Journal of Financial Services Research 5: 315-339 (1992)
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Moral Hazard, Portfolio Allocation, and Asset Returns for Thrift Institutions

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Abstract

This article examines the earnings performance of nontraditional assets allowed to thrifts since the early 1980s. It uses the statistical cost accounting methodology developed by Hester and Zoellner to estimate average returns on thrift portfolio investments for the years ending June 30, 1987 and June 30, 1988. Results show that average returns on land loans, service corporation investment, real estate investment, and commercial loans were significantly lower than returns on more traditional assets. The results are far more pronounced at capital deficient institutions, lending support to the hypothesis that they used nontraditional investments as a means of exploiting the deposit insurance system. Returns on nontraditional assets are significantly affected by geographic factors, even for well capitalized institutions. The article concludes with an evaluation of the reimposition of portfolio restrictions on thrifts by the Financial Institutions Reform, Recovery, and Enforcement Act of 1989.

1. Introduction

The Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) and the Garn-St Germain Depository Institutions Act of 1982 significantly loosened restrictions on the portfolio investments of federally chartered thrift institutions. The first of these acts allowed thrifts to invest in consumer loans. The second expanded consumer loan investment powers, permitted unsecured commercial lending, expanded nonresidential real estate investment powers, and, perhaps most importantly, eliminated loan-to-value restrictions on all classes of real estate loans except one- to four-family houses. Concurrently, many states adopted even more liberal asset investment provisions for state chartered thrifts.

The views expressed in this paper are those of the authors and do not necessarily represent the views or opinions of the Federal Housing Finance Board, the Board of Governors of the Federal Reserve System, or the Federal Deposit Insurance Corporation. George Benston, Tom Fomby, Allen Berger, John Wolken, and anonymous referees made numerous constructive suggestions.

The Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIREA) reverses some of these provisions. It reimposes loan-to-value restrictions on real estate loans, limits nonresidential real property loans, and prohibits the ownership of real estate for development purposes. It also generally applies to state chartered institutions the statutory investment limitations applicable to federally chartered ones.

This article provides evidence on the profitability of alternative thrift investments by estimating net yields of assets in thrift portfolios. With this evidence, one may then evaluate whether or not the asset categories liberalized by DIDMCA and the Garn-St Germain Act have significantly enhanced thrift profitability as originally envisaged.

The analysis is conducted within a statistical cost accounting framework that allows for the estimation of net asset yields and full liability costs for thrift institutions. The model used here is a variant of the methodology of Hester and Zoellner (1966), who extended the application of statistical cost accounting principle to revenues. Since it is a cross-sectional technique, it cannot measure the potentially beneficial diversification effects arising from imperfectly correlated cash flows.

Data are taken from the two years ending June 30, 1987 and June 30, 1988, as far as possible from the adoption of the Garn-St Germain Act so as to insulate operating results from the start-up costs and losses often associated with new activities. Investments such as raw land and real estate development require large initial cash outlays, but may provide offsetting returns in later years that make the investments profitable in the long run. Without asset-specific returns, it is impossible to account for such lags, so that any interpretation of results should be tempered by an understanding of potential limitations of this approach. If, however, much of the direct investment by thrifts was accomplished in the years immediately following deregulation, these projects should have matured by the time period covered in this study.[1] The poor performance of many nontraditional assets in the late 1980s may reflect past unrecognized capital losses and not necessarily low current returns.

In order to examine the interaction of moral hazard and portfolio allocation, separate analyses are conducted on three groups of institutions, stratified by tangible net worth as well as on the industry as a whole.[2] This stratification is based on tangible net worth two years earlier rather than on contemporaneous net worth because low contemporaneous net worth may reflect unfavorable outcomes, while potential moral-hazard-laden behavior should reflect owners' equity interests at some point in the past.

The results show that, at least during the sample period, nontraditional investments, especially those associated with real estate development, were less profitable than were residential mortgages. However, this result is significantly more pronounced at capital-deficient thrifts, suggesting that some institutions may have used nontraditional investments as a means of exploiting the current system of deposit insurance where risks are not actuarially priced.

As a further test of the hypothesis that the effects of moral hazard rather than exogenous economic shocks are responsible for the results, thrifts outside of the "oil patch" are examined to see whether the collapse of Southwestern real estate markets is responsible for the reported poor performance of real estate development-related assets. The results of this further analysis provide considerable support for the exogenous shock hypothesis.

In section 2, expanded thrift powers and their potential interaction with moral hazard are examined. This is followed in section 3 by a discussion of the data and the statistical cost accounting methodology used in the analysis. Section 4 presents the empirical results, followed by a summary and conclusion in section 5.

2. Thrift powers and moral hazard

Modern portfolio theory suggests that expanded investment powers may lead to increased risk-adjusted returns for thrift institutions, both through higher returns and through lower risk associated with diversification.[3] However, when deposit insurance is not actuarially priced, these expanded powers also offer thinly capitalized thrifts the opportunity to increase the value of the implicit deposit insurance subsidy from FSLIC by undertaking investments that are excessively risky from the insurer's point of view.[4] Evidence from a number of empirical studies supports this.[5] However, the tendency toward excessive risk taking may be controlled by the maintenance of meaningful capital requirements, asset-specific regulation, risk-based premiums, and early-closure rules (Benston 1989).

Table 1 shows the portfolio holdings as a percentage of total assets for all FSLIC-insured institutions averaged over the five quarter ends from June 30, 1987 to June 30, 1988, and also breaks these holdings down by three strata of tangible net worth, measured two years earlier. Aggregate use of the new powers for the year ending June 30, 1988 is modest, with consumer loans constituting only 4.3 percent of assets, unsecured commercial loans 1.2 percent, service corporation investment 0.8 percent,[6] direct equity real estate investment 0.3 percent, land loans 1.9 percent, and nonresidential mortgages 8.1 percent.

Use of these powers by TNW > 3 percent institutions is somewhat less than aggregate use, but use of new powers by tangible-insolvent institutions is greater than aggregate use in every category. Asset and liability holdings between tangible-insolvent institutions and those with tangible net worth greater than 3 percent are significantly different for all items except multifamily mortgages.[7]

Other studies have reported that many of the institutions closed by FSLIC during the 1980s had, prior to and at the date of closing, relatively large amounts of nontraditional assets—especially loans for the acquisition and development of land, nonresidential mortgages, multifamily mortgages, and equity real estate investments.[8] The apparent correlation between failure and high concentrations of nontraditional assets may have several explanations. One is that about-to-fail institutions have already sold all liquid and easily liquefiable traditional assets as a means of generating cash. A second is that nontraditional real estate assets are a convenient vehicle for fraud and self-dealing, which becomes attractive in a period of lax and/or infrequent supervision and the nonenforcement of even very lenient capital requirements. A third explanation is the moral-hazard hypothesis, which posits that owner-principals and manager-agents of thinly capitalized firms act in a rational, profit-maximizing manner in seeking out high-risk, high-return investments when their cost of funds is not affected by the riskiness of their investment

Table 1. Means and standard deviations of the variables for year ending June 30, 1988. All FSLIC-insured institutions and stratified by tangible net worth measured two years earlier. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

Tangible net worth	All (1)	Greater than 3% (2)	Zero to 3% (3)	Insolvent (4)
Traditional assets				
Single-family	49.1	52.7	46.2	41.6*
	(17.9)	(17.6)	(17.6)	(16.3)
Multifamily	4.4	4.1	5.3	4.4
	(6.4)	(6.5)	(6.8)	(5.7)
Mortgage securities	9.1	8.2	9.9	10.8*
	(10.7)	(10.5)	(11.2)	(10.5)
Liquidity	16.4	18.0	14.0	14.2*
	(10.4)	(11.4)	(8.6)	(8.2)
Garn-St Germain assets				
Commercial loans	1.2	1.0	1.3	1.6*
	(2.3)	(2.2)	(2.2)	(2.4)
Consumer loans	4.3	3.9	4.8	5.1*
	(4.9)	(4.8)	(5.2)	(4.7)
Nonresidential	8.1	7.4	9.0	8.9*
	(7.4)	(7.2)	(7.2)	(7.7)
Real estate assets				
Real estate investment	0.3	0.2	0.5	0.4*
	(1.5)	(1.2)	(2.0)	(1.6)
Service corporations	0.8	0.5	1.1	1.4*
	(2.2)	(1.5)	(2.3)	(3.4)
Land loans	1.9	1.5	2.7	2.3*
	(4.6)	(3.7)	(6.1)	(5.0)
Other assets				
Real estate owned	2.0	1.1	2.7	3.7*
	(4.3)	(2.5)	(5.2)	(6.5)
Goodwill	0.7	0.2	0.6	2.6*
	(2.2)	(0.9)	(1.6)	(3.8)
Fixed assets	1.4	1.3	1.6	1.5*
	(1.0)	(1.0)	(1.1)	(0.9)
Valuation allowances	0.8	0.4	1.0	1.8*
	(2.2)	(1.1)	(2.4)	(3.8)
Mortgages serviced	13.3	10.4	18.7	15.8*
	(55.3)	(53.2)	(56.0)	(59.8)
Other assets	5.4	4.3	6.1	7.7*
	(4.2)	(3.5)	(4.3)	(4.8)

continued

Table 1. Continued

Tangible net worth	All (1)	Greater than 3% (2)	Zero to 3% (3)	Insolvent (4)
Liabilities				
Deposits	86.9	86.5	86.9	88.4*
	(12.1)	(8.4)	(12.9)	(18.7)
Advances	4.9	3.4	6.1	7.7*
	(6.3)	(5.3)	(6.5)	(7.5)
Repos	1.6	1.0	2.2	2.6*
	(4.4)	(3.3)	(5.2)	(5.9)
Other borrowings	1.0	0.7	1.1	1.7*
	(2.7)	(2.4)	(2.9)	(3.4)
Other liabilities	1.6	1.4	1.7	1.7*
	(1.3)	(1.3)	(1.3)	(1.2)
Net income	−0.8	0.4	−1.7	−3.4*
	(6.1)	(3.3)	(7.3)	(9.3)
Tangible net worth	2.5	6.6	0.6	−7.4*
	(10.4)	(5.4)	(8.2)	(15.7)
Assets (million)	407.7	245.2	605.5	664.8*
	(1518.7)	(975.3)	(2071.3)	(1964.6)
Observations	2937	1704	679	554

*Significantly different from the TNW > 3% group at the 95% level.
Numbers in parentheses are standard deviations.

portfolio.[9] A fourth explanation is the "exogenous economic shock" hypothesis that thrift operators were blindsided by unforseen economic events—the decline in oil prices and associated collapse of real estate prices in the Southwest.[10] Yet another explanation for the apparent correlation between nontraditional portfolios and failure/closure is regulatory forbearance toward insolvent institutions with traditional portfolios.[11]

The self-dealing and moral-hazard explanations imply that nontraditional investments served as vehicles for exploiting a vulnerable regulatory apparatus, while the economic shock explanation imples that managers may have been making prudent investments but were victims of a regional economic downturn. None of these explanations imply that nontraditional investments per se are undesirable, only that deposit insurance and capital requirements should be priced according to risk or that capital should be sufficient to cover almost all of the losses that might be incurred.

3. Data and methodology

Data used in this study are four-quarter averages taken from thrift quarterly call reports filed with the Federal Home Loan Bank Board by each FSLIC-insured institution for the years ending June 30, 1987 and June 30, 1988. Firms were excluded from the analysis only

Table 1A. Means and standard deviations of the variables for year ending June 30, 1987. All FSLIC-insured institutions and stratified by tangible net worth measured two years earlier. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

Tangible net worth	All (1)	Greater than 3% (2)	Zero to 3% (3)	Insolvent (4)
Traditional assets				
Single-family	49.4	52.8	47.5	43.1*
	(16.7)	(16.6)	(16.5)	(15.1)
Multifamily	4.7	4.4	5.3	4.8
	(6.3)	(6.6)	(6.4)	(5.0)
Mortgage securities	7.4	6.6	7.8	9.0*
	(9.4)	(9.1)	(9.5)	(10.1)
Liquidity	17.3	19.2	15.5	14.9*
	(10.1)	(10.6)	(9.6)	(8.4)
Garn-St Germain assets				
Commercial loans	1.1	0.9	1.3	1.4*
	(2.4)	(2.3)	(2.5)	(2.3)
Consumer loans	4.4	3.9	4.7	5.2*
	(4.8)	(4.6)	(5.1)	(4.9)
Nonresidential	8.2	7.2	9.7	9.0*
	(7.4)	(7.1)	(7.9)	(7.0)
Real estate assets				
Real estate investment	0.4	0.2	0.5	0.5*
	(1.5)	(1.1)	(1.9)	(1.7)
Service corporations	0.9	0.6	1.0	1.4*
	(2.4)	(2.2)	(2.4)	(2.8)
Land loans	2.3	1.8	2.7	2.8*
	(5.7)	(5.0)	(6.4)	(6.3)
Other assets				
Real estate owned	1.4	1.0	1.8	2.0*
	(2.6)	(1.8)	(3.4)	(3.0)
Goodwill	0.9	0.2	0.6	2.9*
	(2.7)	(1.1)	(1.8)	(4.7)
Fixed assets	1.4	1.3	1.6	1.5*
	(1.0)	(1.0)	(1.0)	(0.9)
Valuation allowances	0.5	0.3	0.6	1.0*
	(1.6)	(1.0)	(1.5)	(2.4)
Mortgages serviced	8.9	6.4	11.9	11.5*
	(41.5)	(41.3)	(39.6)	(44.0)
Other assets	5.6	4.3	6.0	8.4*
	(4.4)	(3.8)	(4.3)	(4.4)

continued

Table 1A. Continued

Tangible net worth	All (1)	Greater than 3% (2)	Zero to 3% (3)	Insolvent (4)
Liabilities				
Deposits	87.7	88.0	87.9	86.7*
	(9.2)	(7.1)	(10.5)	(11.8)
Advances	4.0	2.7	4.9	6.3*
	(5.6)	(4.6)	(5.9)	(6.4)
Repos	1.0	0.5	1.3	1.7*
	(3.7)	(2.3)	(4.5)	(5.1)
Other borrowings	0.9	0.6	0.9	1.6*
	(2.5)	(2.1)	(2.3)	(3.5)
Other liabilities	1.6	1.5	1.6	1.6*
	(1.3)	(1.3)	(1.2)	(1.2)
Net income	0.0	0.8	−0.4	−1.4*
	(3.5)	(2.7)	(3.6)	(4.6)
Tangible net worth	2.9	6.1	1.7	−3.9*
	(6.5)	(3.9)	(5.4)	(7.1)
Assets (million)	371.8	220.1	453.0	653.2*
	(1322.7)	(901.3)	(1539.3)	(1822.9)
Observations	2920	1533	788	599

*Significantly different from the TNW > 3% group at the 95% level.
Numbers in parentheses are standrad deviations.

if data were not available for all four quarterly reports covered by the sample period or if the firms were not in existence two years prior to the estimation period.

The methodology used in this paper is a variant of the statistical accounting model. This methodology was popularized by Hester and Zoellner (1966), who extended statistical cost accounting methods to revenues. Subsequently, variants of this model have been applied to commercial banking data numerous times.[12] Crockett and King (1982) applied this technique to savings and loan data to examine the differences in powers available to state- versus federally-chartered thrifts in Texas. Brewer (1988) also has used this technique with thrift data to study the amount of implicit interest paid on savings deposits during the era of binding deposit-rate controls.

The statistical cost accounting model is an econometric technique that may be used, as here, to estimate net asset yields and full liability costs. Underlying this technique is the assumption that variations in income are attributable to variations in portfolio composition:

$$Y = \sum_{i}^{N} R_i - \sum_{j}^{M} C_j \tag{1}$$

where Y is an income measure, R_i is the revenue (net of servicing costs) associated with asset i ($i = 1, \ldots, N$), C_j is the cost (net of operating expenses) associated with liability j ($j = 1, \ldots, M-1$), and M represents net worth. Multiplying each R_i by A_i/A_i and each C_j by L_j/L_j, one obtains:

$$Y = \sum_i \frac{R_i}{A_i} A_i - \sum_j \frac{C_j}{L_j} L_j, \tag{2}$$

where the A_is are asset classes, the L_js are the liability classes, and L_M is net worth. The regression equation to estimate this model then becomes:

$$Y = \sum_{i=1}^{N} \beta_i A_i - \sum_{j=1}^{M} \delta_j L_j. \tag{3}$$

The estimated coefficients are interpreted as average returns and average costs.

In order to estimate equation (3), one variable must be excluded to avoid perfect collinearity. This study follows Rose and Wolken (1986) by choosing GAAP net worth as the excluded regressor. Theoretically, the components of GAAP net worth have no associated explicit costs, making it the preferred, but not the only choice for exclusion.

Unfortunately, GAAP net worth of most institutions is so small that the sum of assets still closely approximates the sum of liabilities. Since the $X'X$ matrix is nearly singular, computational problems lead to unreasonably large parameter estimates, a problem also encountered by Brewer (1988), whose estimated average mortgage yields for 1983 are five to six percent above historical values.

One remedy for this problem is to impose additional structure on the model. In this study, this is done by restricting the coefficient on deposits. The full deposit cost coefficient can be reasonably estimated from call-report data and the bank functional cost data. This is done by adding to deposit interest costs an amount equal to one percent of deposits. Net operating expenses from the 1987 functional cost data for time and savings deposits are 0.83 percent for banks with assets of less than $50 million, 0.75 percent for banks between $50 and $200 million, and 0.85 percent for banks above $200 million. These numbers are rounded up to 1.0 percent to take into account the higher noninterest operating expenses associated with NOW accounts and the higher deposit insurance premiums faced by thrifts.

The transformation of the dependent variable is

$$Y^* = Y + (\delta_1 + 0.01) L_1, \tag{4}$$

where Y is before-tax net income with the exclusion of gains on the sale of loans and securities, and $\delta_1 L_1$ is the aggregate deposit interest expense reported by the institutions. This transformed dependent variable has the interpretation of revenues available to pay deposit interest costs and return to equity holders after the payment to nondeposit liability holders. Substituting (4) into (3) and excluding net worth (L_M) yields:

$$Y^* = \sum_{i=1}^{N} \beta_i A_i - \sum_{j=2}^{M-1} \delta_j L_j. \tag{5}$$

Finally, to reduce heteroskedasticity equation (5) is divided by total assets A.[13] This yields:

$$\frac{Y^*}{A} = \sum_{i=1}^{N} \frac{\beta_i A_i}{A} - \sum_{j=2}^{M-1} \frac{\delta_j L_j}{A} + \mu. \tag{6}$$

A variation of equation (6) is estimated.

Assets included in the model may be partitioned into four groups—those associated with traditional thrift activities, with the powers authorized or expanded by the Garn-St Germain Act, with real estate development, and with other assets. The included variables associated with traditional thrift activities are one- to four-family mortgages, multifamily mortgages, mortgage-backed securities, and liquidity. The asset variables associated with Garn-St Germain powers are consumer loans, commercial loans, and nonresidential mortgage loans. Real estate investment, service corporation investment, and land loans are the variables associated with real estate development. Assets not fitting into any of these categories are goodwill, foreclosed real estate owned, fixed assets, valuation allowances, and other assets.[14,15]

The liability variables are Federal Home Loan Bank advances, reverse repurchase agreements, other borrowings, and other liabilities. Deposits are implicitly included, but have been substituted out of the estimation model. While selection and aggregation of the independent variables is always somewhat arbitrary when using statistical cost accounting models, the included variables must be mutually exclusive and totally exhaustive to prevent specification bias.

A net mortgage servicing portfolio is explicitly included in the model to capture the revenues and costs attributable to this particular off-balance-sheet item. It represents a large source of income not associated with an asset category that can be readily measured, and its exclusion would likely bias the coefficients on the one- to four-family mortgage and mortgage-backed security variables.

An intercept term also is included to measure those costs or revenues invariant with respect to the scale of the firm. If such costs or revenues exist, they should be small. Since the model has been scaled by assets, the reported intercept coefficient is that on the variable 1/Assets. Because the estimated intercept coefficient is significant in some specifications, it is included in the model.

The dependent variable is pre-tax income plus full deposit expense, excluding gains on sale of loans and securities. The timing of these gains is highly discretionary, and extraordinary items have usually been excluded when the statistical cost accounting model has been applied to commercial banking data. This exclusion substantially limits any bias that would be introduced by market-value gains on loans and securities in a declining interest rate environment by ignoring short-term realization of such gains. Upward movements are not included if the assets were not sold. The limited effects on income of nonrealized market-value changes remain. Thus, while unrealized capital losses on loans and securities due to interest rates are not reflected in the income measure, neither are realized or unrealized capital gains.

Gains on the sale of real estate are included in the income measure, as are downward market-value adjustments in the value of equity investments, which generally have to be recorded at the lower of cost or market. The dependent variable includes capital losses and loss provisions on all assets. Before-tax income is used because various provisions concerning tax carry-forwards and carry-backs mean there may be little relationship between current-period taxes and current-period income for thrift institutions. All asset and liability balances are averages of five end-of-quarter values, while the income variable is the sum of four quarterly values.

4. Results

Table 2 presents regression results for the two twelve-month periods ending June 30, 1987 and 1988. The asset coefficients are interpreted as returns to the specific asset class after servicing costs and after credit losses. The statistical cost technique allocates operating costs and credit losses to the various asset classes.

The results for the two time periods are quite similar in that traditional assets performed reasonably well, as did both consumer loans and nonresidential mortgages. Unsecured commercial loans, real estate investment, service corporation investment, and land loans, especially in the second period, did not. For both periods, commercial loans, real estate investment, service corporation investment, and land loans have estimated yields significantly less than that on one- to four-family mortgages. The negative net yield on real estate investment, service corporation investment, and land loans reflects the write-down of a part of the asset in question. While these coefficients are negative, the mean value of the portfolio proportion is small for these asset classes. For an institution with a portfolio with mean values of the asset proportions, the real-estate related assets would not have led to large losses.

Table 3 presents regression results for the year ending June 30, 1988 categorized by tangible net worth two years earlier. This is done because contemporaneous stratification by tangible net worth would make it most difficult to test the moral-hazard hypothesis. With contemporaneous sampling, one cannot tell whether losses on nontraditional investments led to capital deficiencies, or whether capital-deficient firms invested heavily in nontraditional assets. The former is consistent with the exogenous economic shock hypothesis, while the latter is consistent with the moral-hazard hypothesis. The stratification by tangible net worth were estimated simultaneously with a complete set of dummy interaction terms in order to gain efficiency.

These results indicate that thrifts that were insolvent two years earlier obtained returns on traditional assets that were at least as good as, and in the cases of one- to four-family mortgages and multifamily mortgages, significantly better than, those obtained by the group of thrifts with TNW > 3 percent of assets. The estimated yields on real estate investment and land loans were significantly less than those obtained for the TNW > 3 percent group,[16] while estimated yields on real estate investment, service corporation investment, and land loans for the insolvent group were significantly less than zero. For the year ending June 30, 1988, even highly capitalized institutions had a negative and significant return on service corporation investment. These results, however, need to be interpreted in light of the small mean values for the portfolio proportion of real estate assets.

As a whole, these results are supportive of the existence of moral hazard in the investment behavior of tangible-insolvent institutions. More importantly, they demonstrate that the investment activities newly restricted by FIRREA are not inherently bad. The largest group of institutions earned a positive return on their investments in nonresidential mortgages, and TNW > 3 percent institutions did well with real estate investment but not with land loans. If significant diversification benefits accrue from these activities, a case may be made for allowing these types of investment in order to reduce thrift portfolio

Table 2. Statistical cost model. Comparison of coefficients for years ending June 30, 1987 and June 30, 1988. All FSLIC-insured institutions. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

	Year ending 6/30/87 (1)	Year ending 6/30/88 (2)
Traditional assets		
Single-family	11.02*	9.66*
	(0.17)	(0.27)
Multifamily	11.18*	10.94*
	(0.72)	(1.16)
Mortgage securities	9.11*	8.61*
	(0.46)	(0.67)
Liquidity	7.15*	7.42*
	(0.36)	(0.59)
Garn-St Germain assets		
Commercial loans	4.17*	2.20
	(1.87)	(3.17)
Consumer loans	11.02*	11.27*
	(0.84)	(1.39)
Nonresidential	11.13*	9.36*
	(0.64)	(1.05)
Real estate assets		
Real estate investment	−10.14*	−3.29
	(2.82)	(4.94)
Service corporations	−17.79*	−31.38*
	(1.79)	(3.24)
Land loans	7.63*	−4.10*
	(0.85)	(1.72)
Other assets		
Real estate owned	−19.76*	−41.13*
	(1.74)	(1.95)
Goodwill	10.57*	5.93
	(1.56)	(3.22)
Fixed assets	−19.36*	−16.81*
	(4.15)	(6.64)
Valuation allowances	−87.09*	−75.88*
	(2.92)	(3.84)
Mortgages serviced	0.24*	−0.06
	(0.11)	(0.14)
Other assets	−7.89*	−2.79
	(1.19)	(2.05)

continued

Table 2. Continued

	Year ending 6/30/87 (1)	Year ending 6/30/88 (2)
Liabilities		
Advances	−12.15*	−2.79*
	(0.82)	(1.22)
Repos	−7.40*	−7.89*
	(1.16)	(1.69)
Other borrowings	−5.79*	−6.19*
	(1.67)	(2.64)
Other liabilities	9.91*	2.95
	(3.66)	(5.96)
Intercept	−3855.75*	992.56
	(1314.05)	(2280.02)
Observations	2920	2937
F	1904.2	600.2

The transformed dependent variable is revenues less full cost of nondeposit liabilities all divided by assets, from equation (4). The respective means (standard deviations) of the dependent variable are 0.0744 (0.0330) and 0.0612 (0.0552).
*Significantly different from zero at the 95% level.
Numbers in parentheses are standard errors.

risk.[17] However, these expanded asset powers must go hand in hand with some type of market discipline through deposit insurance reform, the maintenance of meaningful capital requirements, and for early closure rules.

4.1. Is the Southwest to blame?

Many have attributed the poor performance of real estate development related assets to the exogenous "economic shock" hypothesis—here the collapse of real estate markets in the Southwest, especially of those in Texas. While it is not possible to know what specific loans and investments are collateralized by real estate located in the Southwest, it is possible to estimate the cost relationship excluding institutions located in the distressed areas. These results should provide some evidence on whether the aggregate results are driven by the adverse economic events in the Southwest.

The regression results reported in table 4 address this in two ways. The first two columns stratify the data by having an interaction dummy variable for institutions located in the "oil patch"—Texas, Louisiana, Oklahoma, and Colorado (192 institutions). These are the states most likely to be adversely affected by the collapse in oil prices during the 1980s. These results are only for institutions that two years earlier reported tangible net worth of at least three percent of assets.

Institutions in these four states have significantly lower yields than all other institutions for multifamily mortgages, commercial loans, and service corporation investment. The interaction dummy variables for nonresidential mortgages and land loans are negative

Table 2A. Statistical cost model. Comparison of coefficients for years ending June 30, 1987 and June 30, 1988. FSLIC-insured institutions with service corporation investment of at least 0.5 percent of assets. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

	Year ending 6/30/87 (1)	Year ending 6/30/88 (2)
Traditional assets		
Single-family	11.45*	10.46*
	(0.51)	(0.88)
Multifamily	11.45*	15.62*
	(1.62)	(2.99)
Mortgage securities	7.82*	8.77*
	(1.34)	(2.01)
Liquidity	8.12*	8.61*
	(1.13)	(1.96)
Garn-St Germain assets		
Commercial loans	6.90	−1.73
	(3.59)	(6.60)
Consumer loans	13.02*	12.55*
	(1.87)	(3.54)
Nonresidential	10.99*	7.51*
	(1.42)	(2.44)
Real estate assets		
Real estate investment	−27.18*	−5.57
	(6.25)	(9.72)
Service corporations	−15.97*	−21.79*
	(2.74)	(5.78)
Land loans	9.93*	0.85*
	(1.46)	(3.12)
Other assets		
Real estate owned	−13.79*	−66.86*
	(3.32)	(4.32)
Goodwill	10.83*	13.51
	(2.74)	(6.75)
Fixed assets	−25.60*	−23.89*
	(9.91)	(19.22)
Valuation allowances	−129.51*	−76.40*
	(6.66)	(7.66)
Mortgages serviced	0.46*	0.23
	(0.22)	(0.34)
Other assets	−7.40*	−8.14
	(2.58)	(4.42)

continued

Table 2A. Continued

	Year ending 6/30/87 (1)	Year ending 6/30/88 (2)
Liabilities		
Advances	−15.09*	−1.56
	(1.78)	(2.89)
Repos	−3.31	−6.56
	(2.96)	(4.07)
Other borrowings	−5.37	−10.86
	(3.66)	(5.83)
Other liabilities	12.72	13.09
	(8.56)	(14.47)
Intercept	−4421.04	14323.10
	(7363.57)	(14762.94)
Observations	879	872
F	252.4	86.7

The transformed dependent variable is revenues less full cost of nondeposit liabilities all divided by assets, from equation (4). The respective means (standard deviations) of the dependent variable are 0.0620 (0.0449) and 0.0422 and (0.0841).
*Significantly different from zero at the 95% level.
Numbers in parentheses are standard errors.

and approach the customary 95 percent significance levels. The interaction dummy variables for liquidity, consumer loans, and real estate investment are significant and positive.

The results in column three and four are for an entirely different stratification—an interaction dummy for institutions in Federal Home Loan Bank Districts Eight through Twelve (533 institutions). This area corresponds to all states west of the Mississippi River plus Mississippi, encompassing a diverse set of regional economies, including troubled energy and agricultural regions in addition to the growing economies of the West Coast. For institutions in these states, nonresidential mortgages, service corporation investment, and land loans have significant negative coefficients on the interaction terms, but the real estate investment interaction dummy has a large positive coefficient. Institutions with TNW > 3 percent of assets and not located in areas that were subject to sectoral shocks had rather favorable experience with nontraditional assets, at least in the year ending June 30, 1988. Aggregate returns on unsecured commercial loans, multifamily mortgages, nonresidential mortgages, service corporation investment, and land loans were apparently depressed by regional factors. This indicates that, in addition to the low returns on nontraditional assets experienced by previously insolvent institutions, relatively healthy institutions in depressed markets also experienced low returns on nontraditional assets. These results, taken with the ones presented earlier in table 3, indicate the blame for the thrift debacle can be shared by regional economic collapse *and* the effects of moral-hazard behavior by tangibly insolvent thrifts.

Table 3. Statistical cost model for year ending June 30, 1988. Comparison of coefficients by tangible net worth measured two years earlier (jointly estimated). All FSLIC-insured institutions.

Tangible net worth	Greater than 3% (1)	Zero to 3% (2)	Insolvent (3)
Traditional assets			
Single-family	9.44*	9.07*	11.92*▲
	(0.33)	(0.62)	(0.77)
Multifamily	8.56*	10.43*	17.90*▲
	(1.50)	(2.19)	(2.91)
Mortgage securities	8.43*	9.08*	9.71*
	(0.83)	(1.43)	(1.66)
Liquidity	7.53*	7.78*	6.04*
	(0.68)	(1.46)	(1.74)
Garn-St Germain assets			
Commercial loans	4.00	9.18	2.38
	(4.07)	(6.49)	(6.94)
Consumer loans	11.63*	10.79*	11.83*
	(1.84)	(2.53)	(3.23)
Nonresidential	9.10*	10.47*	6.41*
	(1.42)	(2.04)	(2.24)
Real estate assets			
Real estate investments	30.51*	0.16	−54.97*▲
	(8.04)	(7.59)	(10.53)
Service corporations	−25.74*	−22.71*	−25.82*
	(6.09)	(6.45)	(4.72)
Land loans	0.79	5.80	−13.74*▲
	(2.90)	(2.98)	(3.42)
Other assets			
Real estate owned	−24.67*	−43.95*	−41.01*▲
	(4.61)	(3.34)	(2.76)
Goodwill	13.27	25.56*	1.52▲
	(9.43)	(8.52)	(4.05)
Fixed assets	−7.14	−2.91	−80.03*▲
	(8.87)	(11.79)	(16.23)
Valuation allowances	−151.81*	−119.27*	−40.08*▲
	(10.35)	(7.78)	(5.19)
Mortgages serviced	−0.18	0.10	0.29
	(0.19)	(0.31)	(0.27)
Other assets	−2.61	−4.05	−10.54▲
	(3.32)	(4.19)	(3.55)

continued

Table 3. Continued

Tangible net worth	Greater than 3% (1)	Zero to 3% (2)	Insolvent (3)
Liabilities			
Advances	−4.35*	−7.02*	0.60▲
	(1.84)	(2.30)	(2.17)
Repos	−7.40*	−7.67*	−6.54*
	(2.81)	(3.14)	(2.86)
Other borrowings	−4.45	−10.02*	−5.73
	(3.87)	(5.01)	(5.11)
Other liabilities	6.35	−1.87	−1.50
	(7.71)	(11.93)	(13.57)
Intercept	−1907.30	22873.40*	17770.45
	(2398.54)	(6965.20)	(9800.06)
Observations	1704	679	554
F	221.04		

The transformed dependent variable is revenues less the full cost of nondeposit liabilities all divided by assets, from equation(4). The mean of the dependent variable is 0.0612 and the standard deviation is 0.0552.
*Significantly different from zero at the 95% level.
▲Significantly different from the coefficient for the TNW > 3% group at the 95% level.
Numbers in parentheses are standard errors.

4.2. Implications of FIRREA

The Financial Institutions Reform, Recovery, and Enforcement Act of 1989 was proposed as a belated response to mounting losses in the thrift industry. In addition to authorizing $50 billion for case resolution and fundamentally restructuring the thrift regulatory apparatus, FIRREA imposes upon federally-chartered thrift institutions a number of asset investment restrictions. This is a partial reversal of some provisions of the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn-St Germain Depository Institutions Act of 1982 that removed or liberalized asset investment restrictions. Implicit in the Congressional action is the belief that thrift investments in the newly restricted assets were largely to blame for the record number and cost of thrift failures. During Congressional debate on FIRREA, thrift diversification into nontraditional and/or speculative investments was repeatedly cited as a major contributing factor to the massive insolvencies that bankrupted the thrift deposit insurance fund.

FIRREA imposes a series of loan-to-value limitations on real estate loans. Prior to the adoption of the Act, federal institutions paradoxically were subject to loan-to-value limits only on one-to four-family mortgages, perhaps the asset in their portfolios subject to the least credit risk. The new limits are 95 percent on one-to four-family homes, 80 percent on other improved real estate, 70 percent on developed but unimproved real estate, and 65 percent on raw land. The Act further limits nonresidential real property loans to four

Table 3A. Statistical cost model for year ending June 30, 1987. Comparison of coefficients by tangible net worth measured two years earlier (jointly estimated). All FSLIC-insured institutions.

Tangible net worth	Greater than 3% (1)	Zero to 3% (2)	Insolvent (3)
Traditional assets			
Single-family	10.93*	11.09*	10.37*
	(0.21)	(0.35)	(0.46)
Multifamily	11.30*	12.18*	9.83*
	(0.95)	(1.38)	(1.85)
Mortgage securities	9.16*	10.16*	7.53*
	(0.60)	(0.91)	(0.96)
Liquidity	7.55*	7.45*	4.96*▲
	(0.45)	(0.76)	(0.96)
Garn-St Germain assets			
Commercial loans	6.80*	8.34*	−4.83▲
	(2.67)	(3.29)	(3.98)
Consumer loans	12.22*	8.94*	11.25*
	(1.19)	(1.46)	(1.82)
Nonresidential	11.66*	10.62*	9.41*
	(0.93)	(1.08)	(1.37)
Real estate assets			
Real estate investments	−13.67*	2.01	−22.91*
	(5.22)	(4.13)	(5.50)
Service corporations	−33.66*	1.05*	−4.11*▲
	(2.60)	(3.48)	(3.31)
Land loans	7.89*	8.06*	5.11*
	(1.38)	(1.47)	(1.67)
Other assets			
Real estate owned	−14.91*	−17.81*	−28.56*▲
	(3.47)	(2.37)	(3.49)
Goodwill	19.01*	0.05	8.23*▲
	(5.06)	(4.27)	(1.86)
Fixed assets	−24.15*	−14.63	−22.01*
	(5.48)	(7.66)	(10.26)
Valuation allowances	−91.13*	−111.95*	−70.14*▲
	(6.29)	(5.57)	(4.16)
Mortgages serviced	0.14	0.60*	−0.12
	(0.17)	(0.21)	(0.22)
Other assets	−5.26*	−12.56*	−3.72
	(2.01)	(2.31)	(2.14)

continued

Table 3A. Continued

Tangible net worth	Greater than 3% (1)	Zero to 3% (2)	Insolvent (3)
Liabilities			
Advances	−13.81*	−10.69*	−10.30*▲
	(1.39)	(1.42)	(1.46)
Repos	−10.28*	−6.44*	−7.45*
	(2.55)	(1.92)	(1.80)
Other borrowings	−5.54*	−3.94	−7.04*
	(2.67)	(3.58)	(2.63)
Other liabilities	3.78	−5.23	−47.78*▲
	(5.02)	(7.16)	(7.71)
Intercept	−5782.44*	8461.05*	9988.28
	(1382.76)	(4105.37)	(6524.28)
Observations	1533	788	599
F	681.04		

*Significantly different from zero at the 95% level.
▲Significantly different from the coefficient for the TNW > 3% group at the 95% level.
Numbers in parentheses are standard errors.

times an institution's capital. Unchanged are the percent-of-asset limitations on commercial loans, consumer loans, and service corporation investment.

The Act also generally limits the asset investment authority of state-chartered institutions to the same activities and amounts as permitted for federals. State-chartered institutions may be granted permission to engage in activities not permitted for federals only if they are in compliance with fully phased-in capital requirements and the Federal Deposit Insurance Corporation determines that the activity does not pose significant risk to the insurance fund. The Act does not allow the aggregate limitation on nonresidential real property loans to be waived.

For the past several years, the Federal Home Loan Bank Board had been embroiled in a controversy over the "direct investment" activities of insured institutions.[18] Direct investment includes equity interests in service corporations, ownership of real estate for development or investment purposes, and the holding of equity securities. FIRREA severely curtails direct investment powers—by restricting state-chartered thrifts to the three percent service corporation limit already faced by federals, by an explicit prohibition against other equity investments by state-chartered institutions, and by imposing a 100 percent capital requirement on the investment in subsidiaries that are engaged in activities impermissible for national banks. Taken together, these provisions limit thrift equity investments in real estate to investments through separately capitalized subsidiaries.

These recently enacted asset investment restrictions appear to be directed at a spurious correlation. While the healthier institutions in the late 1980s were those with very traditional portfolios, the converse was true in 1981.[19] Still, Congress may not have been acting

Table 4. Statistical cost model for year ending June 30, 1988. Geographic comparisons. Tangible net worth measured two years earlier of at least 3 percent of assets. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

		Dummy for TX, CO, OK, & LA		Dummy for Districts 8–12
	(1)	(2)	(3)	(4)
Traditional assets				
Single-family	9.71*	−0.02	9.86*	−0.80*
	(0.17)	(0.51)	(0.22)	(0.44)
Multifamily	9.84*	−7.89*	9.40*	−1.30
	(0.75)	(2.76)	(1.15)	(1.62)
Mortgage securities	8.65*	−1.32	8.87*	−0.87
	(0.41)	(1.44)	(0.53)	(0.97)
Liquidity	7.00*	3.22*	7.14*	0.76
	(0.34)	(1.16)	(0.44)	(0.79)
Garn-St Germain assets				
Commercial loans	6.54*	−32.00*	7.36*	−5.49
	(2.06)	(6.33)	(3.06)	(4.36)
Consumer loans	9.87*	10.53*	10.09*	3.33
	(0.97)	(2.40)	(1.27)	(2.04)
Nonresidential	8.97*	−3.61	10.17*	−3.82*
	(0.75)	(1.87)	(1.06)	(1.52)
Real estate assets				
Real estate investments	9.24*	21.44*	7.79	23.41*
	(4.53)	(9.95)	(10.47)	(11.54)
Service corporations	1.40	−88.66*	−4.54	−34.41*
	(3.66)	(7.02)	(5.83)	(7.14)
Land loans	8.09*	−5.22	9.17*	−10.10*
	(2.90)	(3.03)	(2.94)	(3.48)
Other assets				
Real estate owned	−12.88*	−28.77*	−11.30	−16.08*
	(4.02)	(5.09)	(7.32)	(7.83)
Goodwill	0.99	55.08*	10.10	5.09
	(5.41)	(9.79)	(9.01)	(10.87)
Fixed assets	−7.97	8.96	−16.03*	11.72
	(4.76)	(10.74)	(6.73)	(9.54)
Valuation allowances	−104.33*	−82.99*	−125.76*	−38.82*
	(7.73)	(10.32)	(12.90)	(14.32)
Mortgages serviced	−0.30*	−0.04	0.01	0.31
	(0.12)	(0.20)	(0.20)	(0.23)
Other assets	−6.61*	22.82*	−6.54*	−7.63*
	(1.71)	(5.23)	(2.32)	(3.67)

continued

Table 4. Continued

	(1)	Dummy for TX, CO, OK, & LA (2)	(3)	Dummy for Districts 8-12 (4)
Liabilities				
Advances	−9.19*	13.96*	−10.61*	−11.16*
	(1.02)	(2.09)	(1.47)	(1.98)
Repos	−7.28*	7.21	−9.21*	4.13
	(1.47)	(3.79)	(2.32)	(3.11)
Other borrowings	−8.50*	−8.32	−7.81*	0.82
	(2.09)	(4.93)	(3.13)	(4.29)
Other liabilities	2.62	36.25*	0.16	23.44*
	(4.35)	(9.68)	(5.64)	(8.98)
Intercept	−2124.41	−27517.4*	−3232.33*	6297.01
	(1155.26)	(6909.59)	(1409.44)	(3433.62)
Observations	1512	192	1171	533
F	914.1		721.8	

*Significantly different from zero at the 95% level.
Numbers in parentheses are standard errors.
Federal Home Loan Bank Districts 8 through 12 encompass all states west of the Mississippi River plus Mississippi.

in a totally arbitrary way in addressing nontraditional investments. While, ex ante, nontraditional assets may increase the return or decrease the risk of a thrift's portfolio, ex post returns have not been favorable. This has been especially true for the capital-deficient portion of the industry.

5. Summary and conclusions

This study uses the statistical cost accounting methodology to evaluate the relative profitability of alternative asset classes for various stratifications of the thrift industry. While the evidence presented is consistent with the view that moral hazard associated with the current system of deposit insurance led to the thrift crisis, the study is not intended as a direct test of that hypothesis. Rather, it answers the more modest question of how profitable were the alternative investments available to thrifts in the second half of the 1980s.

The results how that use of investment powers expanded by the deregulation of the early 1980s was modestly profitable for the solvent portion of the thrift industry, but ex post led to significant losses on those assets for the insolvent portion. Net yields on such traditional assets as one- to four-family loans and multifamily loans varied little across net-worth strata. For nontraditional assets other than consumer loans, the actual returns across net-worth strata were for more variable. This finding comports with the hypothesized deleterious effects of moral hazard on the insolvent thrifts. Moreover, it argues for

Table 4A. Statistical cost model for year ending June 30, 1987. Geographic comparisons. Tangible net worth measured two years earlier of at least 3 percent of assets. (Data are averages of five quarter-end values and are expressed as ratios to average total assets).

		Dummy for TX, CO, OK, & LA		Dummy for Districts 8-12
	(1)	(2)	(3)	(4)
Traditional assets				
Single-family	10.94*	−0.21	11.02*	−0.34
	(0.16)	(0.54)	(0.21)	(0.37)
Multifamily	11.66*	−0.81	10.74*	1.18
	(0.75)	(2.17)	(1.00)	(1.48)
Mortgage securities	9.21*	1.09	9.38*	−0.87
	(0.46)	(1.77)	(0.56)	(1.02)
Liquidity	7.40*	3.94*	7.19*	2.35*
	(0.34)	(1.26)	(0.42)	(0.77)
Garn-St Germain assets				
Commercial loans	5.00*	10.52*	3.80	2.19
	(2.20)	(4.95)	(2.92)	(4.24)
Consumer loans	12.41*	−3.00	9.31*	5.03*
	(1.00)	(2.13)	(1.34)	(1.85)
Nonresidential	11.68*	−0.68	9.51*	3.76*
	(0.78)	(1.73)	(1.10)	(1.47)
Real estate assets				
Real estate investments	−11.58*	7.49	−9.22	−4.39
	(5.43)	(7.81)	(15.12)	(15.70)
Service corporations	−57.72*	61.09*	−3.94	−32.86*
	(2.40)	(4.42)	(6.00)	(6.40)
Land loans	9.54*	−3.88	5.73	3.77
	(1.88)	(2.52)	(3.25)	(3.47)
Other assets				
Real estate owned	−15.37*	−4.37*	−12.56	−2.61
	(3.99)	(5.38)	(6.93)	(7.57)
Goodwill	3.02	22.79*	−3.54	33.16*
	(4.74)	(8.64)	(7.93)	(7.57)
Fixed assets	−29.68*	28.09*	−20.95*	0.19
	(4.38)	(10.93)	(6.39)	(8.57)
Valuation allowances	−84.96*	1.62	−55.94*	−45.25*
	(6.02)	(10.25)	(8.65)	(10.55)
Mortgages serviced	0.40*	−0.20	0.60*	−0.47
	(0.15)	(0.29)	(0.21)	(0.27)
Other assets	−1.85	−10.61*	−3.58	−9.06*
	(1.62)	(4.61)	(2.20)	(3.33)

continued

Table 4A. Continued

	(1)	Dummy for TX, CO, OK, & LA (2)	(3)	Dummy for Districts 8–12 (4)
Liabilities				
Advances	−12.73*	4.65	−7.92*	−9.56*
	(1.13)	(2.72)	(1.59)	(2.16)
Repos	−7.76*	−11.42*	−11.03*	0.19
	(2.25)	(4.41)	(3.27)	(4.19)
Other borrowings	−4.52*	−17.12*	−6.27	−3.24
	(2.06)	(7.16)	(3.58)	(4.44)
Other liabilities	0.57	−21.85	−9.31	32.28*
	(4.06)	(13.49)	(5.36)	(8.41)
Intercept	−4031.73*	−21415.4*	−3176.65*	−11388.2*
	(1040.82)	(4499.33)	(1199.60)	(2681.42)
Observations	1341	192	1030	503
F	1174.0		1049.0	

*Significantly different from zero at the 95% level.
Numbers in parentheses are standard errors.
Federal Home Loan Bank Districts 8 through 12 encompass all states west of the Mississippi River plus Mississippi.

the enforcement of capital standards, and highlights the benefits of early closure rules for undercapitalized depository institutions, if such closures can be done a way that will preserve whatever franchise value the institution may still have.

While equity real estate was less profitable than traditional thrift investments for virtually all institutions, this finding must be tempered for at least three reasons. First, commercial real estate in general performed poorly during the sample time period because of overbuilding in virtually all U.S. markets. Second, many studies have found that incorporation of equity real estate into a wide variety of portfolio compositions reduces overall portfolio risk. Third, gains on real estate investments can only be recorded upon sale of the asset, whereas capital losses must be recorded even while the asset is held.

From a policy standpoint, these findings have important implications as the Congress considers revisiting the thrift bailout bill. Specifically, the results suggest that by mandating tightened investment restrictions, FIRREA may reduce the opportunity for diversification by healthy thrifts, making them more susceptible to systemic problems such as interest rate risk. As the results indicate, the problems with expanded asset powers lie not in the powers per se, but in the granting of such powers to institutions in a regime where they do not bear the full costs of the riskiness of their portfolios.

Notes

1. The results must be interpreted in light of the severe downturn in real estate markets of the late 1980s.
2. Tangible net worth (TNW) is net worth under Generally Accepted Accounting Principles (GAAP) less intangible assets, most of which is goodwill and most of the remainder is purchased loan servicing.
3. See, for example, Markowitz (1952), Lintner (1965), and Mossin (1966). Whether or not these higher risk-adjusted returns are realized is an empirical issue.
4. Merton (1977, 1978), Sharpe (1978), Flannery (1982), and Pyle (1983) all model how mispriced deposit insurance creates a moral hazard issue.
5. See, for example, Hanweck and Crockett (1989), Cole (1990a, 1990b), and Demirguc-Kunt (1990). Kane (1989) provides an excellent discussion of the issues underlying moral hazard problems as they apply to thrifts.
6. Service corporations are thrift-institutions subsidiaries that may be either wholly owned or jointly owned. While some service corporations engage in rather mundane activities such as insurance agency, data processing, or mortgage banking, about 95 percent of the service corporation activity reported on the industry's balance sheet is direct investment in real estate. Service corporations are the only (and indirect) way in which a federally chartered thrift could develop or invest in real estate. FIRREA requires that direct real estate investment by state-chartered institutions be conducted in a separately capitalized subsidiary.
7. The portfolio contrasts between the more highly capitalized and tangible-insolvent thrifts may be starker than these numbers portray if, as is likely, the tangible-insolvents' portfolios reflect nontraditional assets that have already been partially written down. Another source of unreported and potential portfolio differences is the selling of above-par mortgages to record gains and the holding of below-par mortgages to avoid realizing the capital loss.
8. See, for example, Cole (1990b), who also finds that many of these categories are statistically significant in predicting both insolvency and closure. Previous studies of S&Ls by Randolph and Hamden (1988) and Pantalone and Platt (1987) report similar results. However, Benston (1985) in his multivariate analysis found that direct investments did not contribute to the likelihood of failure, and that direct investment contributed positively to the earnings of the California institutions with high levels of direct investment that later failed. Barth, Brumbaugh, Sauerhaft, and Wang (1985) found no relationship between direct investment and failure in their study that used data from the early 1980s.
9. The incentives for this type of behavior were noted by Merton (1977, 1978) who observed that deposit insurance that is not actuarially priced grants a put option to the owners of insured depositories. Kane (1983) further developed this notion, while Cole (1990a, 1990b) and Demirguc-Kunt (1990) explicitly model and test for this type of behavior within a principal-agent framework.
10. See Cole, McKenzie, and White (1990) who attempt to distinguish among these hypotheses. They find support for the second and third of these hypotheses, but not for the first.
11. Cole (1990b) provides evidence that thrift regulators were less likely to close insolvent institutions that invested in traditional assets funded by core deposits.
12. Rose and Wolken (1986) provide a review and critique of the methodology and its applications.
13. The Breusch-Pagan (1979) test indicates that the hypothesis of equal variances cannot be rejected when the model is transformed by dividing by total assets, but must be rejected both when the model is not transformed and when the model is transformed by dividing by the square root of assets.
14. The call reports have separate line items for the valuation allowances associated with real estate investment, real estate owned, fixed assets, investment securities, and service corporation investment. The valuation allowance variable included in the regressions reflects valuation allowances on all types of loans because valuation allowances are not reported separately for each type of loan.
15. Other assets include loans-in-process (the undisbursed portion of construction loans), deferred loan fees, unamortized premiums, unaccreted discounts, accrued interest receivable, advance payments by borrowers for taxes and insurance, margin on futures accounts, options fees paid, purchased loan servicing, leased property, receivables secured by pledged deposits, deferred loan losses, and "other assets."
16. These findings on service corporations should be compared with those of Benston (1985) who found that direct investments had higher returns than other assets during the early 1980s; of Freund (1986) who found

lackluster performance of thrift service corporations principally engaged in real estate, and of the Federal Home Loan Bank Board (1989) that found generally weak returns for direct investments.

17. Miles and McCue (1984), Hartzell, Hekman, and Miles (1986), Cole et al. (1989), and Miles, Cole, and Guilkey (1990) all find that equity real estate is an excellent stock and/or bond portfolio diversifier. Benston (1985) found that, although direct real estate investments had higher standard deviations of returns than other assets, total asset portfolio standard deviations were lower for institutions with direct investment in excess of three percent of assets than they were for institutions with smaller amounts of direct investments. Studies finding limited benefits to real estate in a bank's portfolio include Rosen et al. (1989), Felgran (1988), and Boyd, Hanweck, and Pithyachariyakul (1980).
18. See Benston (1985), Benston and Brumbaugh (1988), Benston and Koehn (1988), Freund (1986), and Federal Home Loan Bank Board (1989).
19. In order to avoid a repeat of the debacle of the early 1980s, both capital requirements and deposit insurance premiums should consider interest rate risk. Bank capital requirements do not consider interest rate risk, and proposed capital standards for thrifts that explicitly consider interest rate risk have not been well received.

References

Barth, J., and Bradley, M. 1989. "Thrift Deregulation and Federal Deposit Insurance." *Journal of Financial Services Research*, (September).

Barth, J., Brumbaugh, R., Sauerhaft, D., and Wang, G. 1985. "Thrift-Institution Failures: Causes and Policy Issues." In *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago.

Benston, G. 1985. *An Analysis of the Causes of Savings and Loan Association Failures*, Monograph Series in Finance and Economics, New York University, Graduate School of Business Administration, Salomon Brothers Center for the Study of Financial Institutions.

Benston, G. 1989. "The Federal 'Safety Net' and the Repeal of the Glass-Steagall Act's Separation of Commercial and Investment Banking." *Journal of Financial Services Research*, (December).

Benston, G., and Brumbaugh, R. D. 1988. "On the Controversy over Asset Restrictions for Thrift Institutions." *Housing Finance Review*, (Fall/Winter).

Benston, G., and Koehn M. 1988. "Capital Dissipation, Deregulation, and the Insolvency of Thrifts." Paper presented at the Annual Meetings of the American Finance Association, New York, (December).

Boyd, J., Hanweck, G. and Pithyachariyakul, P. 1980. "Bank Holding Company Diversification." in *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago, (May).

Breusch, T., and Pagan, R. 1979. "A Simple Test for Heteroscedasticity and Random Coefficient Variation." *Econometrica*, (September).

Brewer, E. 1988. "The Impact of Deregulation on the True Cost of Savings Deposits: Evidence from Illinois and Wisconsin Savings and Loan Associations." *Journal of Economics and Business*, (February).

Cole, R. 1990a. "Agency Conflicts and Thrift Resolution Costs." FIS Working Paper No. 3-90, Federal Reserve Bank of Dallas, (July).

Cole, R. 1990b. "Insolvency versus Closure: Why the Regulatory Delay in Closing Troubled Thrifts?" FIS Working Paper No. 2-90, Federal Reserve Bank of Dallas, (July).

Cole, R., Guilkey, D., Miles M., and Webb, B. 1989. "More Scientific Diversification Strategies for Commercial Real Estate." *Real Estate Review*, (Spring).

Cole, R., McKenzie, J., and White L. 1990. "The Causes and Costs of Thrift Institution Failures: A Structure-Behavior-Outcomes Approach." New York University, Leonard N. Stern School of Business, Salomon Brothers Center for the Study of Financial Institutions, Working Paper S-90-26, (October).

Crockett, J. and King, A. T. 1982. "The Contribution of New Asset Powers to S&L Earnings: A Comparison of Federal- and State-Chartered Associations in Texas." Working Paper No. 110, Federal Home Loan Bank Board, (July).

Demirguc-Kunt, A. 1990. "Modeling the Bank Regulator's Closure Option: A Two-Step Logit Approach." mimeo. 1989.

Federal Home Loan Bank Board. 1989. *Report on Direct Investment Activities of FSLIC-Insured Institutions*, (February).

Felgran, S. 1988. "Bank Participation in Real Estate: Conduct, Risk, and Regulation." *New England Economic Review*, (November/December).

Flannery, M. 1982. "Deposit Insurance Creates a Need for Bank Regulation." *Business Review*, Federal Reserve Bank of Philadelphia, (January/February).

Flannery, M. 1989. "Pricing Deposit Insurance When Insurer Measures Risk with Error." In *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago, (May).

Freund, J. 1986. "Real Estate Investments by Thrift Service Corporations." Staff Paper, Division of Research and Statistics, Board of Governors of the Federal Reserve System.

Hanweck, G. and Crockett, J. 1989. "A Theoretical and Empirical Analysis of the Incentives for 'Go-for-Broke' Behavior by Thrift Management and Regulatory Implications for Risk-Based Capital Requirements and Federal Deposit Insurance Premia as Incentives for Risk-Taking Control." Mimeo, George Mason University.

Hartzell, D., Hekman, J. and Miles, M. 1986. "Diversification Categories in Investment Real Estate. *AREUEA Journal*, (Winter).

Hester, D. and Zoellner, J. 1986. "The Relation Between Bank Portfolios and Earnings: An Econometric Analysis." *Review of Economics and Statistics*, (November).

Kane, E. 1983. "The Role of Government in the Thrift Industry's Net Worth Crisis." In *Financial Services: The Changing Institutions and Government Policy*, George Benston, Englewood Cliffs, N.J.: Prentice-Hall.

Kane, E. 1989. *The S&L Insurance Mess: How Did It Happen?*, The Urban Institute Press: Washington, D.C.

Lintner, J. 1965. "Security Prices, Risk, and Maximal Gains from Diversification." *The Journal of Finance*, (December).

Markowitz, H. 1959. *Portfolio Selection: Efficient Diversification of Investment*, New York: John Wiley.

Merton, R., 1977. "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees: An Application of Modern Option Pricing Theory." *Journal of Banking and Finance*, (June).

Merton, R. 1978. "On the Cost of Deposit Insurance When There Are Surveillance Costs." *Journal of Business*, (July).

Miles, M., Cole, R. and Guilkey D. 1990. "A Different Look at Commercial Real Estate Returns." *AREUEA Journal*, (Winter).

Miles, M. and McCue, T. 1984. "Commercial Real Estate Returns." *AREUEA Journal*, (Fall).

Mossin, J. 1966. "Equilibrium in a Capital Asset Market." *Econometrica*, (October).

Pantalone, C. and Platt, M. 1987. "Predicting Failures of Savings and Loan Associations." *AREUEA Journal*, (Summer).

Rose, J. and Wolken, J. 1986. "Statistical Cost Accounting Models in Banking: A Reexamination and Application." Staff Studies No. 150, Board of Governors of the Federal Reserve System, (May).

Rosen, R. Lloyd-Davies, P., Kwast, M. and Humphrey, D. 1989. "New Banking Powers: A Portfolio Analysis of Bank Investment in Real Estate." *Journal of Banking and Finance*. (July).

Rudolph, P. and Hamden, B. 1988. "An Analysis of Post-Deregulation Savings-and-Loan Failures." *AREUEA Journal*, (Spring).

Sharpe, W. 1978. "Bank Capital Adequacy, Deposit Insurance and Security Values." *Journal of Financial and Quantitative Analysis*, (November).

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