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The Impact of S&L Failures and Regulatory Changes on the CD Market, 1987–1991

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The Impact of S&L Failures and Regulatory Changes on the CD Market, 1987-1991

Abstract

This paper examines the relationship between interest rates offered by savings and loan associations (S&Ls) on six month certificates of deposit (CDs) and various firm-specific variables over the period from 1987 to 1991. We report that wholesale and retail CD rates at S&Ls were significantly related to their capital-asset ratios, asset growth, and asset risk prior to the passage of the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) in 1989. In the post-FIRREA environment, however, CD rates do not appear to be as significantly related to risk and capital adequacy variables. The resolution of hundreds of insolvent thrifts by the Resolution Trust Corporation combined with tougher scrutiny of remaining S&Ls by thrift regulators after the passage of FIRREA would explain this weaker relationship between CD rates and risk and capital adequacy variables.

The Impact of S&L Failures and Regulatory Changes on the CD Market, 1987-1991

This paper analyzes the market for six month certificates of deposit (CDs) at insured savings and loan associations (S&Ls) over a four and one-half year period from 1987 to 1991. During this period, the industry underwent significant structural and regulatory changes resulting from huge losses and the subsequent closure of hundreds of insolvent S&Ls. The cost of compensating insured depositors was so large that Congress was forced to pass several bills to recapitalize the S&L deposit insurance fund. The first bill, the Competitive Equality Banking Act (CEBA) of 1987, increased the resources of the Federal Savings and Loan Insurance Corporation (FSLIC) and reaffirmed that insured deposits are backed by the full faith and credit of the United States government. The second bill, the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) of 1989, provided additional taxpayer funds to bail out the S&L industry. In addition, FIRREA also abolished the Federal Home Loan Bank Board, created the Resolution Trust Corporation (RTC) to oversee the S&L bailout, and established the Office of Thrift Supervision (OTS) to regulate federally chartered S&Ls. Because of the magnitude of the S&L crisis, Congress has subsequently passed additional measures providing funds to close or recapitalize insolvent S&Ls.

This study focuses on the impact of these changes on S&L deposit markets to address two questions. First, do CD rates offered by thrifts convey information by distinguishing between financially weak and healthy institutions? How partially insured depositors respond to differences in risk among depository institutions is relevant to both regulators and investors. Because these depositors are exposed to losses if an institution fails, they must decide whether or not to invest in that institution or demand a higher interest rate for doing so. Thus, deposit markets can provide signals that both regulators and investors can use to evaluate the risk exposure of depository institutions. However, the degree of depositor monitoring is affected by the terms of the deposit insurance

contract. If deposit insurance coverage (implicit and explicit) is very broad, uninsured depositors would not have as strong an incentive to monitor, and the relationship between CD rates and risk exposure would be weaker. On the other hand, if the deposit insurance fund is poorly capitalized or the government reduces insurance coverage, then one would expect a stronger relationship between CD rates and S&L risk exposure.

The second question addressed in the paper is how have deposit markets changed since FIRREA was passed. One issue of interest is the impact of the RTC's closing of insolvent institutions on deposit interest rates. Before FIRREA, many observers believed that poorly capitalized institutions, scrambling to raise funds in a desperate attempt to avoid failure, bid CD rates above the normal spreads over Treasury securities of comparable maturity. Healthy S&Ls were forced to pay higher deposit rates as well in order to maintain their customer base, which raised their cost of funds and reduced their profitability [see Barth, Bartholomew, and Whidbee (1989)]. We test this hypothesis by separating out those S&Ls that were ultimately taken over by the RTC during the sample period from the remaining S&Ls and comparing the relationship between the CD rates offered by S&Ls in each group and risk and capital adequacy variables.

A related issue is the impact of greater regulatory scrutiny on CD interest rates after FIRREA. In additional to factors previously mentioned, the riskiness of an insured depository's CDs is affected by the closure rule followed by regulators. For example, the lack of reserves in the now defunct FSLIC had prevented S&L regulators from closing insolvent institutions. By relaxing closure rules, a policy known as forbearance, regulators allowed inadequately capitalized S&Ls to remain open to gamble for resurrection. Because these institutions were inadequately capitalized, there was a risk that partially insured depositors would not be fully protected if the institution failed; hence, they demanded additional interest for bearing greater risk. On the other hand, if an S&L faces a strict rule in which it is closed before it exhausts its capital, then there is likely to be little risk to depositors. The amounts provided in FIRREA and subsequent

funding bills have allowed regulators to tighten closure rules; therefore, we should observe a weaker link between CD rates and S&L risk in the post-FIRREA period. In effect, greater regulatory discipline implies that less market discipline is required.

Several researchers have attempted to infer risk exposure of financial institutions from the market prices of their liabilities. Avery, Belton, and Goldberg (1988) were unable to find a significant relationship between the default risk premium on subordinated debt instruments and accounting-based measures of risk for large banking organizations in 1983 and 1984. Gorton and Santomero (1989), using the same data as Avery, *et al.*, reported that accounting measures of risk were marginally related to bank asset volatility. Others have found deposit rates to be significantly related to firm-specific variables. Baer and Brewer (1986) found deposit rates to be positively related to stock market volatility and negatively related to the market capitalization-total asset ratio for a sample of 37 large commercial banks from 1979 to 1982. Hannan and Hanweck (1988) analyzed 1985 interest rate survey data for large CDs from approximately 300 banks. They reported that CD rates increased with both the ratio of risky assets to capital and the volatility of after-tax returns on bank assets and that the magnitude of these effects grew with the stated maturity of the deposit instrument. Cargill (1989) found a positive relationship between CD rates and CAMEL ratings given by bank examiners (higher CAMEL ratings imply a riskier bank) for a sample of 54 banks during 1987. Ellis and Flannery (1991) found that CD rates paid by large money center banks include significant default risk premiums. These studies show a positive relationship between bank riskiness and the interest rate paid on time deposits, so one can conclude that, at least through 1987, the CD market did impose discipline in the form of a higher cost of funds for banks that decided to take additional risk.

However, it is worth asking whether the market's incentive to evaluate and price S&L risk taking has changed since the passage of FIRREA. Spellman and Cook (1989) examined monthly data for approximately 250 thrifts in the Eleventh Federal Home Loan

District. They calculate that the "deposit premium" for a well-capitalized thrift's large CDs rose from an average of approximately 75 basis points between March and September 1987 to 108 basis points for the November-December 1987 period. Since CEBA was passed in August 1987, one would not have expected the interest rate spread to have increased. In Cook and Spellman (1991), they develop a model which relates the rate on insured CDs to the solvency of the deposit insurer. They contend that because the passage of CEBA raised the perceived solvency ratio of FSLIC, insured depositors did not demand as large a spread over the riskfree rate after FSLIC was recapitalized. Examining rates paid by approximately 390 large thrift institutions in August 1987 and August 1988, they found that the CD spread declined and that the relationship between the CD spread and S&L risk variables was stronger before the passage of CEBA.

We extend the results found in these studies by examining the markets for both large and small CDs at S&Ls over an 18 quarter period from March 1987 to June 1991. Thus, we can observe whether the recapitalization of the S&L deposit insurance fund under FIRREA had a similar effect on interest rate spreads of large, uninsured CDs as Cook and Spellman found for insured CDs after the passage of CEBA. We can also determine whether the relationship between firm risk variables and CD rates changed after the passage of FIRREA. We examine the spread on small CDs to determine whether risky firms raised their rates above those of other institutions. By separating S&Ls that were taken over by the RTC from other institutions, we can understand whether the market treated financially distressed S&Ls differently throughout the 1987-1991 period. We employ a larger sample than in previous studies, with the sample size for S&Ls issuing large CDs declining from 2474 to 1877 over the period we examine.

Our results indicate that the interest rate spreads between both wholesale (deposits in excess of $100,000) and retail (deposits in denomination less than or equal to $100,000) CDs and Treasury bills were significantly related to S&L risk exposure and capital adequacy before the passage of FIRREA. The fact that retail depositors also were

paid a rate in excess of the riskfree interest rate is interesting since these deposits were fully guaranteed by the federal government. After the passage of FIRREA, however, the relationship between CD rates and firm-specific variables is weaker, indicating that depositors no longer exercised their monitoring function. We also observe that average CD rate spreads fell substantially from the end of 1987 to 1991, and that the difference in rates paid by financially distressed institutions *vis-a-vis* healthy institutions also declined after FIRREA.

The paper is divided into five sections. Section two develops the theoretical relationships we test. Section three describes the data sources and presents an overview of the behavior of the CD rate spread over the period. Section four specifies the econometric model used in the study and reports the empirical results. Section five provides some concluding remarks.

II. Model Specification

Uninsured deposits, like other forms of uninsured thrift liabilities, can be valued using an option pricing framework such as Merton (1974). Suppose at the end of period t a thrift has A_t dollars in assets financed with D_t dollars of deposits and K_t dollars of capital. As long as the value of K_t exceeds a positive threshold level relative to the value of assets, the institution is considered solvent, existing shareholders maintain control of the institution, and creditors expect to receive their payments. However, if the value of K_t falls below the threshold, then the probability that regulators may intervene and close the institution increases. In the absence of deposit insurance, depositors can expect to receive no more than the value of total assets at the time of closure, net of resolution costs. Thus, the value of deposits is equal to min (A_t, D_t), and the probability that depositors would incur a loss is equal to the probability that $A_t < D_t$.

The existence of deposit insurance complicates the issue somewhat, but as long as deposits are not fully insured, a positive probability of loss to depositors exists. Let F be the maximum value of the guarantee, and assume $F < D$ for all t. Then the value of

deposits at date t becomes max (F, min (A_t, D_t)). While the depositors can lose no more than D_t - F, the possibility of a loss still exists.

What variables affect the probability that $A_t < D_t$? Suppose the value of assets at date t is a random variable with expected value A and variance σ_A^2. Then expected net worth at date t equals A - D_t. The loss probability can be expressed as:

$$Prob(A_t < D_t) = f(K_t/A_t, \sigma_A^2). \quad (1)$$

Holding asset risk (σ_A^2) constant, the larger the value of expected net worth per dollar of assets, the less likely it is that the actual value of A_t will fall below D_t. Thus, the greater the expected capital-asset ratio, the lower the probability that depositors will realize a loss. Holding the expected capital-asset ratio constant, an increase in σ_A^2 raises the probability that net worth is negative. Hence, variables which are positively correlated with the perceived riskiness of a thrift institution's asset portfolio would also be positively related to the loss probability.

If all S&Ls were required to offer the same interest rate on their deposits, one would expect that S&Ls with higher probabilities of failure would experience greater difficulty in raising funds. Because CD rates are not regulated, S&Ls can compensate depositors for bearing additional risk by paying higher deposit rates. Thus, the risk premium on CDs, defined as the additional interest paid to compensate for greater exposure to losses, should be inversely related to the capital-asset ratio and directly related to the riskiness of the asset portfolio. Market discipline is thus reflected in the interest rate an S&L must pay to depositors.

The interest rate paid to depositors may also be affected by the size of the institution. To understand the potential effect of size, one can divide the CD rate paid by an institution into three components: the interest rate on a riskfree asset of comparable maturity, compensation for less liquidity relative to the riskfree asset, and the risk premium as defined above. Because larger thrifts have more large CDs outstanding, they

are likely to be perceived as more liquid, so the liquidity component of the CD rate would be a decreasing function of size.

Another variable which may affect the interest rate paid on large CDs is the growth rate of total assets. Rapid asset growth has been identified by several researchers as being related to increased risk taking by depository institutions. Many of these S&Ls used brokers to secure deposits outside of their normal market areas (see Moore (1992)). As a result, they often had to pay higher interest rates to secure such funds. Thus, we hypothesize a positive relationship between CD rates and asset growth.

The relationships between the large CD rates and the firm-specific variables described in this section can be tested using an empirical model such as equation (2):

$$SPREAD_{i,t} = \beta_0 + \beta_1 CAP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 DRISK_{i,t} + \varepsilon_{i,t}. \quad (2)$$

The dependent variable SPREAD represents the difference between the CD rate and the yield on U.S. Treasury bills of comparable maturity. SPREAD incorporates both the difference in liquidity between T-bills and large CDs as well as the risk premium. CAP is the ratio of capital to total assets; SIZE is the logarithm of total assets; GROWTH is the percent change in total assets from one period to the next; DRISK represents a measure of asset risk; and ε is a disturbance term with zero expected value. The values of β_0 through β_4 are coefficients to be estimated. We have no prediction for β_0, but we predict negative values for β_1 and β_2 and positive values for β_3 and β_4. All variables represent values for the ith thrift at the end of period t.

One can examine the impact of these variables on retail CDs by substituting the spread between the 6-12 month retail CD and T-bill rates as the dependent variable. In a perfectly competitive market with no information or other transaction costs, fully insured retail CDs at different S&Ls should yield the same rate since they are perfect substitutes. In practice, this is not likely to be the case for several reasons. First, it may be less convenient for depositors to place funds in S&Ls that are not close to them, so S&Ls that

need to attract additional deposits from outside their normal market area may be forced to offer higher CD rates. From an S&L's point of view, these deposits are close substitutes for wholesale funds, so they ought to be priced in a similar way. Second, as the financial condition of the deposit insurer deteriorates, depositors should demand higher rates on retail CDs of risky institutions. Third, depositors may fear that regulators taking over an insolvent S&L will repudiate the contracted rate and re-issue the CD at a lower interest rate. This introduces a call option into the instrument that would raise the cost of funds for those institutions most likely to be seized by regulators.[1]

Fourth, poorly capitalized S&Ls have incentives to offer high CD rates in order to obtain funds to gamble for resurrection. This "moral hazard" behavior would place pressure on healthy S&Ls to increase their rates as well. If regulators intervene early to limit such behavior by requiring owners to recapitalize as needed, or, if preventive measures fail, by taking steps to resolve institutions through sale or liquidation as soon as they become economically insolvent, there would be little, if any, relationship between retail CD rates and S&L risk variables. However, not only did regulators fail to close or recapitalize the large portion of the industry that had become insolvent because of the rise in interest rates during the early 1980s, they actually permitted many insolvent institutions to be managed as if they were going concerns. These reasons lead one to conclude that the hypothesized relationships in the retail market should not be qualitatively different from those expected in the wholesale market.

III. Data Sources and Empirical Method

The firm data used are from the Quarterly *Reports of Condition* filed by insured S&Ls to federal regulators. S&Ls were not required to submit deposit pricing data prior to 1987. The sample changes each quarter because (1) not all S&Ls reported deposit interest rates every quarter and (2) many institutions were closed during this period.

Two CD rates were used to form the dependent variable: the interest rate on large (wholesale) CDs with a term to maturity of 6 to 12 months and small (retail) CDs with

the same term to maturity. Although data exist for shorter term CDs, a much smaller sample of S&Ls actually reported these figures. To compute SPREAD, the 6 month bond-equivalent yield on Treasury bills was subtracted from the 6-12 month CD rate.

Two measures of capital were used to compute the capital-asset ratio for each thrift for each quarter: tangible (TAP) capital and generally accepted accounting principles (GAAP) capital. Because the choice of capital had no qualitative effect on the results reported in the paper, we only report results based on TAP capital. SIZE represents the log of total assets for each S&L at the end of each quarter. GROWTH is the percent change in total assets during the quarter.

Two measures designed to proxy for the riskiness of the S&Ls asset portfolio are used in this study. RASSETS is the sum of junk bonds plus acquisition and development loans divided by total assets. These assets were selected because, in Brewer and Mondschean (forthcoming), they were found to be the most risky asset categories in S&L portfolios, even after controlling for leverage and asset mix. A second variable, RISK, represents the value of assets classified by regulators as substandard, doubtful, or loss divided by total assets. It is expected that the larger the proportion of thrift assets which fall in these categories, the riskier is the S&L portfolio. In addition, dummy variables corresponding to the nine census regions of the United States were included to control for possible regional effects on CD rates. Sample means for the variables used in the study are presented in Table 1. The model is specified as equation (3):

$$SPREAD_{i,t} = \beta_0 + \beta_1 CAP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 RISK_{i,t} + \beta_5 RASSETS_{i,t} + \sum_{j=1}^{J-1} \gamma_j REG_j + \varepsilon_{i,t}. \quad (3)$$

Another issue we examine is the impact of thrift resolutions on CD rates. After the passage of FIRREA in August 1989 the newly established Resolution Trust Corporation (RTC) accelerated the process of resolving failed S&Ls. From its inception

in August 1989 through the end of June 1992, the RTC closed 651 S&Ls. Many of these institutions were placed in conservatorship, where they continued to operate under strict RTC guidelines until they were liquidated or sold. Since these institutions were backed by the full faith and credit of the federal government, it is not correct to treat them as behaving as private thrifts would in the CD market. Thus, we created a dummy variable, DUM, that equals one if an institution is one of the 651 S&Ls placed into conservatorship (hereafter known as the RTC group) and zero otherwise at the end of period t.[2] We then interacted the dummy variable with the intercept and the five explanatory variables in equation (3) to get the regression model that was used for estimation:

$$\begin{aligned} SPREAD_{i,t} = {} & \beta_0 + \beta_1 CAP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 RISK_{i,t} \\ & + \beta_5 RASSETS_{i,t} + \delta_0 DUM + \delta_1 (DUM)(CAP_{i,t}) + \delta_2 (DUM)(SIZE_{i,t}) \\ & + \delta_3 (DUM)(GROWTH_{i,t}) + \delta_4 (DUM)(RISK_{i,t}) \\ & + \delta_5 (DUM)(RASSETS_{i,t}) + \sum_{j=1}^{J-1} \gamma_j REG_j + \varepsilon_{i,t}. \end{aligned} \tag{4}$$

The behavior of interest rates and the mean interest rate spreads for each quarter over the sample period are displayed in Figures 1 through 4. Figure 1 compares the average spread between the 6-12 month large CD and Treasury bill rates for the RTC group with the rest of the S&Ls in the sample. Vertical lines are drawn to correspond with the approximate dates CEBA and FIRREA became law. The results from Figure 1 show a large increase in the mean spread during 1987 and a large decline in the spread after 1987. Since the beginning of 1989, the spread has fluctuated between 30 to 70 basis points above the T-bill yield. Since it is possible that fluctuations in the interest rate spread may be due to other factors besides S&L risk (such as a "flight to quality" which would favor Treasuries), figure 2 plots the spread between the interest rate on 6 month prime-rated commercial paper and 6 month U.S. Treasury bills for the 1987-1991 period. The paper-bill spread rose to over 140 basis points in late 1987 (possibly a reaction to the October stock market crash), fell sharply at the beginning of 1988, declined further in

1989, rose somewhat at the end of 1990 and fell during 1991. Figure 3 plots the spread between the average 6-12 month large CD and commercial paper rates. The figure shows a decline in the CD-paper spread from early 1988 to the middle of 1989, and an increase thereafter. The increase in this spread after the passage of FIRREA is mainly due to the decline in commercial paper rates relative to both T-bill and CD rates.

Figure 4 examines the mean spread between the RTC institutions and other S&Ls. Prior to the passage of FIRREA, the spread for RTC institutions ranged from 10 to 25 basis points above well-capitalized thrifts. Since the passage of FIRREA, however, the spread has declined, indicating that the passage of FIRREA (and the implicit commitment of more funds if necessary) reduced the expected losses to uninsured depositors. As long as the RTC uses the purchase of assets and assumption of liabilities (P&A) method for resolving insolvent institutions, large depositors will not suffer losses. Since the P&A method is the most common way to resolve thrift and bank failures, the passage of FIRREA lowered the expected loss probability for uninsured depositors.[3] Thus, it seems that one consequence of the passage of the refunding bills has been a reduction in the average risk premium on all types of CDs.

IV. Estimation Procedure and Empirical Results

Equation (4) was estimated quarter by quarter using ordinary least squares. In all the regressions, the census region including Texas was suppressed; hence, coefficients on the REG dummies should be interpreted as relative to the Texas region. The coefficient estimates of the regional dummy variables are not reported but are available from the authors. The results of these regressions for the six month large CD rate spread are presented in Table 2. Reading across the table one can see how the magnitude of each coefficient has changed over time. The most consistent result is that the RASSETS coefficient is positive and significantly different from zero at the one percent level throughout the sample period. The coefficient on asset growth is significantly positive in every quarter except one through September 1989 and relatively insignificant afterward.

The coefficient on CAP is significantly negative through the third quarter of 1989. The coefficient on RISK is significantly positive in only three of the eighteen quarters.

The coefficient estimates for the RTC institutions can be derived by adding the coefficients for each variable with the corresonding interactived variable. Thus, a positive coefficient on RASSET*DUM indicates that an RTC S&L with a similar proportion of risky assets paid a higher rate than a non-RTC thrift. Table 2 shows that S&Ls that were eventually taken over by the RTC paid higher CD rates for similar proportions of risky assets than non-RTC institutons up through the end of 1990. The coefficient on CAP*DUM reveals a strong negative relationship in the first five quarters of the sample period, indicating that the CD rates of poorly capitalized institutions in the RTC group were more sensitive to changes in the capital-asset ratios than other S&Ls. The empirical results in Table 2 indicate that uninsured depositors were able to discriminate between S&Ls that were likely to be taken over by the federal government and other thrifts and receive a higher interest premium for bearing additional risk.

The coefficient on SIZE was significantly positive in eight of the eighteen quarters and significantly negative in six quarter. This was unexpected since previous work had found a negative relationship between firm size and deposit rates. However, the coefficient on (SIZE)(DUM) is significantly positive in 15 of the 16 quarters from 1987 to 1990, indicating that, conditioning on size, institutions ultimately taken over by the RTC paid higher deposit rates than S&Ls not taken over by the RTC. By bidding up deposit rates, other large institutions may have been forced by competition to raise their CD rates as well, which would account for the ambiguous sign on SIZE.

The results for the 6 month retail CDs are reported in Table 3.[4] The coefficient on CAP is significantly negative for most of the quarters prior to FIRREA and insignificant for most of the quarters in the post-FIRREA sample period. Both GROWTH and SIZE are significantly positive and related to the retail spread, and RASSETS is significantly positive throughout. The dummy variable results show that

relatively large RTC institutions tended to pay higher retail deposit rates than relatively large non-RTC institutions. Also, thrifts in the RTC group tended to pay more interest rates for holding risky assets and growing faster than other S&Ls. These effects were not as strong and consistent in the post-FIRREA period.

What does this evidence tell us about the link between CD rates and S&L risk? We find that, for the most part, CD spreads are related to S&L-specific variables in ways economic theory would suggest, but the effects are not as strong as they were before the passage of FIRREA. The conclusion to be drawn is that although there exists some relationship between CD rates and S&L risk in the sense that better capitalized, less risky S&Ls tend to pay lower CD rates, the differential between deposit rates paid by poorly capitalized institutions and well-capitalized thrifts has narrowed since the passage of FIRREA. One explanation for this is that the closure of the weakest institutions combined with stricter regulatory enforcement has reduced the risk exposure to uninsured depositors.

V. Conclusions

In the paper, we study the market for S&L certificates of deposit from 1987 to 1991 to examine the degree to which both insured and uninsured depositors react to differences in S&L risk. We find evidence that the spreads between the CD rates and the Treasury bill rate are significantly related to the capital-asset ratio and measures of risk taking. However, it appears that this relationship has not been as strong since FIRREA was passed in the sense that the estimated regression coefficients on these variables are not as significantly related to CD rates as before FIRREA.

These results have implications for policy. It is helpful to have depositors imposing discipline on thrifts because it reduces the S&Ls' incentive to increase risk exposure. If this discipline weakens, other things equal, the incentive to engage in riskier activities increase. However, strong regulatory enforcement can substitute for market discipline. If the degree of regulatory scrutiny is lessened or the terms of deposit

insurance become less broad, then one would expect depositors to monitor S&Ls more closely. It will be interesting, for example, to see whether the coefficients on some of the explanatory variables increase after the implementation of the FDIC Improvement Act of 1991, since that law is designed to make it more difficult to use the "too big to fail" doctrine to protect uninsured depositors.

Footnotes

[1] The opportunity to repudiate the interest rates of deposits affect the premium that buyers pay to acquire deposits of failed depository institutions (Collins 1992).

[2] We thank Philip Bartholomew for providing us with the set of institutions taken over by the RTC during this period.

[3] Of the 651 S&Ls resolved by the RTC from its inception in August 1989 through the end of June 1992, 62 percent have been P&A transactions, representing about 80 percent of the deposits of resolved institutions.

[4] We have done some tests using the spread between the wholesale and retail CD rates as the dependent variable. We find no evidence that this spread variable is correlated with the risk and capital adequacy measures. These results are available from the authors on request.

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Table 1
Means of variables used in the study

Variable name	1987:12 Mean	1990:12 Mean
6-12 month small CD rate (percentage points)	7.44	7.53
6-12 month large CD rate (percentage points)	7.66	7.56
6 month small CD spread (CD - T-bill rate)	0.94	0.47
6 month large CD spread (CD T-bill rate)	1.16	0.50
Total assets (millions of $)	489.73	531.14
CAP (percent)	2.04	4.42
RISK (percent)	3.10	3.90
GROWTH (quarterly percent change)	2.46	-0.13
RASSETS (percent)	2.23	1.32
Sample size	2334	1862

Table 2
Regression estimates using the spread between the 6 month large CD and T-Bill rates as the dependent variable: 8703-9106

	8703	8706	8709	8712	8803	8806	8809	8812	8903	8906
DUM1	1.159	0.819	0.900	1.160	1.444	0.724	0.202	-0.113	-0.508	0.270
	(15.168)***	(8.043)***	(8.479)***	(11.820)***	(17.682)***	(9.206)***	(2.097)**	(-1.055)	(-3.803)***	(2.632)***
SIZE	-0.022	0.024	0.039	0.006	-0.024	0.017	0.038	0.046	0.080	0.014
	(-3.628)***	(2.844)***	(4.464)***	(0.689)	(-3.557)***	(2.554)***	(4.853)***	(5.479)***	(7.805)***	(1.735)*
CAP	-0.453	-1.023	-0.921	-0.825	-0.473	-0.487	-0.306	-0.663	-0.796	-0.535
	(-4.000)***	(-7.199)***	(-6.580)***	(-6.565)***	(-4.631)***	(-5.244)***	(-2.116)**	(-2.776)***	(-2.350)**	(-2.143)**
RISK	0.011	0.860	-0.561	0.622	0.071	0.087	0.370	-0.503	0.347	0.360
	(0.048)	(2.888)***	(-1.860)*	(2.700)**	(0.444)	(0.580)	(1.500)	(-1.064)	(0.625)	(1.332)
GROWTH	0.007	0.008	0.012	0.008	0.001	0.006	0.001	0.002	0.005	0.008
	(2.582)***	(5.616)***	(6.338)***	(5.790)***	(1.848)*	(4.450)***	(2.079)**	(2.254)**	(2.409)**	(5.150)***
RASSETS	1.604	2.057	2.446	1.820	1.166	1.160	1.174	1.399	1.744	0.997
	(7.331)***	(6.816)***	(7.610)***	(5.933)***	(4.313)***	(4.313)***	(3.304)***	(3.554)***	(3.862)***	(2.815)***
DUM	0.902	0.544	0.661	0.823	0.963	0.461	0.075	-0.238	-0.581	-0.194
	(6.727)***	(2.995)***	(3.578)***	(4.853)***	(6.853)***	(3.435)***	(0.468)	(-1.419)	(-2.845)***	(-1.188)
(SIZE)(DUM)	0.003	0.053	0.063	0.039	0.020	0.041	0.054	0.585	0.090	0.062
	(0.266)	(3.546)***	(4.408)***	(2.750)***	(1.680)*	(3.623)***	(4.054)***	(4.176)***	(5.317)***	(4.576)***
(CAP)(DUM)	-0.587	-0.823	-0.942	-0.676	-0.528	-0.080	-0.160	-0.136	-0.314	-0.221
	(-2.510)**	(-2.849)***	(-3.410)***	(-3.227)***	(-3.330)***	(-0.553)	(-0.994)	(-0.962)	(-2.005)**	(-2.016)**
(RISK)(DUM)	0.187	0.620	0.709	0.654	0.250	0.377	0.656	0.632	0.816	0.340
	(0.726)	(1.586)	(1.845)*	(2.478)**	(1.401)	(2.397)**	(3.222)***	(3.341)***	(3.917)***	(2.064)**
(GROWTH)(DUM)	0.006	0.008	0.013	0.003	0.002	0.002	0.005	0.004	0.011	-0.000
	(2.497)**	(3.219)***	(3.733)***	(1.655)*	(1.112)	(2.180)**	(2.200)**	(1.216)	(2.808)***	(-0.139)
(RASSETS)(DUM)	1.253	1.981	1.189	2.300	0.519	1.004	0.643	1.116	1.208	0.764
	(6.270)***	(7.090)***	(3.932)***	(8.284)***	(2.147)**	(4.125)***	(2.114)**	(3.469)***	(2.900)***	(2.306)**
$\bar{R}^2$	0.811	0.804	0.859	0.874	0.903	0.868	0.737	0.591	0.564	0.598
F-Stat	531.640	509.520	750.698	855.458	1134.782	795.432	333.039	169.720	150.946	174.546
N	2467	2474	2462	2471	2437	2420	2376	2334	2322	2329
CHOW TEST:	2.733**	2.218**	3.282***	3.109***	2.707***	2.415**	2.746***	2.190**	1.494	7.860***

Table 2 (continued)
Regression estimates using the spread between the 6 month large CD and T-Bill rates as the dependent variable: 8703-9106

	8909	8912	9003	9006	9009	9012	9103	9106
DUM1	0.454	0.500	0.054	-0.104	0.333	0.545	0.657	0.545
	(6.089)***	(7.201)***	(0.755)	(-1.362)	(4.723)***	(6.301)***	(7.483)***	(6.666)***
SIZE	0.003	-0.015	0.005	0.012	-0.006	-0.019	-0.024	-0.020
	(0.564)	(-2.676)***	(0.931)	(2.038)**	(-1.065)	(-2.864)***	(-3.612)***	(-3.218)***
CAP	-0.403	0.215	0.103	0.160	0.029	-0.007	0.374	0.599
	(-2.158)**	(0.648)	(0.707)	(0.890)	(0.149)	(-0.029)	(1.616)	(2.650)***
RISK	-0.089	-0.188	-0.276	-0.078	-0.013	-0.221	-0.284	-0.249
	(-0.286)	(-0.623)	(-1.268)	(-0.330)	(-0.059)	(-0.834)	(-1.142)	(-1.082)
GROWTH	0.004	0.002	0.000	-0.000	0.000	-0.001	0.003	0.003
	(2.917)***	(1.197)	(0.439)	(-0.227)	(0.598)	(-0.707)	(2.687)***	(1.687)*
RASSETS	0.646	1.139	0.782	0.759	0.522	1.081	1.384	0.972
	(2.574)***	(3.954)***	(2.637)***	(2.463)***	(2.359)**	(2.889)***	(3.472)***	(2.613)***
DUM	0.141	0.101	-0.246	-0.296	-1.086	-0.106	0.365	0.385
	(1.114)	(0.829)	(-1.701)*	(-1.778)*	(-0.695)	(-0.488)	(1.519)	(1.561)
(SIZE)(DUM)	0.032	0.020	0.029	0.029	0.034	0.042	0.003	-0.007
	(3.047)***	(1.975)**	(2.394)**	(2.089)**	(2.662)***	(2.345)**	(0.150)	(-0.332)
(CAP)(DUM)	0.113	-0.263	-0.013	-0.016	-0.060	-0.020	-0.057	-0.046
	(1.296)	(-0.697)	(-0.169)	(-0.447)	(-0.950)	(-0.240)	(-0.859)	(-0.880)
(RISK)(DUM)	0.187	0.257	0.216	0.428	0.093	-0.236	0.099	-0.078
	(1.279)	(3.147)***	(1.414)	(3.141)***	(0.651)	(-1.219)	(0.589)	(-0.528)
(GROWTH)(DUM)	0.003	-0.002	-0.000	0.005	0.002	-0.001	0.006	0.002
	(0.921)	(-0.920)	(-0.034)	(1.412)	(0.711)	(-0.317)	(1.918)*	(0.735)
(RASSETS)(DUM)	0.734	0.945	1.082	0.784	0.926	1.292	-0.533	-0.609
	(2.345)**	(4.344)***	(2.652)***	(2.153)**	(1.879)*	(3.027)***	(-0.653)	(-1.053)
$\bar{R}^2$	0.754	0.670	0.521	0.543	0.763	0.699	0.746	0.767
F-Stat	340.073	227.885	115.390	122.176	321.249	226.108	282.544	310.151
N	2219	2235	2102	2040	1985	1941	1915	1877
CHOW TEST:	3.829***	4.295***	1.807*	1.483	2.437**	2.943***	2.024*	2.445**

Table 3
Regression estimates using the spread between the 6 month small CD and T-Bill rates as the dependent variable: 8703-9106

	8703	8706	8709	8712	8803	8806	8809	8812	8903	8906
DUM1	0.960 (17.720)***	0.597 (8.266)***	0.911 (12.353)***	0.845 (11.629)***	1.159 (18.659)***	0.699 (11.819)***	0.054 (0.790)	-0.206 (-2.774)***	-0.427 (-4.446)***	-0.058 (-0.710)
SIZE	-0.017 (-3.790)***	0.022 (3.673)***	0.013 (2.111)**	0.012 (2.003)**	-0.014 (-2.766)***	-0.001 (-0.186)	0.022 (3.995)***	0.024 (4.038)***	0.042 (5.701)***	0.017 (2.752)***
CAP	-0.113 (-1.502)	-0.671 (-7.678)***	-0.495 (-6.229)***	-0.444 (-5.584)***	-0.163 (-2.316)**	-0.160 (-2.367)**	0.180 (1.814)*	-0.025 (-0.156)	-0.183 (-0.764)	-0.299 (-1.513)
RISK	0.269 (1.837)*	0.116 (0.604)	0.147 (0.731)	0.432 (2.897)***	0.164 (1.487)	0.165 (1.530)	0.570 (3.361)***	-0.015 (-0.047)	-0.598 (-1.402)	0.028 (0.117)
GROWTH	0.001 (3.993)***	0.006 (6.247)***	0.005 (4.981)***	0.007 (6.420)***	0.000 (0.162)	0.003 (3.352)***	0.001 (2.040)**	0.002 (3.628)***	0.006 (3.577)***	0.008 (6.687)***
RASSETS	1.240 (9.125)***	1.567 (7.764)***	1.186 (5.425)***	1.218 (5.364)***	0.995 (4.956)***	0.784 (3.914)***	0.746 (2.971)***	1.013 (3.427)***	1.115 (3.206)***	0.710 (2.360)**
DUM	0.641 (6.351)***	0.324 (2.364)**	0.348 (2.517)**	0.446 (3.301)***	0.692 (6.027)***	0.376 (3.460)***	-0.007 (-0.055)	-0.426 (-3.408)***	-0.703 (-4.528)***	-0.150 (-1.117)
(SIZE)(DUM)	0.011 (1.369)	0.048 (4.190)***	0.063 (5.425)***	0.047 (4.149)***	0.026 (2.691)***	0.027 (2.984)***	0.032 (3.117)***	0.044 (4.239)***	0.070 (5.351)***	0.034 (2.974)***
(CAP)(DUM)	-0.389 (-2.594)***	-0.419 (-2.260)**	-0.362 (-2.148)**	-0.408 (-2.856)***	-0.303 (-2.957)***	0.065 (0.854)	0.029 (0.357)	0.075 (1.068)	-0.016 (-0.211)	-0.033 (-0.529)
(RISK)(DUM)	0.303 (1.691)*	-0.037 (-0.133)	0.200 (0.767)	0.558 (3.104)***	0.445 (3.503)***	0.502 (4.403)***	0.588 (4.479)***	0.529 (4.356)***	0.457 (3.149)***	0.499 (4.070)***
(GROWTH)(DUM)	0.003 (2.005)**	0.004 (2.063)**	0.000 (0.175)	0.017 (1.108)	0.003 (2.317)**	0.001 (1.353)	0.003 (2.178)**	0.002 (0.967)	0.002 (0.624)	0.003 (2.136)**
(RASSETS)(DUM)	1.069 (6.975)***	1.672 (8.015)***	1.162 (5.374)***	1.125 (5.118)***	0.148 (0.785)	0.418 (2.198)**	0.382 (1.706)*	0.775 (3.316)***	1.03 (3.233)***	0.769 (2.748)***
$\bar{R}^2$	0.817	0.779	0.853	0.863	0.907	0.840	0.631	0.375	0.290	0.457
F-Stat	691.818	545.215	898.121	974.561	1492.771	801.051	254.605	87.543	60.395	122.796
N	3102	3096	3103	3086	3068	3040	2966	2891	2906	2895
CHOW TEST:	2.380**	1.550	3.110***	2.676***	5.034***	2.642***	2.526**	1.665	4.241***	9.118***

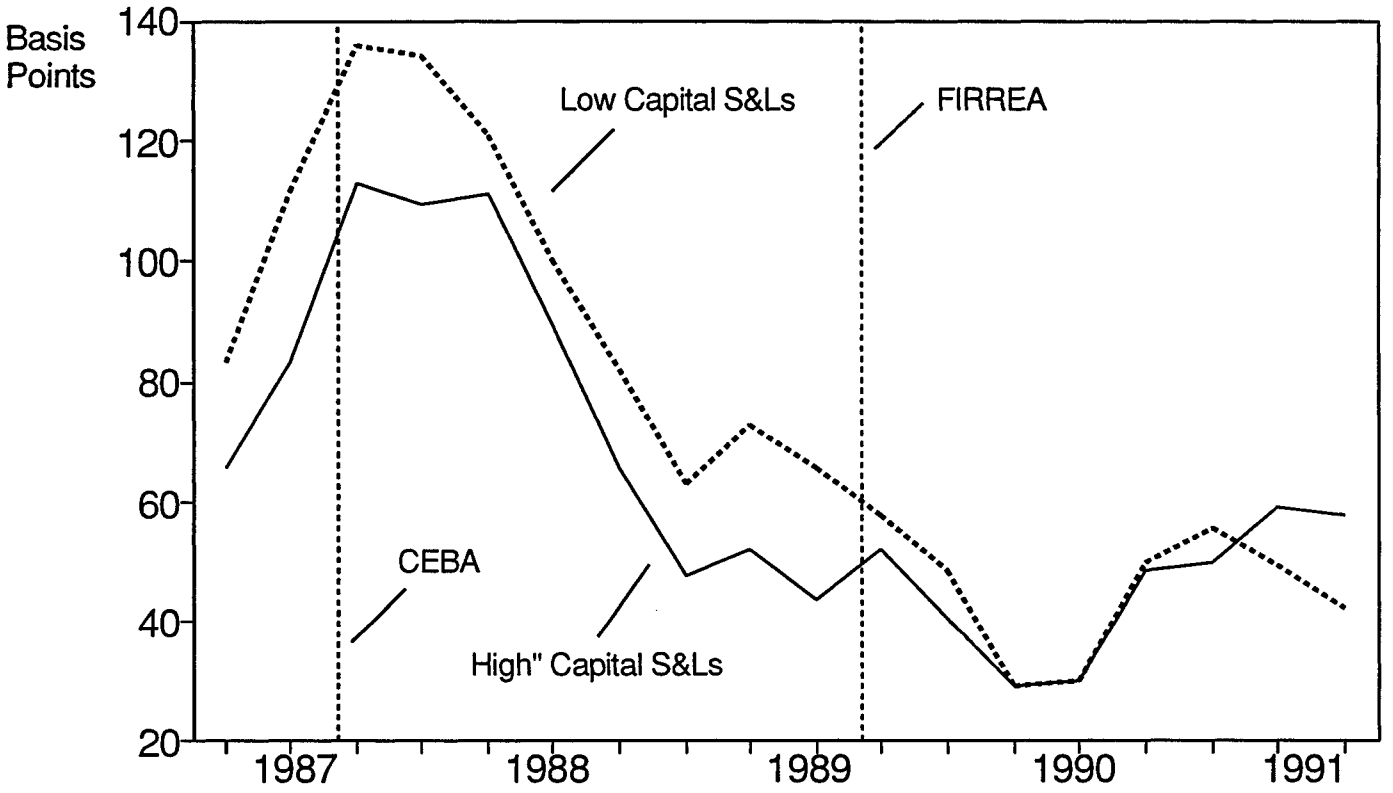
Table 3 (continued)
Regression estimates using the spread between the 6 month small CD and T-Bill rates as the dependent variable: 8703-9106

	8909	8912	9003	9006	9009	9012	9103	9106
DUM1	0.231	0.298	-0.158	-0.347	-0.010	0.310	0.412	0.379
	(4.001)***	(5.664)***	(-2.673)***	(-5.652)***	(-0.163)	(4.594)***	(6.480)***	(6.094)***
SIZE	0.004	-0.009	0.013	0.219	0.013	-0.006	-0.008	-0.009
	(0.890)	(-2.076)**	(2.728)***	(4.439)***	(2.639)***	(-1.150)	(-1.710)*	(-1.955)*
CAP	0.016	0.099	0.084	0.050	0.041	-0.193	0.227	0.423
	(0.112)	(0.374)	(0.711)	(0.485)	(0.253)	(-1.116)	(1.396)	(2.578)***
RISK	-0.605	-0.531	-0.194	-0.004	0.141	-0.063	0.211	0.023
	(-2.484)**	(-2.271)**	(-1.035)	(-0.018)	(0.744)	(-0.310)	(1.144)	(0.128)
GROWTH	0.003	0.003	0.001	0.000	-0.000	-0.001	0.002	0.001
	(3.051)***	(2.750)***	(1.470)	(0.328)	(-1.785)*	(-0.871)	(2.619)***	(0.159)
RASSETS	0.951	1.070	0.967	0.950	0.646	1.213	1.065	1.045
	(4.603)***	(4.568)***	(3.752)***	(3.388)***	(3.125)***	(3.989)***	(3.564)***	(3.512)***
DUM	0.034	0.057	-0.398	-0.567	-0.474	-0.173	0.139	0.261
	(0.336)	(0.607)	(-3.451)***	(-4.095)***	(-3.417)***	(-1.026)	(0.829)	(1.474)
(SIZE)(DUM)	0.023	0.018	0.034	0.044	0.056	0.037	0.018	0.000
	(2.746)***	(2.187)**	(3.533)***	(3.731)***	(4.845)***	(2.653)***	(1.264)	(0.009)
(CAP)(DUM)	0.040	0.538	0.023	-0.016	-0.098	-0.104	-0.085	-0.049
	(0.943)	(1.764)*	(0.702)	(-0.941)	(-2.196)**	(-1.456)	(-1.673)*	(-1.152)
(RISK)(DUM)	0.217	0.140	0.219	0.323	0.034	0.151	0.052	0.070
	(2.203)**	(3.784)***	(2.483)**	(3.345)***	(0.323)	(0.982)	(0.419)	(0.584)
(GROWTH)(DUM)	0.002	0.001	0.000	0.006	0.002	-0.002	0.006	0.006
	(1.188)	(0.709)	(0.047)	(2.405)**	(0.936)	(-0.900)	(2.286)**	(2.593)***
(RASSETS)(DUM)	0.764	0.541	0.425	0.765	0.415	0.721	0.292	-0.545
	(3.244)***	(3.222)***	(1.584)	(2.366)**	(1.387)	(2.041)**	(0.495)	(-1.189)
$\bar{R}^2$	0.663	0.591	0.404	0.474	0.725	0.738	0.809	0.800
F-Stat	274.627	198.399	90.892	115.228	327.808	341.753	509.875	467.911
N	2782	2738	2649	2535	2484	2425	2397	2331
CHOW TEST:	4.477***	8.868***	2.073**	1.933*	2.849***	2.108**	1.791*	5.038***

Figure 1

Rate Spreads of 6-12 Month Large CDs for S&Ls

(Number of Basis Points above 6 Month Treasury Bill Rate)



Source: Office of Thrift Supervision. Calculations are based on means of CD rates reported by S&Ls in each group. Low capital S&Ls are those institutions eventually taken over by the RTC between 1989 and 1992.

Figure 2

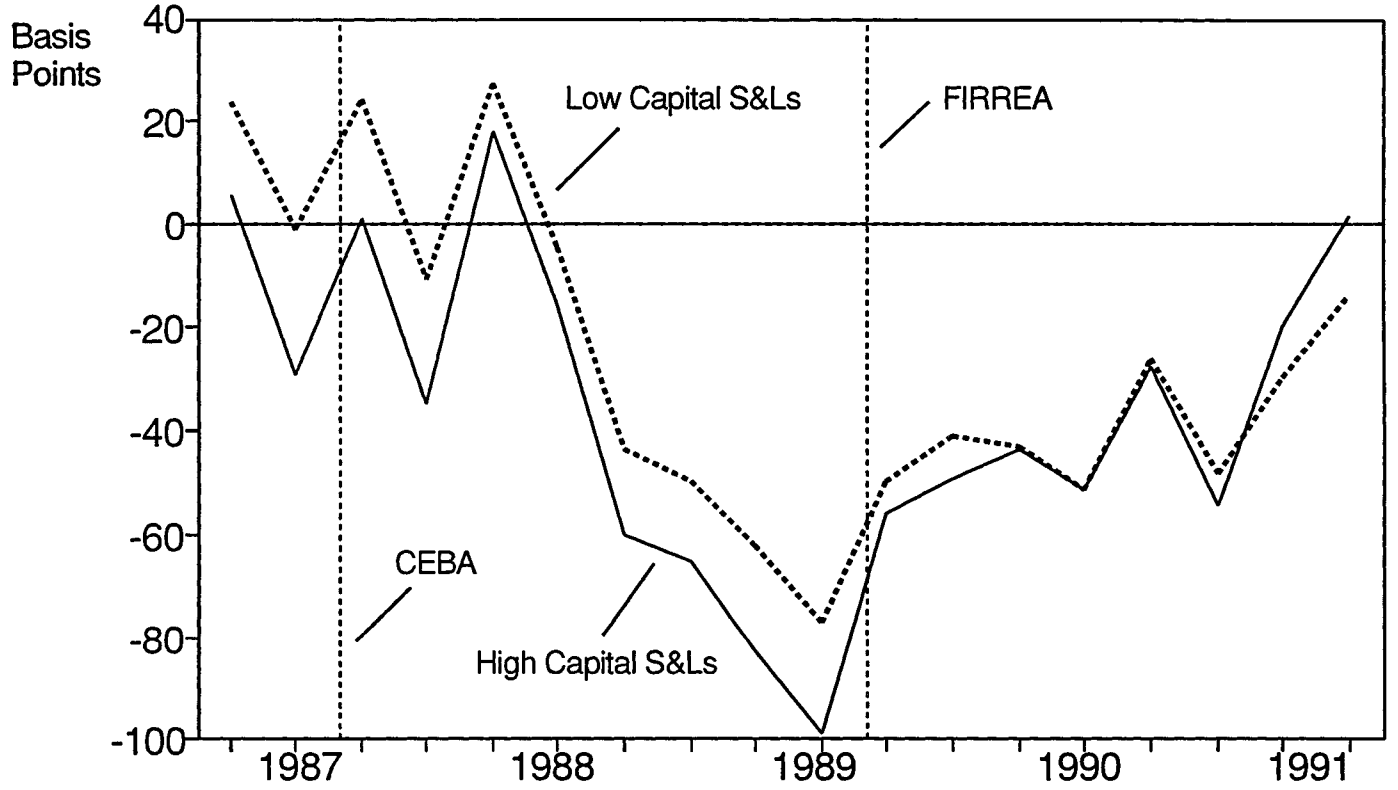
6 Month Commercial Paper - T-Bill Interest Rate Spread -- 1987-1991

Source: Federal Reserve Board

Figure 3

Rate Spreads of 6-12 Month Large CDs for S&Ls

(Number of Basis Points above the 6 Month Commericial Paper Rate)

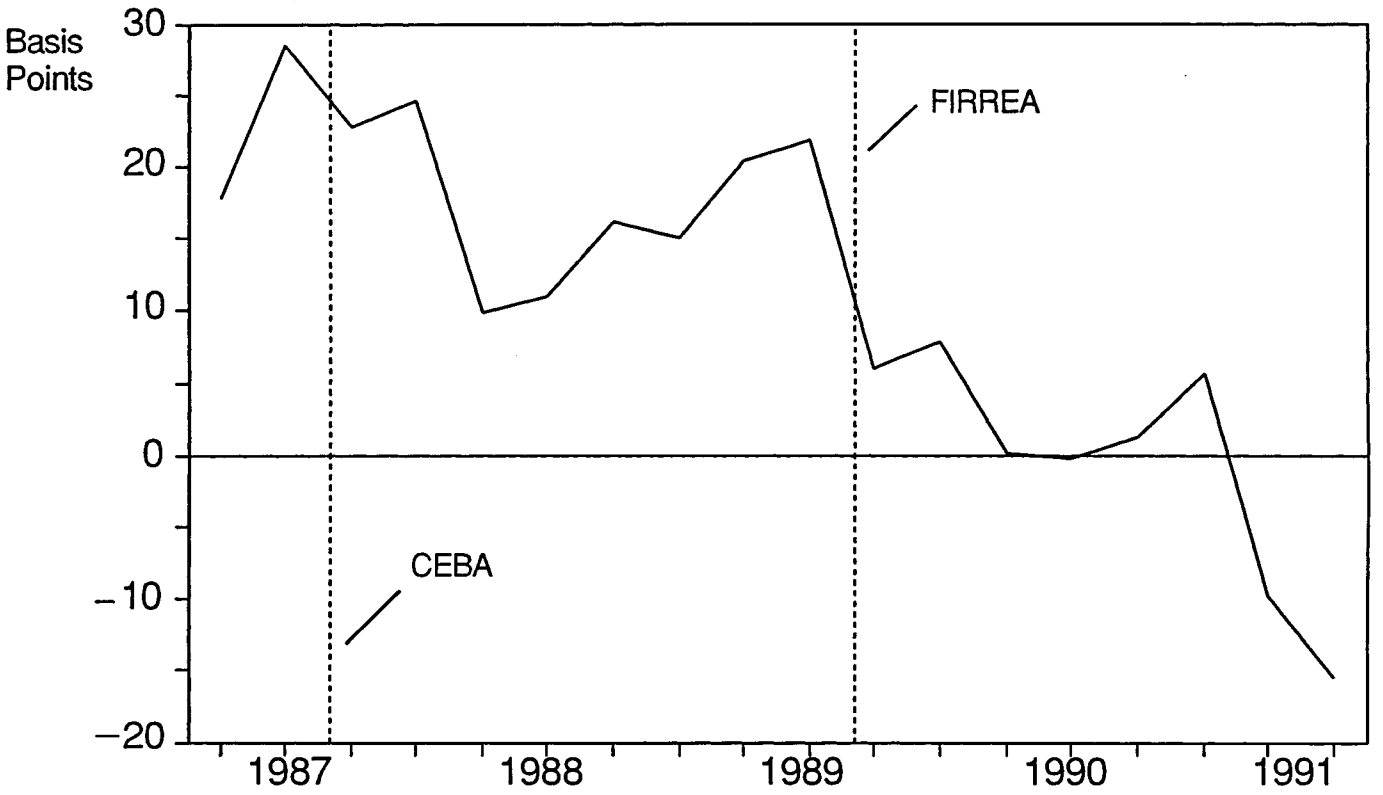


Source: Office of Thrift Supervision. Calculations are based on means of CD rates reported by S&Ls in each group. Low capital S&Ls are those institutions eventually taken over by the RTC between 1989 and 1992.

Figure 4

Rate Spread of 6-12 Large CDs for Low Capital S&Ls

(# of Basis Points above average rate paid by well-capitalized S&Ls)



Source: Office of Thrift Supervision. Calculations are based on means of CD rates reported by S&Ls in each group. Low capital S&Ls are those institutions eventually taken over by the RTC between 1989 and 1992.