pr(Failure_{i,t}) = \Lambda(\boldsymbol{\beta' X_{i,t-1}}), \tag{2}$$

where $Failure_{i,t}$ is defined in the terms expressed above for bank $i$ in year $t$ and $\Lambda(.)$ denotes the logistic cumulative distribution function. In our vector of control variables $X_{i,t-1}$, we include the 14 balance sheet and income items considered in Cole and White (2012), plus service corporation investments. The primary aim of this exercise is to demonstrate that the dimensions along which

[15] An institution could fail more than once if it receives open bank assistance in order to continue operations, but later closes with government assistance. In this case, the bank would appear in the FTDB twice.

thrifts in the 9th district expanded risk in response to the weaker supervision did indeed increase the probability of failure. For this reason, our focus is on CRE loans, ADC loans, and service corporation investments. We estimate equation (2) for all S&Ls outside of the 9th district, because bank failure requires supervisory decisions and actions. Consequently, excluding the 9th district thrifts ensures that our estimates are not confounded by the inclusion of insolvent S&Ls that were either not closed or closed with an extraordinary delay as a result of the decline in supervision in the 9th district.

The coefficient estimates from our logit regression (reported as odds ratios) are displayed in Table 9.[16] ADC loans, CRE loans, and service corporation investments all increase the odds of failure. Not only do these results confirm that our risk taking measures capture the relevant concept of risk, they also imply that the reduction in supervision in the 9th district ultimately led to a higher incidence of failure in the region.

Besides increasing the number of failures, lax oversight could also lead to more costly resolutions for two reasons. First, insufficient supervision would allow technically insolvent thrifts to operate longer than they otherwise would, possibly gambling for resurrection by taking on more risk or evergreening delinquent loans (Hundtofte (2016), Cole and White (2017)). Second, poorly-supervised thrifts will more rapidly accumulate low quality assets with higher rates of delinquency and default, as we have shown. As a result, fewer assets will be passed to acquiring institutions, and larger losses will be borne by the government insurance fund (in this case the FSLIC and, later, the RTC). This connection between a delay in resolution and a more costly clean-up process was well understood during the formulation of the regulatory and supervisory response in the aftermath of the Great Depression, and informed the final statutes. In the words of McCanan (1932), "If an insolvent bank is taken over promptly and its affairs administered by competent

[16] Our results are very similar to those achieved in Cole and White (2012) (see Table 9 of the citation). Directionally, the only difference we observe is the effect of multi-family mortgage lending on the probability of failure.

men, the loss to depositors may be greatly minimized. Otherwise, the yield from assets may be small and expenses large."[17]

Consistent with this theory, Table 10 tallies the average cost of failure, reported in the FTDB, by FHLB district between 1983 and 1990. Panel A reports the average cost of failure weighted by the assets of the failing institution, while Panel B reports the unweighted average. During these years, the average cost of failure in the Dallas district was strikingly higher than in other districts. On the right side of the table, we report similar figures for commercial banks. Failure costs for commercial banks operating in the 9th district were pedestrian relative to other districts, with only the 7th highest costs. Comparing the cost ranking for commercial banks to those for thrifts argues against geographical explanations of the high costs associated with thrift failures in the 9th district.

Going further than this univariate evidence, we next estimate OLS regressions of the following form to assess differences in 9th district failures:

$$Y_{i,t} = \alpha + \beta \cdot 9th\ District_i + \mathbf{\Phi' X_{i,t-1}} + \eta_t + \varepsilon_{i,t}, \tag{3}$$

where $Y_{i,t}$ is one of three outcome variables for each failure of bank $i$ in quarter $t$. Our first outcome variable is the failed institution's total cost of resolution, divided by total assets at the time of failure. As a second measure, we consider the share of failed thrifts' assets passed to the acquiring institution. Our third measure used to evaluate each failure is the capital-to-asset ratio six months prior to the date of failure. A thrift that experiences a delay in the timing of resolution due to insufficient oversight would be expected to have a poorer capital position in the quarters prior to failure than comparable institutions facing closer supervisory attention. $9th\ District_i$ is our key independent variable, which is simply a dummy indicating the location of a thrift in the Dallas district. We note that we are unable to conduct DiD regressions due to the paucity of failures prior to 1983, but we include bank-, state-, and county-level controls in the

[17] In related work, Barth et al. (1989) show that limited resources can affect the resolution decision by demonstrating that lower FSLIC financial resources led to a decrease in the probability of closure.

vector $\boldsymbol{X_{i,t-1}}$. Bank-level controls are lagged twelve months, while county and state controls are lagged one period according to their most recent observation (typically one quarter for state-level controls and one year for county-level controls).[18] Moreover, we include time fixed effects, $\eta_t$, to capture country-wide factors affecting failure costs such as interest rates and macroeconomic conditions. $\varepsilon_{i,t}$ denotes robust errors.

In the first panel of Table 11, we report the results for the costs of failure. The coefficient of 47.8 in column (1) implies that, conditional on time fixed effects, the cost of failures relative to assets in the 9th district was 48 percentage points higher on average. Adding additional controls attenuates this estimate somewhat, but failures in the 9th district were still 30 percent more costly as a share of assets, which is economically large.

In Panel B, the outcome variable is the percent of total assets passed at resolution to each institution's acquirer. Thrifts that acquire failed institutions with higher-quality assets would be expected to assume more of the failed bank's assets. Based on the results from the previous section, we anticipate fewer assets passed from 9th district thrifts in the years after the relocation, and this is exactly what we find. Depending on the specification, failed 9th district S&Ls passed between 9 and 11 percent less of their balance sheet to their ultimate acquirers. As discussed above, this result is consistent with the higher average cost of 9th district failures incurred by the insurance fund.

Panel C of Table 11 shows that the capital-to-asset ratio of failed 9th district S&Ls six months prior to failure was about 1.5 to 2 percent lower on average, even after conditioning on the capital-to-asset ratio one year prior to failure. This result suggests that thrifts were indeed allowed to operate longer in the 9th district as they approached failure. In an additional check of this result, Panel D reports the odds ratio of the 9th district dummy coefficient from a logit regression in which the dependent variable is an indicator of net worth below the 3% regulatory requirement twelve months prior to failure.[19] Consistent with the interpretation of the results in

[18]The bank-level controls of net worth, nonperforming loans, liquidity, deposit funding, and size mirror those used in Barth et al. (1990).

[19]As shown in a previous draft of this paper, these results hold when considering a net worth below zero. Barth et al. (1990) shows that negative net worth was not uncommon for S&Ls during the 1980s, especially after 1985.

Panel C, failed 9th district thrifts were about three times as likely to be insolvent well in advance of resolution. Both of these results indicate that thrifts were indeed allowed to operate longer in the supervision-deficient 9th district as they approached failure. Importantly, previous studies have shown that allowing banks to continue operations after becoming insolvent increases costs to the government insurance fund (Kroszner and Strahan (1996) and Cole and White (2017)).

Lastly, we repeat this exercise using a sample of all failed commercial banks from the same time period and present the results in Table 12. In Panel A, we see that there is no clear difference in costs for 9th district failures, and Panel B shows that, if anything, these institutions passed *more* assets to their ultimate acquirer. Similarly, the net worth results reported in Panels C and D reveal much lower point estimates than those observed for S&Ls, with lower or non-existent statistical significance when additional controls are included. Again, we find that the stark results achieved for S&Ls are evidently specific to these institutions and do not appear to be driven by the lending environment in the 9th district, which is shared by commercial banks.

## 6. Conclusion

In this paper, we evaluate the importance of routine and ongoing supervisory oversight and examination for bank risk taking behavior. Exploiting a change in supervision that was exogenous to regional developments and characteristics of the regulated institutions, we are able to document a causal effect of supervision and examination on bank-level risk taking.

We find that financial institutions that witnessed a reduction in supervisory attention took on much more risk than their counterparts that were subject to identical regulations but unaffected by the change in supervisory capacity. In addition, we provide evidence that the shock to supervisory capacity and the subsequent expansion in risk taking resulted in slower resolutions, more costly failures, and, ultimately, a higher incidence of failure.

The effects of weak supervision on risk taking that we document are meaningful. Net worth at thrift institutions by the mid 1980s had fallen to extremely low levels such that even modest charge-offs on the additional risky loans would push many banks into insolvency. In 1980, S&Ls

were an integral part of the financial system, accounting for roughly a quarter of depository institution assets and holding roughly half of all mortgages outstanding in the United States. Given thrifts' significant role in credit provision at the time, it is plausible that the reduction in supervision had farther-reaching effects on real economic outcomes in the region.

From a policy perspective, our findings underscore the importance of supervision *per se* as a companion to financial regulation in banking policy. By clearly disentangling the effects of supervision from regulation, we show that the degree of supervisory attention has an important effect on bank behavior. As such, our findings are consistent with the view that effective supervision, working in concert with regulation, is crucial for the safety and soundness of the banking system.

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## Appendix: Variable Definitions

This appendix presents the variables obtained from the S&L financial reports and, as applicable, summarizes the components of each variable.

| Item | Variable | Mnemonics |
|---|---|---|
| 1 | CRE loans | svgl1447 + svgl0136 |
| 2 | ADC loans | svgl1448 + svgl1449 + svgl1451 + svgl1534 |
| 3 | Service corp. investments | svgl0035 + svgl2130 |
| 4 | Higher risk loans | CRE loans + ADC loans + service corp. investments |
| 5 | Assets | svgl2170 |
| 6 | Liabilities | svgl2950 |
| 7 | Net worth | Assets - liabilities |
| 8 | Nonperforming loans | svgl0879 + svgl0882 + svgl0885 + svgl0799 + svgl0997 + svgl0998 + svgl0999 + svgl0147 + svgl0148 + svgl0149 + svgl3937 + svgl3938 + svgl3939 + svgl3943 + svgl3944 + svgl3945 + svgl3949 + svgl3950 + svgl3951 |
| 9 | Cash investments | svgl0064 + svgl0853 + svgl0626 |
| 10 | Securities investments | svgl0851 + svgl0854 + svgl0627 + svgl0628 + svgl3680 + svgl0433 + svgl0434 + svgl0435 + svgl0441 |
| 11 | Net income | svgl4340 |
| 12 | Return on assets | Net income/assets |
| 13 | Supervisory fees | svgl4149 |
| 14 | Deposits | svgl2339 + svgl2342 + svgl6645 + svgl6647 + svgl2398 + svgl2404 |
| 15 | Single-family mortgages | svgl1444 + svgl1446 + svgl1519 + svgl0134 |
| 16 | Multi-family mortgages | svgl1470 + svgl0113 |
| 17 | Loan loss reserves | svgl1457 + svgl1482 + svgl1574 + svgl0248 + svgl1566 + svgl0452 + svgl3600 + svgl3601 |
| 18 | Consumer loans | svgl1458 + svgl2050 + svgl1459 + svgl1990 + svgl1466 + svgl2008 + svgl2035 + svgl2705 |
| 19 | FHLB advances | svgl2021 + svgl2651 + svgl2652 |

Note: S&L financial reports were filed semiannually using form FHLBB 770 until December 31, 1983 and form FHLBB 1313 quarterly thereafter. A number of series are discontinued over time such that additional mnemonics are required to maintain a full time series for each thrift. The calculations listed above account for such transitions by recoding missing values of discontinued series to zero.

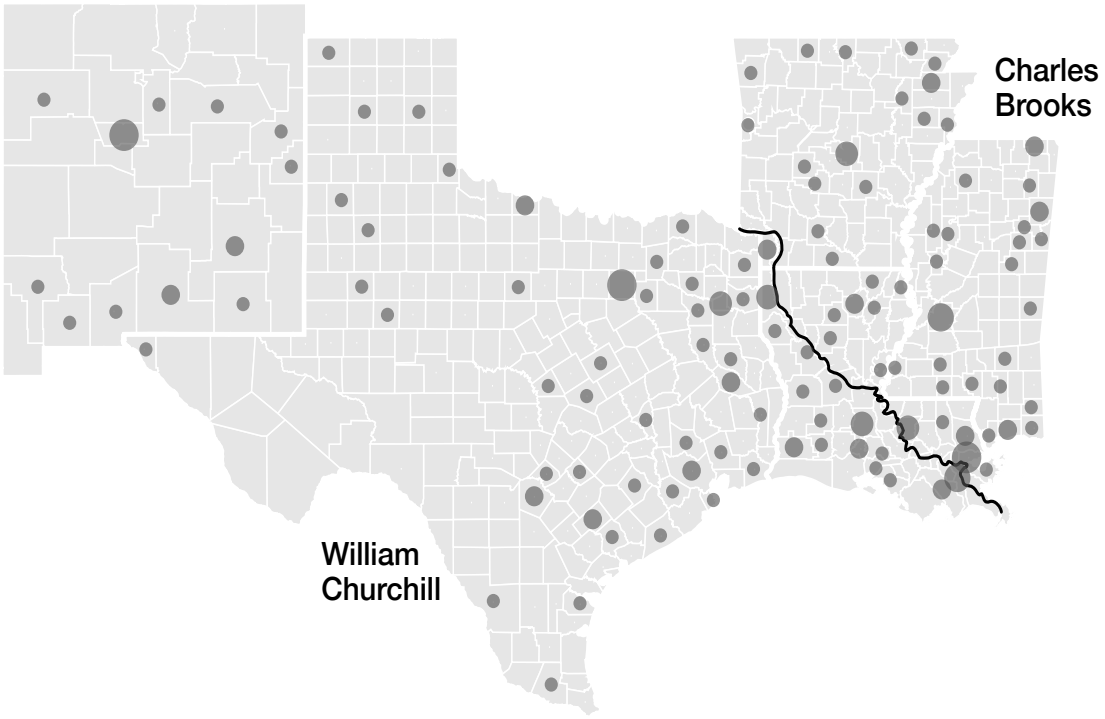



**Figure 1. Map of the 9th FHLB district and field agents' line of demarcation**. This figure plots a map of the 9th FHLB district and the line of demarcation—the Red River—chosen by the two field agents remaining after the relocation of the 9th district FHLB. Federally-chartered institutions are indicated by circles, with the area of each circle increasing in the number of S&Ls in a particular location.

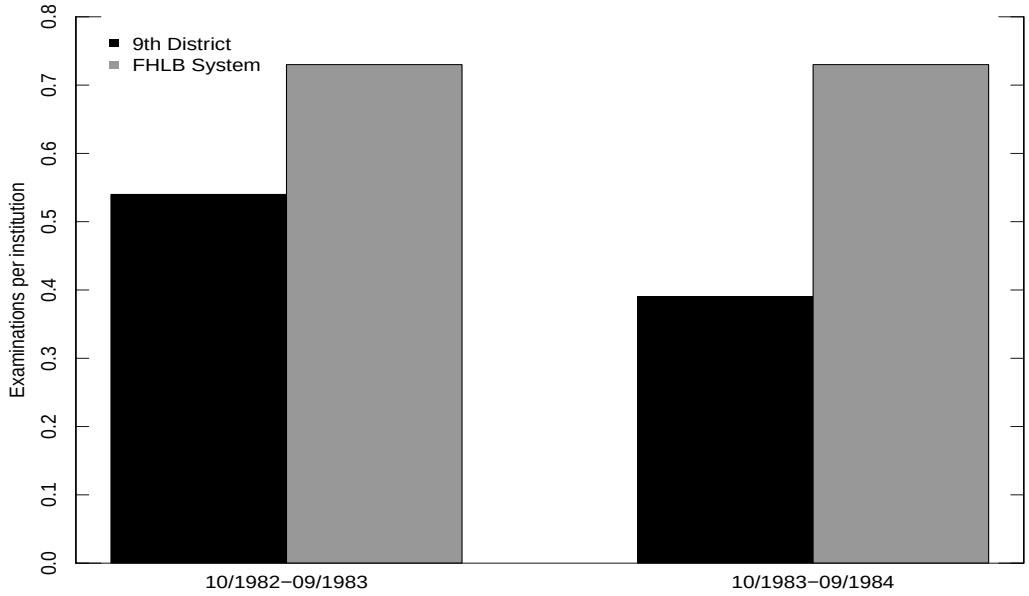



**Figure 2. Comparison of examination intensity**. This figure plots the number of examinations per institution in the 9th district (the black bars) along with the analogue number for the entire FHLB System (the gray bars). The first and second sets of columns correspond to the 12-month period prior to and after the relocation of the 9th district FHLB headquarters, respectively.
Source: FHLBB annual reports, White (1991), and authors' calculations.

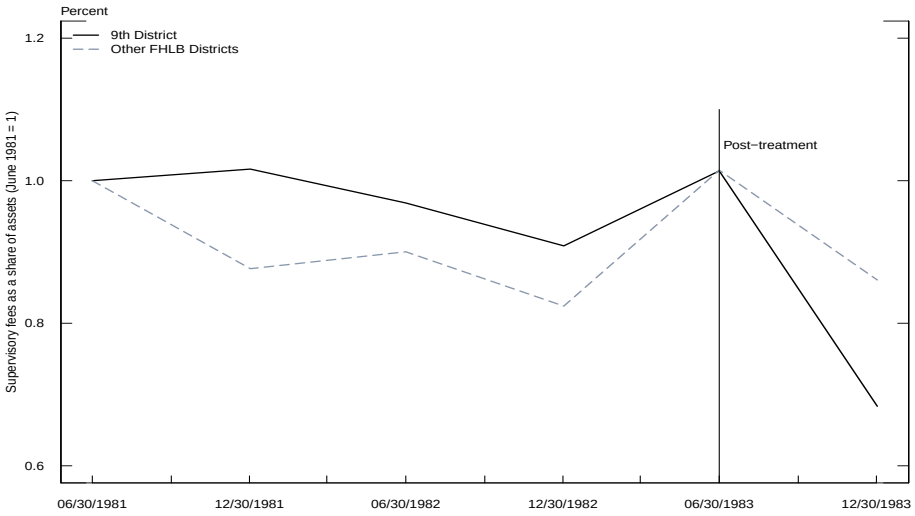



**Figure 3. Comparison of supervisory fees**. This figure plots the average supervisory fees as a share of assets paid by S&Ls in the 9th district and those paid by S&Ls in all other districts for the period from June 30, 1981 to December 30, 1983. The numbers are normalized so that the observation for June 30, 1981 equals one.
Source: S&L financial reports (FHLBB 770).

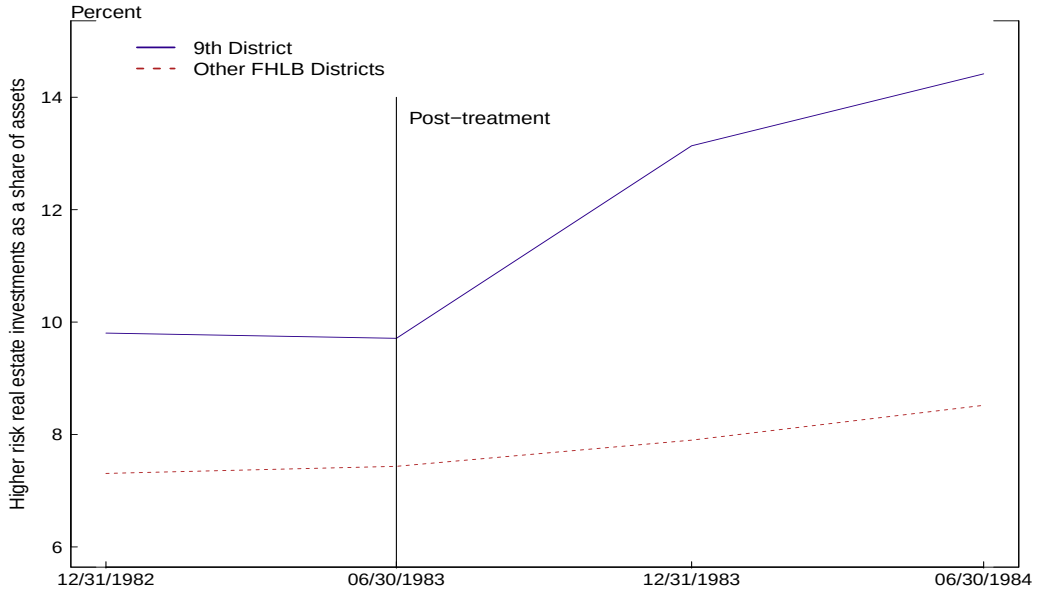
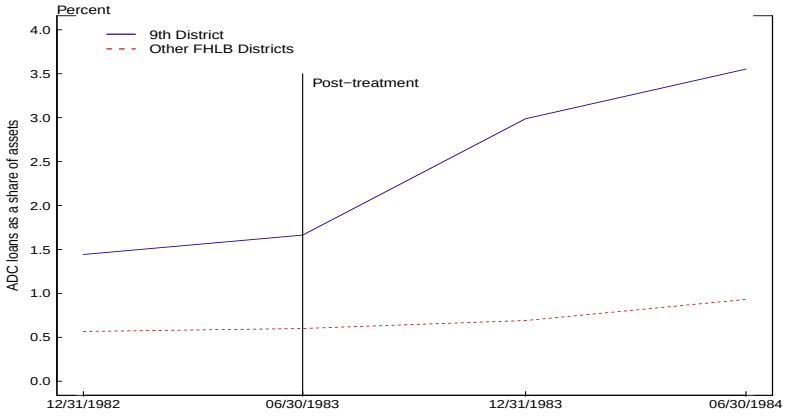
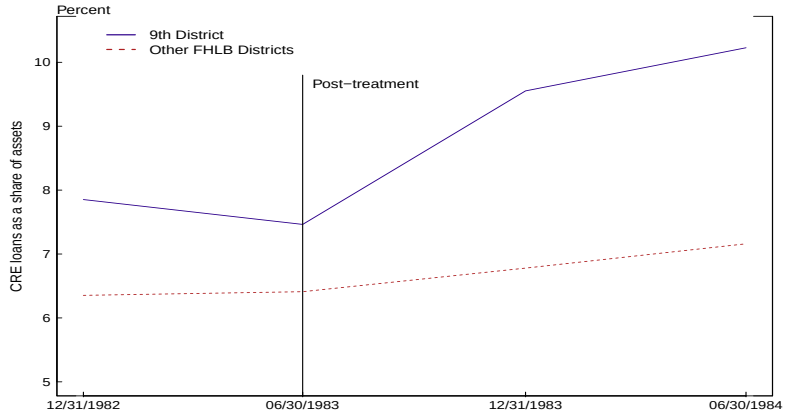


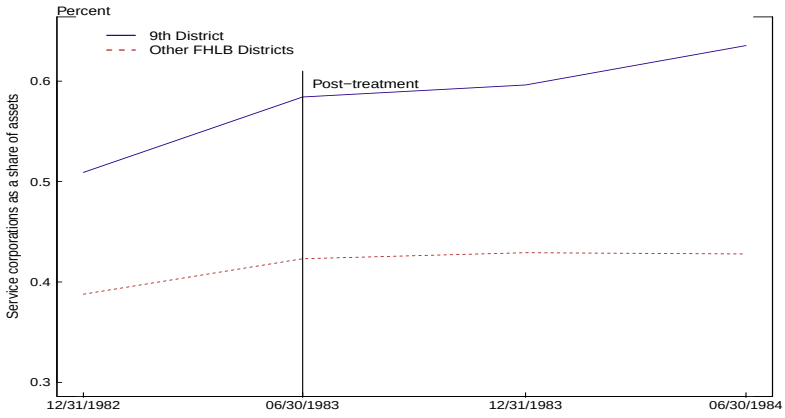

**Figure 4. Higher risk real estate investments by S&Ls in the 9th district and S&Ls in all other FHLB districts**. This figure plots higher risk real estate investments, which include acquisition, development, and construction (ADC) loans; commercial real estate (CRE) loans; and service corporation investments, as a share of assets, for S&Ls in the 9th district and S&Ls in all other FHLB districts from December 31, 1982 to June 30, 1984.




(a) ADC Loans




(b) CRE Loans




(c) Service Corporation Investments

**Figure 5. Components of higher risk real estate investments by S&Ls in the 9th district and S&Ls in all other FHLB districts**. The figure plots acquisition, development, and construction (ADC) loans (Panel (a)); commercial real estate (CRE) loans (Panel (b)); and service corporation investments (Panel (c)), as a share of assets, for S&Ls in the 9th district and S&Ls in all other FHLB districts from December 31, 1982 to June 30, 1984.

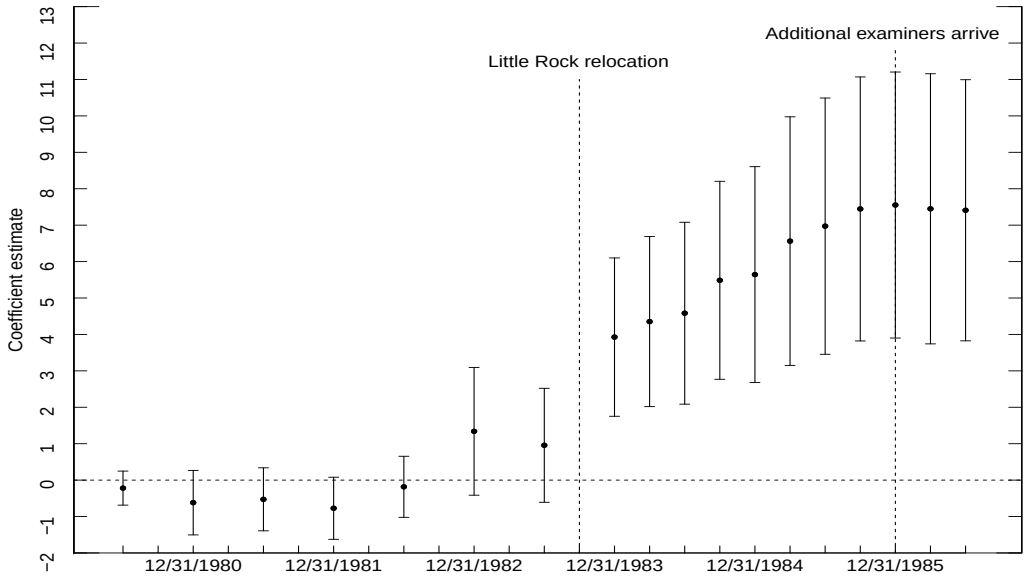



**Figure 6. Risk taking by S&Ls in the 9th district relative to S&Ls in other districts**. This figure plots the time path of the coefficient ($\gamma$) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of all federally chartered S&Ls.

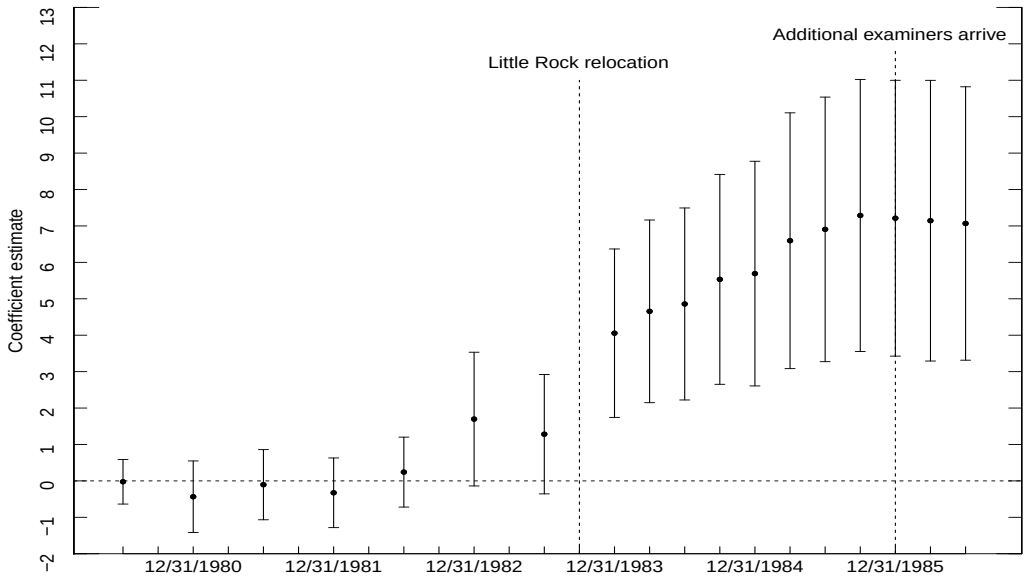



**Figure 7. Risk taking by S&Ls in the 9th district relative to S&Ls in 4th district**. This figure plots the time path of the coefficient ($\gamma$) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of federally chartered S&Ls in the 9th district (FHLB Dallas) and the 4th district (FHLB Atlanta).

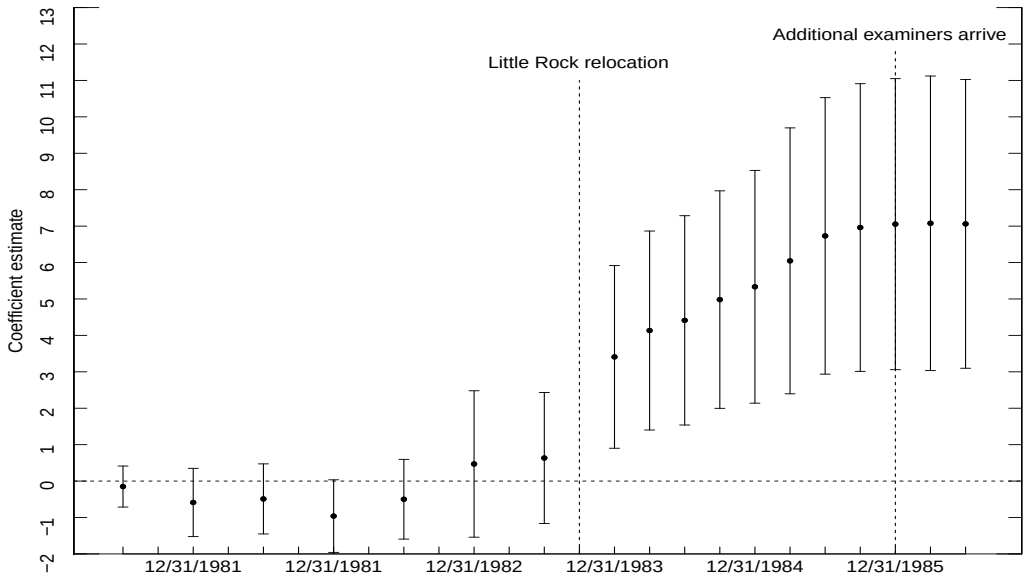



**Figure 8. Risk taking by S&Ls in the 9th district relative to matched S&Ls from other FHLB districts**. This figure plots the time path of the coefficient ($\gamma$) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of federally chartered S&Ls in the 9th district (FHLB Dallas) and nearest neighbor matched thrifts from other FHLB districts.

**Table 1**
**Trainee examiners in selected FHLB districts**

| | |
|---|---|
| 4th district, Atlanta | 27% |
| 7th district, Chicago | 22% |
| 9th district, Dallas | 43% |
| 10th district, Topeka | 19% |
| All FHLB districts | 22% |

Notes: This table reports the percentage of trainee examiners (GS-5/7) relative to the total number of examiners in select FHLB districts for the fiscal year 1984.

Source: Strunk and Case (1988).

**Table 2**
**Summary statistics as of December 31, 1982**

| | 9th district | | Other districts | | 4th district | |
|---|---|---|---|---|---|---|
| | Mean | Std. dev. | Mean | Std. dev. | Mean | Std. dev. |
| Panel A: Outcome variables | | | | | | |
| Higher risk loans/assets | 9.80 | 9.08 | 7.31† | 5.17 | 8.21 | 5.21 |
| CRE loans/assets | 7.85 | 6.96 | 6.35† | 4.57 | 7.18 | 4.61 |
| ADC loans/assets | 1.44 | 5.63 | 0.57 | 1.15 | 0.65 | 1.40 |
| Service corp./assets | 0.51 | 0.98 | 0.39 | 0.69 | 0.38 | 0.76 |
| Panel B: Bank characteristics | | | | | | |
| Total assets ($1,000) | 126,270 | 201,867 | 300,008 | 919,728 | 245,120 | 430,406 |
| Net worth/assets | 3.91 | 2.82 | 4.44 | 3.06 | 4.15 | 2.45 |
| Slow loans/assets | 0.74 | 0.91 | 1.31† | 1.67 | 1.00‡ | 1.17 |
| Cash investments/assets | 2.16 | 2.68 | 2.19 | 3.16 | 2.28 | 3.94 |
| Return on assets | -0.23 | 0.91 | -0.29 | 0.62 | -0.34 | 0.74 |
| Panel C: State characteristics | | | | | | |
| Urban population share | 58.68 | 20.53 | 69.72† | 17.79 | 65.51 | 13.56 |
| State unemployment rate | 10.29 | 1.53 | 11.08† | 2.54 | 9.93 | 2.13 |
| Mining share | 19.47 | 11.15 | 2.71† | 5.46 | 1.09‡ | 1.20 |
| Construction share | 4.80 | 0.50 | 3.86† | 0.79 | 4.19‡ | 1.03 |
| Manufacturing share | 15.16 | 5.71 | 22.08† | 6.48 | 20.27‡ | 7.42 |
| Panel D: County characteristics | | | | | | |
| Income per capita ($) | 10,172 | 2,023 | 11,433† | 2,398 | 10,530 | 2,372 |
| Population | 214,729 | 412,194 | 687,596 | 1,450,692 | 247,962 | 260,943 |
| Labor force participation rate | 43.63 | 6.26 | 47.64† | 5.01 | 47.08‡ | 5.70 |
| County unemployment rate | 9.71 | 3.89 | 10.47 | 3.57 | 9.90 | 3.37 |
| Medical benefits per capita ($) | 0.30 | 0.09 | 0.36† | 0.14 | 0.33‡ | 0.14 |
| Welfare benefits per capita ($) | 0.15 | 0.08 | 0.16 | 0.09 | 0.16 | 0.09 |

Notes: This table contains summary statistics for various outcome variables (Panel A); bank characteristics (Panel B); state-level controls (Panel C); and county-level controls (Panel D). The statistics are computed separately for thrifts in the 9th district, all other districts, and the 4th district as of December 31, 1982. The figures are in percent, unless indicated otherwise. † indicates statistically significant differences (5% significance level) from $t$-tests of differences in means between the 9th district and all other districts, and ‡ indicates significant differences between the 9th district and the 4th district.

**Table 3**
**Risk taking by S&Ls in the 9th district relative to S&Ls in other districts**

| | Higher risk real estate investments | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 4.98*** | 3.59*** | 3.47*** | 3.26*** |
| | (0.83) | (0.83) | (0.82) | (0.78) |
| Adj. $R^2$ | 0.73 | 0.73 | 0.74 | 0.74 |
| | CRE lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.18*** | 1.48*** | 1.46*** | 1.26** |
| | (0.53) | (0.57) | (0.57) | (0.53) |
| Adj. $R^2$ | 0.73 | 0.73 | 0.73 | 0.74 |
| | ADC lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.63*** | 1.98*** | 1.89*** | 1.84*** |
| | (0.48) | (0.43) | (0.43) | (0.43) |
| Adj. $R^2$ | 0.56 | 0.57 | 0.57 | 0.57 |
| | Service corporation investments | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 0.16* | 0.13** | 0.12* | 0.17** |
| | (0.09) | (0.07) | (0.07) | (0.08) |
| Adj. $R^2$ | 0.63 | 0.63 | 0.63 | 0.64 |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 17,070 | 17,070 | 16,741 | 16,741 |

Notes: This table reports results from difference-in-differences regressions of higher risk real estate investments as a share of assets on the interaction term, $Treatment \times Post$, which indicates observations in the 9th district in the post-treatment period beginning in December 1983; fixed effects; and other control variables at the bank, state, and county level. Higher risk real estate investments are composed of commercial real estate (CRE) loans; acquisition, development, and construction (ADC) loans; and service corporation investments, shown separately in lower panels. A constant (not shown) is included in all specifications. Standard errors (in parentheses) are clustered at the county level. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.

**Table 4**
**Risk taking by S&Ls in the 9th district relative to S&Ls in the 4th district**

| | Higher risk real estate investments | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 4.69*** | 2.73*** | 3.23*** | 2.98*** |
| | (0.89) | (0.99) | (0.92) | (0.88) |
| Adj. $R^2$ | 0.67 | 0.68 | 0.68 | 0.69 |
| | CRE lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.17*** | 1.61** | 1.96*** | 1.72*** |
| | (0.59) | (0.68) | (0.65) | (0.64) |
| Adj. $R^2$ | 0.68 | 0.68 | 0.68 | 0.70 |
| | ADC lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.42*** | 1.16** | 1.32*** | 1.27*** |
| | (0.50) | (0.52) | (0.48) | (0.50) |
| Adj. $R^2$ | 0.54 | 0.55 | 0.55 | 0.56 |
| | Service corporation investments | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 0.10 | -0.04 | -0.04 | -0.01 |
| | (0.09) | (0.06) | (0.06) | (0.07) |
| Adj. $R^2$ | 0.55 | 0.55 | 0.56 | 0.56 |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 5,615 | 5,615 | 5,286 | 5,286 |

Notes: This table reports difference-in-differences results for regressions of higher risk real estate investments as a share of assets on the interaction term, $Treatment \times Post$, which indicates observations in the 9th district in the post-treatment period beginning in December 1983; fixed effects; and other control variables at the bank, state, and county level. Higher risk real estate investments are composed of commercial real estate (CRE) loans; acquisition, development, and construction (ADC) loans; and service corporation investments, shown separately in lower panels. A constant (not shown) is included in all specifications. Standard errors (in parentheses) are clustered at the county level. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.

**Table 5**
**Balancing tests for S&Ls in the 9th district relative to matched S&Ls from all other districts**

| | Dallas S&Ls | Matched S&Ls | $t$-stat of $\Delta$ |
|---|---|---|---|
| Ln(age) | 3.46 | 3.54 | 0.83 |
| Ln(assets) | 11.02 | 11.00 | 0.23 |
| Net Worth | 3.93 | 3.84 | 0.32 |
| Net Income | -0.23 | -0.26 | 0.33 |
| Investment Securities | 10.23 | 10.17 | 0.07 |
| Cash | 2.10 | 1.90 | 0.76 |
| Single Family Mortgages | 58.51 | 58.10 | 0.25 |
| Multifamily Mortgages | 3.04 | 2.71 | 0.89 |
| Consumer Loans | 4.92 | 4.88 | 0.07 |
| CRE Loans | 7.81 | 7.95 | -0.21 |
| ADC Loans | 1.43 | 0.82 | 1.33 |
| Deposits | 92.53 | 91.58 | 1.12 |
| FHLB Advances | 3.40 | 4.00 | -1.03 |
| Loan Loss Reserve | 0.21 | 0.09 | 0.72 |
| Nonperforming Loans | 0.74 | 0.72 | 0.20 |
| | | | |
| Observations | | 334 | |
| Pseudo R-squared (pre-match) | | 0.21 | |
| Pseudo R-squared (post-match) | | 0.01 | |

Notes: This table reports average values of thrift-level characteristics for 9th district S&Ls and their matched counterparts. The $t$-statistic of a test of the difference in means is reported in the rightmost column.

**Table 6**
**Risk taking by S&Ls in the 9th district relative to matched S&Ls from all other districts**

| | Higher risk real estate investments | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 5.08*** | 3.63*** | 3.69*** | 3.32*** |
| | (0.88) | (3.63) | (0.90) | (0.86) |
| Adj. $R^2$ | 0.67 | 0.67 | 0.68 | 0.69 |
| | CRE lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.34*** | 1.89*** | 1.89*** | 1.68*** |
| | (0.61) | (0.65) | (0.64) | (0.61) |
| Adj. $R^2$ | 0.68 | 0.68 | 0.69 | 0.70 |
| | ADC lending | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 2.53*** | 1.63*** | 1.70*** | 1.56*** |
| | (0.51) | (0.47) | (0.47) | (0.45) |
| Adj. $R^2$ | 0.56 | 0.57 | 0.57 | 0.58 |
| | Service corporation investments | | | |
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 0.21** | 0.11** | 0.10** | 0.07 |
| | (0.10) | (0.05) | (0.05) | (0.05) |
| Adj. $R^2$ | 0.56 | 0.56 | 0.56 | 0.57 |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 3,587 | 3,587 | 3,534 | 3,534 |

Notes: This table reports difference-in-differences results for regressions of higher risk real estate investments as a share of assets on the interaction term, $Treatment \times Post$, which indicates observations in the 9th district in the post-treatment period beginning in December 1983; fixed effects; and other control variables at the bank, state, and county level. Higher risk real estate investments are composed of commercial real estate (CRE) loans; acquisition, development, and construction (ADC) loans; and service corporation investments, shown separately in lower panels. A constant (not shown) is included in all specifications. Standard errors (in parentheses) are clustered at the county level. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.

**Table 7**
**Risk taking by S&Ls in the 9th district: Robustness Checks**

| Panel A: Arkansas (9th District) vs Missouri (8th District) | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 9.13*** | 4.75** | 4.72** | 5.00** |
| | (1.98) | (1.97) | (1.97) | (2.07) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 543 | 543 | 543 | 543 |
| Adj. $R^2$ | 0.79 | 0.80 | 0.81 | 0.81 |

| Panel B: 9th District vs Oil States | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 3.01*** | 4.10** | 3.81* | 2.94* |
| | (1.06) | (1.86) | (2.04) | (1.60) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 2,720 | 2,720 | 2,720 | 2,720 |
| Adj. $R^2$ | 0.65 | 0.66 | 0.66 | 0.68 |

| Panel C: Treatment Effect by Capital Adequacy | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 5.97** | 4.61* | 4.60** | 4.50** |
| | (2.40) | (2.41) | (2.37) | (2.26) |
| $Post \times Treatment \times NetWorth$ | -0.27 | -0.27 | -0.29 | -0.30 |
| | (0.55) | (0.55) | (0.53) | (0.50) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| State-year FEs | Yes | Yes | Yes | Yes |
| Number of observations | 17,070 | 17,070 | 16,741 | 16,741 |
| Adj. $R^2$ | 0.73 | 0.73 | 0.74 | 0.74 |

Notes: This table reports difference-in-differences results for regressions of higher risk real estate investments as a share of assets on the interaction term, $Treatment \times Post$, which indicates observations in the 9th district in the post-treatment period beginning in December 1983; fixed effects; and other control variables at the bank, state, and county level. Higher risk real estate investments are composed of commercial real estate (CRE) loans; acquisition, development, and construction (ADC) loans; and service corporation investments. Panel A uses a sample of Arkansas and Missouri only, while Panel B uses a sample of all 9th district states as well as KS, MT, ND, OK, and WY. Panel C uses the sample of all states, but includes an interaction term with net worth. A constant (not shown) is included in all specifications. Standard errors (in parentheses) are clustered at the county level. Statistical significance: $^{***}\ p < 0.01, ^{**}\ p < 0.05, ^{*}\ p < 0.10$.

**Table 8**

**Risk taking by S&Ls and banks in the 9th district: Falsification and placebo tests**

| Panel A: Texas vs other 9th district states | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 1.08 | -1.29 | -1.82 | -0.49 |
| | (1.64) | (1.57) | (1.70) | (1.40) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 1,816 | 1,816 | 1,816 | 1,816 |
| Adj. $R^2$ | 0.63 | 0.64 | 0.64 | 0.66 |

| Panel B: 9th district commercial banks vs rest of country | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 0.004 | 0.004 | 0.003 | 0.003 |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 15,165 | 15,165 | 14,918 | 14,918 |
| Adj. $R^2$ | 0.75 | 0.75 | 0.73 | 0.73 |

| Panel C: 9th district commercial banks vs 4th district | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $Post \times Treatment$ | 0.003 | 0.003 | 0.002 | 0.002 |
| | (0.003) | (0.003) | (0.003) | (0.002) |
| State-level controls | No | Yes | Yes | Yes |
| County-level controls | No | No | Yes | Yes |
| Bank-level controls | No | No | No | Yes |
| Number of observations | 3,836 | 3,836 | 3,611 | 3,611 |
| Adj. $R^2$ | 0.70 | 0.70 | 0.70 | 0.71 |

Notes: This table reports difference-in-differences results for regressions of higher risk real estate investments as a share of assets on the interaction term, $Treatment \times Post$, which indicates observations in the 9th district in the post-treatment period beginning in December 1983; fixed effects; and other control variables at the bank, state, and county level. Higher risk real estate investments are composed of commercial real estate (CRE) loans; acquisition, development, and construction (ADC) loans; and service corporation investments. A constant (not shown) is included in all specifications. Panel A uses TX as the treatment state, and AR, LA, MS, and NM as the control states. Panel B uses a sample of commercial banks from the entire country, while Panel C limits the sample to commercial banks from the 9th district (Dallas) and the 4th district (Atlanta). Standard errors (in parentheses) are clustered at the county level. Statistical significance: $^{***}\ p < 0.01,^{**}\ p < 0.05,^{*}\ p < 0.10$.

**Table 9**
**Failure prediction results excluding the 9th district (1983-1990)**

| | Odds Ratio | 95% Confidence Interval |
|---|---|---|
| Net Worth | 0.92*** | 0.905–0.932 |
| Loan Loss Reserve | 0.86*** | 0.814–0.917 |
| Net Income | 0.97 | 0.904–1.036 |
| Nonperforming Loans | 1.09*** | 1.072–1.111 |
| Investment Securities | 0.95*** | 0.940–0.963 |
| Brokered Deposits | 1.00 | 0.995–1.008 |
| Ln(Assets) | 1.20*** | 1.153–1.226 |
| Cash | 0.91*** | 0.864–0.968 |
| Goodwill | 1.06*** | 1.030–1.091 |
| Single Family Mortgages | 0.97*** | 0.961–0.971 |
| Multifamily Mortgages | 0.97*** | 0.956–0.986 |
| ADC Loans | 1.02*** | 1.006–1.042 |
| CRE Loans | 1.01** | 1.000–1.024 |
| Consumer Loans | 1.02*** | 1.007–1.039 |
| Service Corporations | 1.03** | 1.005–1.056 |
| | | |
| Observations | | 19,242 |
| Pseudo R-squared | | 0.19 |

Notes: Logit estimates for the probability of failure on 15 covariates. A constant is also included in the regressions, but not shown. Coefficients are reported in odds ratios. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.

**Table 10**
**Resolution costs by FHLB district (1983-1990)**

Panel A: Weighted Average Costs of Failure by FHLB District and Charter Type

Savings & Loans

| FHLB District | Rank | Resolution Costs/Assets (%) |
|---|---|---|
| **Dallas** | **1** | **80.7** |
| Topeka | 2 | 35.7 |
| Des Moines | 3 | 21.8 |
| Atlanta | 4 | 19.8 |
| New York | 5 | 18.4 |
| Chicago | 6 | 18.1 |
| Boston | 7 | 15.8 |
| Cincinatti | 8 | 13.5 |
| Indianapolis | 9 | 12.6 |
| Seattle | 10 | 10.4 |
| Pittsburgh | 11 | 9.9 |
| San Francisco | 12 | 9.3 |

Commercial Banks

| FHLB District | Rank | Resolution Costs/Assets (%) |
|---|---|---|
| Cincinatti | 1 | 25.9 |
| Topeka | 2 | 24.6 |
| New York | 3 | 20.7 |
| Seattle | 4 | 20.7 |
| Chicago | 5 | 19.7 |
| San Francisco | 6 | 17.3 |
| **Dallas** | **7** | **15.5** |
| Des Moines | 8 | 13.7 |
| Indianapolis | 9 | 13.6 |
| Pittsburgh | 10 | 12.4 |
| Boston | 11 | 7.9 |
| Atlanta | 12 | 5.9 |

State-level ranks for 9th District S&Ls (commercial banks): AR:1(6); TX:2(25); NM:3(9); LA:4(10); MS:12(34)

Panel B: Unweighted Average Costs of Failure by FHLB District and Charter Type

Savings & Loans

| FHLB District | Rank | Resolution Costs/Assets (%) |
|---|---|---|
| **Dallas** | **1** | **73.6** |
| Topeka | 2 | 40.9 |
| Atlanta | 3 | 36.0 |
| Boston | 4 | 23.5 |
| Des Moines | 5 | 20.3 |
| San Francisco | 6 | 16.1 |
| Cincinatti | 7 | 15.7 |
| Chicago | 8 | 15.6 |
| Seattle | 9 | 14.8 |
| New York | 10 | 14.2 |
| Pittsburgh | 11 | 13.0 |
| Indianapolis | 12 | 11.7 |

Commercial Banks

| FHLB District | Rank | Resolution Costs/Assets (%) |
|---|---|---|
| Cincinatti | 1 | 30.4 |
| Topeka | 2 | 30.1 |
| Seattle | 3 | 26.4 |
| Atlanta | 4 | 24.1 |
| Des Moines | 5 | 23.4 |
| Chicago | 6 | 22.1 |
| **Dallas** | **7** | **21.5** |
| San Francisco | 8 | 20.3 |
| New York | 9 | 20.2 |
| Boston | 10 | 18.3 |
| Pittsburgh | 11 | 17.7 |
| Indianapolis | 12 | 15.9 |

State-level ranks for 9th District S&Ls (commercial banks): LA:1(11); AR:2(5); TX:4(21); NM:7(8); MS:11(36)

Notes: This table reports the FHLB district-level resolution costs for savings and loan associations (on the left) and commercial banks (on the right) from 1983-1990. Panel A reports resolution costs weighted by bank assets at the time of failure, and Panel B reports unweighted resolution costs.

**Table 11**
**Regression results: Failed S&Ls (1983-1990)**

| Panel A: Resolution Costs/Assets (%) | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *9thDistrictDummy* | 47.8*** | 42.4*** | 28.0*** | 30.1*** |
| | (11.5) | (11.5) | (6.85) | (7.19) |
| Observations | 461 | 460 | 460 | 446 |
| Adj. $R^2$ | 0.11 | 0.18 | 0.23 | 0.24 |

| Panel B: Assets Passed at Resolution/Assets (%) | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *9thDistrictDummy* | -10.6*** | -10.7*** | -9.47** | -8.72** |
| | (3.18) | (3.18) | (3.94) | (4.14) |
| Observations | 469 | 468 | 468 | 453 |
| Adj. $R^2$ | 0.40 | 0.45 | 0.45 | 0.46 |

| Panel C: Net Worth/Assets (%) 6 Mo. Prior to Failure | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *9thDistrictDummy* | -10.7* | -1.86*** | -1.87*** | -1.55** |
| | (6.24) | (0.63) | (0.67) | (0.69) |
| Observations | 469 | 468 | 468 | 453 |
| Adj. $R^2$ | 0.06 | 0.98 | 0.98 | 0.98 |

| Panel D: Pr(Net Worth $< 3\%$) 1 Yr. Prior to Failure | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *9thDistrictDummy* | 3.43*** | 2.45*** | 2.81** | 3.42*** |
| | (1.16) | (0.89) | (1.28) | (1.69) |
| Observations | 459 | 458 | 458 | 443 |
| Pseudo $R^2$ | 0.36 | 0.44 | 0.45 | 0.47 |
| Bank-level controls | No | Yes | Yes | Yes |
| State-level controls | No | No | Yes | Yes |
| County-level controls | No | No | No | Yes |

Notes: This table reports results for regressions of S&L resolution costs (Panel A), assets passed at resolution (Panel B), and net worth six months prior to failure (Panel C) on year fixed effects and bank-, state-, and county-level controls, as indicated. Panel D reports results from a logit regression of the probability of regulatory insolvency (as defined during our treatment period) 12 months prior to failure. The coefficient of the key independent variable—a 9th district dummy—is reported for each outcome variable. A constant (not shown) is included in all specifications. Robust standard errors are reported in parentheses. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.

**Table 12**
**Regression results: Failed commercial banks (1983-1990)**

| Panel A: Resolution Costs/Assets (%) | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $9thDistrictDummy$ | 1.42 | 3.10*** | -2.65 | -2.04 |
| | (1.08) | (1.09) | (1.66) | (1.70) |
| Observations | 1,116 | 1,116 | 1,116 | 1,107 |
| Adj. $R^2$ | 0.14 | 0.21 | 0.24 | 0.25 |

| Panel B: Assets Passed at Resolution/Assets (%) | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $9thDistrictDummy$ | 5.87*** | 4.85** | 4.14 | -0.02 |
| | (2.28) | (2.35) | (3.13) | (3.23) |
| Observations | 1,117 | 1,117 | 1,117 | 1,108 |
| Adj. $R^2$ | 0.17 | 0.18 | 0.19 | 0.20 |

| Panel C: Net Worth/Assets (%) 6 Mo. Prior to Failure | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $9thDistrictDummy$ | -2.37*** | -0.79*** | -0.54 | -0.58* |
| | (0.56) | (0.29) | (0.33) | (0.34) |
| Observations | 1,117 | 1,117 | 1,117 | 1,108 |
| Adj. $R^2$ | 0.14 | 0.80 | 0.80 | 0.80 |

| Panel D: Pr(Net Worth $< 3\%$) 1 Yr. Prior to Failure | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $9thDistrictDummy$ | 1.39** | 1.37* | 0.85 | 0.93 |
| | (0.21) | (0.23) | (0.21) | (0.24) |
| Observations | 1,117 | 1,117 | 1,117 | 1,108 |
| Adj. $R^2$ | 0.08 | 0.15 | 0.16 | 0.16 |
| Bank-level controls | No | Yes | Yes | Yes |
| State-level controls | No | No | Yes | Yes |
| County-level controls | No | No | No | Yes |

Notes: This table reports results for regressions of commercial bank resolution costs (Panel A), assets passed at resolution (Panel B), and net worth six months prior to failure (Panel C) on year fixed effects and bank-, state-, and county-level controls, as indicated. Panel D reports results from a logit regression of the probability of regulatory insolvency (as defined during our treatment period) 12 months prior to failure. The coefficient of the key independent variable—a 9th district dummy—is reported for each outcome variable. A constant (not shown) is included in all specifications. Robust standard errors are reported in parentheses. Statistical significance: $^{***}$ $p < 0.01$,$^{**}$ $p < 0.05$,$^{*}$ $p < 0.10$.