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Abstract: This article examines the role of commercial real estate investments in the banking crisis of 1985-92, an unprecedented period during which more than 1,300 banks failed. Bank failures are fundamentally important because of the unique role played by financial institutions in the provision of business credit. We discover three striking features of banks failing during this period. First, commercial real estate was only a factor in the bank failures of 1988-92. Second, construction loans played a much larger role in bank failures than permanent loans, and the relationship is strongest with construction loans booked during 1983-1985. Third, other ex ante risk measures are systematically related to banking failure throughout the sample period. These results suggest that risk-seeking banks brought about their own demise and commercial real estate, especially construction lending, was one of the vehicles.

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1. Introduction

Commercial real estate lending by U.S. commercial banks grew by almost 200% between 1981 and 1992 to more than $400 billion. This growth was part of an economy-wide boom in commercial mortgage credit that began following the recessions of 1980-82 and fueled in large part by declining interest rates and the Economic Recovery Tax Act of 1981, which greatly increased the after-tax profitability of commercial real estate investments (see Fergus and Goodman 1994). From 1981 to 1992, nonresidential mortgage credit from all types of institutions increased from approximately $500 billion to more than $1 trillion (U.S. Department of Housing and Urban Development). Curiously, this growth continued, albeit at a slower pace, even after Congress enacted the Tax Reform Act of 1986, which dramatically curtailed most of the tax benefits associated with owning commercial real estate. The end result of this boom was a massive oversupply of commercial real estate that would not be effectively absorbed until the mid-1990s.

In response to the growing oversupply of commercial properties, real estate prices plummeted. As measured by the Russell-NCREIF Property Index, prices peaked in 1985, fell 3 percent by year-end 1989, and declined a startling 32 percent during 1990-92. A decline of this magnitude suggests that even well-underwritten loans inflicted losses on investors, including commercial bank and thrift lenders. In fact, more than 2,000 banks and thrifts failed from 1981-92, and the preponderance of anecdotal evidence suggests that losses on commercial real estate loans played a major role in these failures. While researchers have analyzed the role of

commercial real estate in the failure of thrift institutions (Cole 1993; Cole, McKenzie, and White 1995; and Cole and Eisenbeis 1996), the role of commercial real estate in the failure of commercial banks has been addressed in only a cursory manner (Randall 1993; Cole and Gunther 1995). It is the purpose of this paper to provide a rigorous and in-depth analysis of the role of commercial real estate investments in the failure of more than 1,300 banks during the 1985-92 period. Only during the Great Depression of the 1930s did more banks fail during a comparable period of time.

We wish to study the effect of commercial real estate investment on bank failure rather than on alternative measures of bank performance (such as the provisions of credit, capital adequacy or profitability) because of the unique role that banks play in the provision of credit.[1]

According to Stiglitz and Weiss (1981), problems of asymmetric information between a borrower and potential creditor can impede the flow of capital to profitable firms. Financial institutions (including banks and thrifts) have an important advantage in mitigating this problem of asymmetric information. By monitoring interactions with a firm obtaining its financial services, a financial institution develops valuable private information about the firm's financial prospects useful for deciding whether or not to grant credit (Diamond 1984). This role is most prominent for banks because far more firms obtain financial services (such as checking and

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[1] Previous research has focused on how real estate loans and capital constraints have affected the provision of bank credit to borrowers, but has not analyzed how real estate loans affect bank performance. For example, Peak and Rosengren (1994) and Hancock and Wilcox (1994b) analyze the effect of commercial real estate loans on the provision of bank credit in 1990 for a sample of New England banks and a sample of banks with more than $300 million in total assets, respectively. Hancock and Wilcox (1994a) analyze the effect of capital shortfalls, loan delinquencies, and local economic conditions on the provision of real estate credit. None of these studies address how real estate investments may have contributed to bank failures.

savings accounts) from commercial banks than from any other source of financial services. Given this special role for banks, it is critically important to understand the factors that lead to failure *because the valuable private information a bank has generated about its customers is lost in the event of failure*. Such is not the case when a bank restricts the provision of credit, loses money, or lacks capital.

There is little reason to question that high concentrations of commercial real estate loans were associated with banks that failed and that these loans contributed significantly to the failed banks' losses. Throughout the 1980s, both the percentage of bank assets invested in commercial mortgages and the percentage of commercial mortgages owned by banks increased steadily (Hester 1992; Fergus and Goodman 1994). Randall (1993) examines financial data of 87 New England banks that failed between 1989 and 1992 and finds that cumulative write-offs and non-performing assets were primarily attributable to real estate loans in 83 of the 87 cases. Cole and Gunther (1995) use 1985 financial data to analyze banks failing or surviving from 1986 to 1992 and find that commercial real estate loans are negatively related to the likelihood of survival but unrelated to the expected survival time.

Because they do not formally analyze the relationship between commercial real estate loans and bank failures or do so in only a cursory manner, the studies cited above, and many others like them, leave unanswered many important questions. A central issue is whether commercial real estate loans are inherently riskier than other types of bank investments or a combination of tax law changes and sloppy loan underwriting led to anomolous and precipitous losses on commercial real estate investments. Did all commercial real estate loans contribute to

bank failures or only certain types? Was the critical factor related to bank failure the quantity, or quality, of the commercial real estate loans?

In this paper, we examine the relationship between commercial real estate investments and bank failure in a way that allows us to address these questions. Our approach is to estimate the cross-sectional relationship between bank failure and asset concentrations in commercial real estate and other types of loans. There are several distinctive features of our analysis that permit us to investigate these issues. First, we disaggregate failures by year, which enables us to examine how the effect of commercial real estate investments on bank failures varied over time. Second, we disaggregate commercial real estate into different types of investments— construction loans, multi-family mortgages, and nonresidential commercial mortgages. Third, we utilize lagged values of construction loans to further differentiate permanent loans that were originated as construction loans from those that were not. Fourth, we include additional balance sheet and income statement measures to control for differences in banks' preference for risk-taking. To the extent that these measures are better proxies for bank risk-taking than commercial real estate, these regressions will isolate the contribution of commercial real estate risk to the likelihood of failure as distinct from its signaling value. And fifth, we conduct separate analyses of banks in the Southwest —the region hardest hit by the commercial real estate crash. This enables us to control for regional effects, such as the oil price shock, that contributed to bank failures.

Utilizing this approach, we discover three striking features of bank failures occurring during 1985-1992. First, commercial real estate was not a factor in the banking failures of 1985-86 despite the increase in commercial real estate lending that began in 1982. Commercial

real estate became a factor in banking failures beginning in 1987 and was strongly connected to bank failures occurring during 1988-1992. This suggests that commercial real estate loans are not inherently riskier than other types of bank investments.

Second, the distinction between construction lending and permanent financing is extremely important and has an interesting temporal dimension. Throughout 1988-1992, construction loans play a much larger role in bank failures than permanent loans, and the relationship is strongest with construction loans recorded during 1983-1985.

Third, other ex ante risk measures are systematically related to banking failure throughout the sample period, but do not eliminate the influence of commercial real estate investments on bank failures. Specifically, higher than average ratios of loans to assets, jumbo CDs to assets, and noninterest expense to assets all are associated with higher probabilities of failure.

When we analyze only those banks located in the Southwest, our results are not qualitatively different from those for the nation. This finding eliminates the possibility that the rolling regional recessions of the 1980s are responsible for our national results regarding the role of construction loans booked during the early 1980s.

Although these results affirm that, from 1987 on, banking failures were strongly associated with commercial real estate, they convey a different impression of the relationship than offered by some accounts of the period. Our results suggest that commercial real estate did not bring down the banks; rather risk-preferent banks brought themselves down and commercial real estate, especially construction lending, was one of the vehicles.

The remainder of this paper is organized as follows. In the next section, we provide an overview of real estate lending by commercial banks and bank failures during 1981-1992. In section 3, we discuss our data and methodology, followed by results in section 4 and summary and conclusions in section 5.

2. Real Estate Lending by Commercial Banks and Bank Failures

Between year-end 1981 and year-end 1993, commercial real estate loans at commercial banks increased by a factor of three from $136 billion to $406 billion (table 1). As a percentage of total bank assets, these loans increased from less than 7 percent in 1981 to 11 percent in 1993. In both dollar and percentage terms, commercial real estate loans peaked in 1990 at $429 billion or 12.7 percent of bank assets. In the peak growth period, 1981-90, commercial real estate loans at commercial banks increased at an annual compound rate of 15 percent compared to the 5 percent growth rate of total bank assets.

Commercial real estate loans encompass three distinct types—permanent loans for multifamily structures, permanent loans for nonresidential structures, and loans for land and construction.[2] As shown in table 1, multifamily mortgages accounted for only a small portion of commercial real estate loans throughout this period and actually registered their largest increase (42 percent) during the recent 1990-93 credit crunch period. At their peak in 1993, multifamily loans were $30 billion or less than one percent of total bank assets.

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[2] As defined in table 1, commercial real estate loans also include real estate loans to foreign domiciled borrowers and loans for farmland. These two types of commercial loans, however, are rarely mentioned as contributing to the problems experienced in the banking or commercial real estate industries. Moreover, both are relatively small in magnitude (less than one percent of total bank assets). Consequently, they are not analyzed in detail here.

Nonresidential mortgages increased four-fold from 1981 to 1993, growing from $67 billion or 3.3 percent of bank assets to $267 billion or 7.2 percent of bank assets. These loans on already-built office buildings, hotels, retail store space, and industrial buildings doubled in volume from 1981 to 1986, and doubled again from 1986 to 1993.

Land and construction loans also increased rapidly from 1981 to 1986, more than doubling from $45 billion or 2.2 percent of bank assets to $107 billion or 3.6 percent of bank assets. These loans continued to increase, albeit at a slower pace, through 1989 to reach a peak of $136 billion or 4.1 percent of bank assets. From 1990 to 1993, however, land and construction loans plummeted 50 percent to $66 billion or 1.8 percent of assets, accounting for much of the slowdown in total commercial real estate loan growth.

Commercial bank failures throughout the 1982-93 period were at their highest levels since the 1930s. During the forty-year period from 1941-1981, no more than 16 commercial banks failed in any single year. By contrast, during the next twelve years, there were at least 40 failures per year, and during the 1985-1992 period, more than 100 banks failed each year (Figure 1). Not until 1993, when only 41 banks were closed, did the number of failures drop to pre-1985 levels. Also, shown in Figure 1 is the concentration of bank failures in the Southwest, here defined as the 11th Federal Reserve District. Southwestern banks accounted for at least one fourth of all U.S. bank failures in each year from 1987-92, and more than half of the failures in peak failure years of 1988-90.

3. Methodology

We analyze the relationship between commercial real estate lending and bank failure using both univariate and multivariate methods. Our first step is to identify whether commercial real estate loans and bank failures are related at the bank-level. In this step, we form two portfolios of banks for each year—banks failing during that year and banks surviving through that year—and then perform *t*-tests on the differences in the mean values of commercial real estate loan concentrations for each year.

The second step in our analysis is designed to differentiate between several hypotheses regarding the relationship between commercial real estate loans and bank failures. We model bank failure as a function of commercial real estate loan concentration variables and a set of control variables. Because our dependent variable is binary (fail or survive), the use of ordinary-least-squares regression is inappropriate (see Maddala 1983, pp. 15-16). Instead, we utilize the multivariate logistic regression model. In this model, we assume *Failure**$_{it}$ is an unobservable index of the probability that bank *i* fails during year *t* and is a function of bank-specific characteristics x_{it}, so that:

$$Failure*_{it} \;=\; \beta_t\_x_{it} \;+\mu_{it} \tag{1}$$

where x_{it} is a vector of commercial real estate loan concentration and control variables, β_t is a vector of parameter estimates for the independent variables, μ_{it} is a random disturbance term, $i =$ *1, 2, . . . , N*, where *N* is the number of banks in year *t*, and *t* = 1985, 1986, . . . , 1992. Let *Failure*$_{it}$ be an observable variable that equal to one if *Failure**$_{it}$ > 0 and zero if *Failure**$_{it}$ ≤ 0. In this particular application, *Failure*$_{it}$ is equal to one if a bank fails during year *t* and zero otherwise. Since *Failure**$_{it}$ is equal to $\beta_t\_$x$_{it}$ +μ_{it}, the probability that *Failure*$_{it}$ > 0 is equal to the probability that $\beta_t\_x_{it}$ > 0, or, equivalently, the probability that (μ_{it} > - $\beta_t\_x_{it}$). Therefore,

one can write the probability that *Failure*$_{it}$ is equal to one as as the probability that $(\mu_{it} > -\beta_t \_ x_{it})$, or, equivalently, that Prob(*Failure*$_{it}$ = 1) = 1 - Φ $(-\beta_t \_ x_{it})$, where Φ is the cumulative distribution function of ε, here assumed to be logistic. The probability that *Failure*$_{it}$ is equal to zero is then simply Φ $(-\beta_t \_ x_{it})$. The likelihood function *L* for this model is:

$$L = \prod_{Failure_{it} = 0} [\Phi (-\beta_t \_ x_{it})] \prod_{Failure_{it} = 1} [1 - \Phi (-\beta_t \_ x_{it})]$$

where:

$$\Phi (-\beta_t \_ x_{it}) = \exp(-\beta_t \_ x_{it}) / [1 - \exp(-\beta_t \_ x_{it})] = 1 / [1 + \exp(-\beta_t \_ x_{it})]$$

and

$$1 - \Phi (-\beta_t \_ x_{it}) = \exp(-\beta_t \_ x_{it}) / [1 + (-\beta_t \_ x_{it})].$$

The specific hypotheses we test are:

Hypothesis 1: Different types of commercial real estate investments have differing impact on the probability of bank failure. We speculate that the characteristics of construction loans are such that they resulted in greater losses than other types of loans, disproportionately contributing to the likelihood of failure. To examine this hypothesis, we estimate the probability of failure during year *t* using contemporaneous values of multifamily, nonresidential, and construction real estate loans included in *x*, where contemporaneous is defined as December 31 of year *t-1*.

Hypothesis 2: Construction loans originated prior to the Tax Reform Act of 1986, which reduced or eliminated many of the tax advantages associated with such loans, imposes even greater losses than construction loans made after the provisions of that Act became law. To test this hypothesis, we estimate the probability of failure for each year using lagged values of

construction loans in order to identify whether construction loans originated during earlier periods but migrating to the permanent loan or foreclosed real estate categories (or being written off as losses) are strongly related to bank failures.

Hypothesis 3: Controlling for other measures of bank risk-taking alters the relationship between bank failures and commercial real estate investments. Commercial real estate loans could be positively related to bank failure either because of loan losses attributable to the crash in the commercial real estate market (i.e., because of a "bad" outcome), or because such loans serve as a proxy for bank management's preference for risk-taking. If the former is predominantly true, the relationship between bank failures and real estate loans should be robust to the inclusion of other proxies for a bank's risk-preference, whereas, if the latter is predominantly true, the inclusion of other proxies for bank risk should severely diminish the explanatory power of the commercial real estate variables. To examine this hypothesis, we estimate the probability of failure as a function of not only the three types of commercial real estate but also as a function of five variables measuring management's preference for risk that are commonly found in the literature on bank performance.[3] These variables are total loans, jumbo CDs (CDs greater than $100,000), loans to insiders, non-interest expense, and residential mortgages. Each of these variables is measured as of year-end and is expressed as a percentage of total bank assets. With the exception of residential mortgages, each of these variables typically exhibits a positive relationship with bank risk-taking. We purposely omit other potential control variables, including the ratios of equity-to-assets income-to-assets, net charge-offs-to-assets, non-performing assets-to-total assets, and foreclosed real estate-to-assets, because

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[3] See, for example, Thomson (1992) or Cole and Gunther (1995).

such variables reflect the outcomes of a bank's earlier investments. If real estate investments impose losses on a bank's portfolio, those losses will be reflected through the outcome variables rather than the real estate variables.

4. Data

Our data come from two primary sources. First, we use FDIC press releases to classify each commercial bank as failing or surviving each year during the 1985-1992 period. In many cases, multiple banks associated with one bank holding company failed because of problems at the company's lead bank. For these cases, we include only the holding company's lead bank; the remainder of the holding company's failing subsidiaries are deleted. After these deletions, the number of failing banks in our sample ranges from a low of 110 in 1985 and 1992 to a high of 203 in 1988. The number of surviving banks ranges from a low of 12,221 in 1992 to a high of 14,367 in 1985.

Second, we obtain balance sheet, income statement, and structure data for each bank in each year during the 1981-1992 period from the quarterly Reports of Income and Condition filed by commercial banks with their primary regulator and compiled by the Federal Financial Institutions Examination Council (FFIEC). Our final sample consists of all FDIC-insured commercial banks that filed a year-end call report for any year during the 1985-1992 period.

5. Results

5.1 Univariate Analysis

Table 2 presents univariate statistics by year for the portfolios of failing and surviving banks. For each portfolio in each year during the 1985-1992 period, the table presents the mean and standard error for each explanatory variable along with the results of *t*-tests for significant differences in the means of the failing and surviving portfolios.

This analysis reveals that failing banks held significantly higher concentrations of commercial real estate loans in 1988-1992, with the difference in means ranging from 3.58 percentage points in 1988 to a peak of 9.55 percentage points (18.75 percent for failing banks as compared with 9.20 percent for surviving banks) in 1991. Examination of the three components of commercial real estate loans—multifamily, construction, and permanent nonresidential— reveals that there also were significant differences in the means for permanent nonresidential loans for each year from 1988-1992, peaking at 7.04 percentage points for the 1991 portfolio. The differences in the means of construction loans were significant for 1988-1989 and 1991- 1992, but the differences in the means of multifamily mortgages were significant only for 1991- 1992. Thus, on the basis of univariate analysis, it would appear that permanent nonresidential mortgages were more significant in explaining bank failures than either construction or multifamily mortgages.

Also in table 2 are univariate results for the five variables that we use as controls to differentiate banks with high risk preferences—the ratios of residential mortgages, total loans, jumbo CDs, insider loans, and noninterest expenses to total assets. We note that failing banks typically had higher ratios of each of these variables (except residential mortgages, for which

failing banks had lower ratios) than did surviving banks, and that differences in the mean values

for the surviving and failing banks are statistically significant in at least four of the eight years

analyzed. For two of these variables—the ratios of total loans and noninterest expense to

assets—failing banks had higher means that were statistically different from those of surviving

banks in all eight years; and for two more—jumbo CDs and insider loans—failing banks had

higher means that were statistically different from those of surviving banks in seven of eight

years.

5.2 Results of Multivariate Analysis

The multivariate logistic regression results for each year from 1985 to 1992 are reported

in table 3. For each year, regression estimates for three specifications of eq. (1) are reported. In

the first column, only contemporaneous commercial real estate variables—nonresidential

mortgages, construction loans, and multifamily mortgages—and dummy variables indicating

banks located in the Southwest and New England are included as explanatory variables.[4] In the

second column, the contemporaneous value of construction loans is replaced by the optimal

lagged value, where the optimal value is defined as the one that maximizes the F-statistic of the

regression. To determine the optimal lag, the contemporaneous value of construction loans and

each lagged value back to 1981 were included in the regression sequentially along with the

contemporaneous values of multifamily and permanent nonresidential mortgages. In the third

column for each year are regression results for the full specification of eq. (1) including the

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[4] The New England region is defined as the First (Boston) and Second (New York) Federal
Reserve Bank Districts. As noted earlier, the Soutwest region is defined as the Eleventh (Dallas)
Federal Reserve District.

optimal lagged value of construction loans and contemporaneous values of permanent nonresidential mortgages, multifamily mortgages, and the five control variables for bank risk-taking.

Examining first the column 1 results for each year, we see that commercial real estate loans are essentially unrelated to bank failures in 1985 and 1986 and that only construction loans are significantly related to bank failures in 1987. Beginning in 1988, the coefficients on both construction loans and nonresidential loans are highly significant; however, in each year the relationship as measured by both the size and the *t*-statistics of the coefficients is strongest for nonresidential loans.

The primacy of nonresidential loans is sharply reversed when lagged construction loans replace contemporaneous construction loans as shown in column 2. The first thing to note about these regressions is the marked increase in the overall explanatory power of the models as evidenced by the pseudo-R^2 goodness-of-fit statistics, which appear at the bottom of table 3. For the 1986-1990 regressions, the goodness-of-fit is more than doubled when lagged construction loans replace contemporanous construction loans.

The second thing to note about these regressions is that the optimal explanatory power of construction loans occurs at a lag of three to six years. For example, for banks failing during 1985, the optimal lagged value of construction loans was from year-end 1981; for 1986 and 1987 failures, the optimal lagged value was from 1983; for 1988 and 1989 failures it was from 1984; and for 1991 and 1992 it was from 1985. This suggests that to properly understand the contribution of construction loans and permanent financing to bank failures, it is important to

capture the influence of loans that are originated as construction loans but that are later reclassified as permanent loans—so-called mini-perm loans.

Also significant is our finding that the optimal lag for the construction loan variable (with the exception of the 1985 regressions) falls within a narrow three-year band, 1983-1985. This was a period of robust development lending, but more importantly, it was a period when a great deal of commercial real estate development was driven by the value of tax benefits that subsequently were reduced or eliminated by the 1986 Tax Reform Act. These results suggest that both the type and vintage of commercial real loans are related to bank failure. Finally, these results demonstrate that construction loans played a much larger role in bank failures than permanent financing, particularly in the peak failure years of 1987-1989.

The third set of results for each year includes five control variables for bank risk-taking. Four of these variables are traditional measures of bank risk-taking and are expected to be positively related to bank failure, as they were found to be in the univariate analysis. The fifth variable—residential mortgages as a percentage of total assets—is hypothesized to be negatively related to bank risk-taking. In a stable or declining interest rate environment, such at that which characterized the 1985-1992 period, a bank's residential mortgage portfolio consists a set of relatively low margin and well-diversified, i.e., low-risk, investments, so it is expected to be negatively related to failure. Inclusion of the residential mortgage variable in the analysis also is of interest because of the large increase in bank holdings of residential mortgage loans that coincided with the buildup of commercial mortgages during the analysis period.

In every year, the control variables have the predicted signs[5] and as a group significantly increase the explanatory power of the regressions as measured by the pseudo-R^2. The control variables enter most strongly in 1985-1987, and, after controlling for these measures of bank risk-taking, commercial real estate has little additional explanatory power. This confirms popular wisdom that, until the late 1980s, commercial real estate had little to do with the rising number of bank failures, and, to the extent that commercial real estate loans were positively associated with bank failures, they mainly served as a proxy for a bank's preference for risk-taking. From 1988-1992, commercial real estate loans are significantly related to bank failures, even after controlling for other measures of bank risk.   Accounting for these control variables, however, strengthens the evidence suggesting that construction loans played a far larger role in bank failures than did permanent loans. In each regression for 1988-1992, inclusion of the control variables significantly weakens the relationship between bank failures and permanent nonresidential mortgages, and, to a lesser extent, between bank failures and construction loans. After their inclusion, the significance level of the construction loans variable exceeds that of the nonresidential loan variable in 1988-1990 and 1992.

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[5] The only two exceptions are the negative but insignificant coefficients of jumbo CDs in 1991 and insider loans in 1992.

6. Summary and Conclusions

In this study, we test the relationship between commercial real estate loan concentration and bank failure during the 1985-1992 period. We find that commercial real estate loan concentration was not a factor in the banking failures of 1985-87, despite the increase in commercial real estate lending that began in 1982. High concentrations of commercial real estate loans were, however, strongly connected to the bank failures that occurred during 1988-1992. For this period, the distinction between construction lending and permanent nonresidential financing is extremely important and has an interesting temporal dimension. Throughout this period, construction loan concentration played a much larger role in bank failure than permanent nonresidential loan concentration, and the relationship is strongest with construction lending that was booked for the 1983-1985 period that preceded the Tax Reform Act of 1986, which significantly and adversely affected commercial real estate investments. The significance of the relationship between bank failures and construction loan concentration suggests that construction loans were significantly more risky than other types of commercial real estate investments.

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Table 1

Real estate loans outstanding at U.S. commerical banks as of year-ends 1981-1993.

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total commercial real estate loans [a]	$136 (6.7%)	$149 (6.8%)	$178 (7.5%)	$205 (8.2%)	$239 (8.8%)	$293 (10.0%)	$337 (11.2%)	$372 (11.9%)	$411 (12.5%)	$429 (12.7%)	$420 (12.3%)	$403 (11.5%)	$406 (11.0%)
Multifamily mortgages [b]	$7 (0.3%)	$8 (0.4%)	$14 (0.6%)	$11 (0.4%)	$13 (0.4%)	$16 (0.5%)	$18 (0.6%)	$18 (0.6%)	$20 (0.6%)	$21 (0.6%)	$24 (0.7%)	$27 (0.8%)	$30 (0.8%)
Nonresidential mortgages	$67 (3.3%)	$72 (3.3%)	$85 (3.6%)	$96 (3.8%)	$113 (4.2%)	$140 (4.8%)	$168 (5.6%)	$189 (6.0%)	$215 (6.5%)	$238 (7.0%)	$249 (7.3%)	$257 (7.3%)	$267 (7.2%)
Loans for land and construction	$45 (2.2%)	$52 (2.4%)	$61 (2.6%)	$76 (3.0%)	$89 (3.3%)	$107 (3.6%)	$120 (4.0%)	$128 (4.1%)	$136 (4.1%)	$126 (3.7%)	$103 (3.0%)	$79 (2.3%)	$66 (1.8%)
Foreign [c] real estate loans	$9 (0.4%)	$9 (0.4%)	$9 (0.4%)	$12 (0.5%)	$13 (0.5%)	$17 (0.6%)	$17 (0.6%)	$22 (0.7%)	$23 (0.7%)	$27 (0.8%)	$25 (0.7%)	$20 (0.6%)	$22 (0.6%)
Farmland mortgages	$8 (0.4%)	$8 (0.4%)	$9 (0.4%)	$10 (0.4%)	$11 (0.4%)	$13 (0.4%)	$14 (0.5%)	$16 (0.5%)	$17 (0.5%)	$17 (0.5%)	$19 (0.6%)	$20 (0.6%)	$21 (0.6%)
Residential mortgages [d]	$155 (7.6%)	$159 (7.3%)	$179 (7.5%)	$181 (7.2%)	$199 (7.3%)	$222 (7.6%)	$263 (8.8%)	$302 (9.6%)	$351 (10.6%)	$400 (11.8%)	$429 (12.5%)	$462 (13.2%)	$511 (13.8%)
Total real estate loans	$292 (14.3%)	$308 (14.0%)	$357 (15.0%)	$386 (15.4%)	$438 (16.1%)	$515 (17.5%)	$600 (20.0%)	$675 (21.6%)	$762 (23.1%)	$829 (24.5%)	$849 (24.8%)	$865 (24.7%)	$917 (24.8%)
OREO [e]	$2.6 (0.1%)	$4.4 (0.2%)	$5.2 (0.2%)	$5.9 (0.2%)	$7.2 (0.3%)	$9.2 (0.3%)	$11.0 (0.4%)	$13.8 (0.4%)	$21.4 (0.4%)	$26.0 (0.8%)	$27.6 (0.8%)	$26.3 (0.7%)	$16.8 (0.5%)
Total loans	$1,121 (55.0%)	$1,208 (55.1%)	$1,323 (55.6%)	$1,508 (60.1%)	$1,630 (59.7%)	$1,755 (59.7%)	$1,829 (61.0%)	$1,932 (61.7%)	$2,058 (62.4%)	$2,045 (60.4%)	$2,050 (59.8%)	$2,029 (57.9%)	$2,143 (58.0%)
Total asset	$2,039 (100%)	$2,194 (100%)	$2,381 (100%)	$2,507 (100%)	$2,729 (100%)	$2,937 (100%)	$2,999 (100%)	$3,130 (100%)	$3,299 (100%)	$3,388 (100%)	$3,427 (100%)	$3,501 (100%)	$3,696 (100%)

Amounts are billions of dollars. Percentages of total assets appear in parentheses. a Total real estate loans less residential real estate loans. b Loans secured by five- or more-family houses. c Loans to foreign-domiciled borrowers, only reported by banks with foreign and domestic offices. d Loans secured by one- to four-family houses including home equity loans. e OREO, or other real estate owned, includes foreclosed real estate and equity real estate held for investment purposes.

Table 2

Descriptive statistics for variables examined as determinants of commercial bank failures occurring during 1985-1992

Variable	1985		1986		1987		1988		1989		1990		1991		1992	
	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks	Surviving banks	Failing banks
Commercial real estate loans [c]	6.63 (0.05)	5.29 (0.62)	7.15 (0.05)	8.42 (0.74)	7.74 (0.06)	8.69 (0.58)	8.34 (0.07)	11.92 [b] (0.63)	8.60 (0.07)	13.52 [b] (0.63)	8.93 (0.07)	14.17 [b] (0.85)	9.20 (0.08)	18.75 [a] (1.10)	9.53 (0.08)	16.80 [a] (1.41)
Multifamily mortgages	0.37 (0.01)	0.58 (0.35)	0.40 (0.01)	0.57 (0.12)	0.45 (0.01)	0.55 (0.47)	0.48 (0.01)	1.05 (0.24)	0.47 (0.01)	0.65 (0.09)	0.48 (0.01)	0.75 (0.13)	0.53 (0.01)	1.27 [a] (0.24)	0.59 (0.01)	1.20 [a] (0.20)
Nonresidential mortgages	4.40 (0.04)	3.41 (0.40)	4.84 (0.04)	5.34 (0.49)	5.38 (0.04)	5.34 (0.39)	5.95 (0.05)	7.87 [b] (0.45)	6.21 (0.05)	9.73 [b] (0.48)	6.48 (0.01)	9.94 [b] (0.53)	6.73 (0.06)	13.77 [b] (0.86)	7.20 (0.06)	11.91 [b] (1.05)
Loans for land and construction	1.86 (0.03)	1.29 (0.28)	1.92 (0.03)	2.50 (0.34)	1.92 (0.03)	2.80 (0.34)	1.91 (0.03)	3.00 [b] (0.32)	1.91 (0.03)	3.14 [b] (0.32)	1.97 (0.03)	3.48 (0.59)	1.94 (0.03)	3.72 [a] (0.53)	1.74 (0.03)	3.68 [a] (0.58)
Residential mortgages	10.31 (0.07)	7.87 [b] (0.62)	10.75 (0.07)	7.84 [b] (0.51)	11.18 (0.07)	8.93 [b] (0.47)	12.56 (0.08)	11.23 (0.59)	13.20 (0.09)	11.29 [b] (0.51)	13.67 (0.09)	12.56 (0.63)	14.19 (0.09)	17.13 [a] (1.09)	14.71 (0.10)	14.63 (1.22)
Total loans	52.83 (0.12)	66.11 [b] (0.86)	52.50 (0.12)	65.82 [b] (0.84)	51.03 (0.13)	63.52 [b] (0.84)	52.12 (0.14)	60.60 [b] (1.14)	52.79 (0.14)	60.24 [b] (1.13)	53.23 (0.14)	60.25 [b] (1.05)	53.25 (0.14)	66.28 [b] (1.50)	52.51 (0.14)	61.12 [b] (2.05)
Jumbo CDs	10.89 (0.08)	16.65 [b] (1.31)	11.11 (0.08)	18.66 [b] (1.23)	10.56 (0.08)	20.22 [b] (1.06)	10.47 (0.08)	21.64 [b] (0.95)	10.48 (0.07)	21.04 [b] (0.86)	10.63 (0.07)	14.92 [b] (0.64)	10.12 (0.07)	11.73 (0.78)	8.77 (0.06)	11.32 [b] (0.69)
Loans to insiders	0.59 (0.01)	1.07 [b] (0.15)	0.61 (0.04)	1.47 [b] (0.26)	0.61 (0.01)	1.48 [b] (0.17)	0.60 (0.01)	1.09 [b] (0.12)	0.60 (0.01)	0.98 [b] (0.11)	0.57 (0.01)	1.32 [b] (0.16)	0.54 (0.01)	0.84 [a] (0.11)	0.50 (0.01)	0.72 (0.28)
Noninterest expense	3.39 (0.03)	4.35 [b] (0.16)	3.51 (0.04)	5.01 [b] (0.20)	3.53 (0.05)	5.86 [b] (0.21)	3.60 (0.05)	5.40 [b] (0.20)	3.50 (0.04)	5.85 [b] (0.22)	3.56 (0.04)	6.63 [b] (0.25)	3.56 (0.05)	6.38 [b] (0.43)	1.55 (0.03)	3.35 [b] (0.53)
Number of banks	14,367	110	14,259	135	13,999	195	13,506	203	14,331	194	12,570	153	12,242	103	12,221	110

Standard errors appear in parentheses. Each variable is measures as a percentage of total bank assets. Each column of numbers is based upon failure data for the year indicated at the top of the column and on call report data for December 31 of the previous year. [a] Indicates that the means for the surviving and failing groups are different at the 1.0% level of significance. [b] Indicates that the means for the surviving and failing groups are different at the 0.1% level of significance. [c] Commercial real estate loans include nonresidential loans, multifamily loans, and loans for construction and land.

Table 3

Commercial real estate investments as determinants of U.S. bank failures

Variable	1985			1986			1987			1988		
	1	2	3	1	2	3	1	2	3	1	2	3
Nonresidential mortgages	-0.064 [a] (-2.24)	-0.084 [b] (-2.88)	-0.096 [c] (-3.54)	0.013 (0.71)	0.011 (0.58)	-0.036 [a] (-1.97)	-0.009 (-0.64)	-0.022 (-1.39)	-0.066 [c] (-4.16)	0.035 [c] (3.59)	0.030 [a] (2.52)	0.004 (0.33)
Loans for land and construction	-0.047 (-1.30)			0.027 (1.42)			0.045 [b] (3.24)			0.040 [b] (2.93)		
Lag of loans for land and construction [d]		0.065 [a] (2.51)	-0.026 (-0.80)		0.101 [c] (4.70)	0.013 (0.46)		0.091 [c] (7.29)	0.024 (1.57)		0.105 [c] (8.74)	0.061 [c] (4.40)
Multifamily mortgages	0.090 [a] (2.30)	0.088 [a] (2.05)	-0.031 (-0.71)	0.066 (1.36)	0.052 (0.91)	-0.023 (-0.35)	0.032 (0.76)	0.027 (0.58)	-0.035 (-0.72)	0.076 [c] (3.67)	0.095 [b] (3.27)	0.043 (1.30)
Southwestern banks	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)
New England banks	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)
Residential mortgages			-0.056 [c] (-3.69)			-0.085 [c] (-5.38)			-0.047 [c] (-4.23)			-0.025 [a] (-2.28)
Jumbo CDS			0.015 (1.77)			0.030 [c] (3.36)			0.039 [c] (6.05)			0.062 [c] (10.25)
Total loans			0.093 [c] (10.28)			0.090 [c] (10.25)			0.064 [c] (10.20)			0.020 [c] (3.44)
Loans to insiders			0.084 [b] (2.59)			0.036 (1.57)			0.118 [c] (3.91)			0.098 [a] (2.41)
Noninterest expense			0.061 [c] (4.36)			0.131 [c] (6.82)			0.033 [c] (5.64)			0.024 [c] (3.44)
Number of failing banks	110	107	107	135	120	120	195	174	174	203	169	169
Number of surviving banks	14,368	13,535	13,535	14,259	12,787	12,787	13,999	12,935	12,935	13,506	12,279	12,279
Pseudo-R^2	0.009	0.012	0.146	0.003	0.014	0.161	0.005	0.020	0.150	0.017	0.044	0.118

Logistic regression estimates of the probability of failure for FDIC-insured commercial banks failing during the 1985-1992 period; *t*-statistics appear in parentheses. All variables are measured as a percentage of total bank assets. For each year, the probability of bank failure is estimated using failure data for that year and call report data for December 31 of the preceding year. Failure data were obtained from FDIC press releases. Call report data were obtained from the Federal Reserve Board's archival files. [a] Indicates significance at the 5.0% level. [b] Indicates significance at the 1.0% level. [c] Indicates significance at the 0.1% level. [d] The lagged values of loans for construction and land are taken from the December 1981 call report for 1986 failures, from the December 1983 call report for 1985 and 1986 failures, and from the December 1984 call report for 1988 failures.

Table 3 (continued)

Table 3 (continued)
Commercial real estate investments as determinants of U.S. bank failures

Variable	1989			1990			1991			1992		
	1	2	3	1	2	3	1	2	3	1	2	3
Nonresidential mortgages	0.062 [c] (7.05)	0.058 [c] (5.80)	0.040 [c] (3.61)	0.055 [c] (5.69)	0.060 [c] (5.45)	0.046 [c] (3.85)	0.082 [c] (8.60)	0.081 [c] (7.29)	0.058 [c] (4.77)	0.052 [c] (4.98)	0.046 [c] (3.67)	0.033 [a] (2.47)
Loans for land and construction	0.039 [b] (2.83)			0.047 [c] (3.46)			0.045 [b] (2.61)			0.064 [c] (3.73)		
Loans for land and construction, lagged [d]		0.122 [c] (12.29)	0.093 [c] (8.74)		0.058 [c] (8.53)	0.088 [c] (7.10)		0.082 [c] (4.92)	0.072 [c] (4.00)		0.098 [c] (5.77)	0.083 [c] (4.67)
Multifamily mortgages	0.004 (0.09)	-0.004 (-0.07)	-0.063 (-0.91)	0.017 (0.37)	0.053 (1.05)	0.019 (0.33)	0.044 (1.37)	0.056 (1.10)	0.034 (0.66)	0.068 (1.68)	0.063 (1.11)	0.043 (0.73)
Southwestern banks	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)
New England banks	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)	0.000 [*] (0.00)
Residential mortgages			-0.012 (-1.12)			-0.016 (-1.41)			-0.003 (-0.28)			-0.034 [a] (-2.31)
Jumbo CDS			0.083 [c] (12.25)			0.032 [b] (3.11)			-0.011 (-0.66)			0.043 [b] (3.00)
Total loans			0.014 [a] (2.32)			0.021 [b] (2.76)			0.039 [c] (3.77)			0.019 [a] (2.03)
Insider loans			0.045 (1.17)			0.192 [c] (4.72)			0.252 [c] (4.17)			-0.139 (-0.96)
Noninterest expense			0.037 [c] (3.35)			0.048 [c] (6.11)			0.033 [c] (3.82)			0.024 [c] (3.51)
Number of failing banks	194	178	178	153	130	130	103	84	84	94	74	74
Number of surviving banks	12,938	11,896	11,896	12,570	11,380	11,380	12,242	11,207	11,207	11,815	10,744	10,744
Pseudo-R^2	0.028	0.094	0.185	0.027	0.070	0.115	0.069	0.085	0.118	0.040	0.054	0.081

NOTES: Logistic regression estimates of the probability of failure for FDIC-insured commercial banks failing during the 1985-1992 period; *t*-statistics appear in parentheses. All variables are measured as a percentage of total bank assets. For each year, the probability of bank failure is estimated using failure data for that year and call report data for December 31 of the preceding year. Failure data were obtained from FDIC press releases. Call report data were obtained from the Federal Reserve Board's archival files. [a] Indicates significance at the 5.0% level. [b] Indicates significance at the 1.0% level. [c] Indicates significance at the 0.1% level. [d] The lagged values of loans for construction and land are taken from the December 1984 call report for 1989 and 1990 failure, and from the December 1985 call report for 1991 and 1992 failures.

Table 4
Commercial real estate investments as determinants of Southwestern bank failures

Variable	1985			1986			1987			1988		
	1	2	3	1	2	3	1	2	3	1	2	3
Nonresidential mortgages	-0.064[a] (-2.24)	-0.084[b] (-2.88)	-0.096[c] (-3.54)	0.013 (0.71)	0.011 (0.58)	-0.036[a] (-1.97)	-0.009 (-0.64)	-0.022 (-1.39)	-0.066[c] (-4.16)	0.035[c] (3.59)	0.030[a] (2.52)	0.004 (0.33)
Loans for land and construction	-0.047 (-1.30)			0.027 (1.42)			0.045[b] (3.24)			0.040[b] (2.93)		
Lag of loans for land and construction [d]		0.065[a] (2.51)	-0.026 (-0.80)		0.101[c] (4.70)	0.013 (0.46)		0.091[c] (7.29)	0.024 (1.57)		0.105[c] (8.74)	0.061[c] (4.40)
Multifamily mortgages	0.090[a] (2.30)	0.088[a] (2.05)	-0.031 (-0.71)	0.066 (1.36)	0.052 (0.91)	-0.023 (-0.35)	0.032 (0.76)	0.027 (0.58)	-0.035 (-0.72)	0.076[c] (3.67)	0.095[b] (3.27)	0.043 (1.30)
Residential mortgages			-0.056[c] (-3.69)			-0.085[c] (-5.38)			-0.047[c] (-4.23)			-0.025[a] (-2.28)
Jumbo CDS			0.015 (1.77)			0.030[c] (3.36)			0.039[c] (6.05)			0.062[c] (10.25)
Total loans			0.093[c] (10.28)			0.090[c] (10.25)			0.064[c] (10.20)			0.020[c] (3.44)
Loans to insiders			0.084[b] (2.59)			0.036 (1.57)			0.118[c] (3.91)			0.098[a] (2.41)
Noninterest expense			0.061[c] (4.36)			0.131[c] (6.82)			0.033[c] (5.64)			0.024[c] (3.44)
Number of failing banks	110	107	107	135	120	120	195	174	174	203	169	169
Number of surviving banks	14,368	13,535	13,535	14,259	12,787	12,787	13,999	12,935	12,935	13,506	12,279	12,279
Pseudo-R^2	0.009	0.012	0.146	0.003	0.014	0.161	0.005	0.020	0.150	0.017	0.044	0.118

Logistic regression estimates of the probability of failure for FDIC-insured commercial banks failing during the 1985-1992 period; t-statistics appear in parentheses. All variables are measured as a percentage of total bank assets. For each year, the probability of bank failure is estimated using failure data for that year and call report data for December 31 of the preceding year. Failure data were obtained from FDIC press releases. Call report data were obtained from the Federal Reserve Board's archival files. [a] Indicates significance at the 5.0% level. [b] Indicates significance at the 1.0% level. [c] Indicates significance at the 0.1% level. [d] The lagged values of loans for construction and land are taken from the December 1981 call report for 1986 failures, from the December 1983 call report for 1985 and 1986 failures, and from the December 1984 call report for 1988 failures.

Table 4 (continued)
Commercial real estate investments as determinants of Southwestern bank failures

	1989			1990			1991			1992		
Variable	1	2	3	1	2	3	1	2	3	1	2	3
Nonresidential mortgages	0.062 [c] (7.05)	0.058 [c] (5.80)	0.040 [c] (3.61)	0.055 [c] (5.69)	0.060 [c] (5.45)	0.046 [c] (3.85)	0.082 [c] (8.60)	0.081 [c] (7.29)	0.058 [c] (4.77)	0.052 [c] (4.98)	0.046 [c] (3.67)	0.033 [a] (2.47)
Loans for land and construction	0.039 [b] (2.83)			0.047 [c] (3.46)			0.045 [b] (2.61)			0.064 [c] (3.73)		
Loans for land and construction, lagged [d]		0.122 [c] (12.29)	0.093 [c] (8.74)		0.058 [c] (8.53)	0.088 [c] (7.10)		0.082 [c] (4.92)	0.072 [c] (4.00)		0.098 [c] (5.77)	0.083 [c] (4.67)
Multifamily mortgages	0.004 (0.09)	-0.004 (-0.07)	-0.063 (-0.91)	0.017 (0.37)	0.053 (1.05)	0.019 (0.33)	0.044 (1.37)	0.056 (1.10)	0.034 (0.66)	0.068 (1.68)	0.063 (1.11)	0.043 (0.73)
Residential mortgages			-0.012 (-1.12)			-0.016 (-1.41)			-0.003 (-0.28)			-0.034 [a] (-2.31)
Jumbo CDS			0.083 [c] (12.25)			0.032 [b] (3.11)			-0.011 (-0.66)			0.043 [b] (3.00)
Total loans			0.014 [a] (2.32)			0.021 [b] (2.76)			0.039 [c] (3.77)			0.019 [a] (2.03)
Insider loans			0.045 (1.17)			0.192 [c] (4.72)			0.252 [c] (4.17)			-0.139 (-0.96)
Noninterest expense			0.037 [c] (3.35)			0.048 [c] (6.11)			0.033 [c] (3.82)			0.024 [c] (3.51)
Number of failing banks	194	178	178	153	130	130	103	84	84	94	74	74
Number of surviving banks	12,938	11,896	11,896	12,570	11,380	11,380	12,242	11,207	11,207	11,815	10,744	10,744
Pseudo-R^2	0.028	0.094	0.185	0.027	0.070	0.115	0.069	0.085	0.118	0.040	0.054	0.081

NOTES: Logistic regression estimates of the probability of failure for FDIC-insured commercial banks failing during the 1985-1992 period; t-statistics appear in parentheses. All variables are measured as a percentage of total bank assets. For each year, the probability of bank failure is estimated using failure data for that year and call report data for December 31 of the preceding year. Failure data were obtained from FDIC press releases. Call report data were obtained from the Federal Reserve Board's archival files. [a] Indicates significance at the 5.0% level. [b] Indicates significance at the 1.0% level. [c] Indicates significance at the 0.1% level. [d] The lagged values of loans for construction and land are taken from the December 1984 call report for 1989 and 1990 failure, and from the December 1985 call report for 1991 and 1992 failures.