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

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Abstract

We exploit an exogenous reduction in bank supervision to demonstrate a causal effect of supervisory resources on financial institutions' willingness to take risk. The additional risk took the form of more risky loans, faster asset growth, and a greater reliance on low quality capital. This response to less supervision boosted banks' odds of failure. Lastly, we identify channels by which the reduction in supervisory capacity led to more costly failures relative to unaffected areas. None of these patterns are present in depository institutions subject to a different supervisor but otherwise similar to the banks in our sample.

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1 Introduction

Financial institutions have historically been subject to an inordinate amount of supervisory oversight, reflecting a recognition that these firms occupy a uniquely important place in the economy. Excessive risk taking by these institutions can result in failures and crises that adversely affect economic growth and lead to costs associated with bailouts, resolutions, and government backstops. Despite the focus on supervisory oversight of financial institutions, however, the economy is periodically buffeted by crises emanating from the financial sector. Such episodes have raised questions about the efficacy of supervision and its ability to protect the nonfinancial sector and taxpayers from bearing losses.

In this paper, we measure the causal effects of a reduction in supervisory resources. We show that bank supervision plays a significant role in limiting risk taking at depository institutions. We additionally find that, absent sufficient supervisory oversight, insolvent institutions are closed less quickly. Finally, we document that these two channels—an accumulation of risky assets by banks and delays in resolving insolvent institutions—link a reduction in supervisory capacity to higher failure costs borne by taxpayers.

Specifically, we examine a natural experiment in which some institutions witnessed an exogenous decline in supervisory oversight. The decline in supervision was sparked by the hasty relocation of the 9th district Federal Home Loan Bank (FHLB) from Little Rock, Arkansas to Dallas, Texas in 1983. At this time, regional FHLBs maintained their own supervisory staffs that were responsible for supervising savings and loan associations (S&Ls) in their respective districts. 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. Only two supervisors remained. The decline in supervisory capacity faced by 9th district thrifts was both acute and enduring, as normal supervision and examination scrutiny did not return until about two years after the relocation.[1]

[1]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.

This setting allows us to draw causal inference regarding the importance of bank supervision, which is challenging for several reasons. First, variation in supervision across banks is frequently tied to differences between banks, such as size or riskiness. Second, a common external factor, such as a change to banks' operating environment, can affect both supervisory attention and risk taking. Third, identifying exogenous shocks to supervisory capacity and determining the exact timing of a shock is generally challenging. Fourth, it may be difficult to separate the effects of supervision *per se* from the effects of microprudential regulation, which can interact in complex ways (Ongena et al., 2013).

Our research design avoids these pitfalls and importantly ensures regulation is held constant across institutions. Consequently, we can disentangle the effects of financial supervision from financial regulation.[2] Bank supervision does not merely consist of enforcing prudential limitations, but rather works in concert with regulation as a more flexible element of banking policy (Dudley, 2016). Additionally, the regular presence of supervisors can foster moral suasion, and may thus be an important determinant of banks' willingness to approach the limits of regulatory guidelines.

The first goal of this study is to assess whether changes in supervisory resources 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 newly authorized to hold as a result of the asset deregulation in the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) of 1980 and the Garn-St Germain Act (GSG) of 1982.

We find that affected banks increased their risky real estate investments as a share of assets by about 7 percentage points. The size of the treatment effect is economically large.

[2]The effect of financial regulation on the banking system has been an area of intense study over the past few decades. See Jayaratne and Strahan (1996), Kroszner and Strahan (1996), Barth et al. (2004), Buch and DeLong (2008), and Laeven and Levine (2009), among others.

Given capital positions at the time, even modest charge-offs on the additional investments made as a result of lax supervision in the 9th district would bring many banks to the brink of insolvency. We further show that unsupervised banks grew much more rapidly during this time, and readily engaged in accounting gimmicks to inflate their reported capital ratios. Our results are robust to alternative control groups, and hold for thrifts throughout the entire district. A placebo test using commercial banks that are similar to thrifts in our sample but subject to a different supervisor supports the causal interpretation of our results. In total, our results are consistent with the hypothesis that bank risk taking is a function of supervisory attention.

The second goal of this study is to assess how supervision affects the costs of bank failures borne by taxpayers. The S&L crisis that began just after our first analysis provides an ideal environment to investigate the effects on failure. The salience of failure costs is magnified during crises when deposit insurance funds dwindle due to numerous failures. We find that the additional risk taking increased the odds of failure. Low supervisory attention also delayed the resolution of insolvent banks, which, combined with the additional risk taking, resulted in more costly failures. No similar pattern exists in a sample of failed commercial banks used in a placebo test. Thus, 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. Previous work has shown that supervisory and regulatory *actions*, such as visits, downgrades, and office relocations can impact the behavior of supervised institutions (Delis and Staikouras, 2011; Kiser et al., 2012; Gopalan et al., 2016; Lambert, 2018). Other work has shown that banks respond to supervisory *leniency* by putting off corrective action until more stringent supervisors arrive (Agarwal et al., 2014) or until the negative consequences of the increased risk are realized (Kisin and

Manela, 2017). Finally, Hirtle et al. (2016) employ a data set of allocated supervisory hours to identify an apparent discontinuity based on large banks' 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 loan loss reserves despite witnessing lower delinquency rates.

This paper contributes to the literature in several ways. First, we offer novel identification to measure the causal effects of a change in supervision on bank behavior by examining a natural experiment in which the change in supervision was exogenous to regional developments and characteristics of regulated institutions. In fact, our natural experiment approximates a setting in which supervision is essentially switched off for many banks for about two years. Second, while many of the aforementioned studies focus on supervisors' leniency or specific supervisory actions such as rating assignments, we focus on the importance of supervisory resources (Rezende and Wu, 2014; Hirtle et al., 2016), and show that adequately provisioning for such resources has strong implications for optimal banking policy and financial stability. Another benefit of our natural experiment is that it took place in a unique environment in which measuring bank risk taking is relatively straightforward. Asset deregulation in the years prior to the experiment allowed thrifts to suddenly enter unfamiliar and risky loan segments, and we show that the reduction in supervisory resources indeed sparked an outsized accumulation of these loans. Third, we document that less supervisory attention can lead to a higher incidence of failure, and that failed institutions are resolved at a greater cost to the government insurance fund, and thus, taxpayers. Fourth, we identify two channels through which less supervision leads to higher failure costs. One channel operates via the additional risk taking referenced earlier, which results in fewer assets being passed to the acquirer of failed institutions and leaves the insurance fund with more bad assets. The second channel operates through longer lags in identifying and resolving insolvent institutions. Consequently, so-called "zombie banks" are more prevalent relative to a

counterfactual in which supervision is more stringent, and these institutions are more costly to resolve when they ultimately fail.

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

The Great Depression spurred the federal government to restructure the way it regulated the S&L industry.[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 1934 the National Housing Act created the Federal Savings and Loan Insurance Corporation (FSLIC), which was administered by the FHLBB and provided deposit insurance to S&Ls. This 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, 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).

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. Examiners

[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.

[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.

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 regulatory compliance, with little concern for the overall safety and soundness of the thrift under review.

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

The system of separate examiners and supervisors stratified and complicated the response of the FHLB to any violations. Although removal proceedings and cease-and-desist orders could only be issued by FHLBB officials in D.C., this ostensible centralization of the response to problem institutions was undone 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. Consequently, regional FHLBs carried most 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. 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 permissible 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 came with 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 usually 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 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 wrote that Little Rock's board of directors expressed its desire to relocate to a city "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 this justification, 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

[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.

all 9th district S&Ls and reported that, "the savings and loan associations do not clearly favor or oppose the move," and "the sole principal advantage [is] 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—Bill Churchill and Charles Brooks—worked in the field as supervisory agents. As shown in Figure 1, these two field agents decided to split up the 550,000 square-mile district by geography, sharing responsibility for monitoring almost 500 S&Ls (of which about 170 were federally-chartered institutions).[6]

The resignation of the Bank's supervisors was unexpected and 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 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, as the overwhelming majority of the Bank's supervisors chose 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 9th district examinations. In fact, the number of examinations in the district did not return to pre-move levels until 1986.

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

[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.

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 "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 of 250 supervisory and examination staff for an intensive six-week supervisory blitz in the 9th district. A veteran supervisor that joined the 9th district staff at this time testified before the U.S. Senate that the number of examinations rose to more than three times the number conducted in 1985, and that this was the first comprehensive examination for many institutions in two or three years (Selby, 1989). In addition, the conclusion of the supervisory blitz brought a deluge of enforcement actions that represented a 76% increase over the level for the previous calendar year. Largely as a result of the findings of the outside supervisors and examiners, staff also pursued management replacement actions, liquidation requests, and submitted over 500 criminal referrals to the Department of Justice.[8] In sum, the diminished supervisory capacity in the 9th district persisted for at least two years after the relocation to Dallas.

The negative shock to supervision 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

[8]Corroborating this evidence of insufficient supervision in the two years following the move, the FDIC reported that supervisory examinations fell and remained low during 1984 and 1985 (FDIC, 1997).

of the relocation of the Little Rock office to Dallas, S&Ls in the 9th district experienced a 28% reduction in examinations following the move.[9] This difference belies the true decline in supervisory attention, however, because 9th district exams in the later period primarily consisted of partial-day visitations instead of the multi-day norm. Similarly, as illustrated in Figure 3, supervisory fees paid by S&Ls in the 9th district fell by 33% following the move of the FHLB headquarters, while fees paid by S&Ls in other districts remained within their prior range, declining by 15%.[10] These supervisory fees in part reflect reimbursements for on-site examinations, which are crucial for information gathering (Berger et al., 2000).

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 other federally-chartered S&Ls. We therefore treat the relocation of the Little Rock office as a natural experiment that allows us to measure the effects of an exogenous decline in supervisory capacity.

4 Data and Summary Statistics

To assess the effect of the decrease in supervisory capacity on thrifts' risk taking, we require a measure of risk taking. Bank risk taking can be difficult to pinpoint. Our setting, which follows a period of asset deregulation, offers readily identifiable sources of risk taking (Strunk and Case, 1988). It is well understood that thrifts' foray into deregulated investments contributed importantly to the severity of the S&L crisis. Thus, we measure risk taking as the increase in (1) commercial real estate (CRE) loans; (2) acquisition, development, and construction (ADC) loans; and (3) service corporation investments.[11] Because thrifts were newly

[9]The initial difference in the number of examinations per institutions arises because the 9th district was a relatively large FHLB district with many rural areas and dispersed banks.

[10]The reporting item "supervisory fees" is only available in the financial reports through 1983.

[11]Service corporation investments represent subsidiaries of S&Ls engaging in activities that are prohibited by the S&Ls themselves. Service corporations could, for instance, provide rental and management services,

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 a clear accumulation of risk over the traditional business of residential real estate lending.[12]

These assets were also recognized as risky before 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 residential mortgages. An issue of the *Outlook of the Federal Home Loan Bank System* summarized the conventional wisdom that, "thrifts with a relatively high percentage of single-family mortgages in portfolio will generally suffer much smaller losses than those with nontraditional lending."

Our primary outcome variable is higher risk real estate investments, 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 plot the averages of higher risk real estate loan shares of S&Ls

engage in housing development, and even partner with a developer while providing interim financing for a development project.

[12]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.

in the 9th district against those of S&Ls in all other FHLB districts for the year before and the year after the relocation of the 9th district FHLB. Higher risk real estate investments of 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 for S&Ls outside the 9th district remains nearly flat. The larger value of higher risk real estate loans prior to the shock—which our empirical design properly accounts for—reflects the somewhat faster economic growth in the 9th district in the years preceding our sample period.

Analogous plots for the various components of higher risk real estate loans are shown in Panels (a)-(c) of Figure 5. All components of higher risk real estate investments exhibit parallel trends in the year before the relocation of the 9th district's headquarters. We show further evidence of parallel trends below when depicting the time path of the treatment effect in Section 6.

Panel A of Table 2 reports summary statistics for the outcome variables, as of December 31, 1982, for S&Ls in the 9th district, the other FHLB districts, and the adjacent 4th (Atlanta) district. The latter two cohorts serve as 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 in the 9th district compared to all other districts, the shares of subcomponents 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 Appendix A.

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; per-capita income; receipts of medical benefits (predominantly Medicare); 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.

5 Empirical Methodology

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. In our main analysis, we estimate the following institution-level OLS regressions over the period from December 31, 1981 to June 30, 1985:

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

where $RiskTaking_{i,t}$ 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, such that γ measures the change in risk taking following the decrease in supervision for treated S&Ls relative to the untreated (control) S&Ls. We include a full complement of bank and time fixed effects, denoted ψ_i and η_t, respectively.

$S_{i,t-1}$ 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; population (logged); labor force participation rate; unemployment rate; per-capita receipts of medical benefits; and 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 1983, even 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. $B_{i,1982}$ 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. 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). Including covariates to capture economic conditions and bank characteristics is intended to mitigate possible biases that may otherwise occur if these variables affect $Y_{i,t}$ and are correlated with $Post_t \times Treatment_i$.

6 The Effects of a Decrease in Supervisory Capacity on Bank Risk Taking

As our baseline, we estimate equation (1) using a sample of all federally-chartered S&Ls in the 9th district and their counterparts in the rest of the contiguous United States. 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. For the 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 average treatment effect remains roughly steady at about 3.5 percentage points. The results show that treated S&Ls increased their exposure to higher risk loans in the post-treatment period significantly more than the control group. In unreported results, we find that the increase in these loans as a share of assets is counterbalanced by a decrease in S&Ls' traditional residential real estate lending.

To demonstrate that the increase in risk taking was evident across investment categories, we disaggregate the higher risk lending measure into its constituent parts. In the remaining panels of Table 3, we see 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 of this category, but conventional levels of statistical significance are achieved.

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. Three patterns in the treatment effect emerge from this exercise. First, conditional on fixed effects, the parallel trends in the pre-period are evident, even when including a period of meaningful regulatory change. Second, we observe a clear increase in risk taking subsequent to the relocation, 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. Third, Figure 6 reveals that the additional risk taking by 9th district S&Ls ceased upon the arrival of additional supervisory staff from other FHLB districts. This pattern follows precisely what one would expect if risk taking responds to the intensity of supervisory oversight

driven by resource allocation. Thus, an increase in supervisory resources has the effect of halting increases in bank risk taking. This result stands somewhat in contrast to Agarwal et al. (2014) who do not find a relationship between the number of examiners and regulatory leniency. Importantly, the temporary supervisory force was able to exert such remediation despite the complete lack of soft information about the institutions. It is plausible that this remedial effect would have been even larger had the temporary supervisors possessed such soft information (Calomiris and Carlson, 2018). The gradual acquisition of soft information by newly hired 9th district supervisors in subsequent years could help explain why we observe a decline in the treatment effect when we extend the sample.

The size of the treatment effect is economically large. Delinquency rates on these loans, which were later at the heart of the S&L crisis, were exceptionally high. 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.

These results are not sensitive to alternate control groups, as we show in Appendix B. For example, we find a similar treatment effect when comparing only against institutions in the neighboring 4th district (Figure A1), which began the sample with comparable higher risk loans and capital ratios. A further exercise reveals nearly identical results for an even smaller control group composed of one-to-one matches with 9th district thrifts (Figure A2). In the following subsection, we rule out some possible alternative explanations for our results and additionally offer placebo tests using commercial banks.

6.1 Ruling Out Alternative Explanations

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 in the 1970s. Petroleum

extraction was an important industry for some areas of the 9th district, and the oil boom-bust cycle that began in the 1970s may confound our findings. Of course, the state and county controls—which include local measures of oil production—along with the fixed effects in our specifications aim to capture these effects, which could potentially affect credit demand.

To rule out an energy-related explanation of our results, we 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% and never rose higher than 3.5%. Missouri, located in the Des Moines FHLB district, 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 4, we show 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 additional means of ruling out an explanation related to oil, we compare 9th district S&Ls to those in five top oil producing states in Appendix B (Panel C of Table A2). We find no evidence that oil price dynamics during the mid-1980s contributed to the differential risk taking behavior that we observe.

We next consider the possibility that our results could be explained by another shock to thrifts that occurred at the same time as the supervisory shock. 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.[13] Conversely, the decline in supervision subsequent to the relocation of the 9th district FHLB headquarters did not represent a capital shock, and

[13]It is also plausible that the salience of supervisory efforts increases during crises when bank failures are high and the state of the banking system is plagued with uncertainty (Manela and Moreira, 2017). This may cause supervisors to almost solely focus their efforts on near-failing institutions in the midst of crises and therefore counter the risk-shifting incentives of poorly capitalized banks to some extent.

our estimated treatment effect would exhibit no such difference 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 B of Table 4, 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 profits or 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.

Next, we 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. Texas was especially known for its energy-driven property boom by the early 1980s, and Texas institutions were known to be especially risky. We perform a falsification test wherein Texas institutions compose the treatment group and the remaining 9th district thrifts compose the control group. Panel C of Table 4 reports a null result for this test.[14] As this null result suggests, excluding all Texas thrifts from our baseline analysis (Table 3) yields nearly identical results.

Lastly, we conduct a placebo test using commercial banks. Commercial banks were not subject to FHLB supervision, but were able to engage in higher risk real estate 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 patterns. Therefore, we construct a sample of commercial banks for which we perform otherwise identical tests to those above.

Commercial banks could differ quite substantially from thrifts, especially in total assets. To generate a sample of commercial banks for which we can perform meaningful placebo

[14]Louisiana's economy was the most reliant on oil extraction in the district, 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.

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 ensure that any differential effects owing to size, lending specialization, or capital adequacy are neutralized.

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. The rationale for exact matching on the latter dimension is that a financial institution's opportunity to engage in CRE and ADC lending is 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 matching criteria. Commercial banks that are matched with more than one S&L appear in our dataset only once.

Panel D of Table 4 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 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 Appendix B, we compare only the matched commercial banks in the 9th district to those in the 4th district (Panel D of Table A2), with similar results.

In summary, we have shown that the increase in risk taking by S&Ls in the 9th district was broad-based and unrelated to the oil price decline or a capital shock. Similar financial institutions in the district that were not supervised by the FHLB did not exhibit the same behavior.

6.2 The Effects of a Decrease in Supervisory Capacity on Asset Growth, Capital Adequacy, and Accounting Maneuvers

The growth in the *share* of risky assets is even more striking in the context of the rapid growth of 9th district S&Ls once oversight dwindled. Unconstrained by supervisory oversight, banks could grow rapidly in order to paper over weakening performance, increase compensation levels, or gamble for resurrection. In Panel A of Table 5, we produce the results from an estimation of our baseline specification of equation (1) in which the dependent variable is the natural logarithm of assets. Therefore, the reported coefficients approximate the average difference in growth rates of 9th district thrifts relative to thrifts outside of the district in the period after supervision fell. The results are striking: in the roughly two-year post-treatment period, 9th district S&Ls grew by 15%-21% more quickly on average. As before, the point estimates in Panel A represent lower bounds on the size of the effect observed at the end of the sample period, because the time path of the treatment effect mirrors that shown in Figure 6.

Rapid asset growth can itself reflect risk taking, but this growth may be less concerning if it is accompanied by a sufficient increase in capital. Therefore, Panel B reports the results using the reported capital-to-asset ratio as the dependent variable. Relative to untreated institutions, it appears that 9th district banks boosted their capital ratios by between 0.2 and 0.4 percentage points. In their regularly filed financial reports, thrifts' capitalization levels were apparently not lagging behind their more-supervised counterparts. This result ostensibly reveals a self-imposed improvement in a common measure of bank risk by treated institutions.

At that time, however, there were a number of avenues for thrifts to superficially improve their reported capital-to-asset ratios, even as the *composition* of capital deteriorated. In the years after the S&L crisis, observers noted the sometimes wide gaps between banks' regulatory capital and their GAAP or tangible capital, which stripped out items that banks could use to appear better capitalized than they actually were. Thus, we next examine

whether thrifts engaged in such accounting gimmicks to boost reported capital. Nonstandard capital items include deferred losses from the sale of assets, capital certificates, loans in process, unearned discounts, subordinated debentures, appraised equity capital, and goodwill.[15] By making use of such items, 9th district thrifts could mask a deterioration in their relative capital *adequacy*.

To this end, Panel C reports the results for *only* these nonstandard capital items—which are included in the capital ratio of Panel B—as a percent of assets. Evidently, 9th district thrifts disproportionately used accounting machinations to boost reported capital. Because the capital ratios used in Panels B and C are both reported as a percent of assets, the difference between the treatment effects corresponds to the treatment effect for banks' "core" (tangible GAAP) capital. For example, using the figures in column (4) of Panels B and C, we see that the treatment effect for 9th district thrifts' core capital-to-asset ratios was almost exactly *negative* 1% ($p = 0.05$).

These findings indicate that diminished supervision led to rapid asset growth, which is another measure of bank risk taking. Moreover, bank risk increased because unsupervised institutions allowed a deterioration in their capital adequacy that was masked with creative accounting. Thus, the lack of supervision allowed 9th district thrifts to rely on artificial increases in capital to support abnormal asset growth.

7 The Effects of a Decrease in Supervisory Capacity on the Incidence and Costs of Bank Failures

While we have shown a contemporaneous increase in thrifts' risk taking and riskiness upon the decline in supervisory oversight, weaker supervision can have farther-reaching and more

[15] A full discussion of the nonstandard items that thrifts could use to inflate reported capital is included in Barth (1991).

lasting consequences. In this section, we turn our focus to the effect of supervision on the likelihood and costs of failure.

To identify thrift failures, we merge the FDIC's Failure Transaction Database (FTDB) into our data set. In the FTDB, failure is assumed to occur when the government provides financial assistance to an institution, closes an institution, or takes over an institution's operations. Voluntary liquidations and 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.[16] For the analysis below, our focus is on failures of federal S&Ls between 1983 and 1990. Because some banks operating in 1990 were still in operation despite inevitable failure, we code a December 1990 failure for any bank that failed before the end of 1992.

As a first exercise, we show that the dimensions along which thrifts in the 9th district expanded risk in response to the weaker supervision increased the probability of failure by estimating a logit regression of the following form:

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

where $Failure_{i,t}$ is defined in the terms expressed above for bank i in year t and $\Lambda(\cdot)$ denotes the logistic cumulative distribution function. In our vector of control variables $X_{i,t-1}$, we include the balance sheet and income items considered in Cole and White (2012) plus service corporation investments, and we replace goodwill with nonstandard capital items (which include goodwill). We estimate equation (2) for all S&Ls outside of the 9th district, because bank failure requires supervisory decisions and actions. 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

[16] 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.

in the 9th district. Our focus is on the effects of CRE loans, ADC loans, service corporation investments, and nonstandard capital.

The coefficient estimates from our logit regression, reported as odds ratios, are displayed in Table 6.[17] ADC loans, CRE loans, service corporation investments, and nonstandard capital all increase the odds of failure. Not only do these results confirm that our risk taking measures capture a relevant concept of risk, they also imply that the reduction in supervision in the 9th district led to a higher incidence of failure in the region.

To estimate the additional failures that resulted from the decline in supervision, we can naively calculate an increase in the overall odds ratio owing to the treatment effects for the four key risk taking measures listed at the bottom of Table 6. We find that the odds of failure in the 9th district were 30% higher because of the drop in oversight. Translating this into failure probability yields an increase of 5 percentage points, or about 20% compared with the unconditional failure probability of 26% outside of the Dallas FHLB district. In terms of additional failures in the district, we then attribute roughly 24 additional failures to the supervisory shock. Multiplying the average cost of 9th district resolutions with the additional 24 failures results in losses to the FSLIC of about $5.4 billion, or over $10 billion in 2018 dollars.

In our second exercise, we test two potential channels through which lax oversight could lead to more costly resolutions *conditional on failure*. 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, 2018; Cole and White, 2017). Second, poorly-supervised thrifts will accumulate more 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). A possible

[17] Our results are very similar to those achieved in Cole and White (2012) where statistical significance is achieved (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.

connection between a delay in resolution and a more costly clean-up process was a concern 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 [...], the loss to depositors may be greatly minimized. Otherwise, the yield from assets may be small and expenses large."[18]

Consistent with this theory, Table 7 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, recording 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 the univariate evidence of higher 9th district resolution costs, we estimate OLS regressions of the following form:

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

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. The other outcome variables are used to identify the channels through which a reduction in supervision can lead to an increase in failure costs. Our second outcome variable is the share of failed thrifts' assets passed to the acquiring institution. The third outcome variable 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

[18]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.

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 include bank-, state-, and county-level controls in the 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).[19] Moreover, we include time fixed effects, η_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 8, 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 assume more of the failed bank's assets. Based on the results from Section 6, we anticipate fewer assets passed from 9th district thrifts to acquiring institutions in the years after the relocation, and this is exactly what we find. Failed 9th district S&Ls passed between 9 and 12 percent less of their balance sheet to their ultimate acquirers. Because more bad assets are sent to the insurance fund, taxpayers bear higher resolution costs.

Panel C of Table 8 shows that the capital-to-asset ratio of failed 9th district S&Ls six months prior to failure was about 1.6 to 1.9 percent lower on average, even after controlling for 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. To check this result, Panel D reports the odds ratio of the 9th district dummy coefficient from a

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

logit regression in which the dependent variable is an indicator of net worth below the 3% regulatory requirement twelve months prior to failure.[20] Consistent with the interpretation of the results in Panel C, failed 9th district thrifts were about three times as likely to be insolvent well in advance of resolution. Thus, 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; 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 9. 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. The net worth results reported in Panels C and D reveal much lower point estimates than those observed for S&Ls, with reduced or non-existent statistical significance when we include additional controls. 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.

8 Conclusion

In this paper, we exploit an exogenous change in supervisory capacity to document a causal effect of supervision on bank-level risk taking. We find that financial institutions that witnessed a reduction in supervision took on much more risk than their counterparts that were subject to identical regulations but unaffected by the change in supervisory attention. In addition, we show that the shock to supervisory capacity and the subsequent expansion in risk taking resulted in more failures. Failures were also more costly because more bad assets

[20] 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.

were passed to the insurance fund by failed institutions, and less oversight led to slower resolutions. Thus, we demonstrate that supervision can help limit the broader economic costs of turmoil in the financial sector.

The effects of weak supervision on risk taking that we document are economically 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 allocating sufficient supervisory resources has an important effect on bank behavior and is crucial for optimal banking policy and financial stability.

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Appendix

Appendix A Variable Definitions (S&L Financial Reports)

Our main data set is composed of items from the S&L financial reports, which were filed semiannually using form FHLBB 770 until December 31, 1983 and form FHLBB 1313 quarterly thereafter. We construct the variables described in the main text according to the formulas presented in Table A1. A number of series listed in the table are discontinued over time such that additional mnemonics are required to maintain a full time series for each thrift. The calculations listed in the Table account for such transitions by recoding missing values of discontinued series to zero. Missing values for nonperforming loans must be interpolated for some quarters in 1984 and 1985Q1 to accommodate a gap in reporting requirements.

Appendix B Robustness to Alternate Control Groups

In this Appendix, we demonstrate that our conclusions are unchanged when using alternate comparison groups to measure the treatment effect. First, 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 can be quite small in the FHLB system), 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 later show in a matching exercise, Atlanta thrifts are over-proportionally matched to Dallas thrifts due to similar balance sheet and income characteristics.

Panel A of Table A2 reports the results using this narrower control group. We achieve very similar results, with point estimates that are only slightly smaller than for the full sample. The subcomponents show a pattern similar to that of the prior analysis (i.e., CRE and ADC lending account for the bulk of the increase). As before, Figure A1 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 control S&Ls 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.[21] 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 A3, matched institutions are very similar to 9th district thrifts on the whole, with no statistically significant differences.[22] 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.[23]

The treatment effects estimated using the matched-thrift control sample are reported in Panel B of Table A2. Despite the smaller sample size, statistical significance remains, with point estimates very similar to those reported for the full sample. The time path of the

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

[22] 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).

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

treatment effect also evolves in a similar fashion to the full sample. Figure A2 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 main results cannot be explained by any systematic differences of 9th district institutions in terms of age, size, asset composition, capital adequacy, etc.

Lastly, we pursue an alternate means of ruling out an explanation for our results that is 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 C of Table A2 show similar magnitudes to those achieved for the full sample. As with the exercise in the main text, we are unable to find evidence that the oil price dynamics during the mid 1980s contributed to the differential risk taking behavior that we observe.

Appendix C Additional Placebo Test

In panel D of Table A2, we report the results of a placebo test that compares commercial banks in the 9th district to commercial banks in the 4th (Atlanta) district. To build a sample of comparable commercial banks, we follow the matching procedure described in Section 6.1. As in our baseline placebo test, we find no statistically significant differences (conditional on the set of controls) in risk taking between the 9th district and 4th district commercial banks. Again, the point estimates lie very close to zero. These results similarly demonstrate no evidence of a difference in risk taking behavior by commercial banks in the period after the relocation of the FHLB office.

Figures

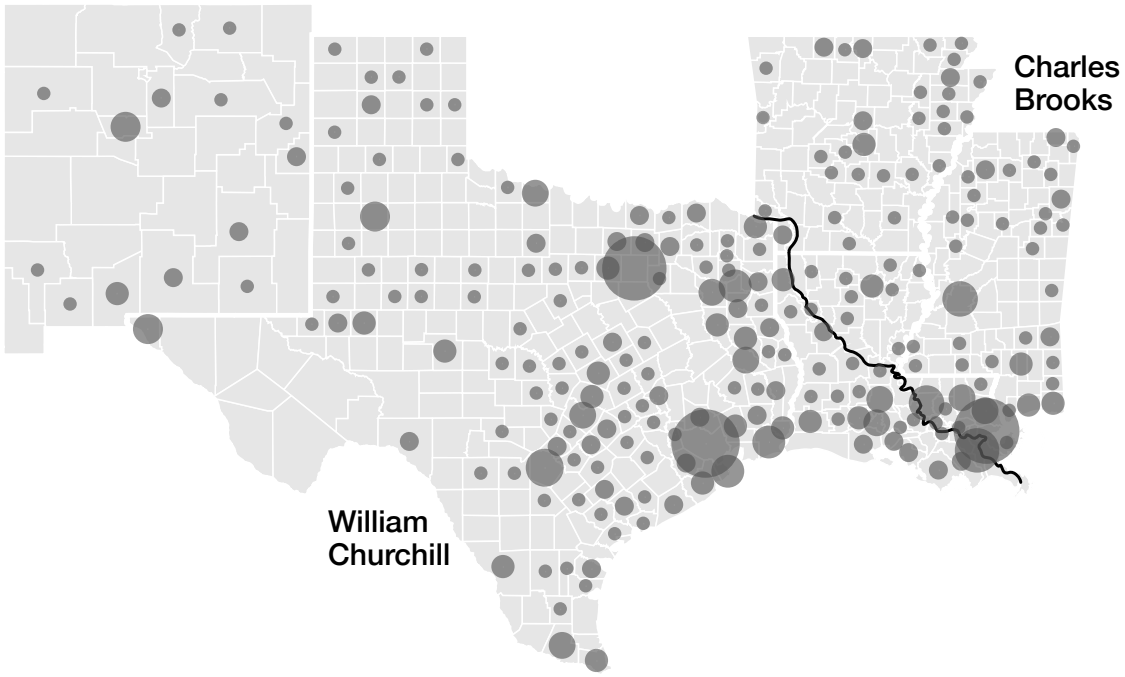


Figure 1: **Map of the 9th FHLB district and field agents' line of demarcation**. This figure plots a map of the 9th FHLB district and the line of demarcation—the Red River—chosen by the two field agents remaining after the relocation of the 9th district FHLB. S&Ls are indicated by circles, with the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

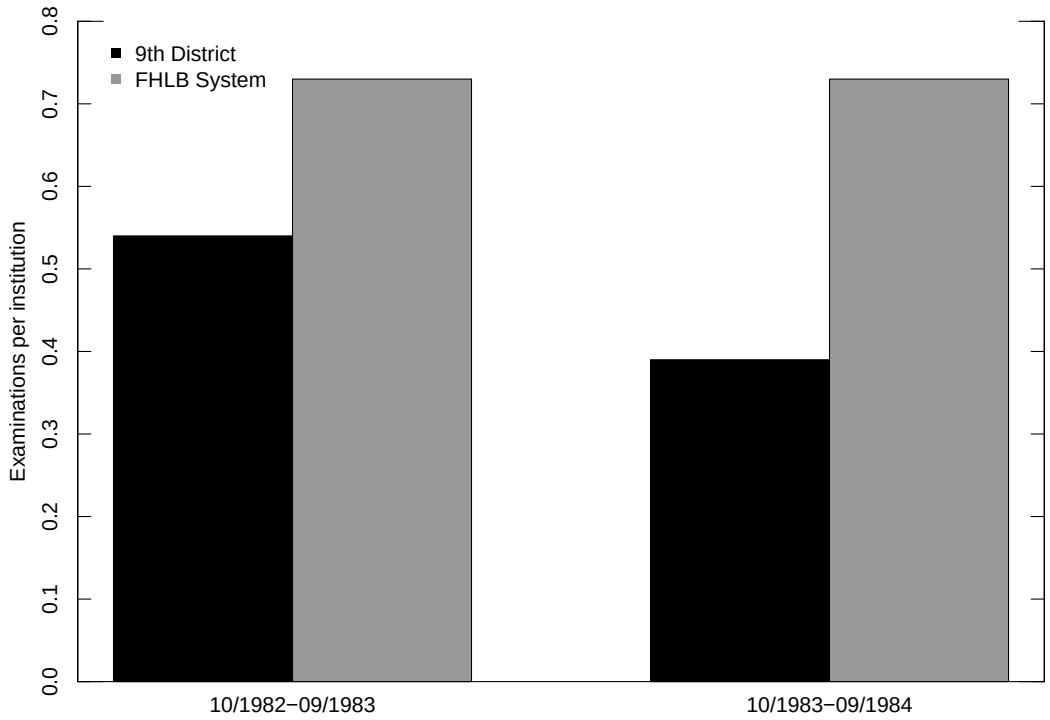


Figure 2: **Comparison of examination intensity**. This figure plots the number of examinations per institution in the 9th district (the black bars) along with the analogue number for the entire FHLB System (the gray bars). The first and second sets of columns correspond to the 12-month period prior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

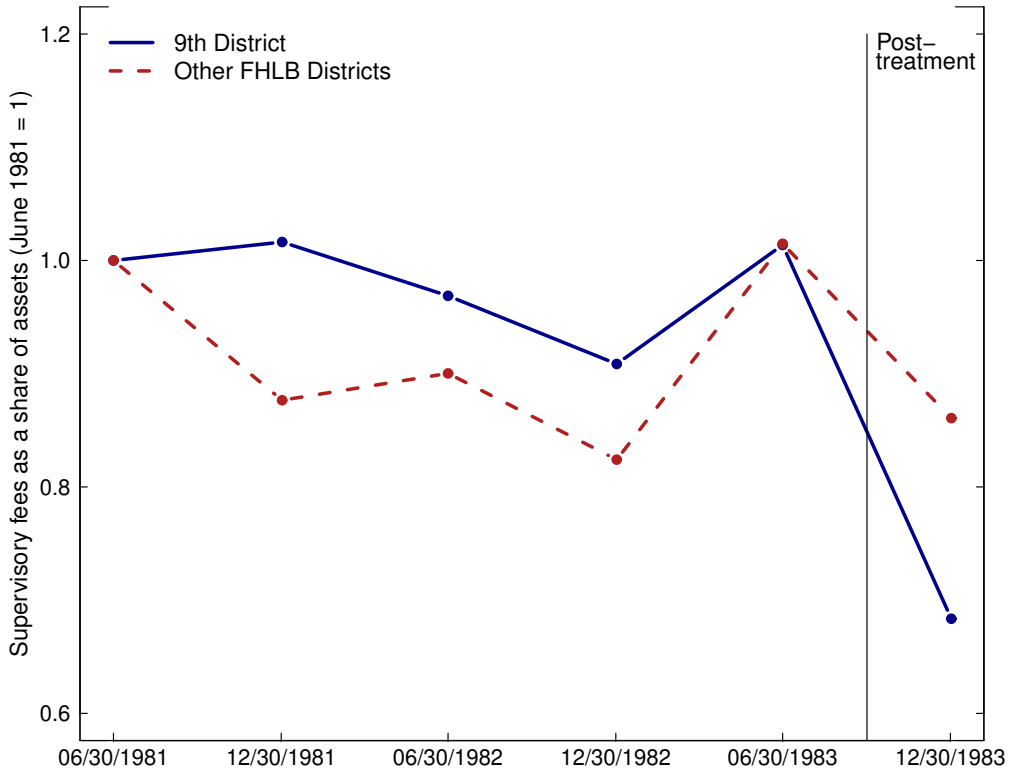


Figure 3: **Comparison of supervisory fees**. This figure plots the average supervisory fees as a share of assets paid by S&Ls in the 9th district and those paid by S&Ls in all other districts for the period from June 30, 1981 to December 30, 1983. The numbers are normalized so that the observation for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

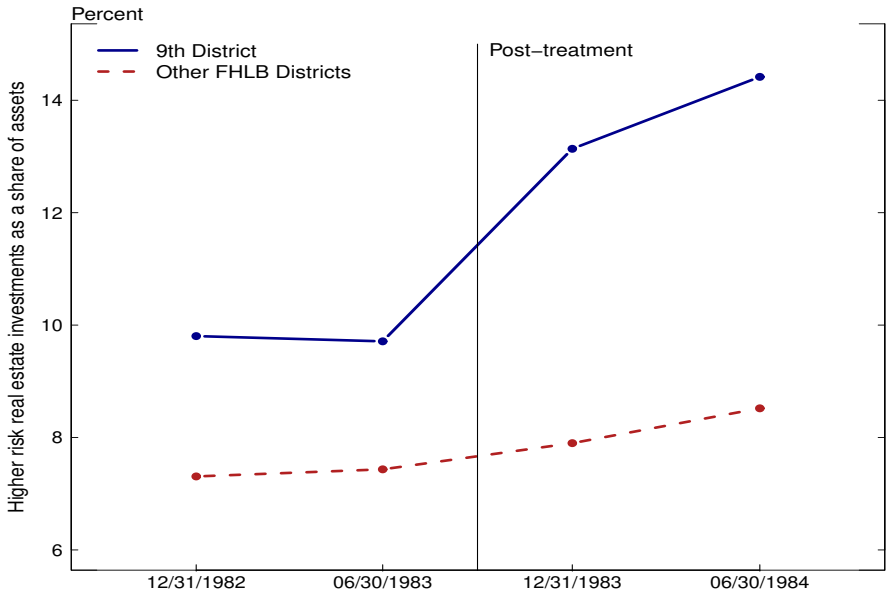
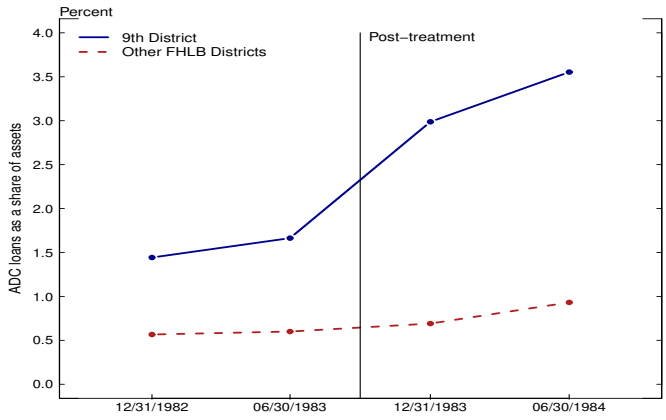
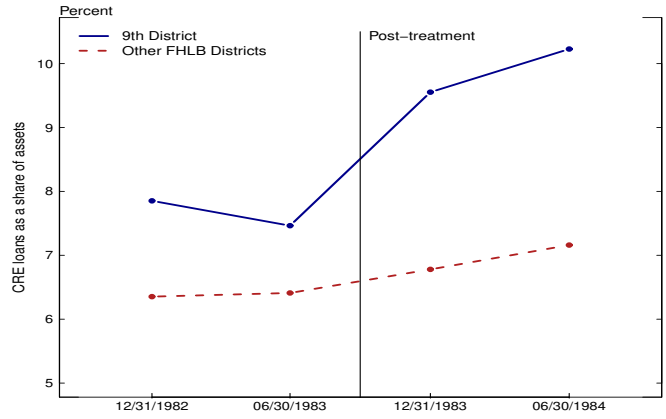


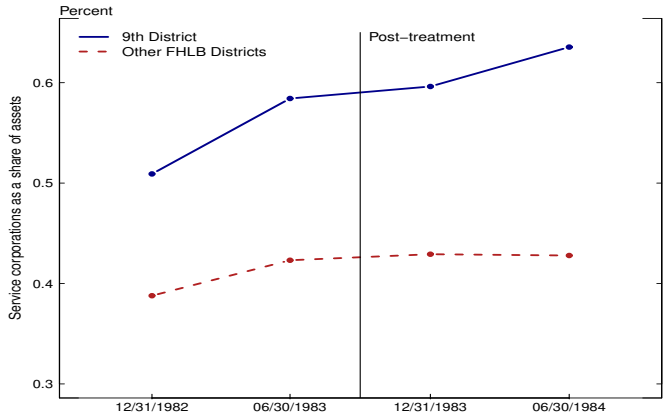
Figure 4: **Higher risk real estate investments by S&Ls in the 9th district and S&Ls in all other FHLB districts**. This figure plots higher risk real estate investments, which include acquisition, development, and construction (ADC) loans; commercial real estate (CRE) loans; and service corporation 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.

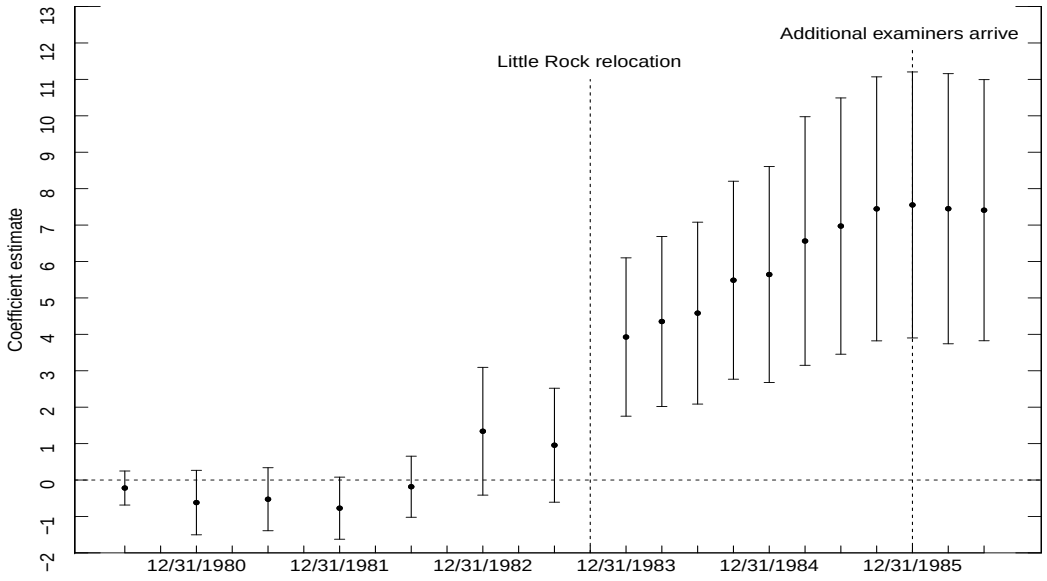


Figure 6: **Risk taking by S&Ls in the 9th district relative to S&Ls in other districts**. This figure plots the time path of the coefficient (γ) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of all federally chartered S&Ls.

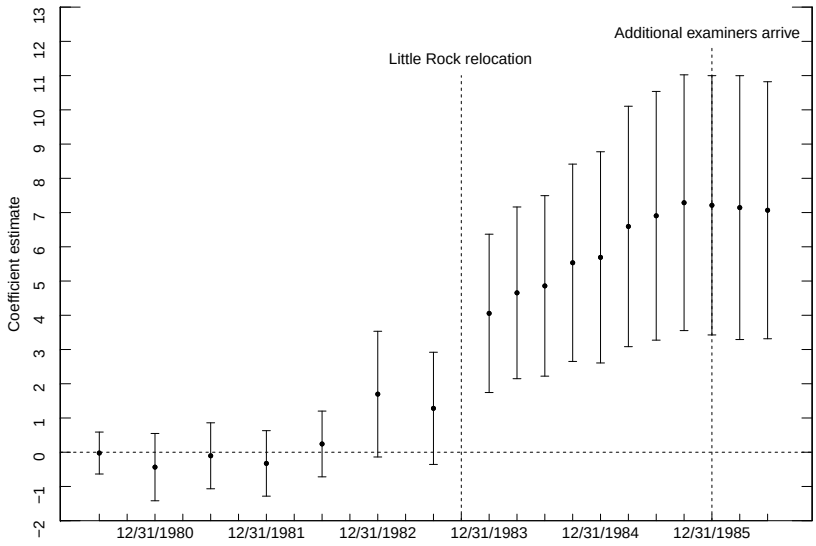


Figure A1: **Risk taking by S&Ls in the 9th district relative to S&Ls in 4th district**. This figure plots the time path of the coefficient (γ) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of federally chartered S&Ls in the 9th district and the 4th district (FHLB Atlanta).

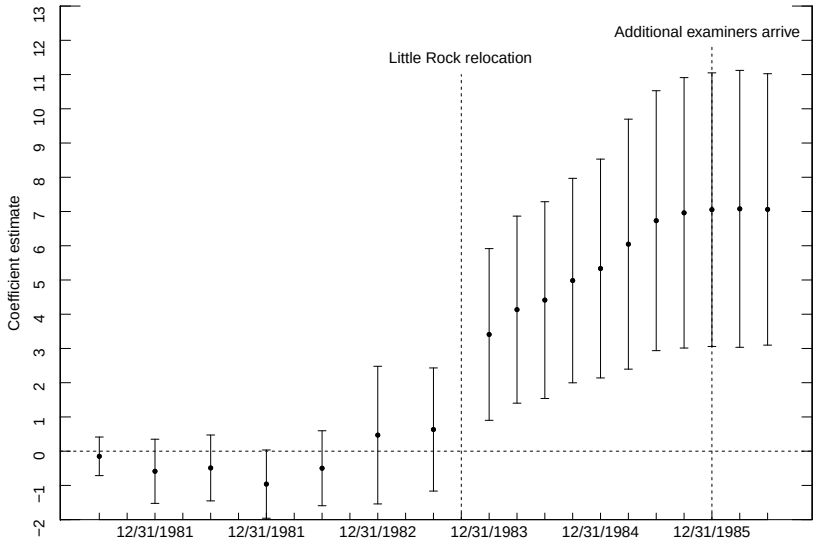


Figure A2: **Risk taking by S&Ls in the 9th district relative to matched S&Ls from other FHLB districts**. This figure plots the time path of the coefficient (γ) from equation (1) for each quarter from June 30, 1980 to June 30, 1986. The sample consists of federally chartered S&Ls in the 9th district and matched thrifts from other FHLB districts.

Tables

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 ($1,000)	126,270	201,867	300,008	919,728	245,120	430,406
Net worth/assets	3.91	2.82	4.44	3.06	4.15	2.45
Nonperforming loans/assets	0.74	0.91	1.31†	1.67	1.00‡	1.17
Cash investments/assets	2.16	2.68	2.19	3.16	2.28	3.94
Return on assets	-0.23	0.91	-0.29	0.62	-0.34	0.74
Panel C: State characteristics						
Urban population share	58.68	20.53	69.72†	17.79	65.51	13.56
State unemployment rate	10.29	1.53	11.08†	2.54	9.93	2.13
Mining share	19.47	11.15	2.71†	5.46	1.09‡	1.20
Construction share	4.80	0.50	3.86†	0.79	4.19‡	1.03
Manufacturing share	15.16	5.71	22.08†	6.48	20.27‡	7.42
Panel D: County characteristics						
Income per capita ($)	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: Alternate Channels

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)
Number of observations	543	543	543	543
Adj. R^2	0.79	0.80	0.81	0.81
Panel B: 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)
Number of observations	17,070	17,070	16,741	16,741
Adj. R^2	0.73	0.73	0.74	0.74
Panel C: 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)
Number of observations	1,816	1,816	1,816	1,816
Adj. R^2	0.63	0.64	0.64	0.66
Panel D: 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)
Number of observations	15,165	15,165	14,918	14,918
Adj. R^2	0.75	0.75	0.73	0.73
State-level controls	No	Yes	Yes	Yes
County-level controls	No	No	Yes	Yes
Bank-level controls	No	No	No	Yes

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 along with all pairwise interactions. 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: Asset growth and capital adequacy of 9th district S&Ls

Panel A: Asset Growth

	(1)	(2)	(3)	(4)
$Post \times Treatment$	0.19***	0.16***	0.16***	0.14***
	(0.05)	(0.04)	(0.04)	(0.04)
Number of observations	17,070	17,070	16,741	16,741
Adj. R^2	0.98	0.98	0.98	0.98

Panel B: Reported Capital-to-Asset Ratio

	(1)	(2)	(3)	(4)
$Post \times Treatment$	0.23*	0.39**	0.35**	0.31
	(0.13)	(0.18)	(0.18)	(0.19)
Number of observations	17,070	17,070	16,741	16,741
Adj. R^2	0.77	0.77	0.78	0.79

Panel C: Nonstandard Capital-to-Asset Ratio

	(1)	(2)	(3)	(4)
$Post \times Treatment$	0.96*	1.17**	1.16**	1.31***
	(0.58)	(0.53)	(0.52)	(0.49)
Number of observations	17,070	17,070	16,741	16,741
Adj. R^2	0.69	0.69	0.69	0.69
State-level controls	No	Yes	Yes	Yes
County-level controls	No	No	Yes	Yes
Bank-level controls	No	No	No	Yes

Notes: This table reports difference-in-differences results for regressions of ln(assets) and capital-to-asset ratios (in percent) 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. 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 6: Failure prediction results excluding the 9th district (1983-1990)

	Odds Ratio	95% Confidence Interval
Net Worth	0.89***	0.864–0.911
Loan Loss Reserve	0.89***	0.826–0.966
Net Income	1.02	0.919–1.133
Nonperforming Loans	1.06***	1.039–1.079
Investment Securities	0.91***	0.895–0.935
Brokered Deposits	1.00	0.994–1.009
Ln(Assets)	0.99	0.887–1.100
Cash	0.92**	0.861–0.990
Single Family Mortgages	0.96***	0.955–0.973
Multifamily Mortgages	0.96***	0.939–0.984
Consumer Loans	1.01	0.982–1.034
ADC Loans	1.03**	1.005–1.050
CRE Loans	1.02***	1.005–1.037
Service Corporations	1.04***	1.008–1.069
Nonstandard Capital	1.03**	1.004–1.048
Observations		14,659
Pseudo R-squared		0.22

Notes: Logit estimates for the probability of failure on 15 covariates. All variables except Ln(Assets) are normalized by assets. 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 7: Resolution costs by FHLB district (1983-1990)

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

Savings & Loans			Commercial Banks		
FHLB District	Rank	Resolution Costs/Assets (%)	FHLB District	Rank	Resolution Costs/Assets (%)
Dallas	**1**	**80.7**	Cincinnati	1	25.9
Topeka	2	35.7	Topeka	2	24.6
Des Moines	3	21.8	New York	3	20.7
Atlanta	4	19.8	Seattle	4	20.7
New York	5	18.4	Chicago	5	19.7
Chicago	6	18.1	San Francisco	6	17.3
Boston	7	15.8	**Dallas**	**7**	**15.5**
Cincinnati	8	13.5	Des Moines	8	13.7
Indianapolis	9	12.6	Indianapolis	9	13.6
Seattle	10	10.4	Pittsburgh	10	12.4
Pittsburgh	11	9.9	Boston	11	7.9
San Francisco	12	9.3	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			Commercial Banks		
FHLB District	Rank	Resolution Costs/Assets (%)	FHLB District	Rank	Resolution Costs/Assets (%)
Dallas	**1**	**73.6**	Cincinnati	1	30.4
Topeka	2	40.9	Topeka	2	30.1
Atlanta	3	36.0	Seattle	3	26.4
Boston	4	23.5	Atlanta	4	24.1
Des Moines	5	20.3	Des Moines	5	23.4
San Francisco	6	16.1	Chicago	6	22.1
Cincinnati	7	15.7	**Dallas**	**7**	**21.5**
Chicago	8	15.6	San Francisco	8	20.3
Seattle	9	14.8	New York	9	20.2
New York	10	14.2	Boston	10	18.3
Pittsburgh	11	13.0	Pittsburgh	11	17.7
Indianapolis	12	11.7	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 8: Regression results: Failed S&Ls (1983-1990)

Panel A: Resolution Costs/Assets (%)				
	(1)	(2)	(3)	(4)
$9thDistrictDummy$	47.8***	44.6***	30.4***	31.3***
	(11.5)	(11.2)	(6.90)	(7.35)
Observations	461	460	460	446
Adj. R^2	0.11	0.18	0.22	0.23

Panel B: Assets Passed at Resolution/Assets (%)				
	(1)	(2)	(3)	(4)
$9thDistrictDummy$	-10.6***	-11.7***	-10.3***	-9.44**
	(3.18)	(3.14)	(3.97)	(4.19)
Observations	469	468	468	453
Adj. R^2	0.40	0.44	0.44	0.45

Panel C: Net Worth/Assets (%) 6 Mo. Prior to Failure				
	(1)	(2)	(3)	(4)
$9thDistrictDummy$	-10.7*	-1.86***	-1.93***	-1.64**
	(6.24)	(0.65)	(0.69)	(0.71)
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***	2.27**	2.66**	2.97**
	(1.16)	(0.82)	(1.21)	(1.46)
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 9: 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: *** $p < 0.01$,** $p < 0.05$,* $p < 0.10$.

Table A1: Variable Definitions

1	CRE loans	svgl1447 + svgl0136
2	ADC loans	svgl1448 + svgl1449 + svgl1451 + svgl1534
3	Svc. corp. investments	svgl0035 + svgl2130
4	Higher risk loans	CRE loans + ADC loans + svc. corp. investments
5	Assets	svgl2170
6	Liabilities	svgl2950
7	Net worth	Assets - liabilities
8	Nonperforming loans	svgl0885 + svgl0799 + svgl0976 + svgl3943 + svgl3946 + svgl3947 + svgl3949 + svgl3952 + svgl3953 + svgl0879 + svgl0882 + svgl0254 + svgl3944 + svgl3950
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
20	Capital certificates	svgl3214 + svgl3213 + svgl3271 + svgl3268 + svgl3267 + svgl3269
21	Subord. debentures	svgl3272 + svgl3686
22	Appraised equity	svgl3273
23	Deferred losses	svgl0868 + svgl0684 + svgl0638 + svgl0639
24	Loans in process	svgl3067 + svgl3068
25	Unearned discounts	svgl3072 + svgl3070 + svgl1565 + svgl3071 + svgl3115 + svgl1573
26	Goodwill	svgl0869 + svgl0507

Note: 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. Missing values for nonperforming loans must be interpolated for some quarters in 1984 and 1985Q1 to accommodate a gap in reporting requirements.

Table A2: Higher risk real estate investments by 9th district S&Ls: Alternate control groups

Panel A: 9th district vs 4th district S&Ls				
	(1)	(2)	(3)	(4)
$Post \times Treatment$	4.69***	2.73***	3.23***	2.98***
	(0.89)	(0.99)	(0.92)	(0.88)
Number of observations	5,615	5,615	5,286	5,286
Adj. R^2	0.67	0.68	0.68	0.69
Panel B: 9th district vs matched S&Ls from all other districts				
	(1)	(2)	(3)	(4)
$Post \times Treatment$	5.08***	3.63***	3.69***	3.32***
	(0.88)	(3.63)	(0.90)	(0.86)
Number of observations	3,587	3,587	3,534	3,534
Adj. R^2	0.67	0.67	0.68	0.69
Panel C: 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)
Number of observations	2,720	2,720	2,720	2,720
Adj. R^2	0.65	0.66	0.66	0.68
Panel D: 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)
Number of observations	3,836	3,836	3,611	3,611
Adj. R^2	0.70	0.70	0.70	0.71
State-level controls	No	Yes	Yes	Yes
County-level controls	No	No	Yes	Yes
Bank-level controls	No	No	No	Yes

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. Standard errors (in parentheses) are clustered at the county level. Statistical significance: *** $p < 0.01$,** $p < 0.05$,* $p < 0.10$.

Table A3: 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 Δ
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.