

The Role of Real Estate

in the New England

Credit Crunch

by Joe Peek and
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Abstract

Banks, particularly in New England, have experienced major losses of capital as a result of their exposure to risky real estate loans. These losses, accompanied by strict enforcement of capital regulations, have caused banks to shrink their assets in an attempt to improve their capital/asset ratios. Poorly capitalized banks have contracted their real estate loans much more than their better-capitalized peers. In New England, which experienced widespread shocks to bank capital, credit availability for real estate is being constrained by capital-impaired lenders.

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The Role of Real Estate in the New England Credit Crunch

Because of its dependence on bank financing, real estate has always borne the brunt of reductions in credit availability. During previous recessions, high interest rates caused disintermediation, which reduced bank credit, especially to the real estate sector (Gibson 1973; Jaffee and Rosen 1979; Dokko, Edelstein and Urdang 1990). However, with the elimination of deposit rate ceilings and with interest rates falling rather than rising, the recent period of tight credit to the real estate sector of the economy bears little resemblance to previous periods of disintermediation. Instead, it has been hypothesized that bank financing has been curtailed because of the large losses of capital in the banking sector, primarily from losses on real estate loan portfolios (Syron 1991; Peek and Rosengren 1991). Consequently, banks have had to shrink in order to satisfy capital requirements. Thus, a more apt description of current credit availability problems is that we are experiencing a capital crunch. The focus of this paper is to establish the importance of this reduction in bank capital for credit availability to the real estate sector.

Banks acquired sizable portfolios of real estate loans during the 1980s, the collateral for which has recently dropped substantially in value. This eroded bank capital at a time when capital/asset ratios were being strictly

enforced. Troubled banks have had little success in raising new capital, and earnings are not likely to quickly reverse the deteriorating capital position of most banks. Thus, banks have been forced to meet the new capital standards by shrinking their balance sheets. They have achieved this by tightening credit conditions, removing some loans from the books, and taking few, if any, new customers. Furthermore, because of the recent poor performance of real estate loans in many bank portfolios, bankers and regulators have been particularly wary of real estate loans. Some retrenchment from the rapid expansion in the 1980s was likely as the unduly optimistic projections for real estate were not realized, but it is possible that banks now may be overly cautious in extending credit to real estate projects.

Because New England provides an extreme case of a situation that has occurred to a lesser degree in much of the rest of the country, this paper focuses on the relation between bank capital and real estate loans in New England. The first section of the paper documents the rapid expansion in real estate loans by banks in New England during the 1980s and examines the motivation for the aggressive increase in real estate lending. The second section examines the consequences of the downturn in real estate prices. Bank capital/asset ratios deteriorated and banks sought to satisfy binding capital requirements by reducing their lending. The third section considers whether the real estate lending behavior of poorly capitalized institutions has differed from that of well capitalized institutions and provides some possible explanations for these differences. We also make adjustments for loan charge-offs and consider the possibility that banks may have substituted mortgage securities for mortgage loans in their asset portfolios. The final section provides conclusions.

I. Real Estate Lending in the 1980s

A number of factors likely contributed to the upsurge in real estate lending in the 1980s. The large losses on Third World loans caused banks to reemphasize domestic lending. The particularly favorable treatment of real estate in the Economic Recovery Tax Act of 1981 as well as problems with farm loans and oil industry loans made real estate lending particularly attractive.¹ The increased interest in real estate lending coincided with a buoyant real estate market in many parts of the country, with the explosion in real estate prices in New England being among the more conspicuous. Table 1 shows the composition of bank portfolios in the United States and New England in 1984, when real estate lending began to increase rapidly, and 1989, when real estate lending in New England peaked. The data include all commercial banks and savings banks with FDIC insurance.²

FDIC-insured institutions in New England in 1984 already had a much larger proportion of their portfolios in real estate loans than their peers nationwide, in part because FDIC-insured savings banks played the role of home mortgage lenders that was often filled by FSLIC-insured savings and loans elsewhere in the country. New England institutions also had greater

¹While the 1981 Tax Act greatly increased incentives to real estate investment in the United States, the boom was not uniform across regions of the country, and many other countries also experienced a real estate boom during the same period. Furthermore, the increased funds flowing into U.S. real estate included a substantial portion from pension funds and foreign investors not directly affected by the tax changes. The Deficit Reduction Act of 1984 and especially the Tax Reform Act of 1986 contained provisions that more than reversed the incentives of the 1981 Act. (See, for example, Follain, Hendershott, and Ling 1987; Poterba 1990.) These changes likely contributed to the reversal of the boom.

²Some of the increase between 1984 and 1989 reflects the addition of new FDIC-insured institutions that had previously been FSLIC-insured institutions.

Table 1

Bank Holdings of Real Estate Loans in New England and the United States¹

	New England			United States		
	Percentage Growth Rate 1984-89	Percentage of Total Assets 1984	1989	Percentage Growth Rate 1984-89	Percentage of Total Assets 1984	1989
Real Estate Loans	243.7	27.4	43.7	99.4	16.5	24.6
Construction	443.8	2.5	6.2	99.4	2.8	4.2
1-4 Family	206.5	17.8	25.3	90.2	8.7	12.3
Multifamily	266.7	1.1	2.0	81.1	.7	1.0
Commercial	265.4	6.0	10.1	127.3	3.9	6.7
Capital	152.6	6.0	7.0	42.7	6.1	6.4
Nonperforming Loans ²	646.5	.8	3.0	54.9	1.6	1.9
Total Assets (billions)		\$131	\$281		\$2576	\$3457

¹Data include all FDIC-insured commercial banks and savings banks.²As of end of year. Nonperforming loans have been defined as the sum of loans that are nonaccruing and those 90 days past due.

concentrations in both commercial real estate loans and multifamily mortgages, each being more than half again as large a percentage as the national average.³

Real estate lending in New England grew even more rapidly than in the nation as a whole between 1984 and 1989. While bank assets in New England grew by 115 percent over this period, each category of real estate loans grew by at least 200 percent. Particularly explosive was the 444 percent growth in the construction loan category, followed by the increase of almost 270 percent in multifamily residential loans and in commercial real estate loans. By 1989, New England banks had 16.3 percent of their assets in the relatively risky categories of construction and commercial real estate loans, more than twice their equity capital base. At the same time, even though their capital/asset ratio rose more than that for banks across the nation during this period, their 153 percent growth in equity capital was eclipsed by a 646 percent increase in nonperforming loans (defined as loans 90 days past due plus nonaccruing loans), with nonperforming real estate loans accounting for much of the increase. Thus, while increasing bank exposure to New England real estate was initially quite profitable, these profits were to prove to be transitory.

³In 1984, New England commercial banks looked much like their peers in the rest of the country. For example, commercial banks nationwide had 16.5 percent of their assets in real estate loans compared to 16.6 percent for commercial banks in New England. However, the growth in lending to the real estate sector between 1984 and 1989 was quite different. By 1989 commercial banks nationwide had 24.6 percent of their assets in real estate loans compared to 31.4 percent for commercial banks in New England.

II. The Decline of Real Estate Lending in the 1990s

Real estate loans extended by New England banks changed dramatically in 1990. Table 2 provides the growth rates from the first quarter of 1990 to the first quarter of 1991 for FDIC-insured banks in New England and in the United States. Real estate loans declined by 8.5 percent in New England compared to an increase of 5.7 percent nationwide. Each category of real estate loans declined in New England, while only construction loans declined nationally, and that decline was only about one-quarter of the 39.5 percent decline in New England. The decline in New England real estate lending coincided with the deterioration in the loan portfolio, with a ratio of nonperforming loans to total assets nearly double that of the nation. Because real estate loans accounted for a larger share of nonperforming loans in New England than in the nation, the ratio of nonperforming real estate loans to total assets in New England was more than two and one-half times that for the nation. This deterioration in the loan portfolio contributed to the 12.4 percent decline in capital for New England banks, while bank capital nationwide was increasing by 4.4 percent.⁴

Figure 1 shows the relationship between real estate prices, real estate loans, and total nonperforming loans for New England and the United States. The boom in real estate lending occurred during a period of rapidly rising real estate prices. (For details see Case 1986). From 1984 to 1989, while

⁴The decline in bank equity was actually more severe than is indicated in the table. Bank capital in the first quarter of 1991 includes the \$500 million equity infusion into the Bank of New England and the \$250 million infusion into Connecticut Bank and Trust by the FDIC. Omitting these capital infusions, the decline in equity capital for New England would have been 16 percent.

Table 2
Bank Holdings of Real Estate Loans in New England and the United States¹

	New England		United States	
	Percentage Growth Rate 1990:1-91:1	Percentage of Total Assets 1991:1	Percentage Growth Rate 1990:1-91:1	Percentage of Total Assets 1991:1
Real Estate Loans	-8.5	43.0	5.7	24.1
Construction	-39.5	3.6	-11.8	3.6
1-4 Family	-4.4	26.6	10.3	12.1
Multifamily	-12.7	1.9	.2	.7
Commercial	-1.8	10.9	8.4	7.2
Capital	-12.4	6.1	4.4	6.7
Nonperforming Loans ²	22.4	4.9	32.8	2.6
Nonperforming Real Estate Loans ²	17.2	3.4	57.4	1.3
Total Assets (billions)		\$256		\$3355

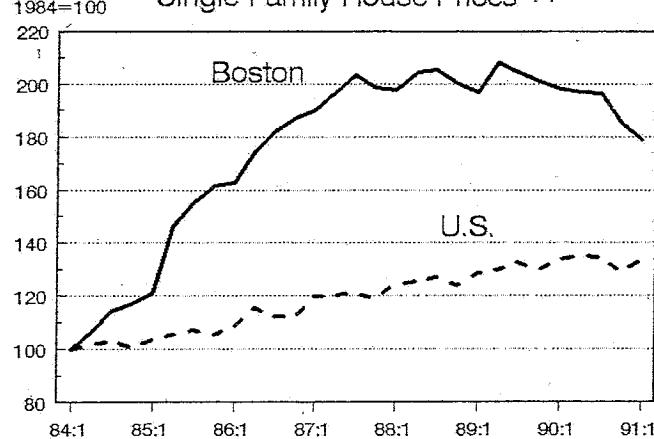
¹Data include all FDIC-insured commercial banks and savings banks.

²Nonperforming loans have been defined as the sum of loans that are nonaccruing and those 90 days past due.

Figure 1

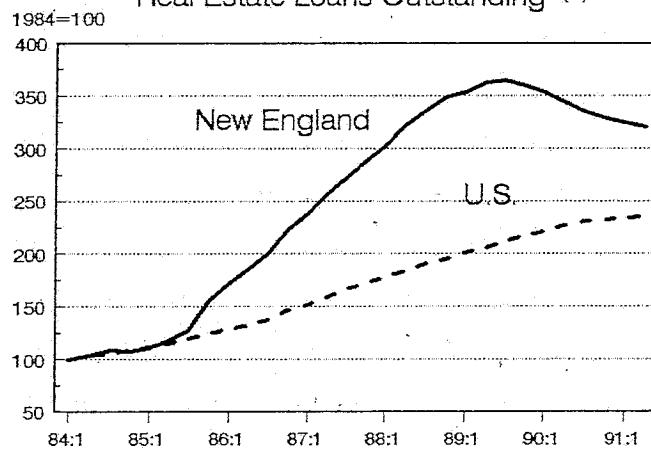
Panel A

Single-Family House Prices (1)



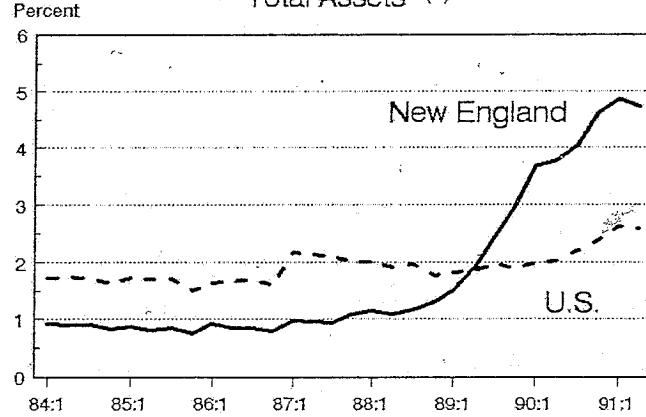
Panel B

Real Estate Loans Outstanding (2)



Panel C

Nonperforming Loans as a Percentage of
Total Assets (2)



(1) Source: National Association of Realtors.

(2) Source: Call Reports for FDIC-insured institutions. Changes in a data series will reflect changes in the number of FDIC-insured institutions.

house prices increased by 70 percent in New England, real estate loans held by FDIC-insured banks there more than tripled. The rapid rise in real estate prices, combined with the widely held perception that nominal real estate prices might flatten but were unlikely to fall, contributed to the more rapid expansion of real estate lending in New England compared to the nation as a whole. As prices began to flatten in New England, so did real estate lending, and by 1989 both house prices and real estate loans were decreasing.

The decline in real estate prices did more than just diminish the ardor for additional real estate lending; nonperforming real estate loans began to increase rapidly. As the volume of nonperforming loans rose, banks made additional provisions for loan loss reserves, producing losses sufficient to seriously diminish the capital of many New England banks.

This loss of capital occurred at the same time that regulators began to rigorously enforce minimum capital requirements. (For a discussion of optimal bank capital regulation, see Pringle 1974; Santomero and Watson 1977.) The Basle accord, an international agreement that required banks to maintain a minimum ratio of capital to risk-adjusted assets, forced regulators to focus on capital regulation. In addition, bank regulators in the United States adopted a minimum ratio of capital to unadjusted assets (the leverage ratio). Given the huge costs associated with the earlier tax regulation of the savings and loan industry and given the adoption of new minimum capital standards both nationally and internationally, forbearance for poorly capitalized institutions did not occur to the same extent as it had during the savings and loan crisis and for commercial banks affected by losses on Third World loans.

Banks below minimum capital standards had only two options: increase equity with retained earnings or new capital, or shrink their assets. New

England banks with large loan losses had little possibility of quickly restoring capital with retained earnings and did not raise additional equity, possibly because of the difficulty of issuing new shares at what they considered to be a "fair" price.⁵ As a result, most institutions with binding capital requirements in New England were forced to shrink.

Banks can shrink by selling securities. Alternatively, they can shrink their loan portfolios by tightening credit standards and, in some cases, calling or refusing to roll over loans. Because poorly capitalized banks feel more pressure to shrink their asset portfolios, their customers may find their loan conditions or loan availability altered primarily because of the financial condition of their banks. Given the prominent role that real estate loans played in causing the problems for banks, such loans may have been a particular target as banks reduced their loan portfolios to satisfy capital requirements. The empirical section of this paper documents that poorly capitalized institutions decreased their real estate loan portfolios more than well capitalized institutions in the same market. Thus, unlike periods of disintermediation that should affect all banks similarly, this shock may be unevenly distributed, with customers of poorly capitalized banks suffering a disproportionate burden. Moreover, in an atmosphere of shrinking bank

⁵The reason investors may require a large risk premium is explored in Myers and Majluf (1984). As applied to banking, outside investors have difficulty ascertaining the value of a firm because management does not have an incentive to disclose unfavorable information. When collateral values are rising, few defaults occur and the likelihood of a serious erosion of bank capital is low. Thus, investors need only to monitor the health of the economy. However, when loans are defaulting and collateral is impaired, the importance of monitoring increases. Since data on the individual loans in a bank's portfolio are not publicly available, outside investors raise their required risk premium because of the increased difficulty in ascertaining the quality of the bank portfolio.

portfolios, customers denied access to credit by their customary lender may find few alternative sources of funds.

III. The Capital Crunch and Real Estate Loans

A major difficulty in most empirical studies of credit crunches is disentangling supply from demand. Most studies have examined loans over time to determine if problems in the banking sector have an important independent role beyond the normal decline in demand that occurs during economic downturns. For those skeptical of the importance of credit crunches, these studies are seriously flawed by the inability to completely control for loan demand.

We control for demand by examining a cross-section of banks in New England that experienced the same downturn in real estate prices and by including additional explanatory variables intended to capture differences in lending opportunities across banks. If diminished real estate lending reflected decreased lending opportunities to the real estate sector, the degree of a bank's shrinkage would be unrelated to its capital/asset ratio. If, however, low capital/asset ratios have caused banks to shrink their real estate portfolios, we should find much larger reductions in poorly capitalized institutions than in well capitalized institutions. And if so, problems in the banking sector may account for some of the substantial drop in lending to the real estate sector in New England.⁶

⁶Our test focusses on differences in lending behavior between poorly capitalized and well capitalized banks. Consequently, it cannot identify an across the board reduction in real estate lending associated with an increase in the risk aversion of lenders to real estate sector loans or even to lending generally. Many investigators might define a credit crunch more broadly to include such situations.

The Data

Our sample is based on call report data for all FDIC-insured commercial and savings banks in the First Federal Reserve District (New England) that operated continuously between December 31, 1988, and March 31, 1991. For the regression analysis, we use data from the first quarter of 1990 to the first quarter of 1991. This period was chosen for a number of reasons: it coincides with the large drop in real estate lending; a relatively short window limits the distortions that occur with bank mergers and failures; and four quarters of data (or a multiple thereof) are needed to calculate the changes in the variables in order to avoid problems with seasonal factors. Furthermore, in the first quarter of 1990, bank examiners found substantial problems in the Bank of New England's real estate portfolio, causing other banks (and examiners) to examine their own institutions.

We excluded institutions that were not "mature" banks, defined as banks that opened after January 1, 1989, or that had any of the following characteristics: no loan losses, no nonperforming loans, no demand deposits, no commercial and industrial loans, real estate loans accounting for less than 3 percent of assets, or a capital/asset ratio above 20 percent. These were generally institutions not actively involved in loan origination, or new institutions. In the latter instance, their inclusion in the sample would have resulted in a relationship between the change in loans and capital/asset ratios that reflected expansion due to new formations rather than contraction due to binding capital requirements, thus biasing the results in favor of the capital crunch hypothesis.

We retroactively consolidated the assets and liabilities of FDIC-insured banks that merged during our sample period. However, we eliminated those

banks that acquired a failed institution because they acquired only a portion of the failed institution's assets. Institutions that merged with FSLIC-insured institutions were dropped because FSLIC data were not comparable with FDIC data. Failed institutions that were liquidated were dropped because their shrinkage would represent insolvency rather than changes in bank behavior.⁷

When we calculated the percentage change in real estate loans for the banks remaining in our sample, we found a few institutions with real estate loan growth substantially exceeding 100 percent in a single year. Such institutions were contacted; they indicated that the sharp jump was due to a reclassification of certain loans (usually commercial and industrial loans) into the real estate loan category as a result of a systematic change in their accounting and/or monitoring systems. Consequently, we contacted all those institutions with percentage changes in real estate loans that appeared to be unusually large for that type of institution (exceeding 10 percent for large commercial and savings banks; exceeding 30 percent for small commercial banks; exceeding 15 percent for small savings banks).⁸ We then eliminated those institutions (14) where loan reclassifications accounted for the large increase, since the change was not a reflection of that bank's lending behavior.

⁷Given that we omit failed institutions, the aggregate pool of funds available likely contracted by more than indicated by our sample of banks. However, our focus is on distinguishing between poorly capitalized and well capitalized institutions to test the capital crunch hypothesis rather than determine the extent to which aggregate lending declined.

⁸Aggregate data overstate real estate lending by the volume of loans reclassified as real estate loans. Thus, real estate lending may have been substantially weaker than had appeared.

The remaining sample of lending institutions consisted of 389 commercial and savings banks, of which 36 were large commercial banks, 140 were small commercial banks, 73 were large savings banks, and 140 were small savings banks. We differentiate large from small according to the criteria used in the call reports, \$300 million in assets. We also separate savings and commercial banks because savings banks have traditionally had a much larger portfolio concentration in one- to four-family mortgages.

Numerous capital ratios are used by regulators, based on risk-adjusted and unadjusted assets, capital including and excluding subordinated debt, and capital including and excluding intangible assets. Our measure of the capital ratio is total equity capital divided by total assets. This measure is quite similar to the leverage ratio, which is the most binding capital ratio for many New England banks.⁹

Banks have some latitude in timing the reserving for loan losses (Walter 1991). Consequently, we also make adjustments to capital to control for banks' willingness to reserve for nonperforming loans. Banks with large loan loss reserves relative to their nonperforming loans will have lower capital than peers that have reserved less. This adjustment is intended to put all banks on an equal footing, regardless of the exact timing of their loan loss provisions. Peers are defined as all other banks in the same category from among large commercial banks, large savings banks, small commercial banks, and small savings banks. Equation 1 provides an adjustment that controls for bank discretion in the timing of reserving against future loan losses.

⁹As of June 30, 1991, of the 20 largest First District commercial and savings banks, none violated tier 1 risk-based capital guidelines, seven violated total risk-based guidelines, and nine violated a 5 percent leverage ratio.

$$(1) \ adjK_i = K_i + \left(1 - \frac{B_i}{B}\right) LLR_i$$

where

$$\beta_i = \frac{NP_i}{LLR_i}$$

$$\bar{\beta} = \frac{\sum NP_i}{\sum LLR_i}$$

K_i = equity capital for bank i

NP_i = nonperforming loans for bank i

LLR_i = loan loss reserves for bank i

If a bank has not reserved as much relative to nonperforming loans as similar banks, the capital is decreased.¹⁰ If a bank has large reserves relative to nonperforming loans compared to similar banks, the capital is increased.

Total assets are similarly adjusted to maintain a consistent balance sheet.

Because our results were not sensitive to whether adjusted or unadjusted capital was used, we report only those empirical results based on the adjusted capital measure.

¹⁰For the purposes of calculating adjusted capital, we divided the sample of all New England banks (before omitting from our sample those that reclassified loans or had little exposure to real estate loans) into four categories: large commercial, small commercial, large savings, and small savings. An average loan loss provision was then calculated for each set of comparable institutions and used to adjust the capital of each bank in that category. For the first quarter of 1990, the average ratios of nonperforming loans to loan loss reserves were: large commercial banks, 1.53; small commercial banks, 2.28; large savings banks, 2.71; small savings banks, 3.94.

Empirical Test

If the drastic drop in real estate lending was a shock affecting only the demand for loans, all banks should reduce their real estate loan originations by a similar proportion. If, on the other hand, reductions in lending occurred disproportionately at poorly capitalized institutions, then capital constraints may be forcing banks to shrink, with at least some of that adjustment occurring in their real estate loan portfolios. By looking at a cross-section of institutions in the same geographic region, we avoid many of the problems in controlling for demand experienced in time series analyses of credit crunches. All institutions face approximately the same lending opportunities, since they are in the same market and face the same market conditions.

The loan data are available on the quarterly call reports filed by all FDIC-insured institutions. Unfortunately, the balance sheet information provides the stock of loans rather than loan originations. Several studies (King 1986; Bernanke and Lown 1991) have examined credit crunch issues by treating the first difference of the stock of loans as new funds available to lend. However, the stock of loans can change for reasons other than new originations. Both loan sales and the writing down of bad loans can cause the stock of loans to change even if the quantity of loans being originated is unaltered. After reporting the evidence for changes in the stock of loans, we reestimate our equations with corrections for loan charge-offs. Unfortunately, loan sale information on real estate loans is not available.

We estimate the following equation:

$$(2) RE_i = \alpha_0 + \alpha_1 (K/A)_i + \alpha_2 ASSETS_i + \alpha_3 FEE_i + \alpha_4 C\&I_i + \alpha_5 CONSTR_i + \alpha_6 SINGLE_i \\ + \alpha_7 MULTI_i + \alpha_8 COMMERCIAL_i + \mu_i$$

The dependent variable RE is the percentage change in total real estate loans from the first quarter of 1990 to the first quarter of 1991. K/A is the beginning-of-period (first quarter of 1990) capital to asset ratio, corrected for differences in the timing of reserving against nonperforming loans as described above.

While many demand factors will be controlled for by examining institutions in the same geographic region at a particular time, we further control for possible demand factors by controlling for bank characteristics. Banks specialize in different segments of the market, and it is possible that these market niches did not experience demand shocks of the same magnitude.

The first control variable is the logarithm of bank assets (ASSETS) at the beginning of the period, first quarter 1990. Banks are limited in the percentage of their capital they can lend to any one borrower. Thus, small banks will be limited in their lending to borrowers that require large loans. If large borrowers experienced larger shocks than small borrowers, larger banks may experience larger loan demand shocks.

The second control variable is FEE, the ratio of fee income to the sum of total interest income and fee income, calculated for calendar year 1989. This controls for differences in demand for different types of bank activity. In particular, banks with large off-balance-sheet activities may be better insulated from demand shocks than banks that focus on lending.

We also include several variables that control for market exposure to different types of lending. C&I, the ratio of commercial and industrial loans to total assets for calendar year 1989, captures large exposures to business

lending. CONSTR, SINGLE, MULTI, and COMMERCIAL are construction loans, one-to four-family mortgages, multifamily mortgages, and commercial real estate loans, respectively, each divided by total assets and calculated for calendar year 1989. These variables capture the exposure the institution had to the various real estate sectors immediately prior to the estimation period.

To further control for differences by institution, we segment our sample into large and small, and savings bank and commercial bank categories. While savings banks no longer have statutory limitations on their lending activity, they have traditionally had a larger exposure in one- to four-family mortgages and a smaller exposure to commercial and industrial loans than commercial banks.

Results for Real Estate Loans

Table 3 contains the regression results for equation 2. We allow for the possibility of heteroskedasticity in the error term using a White (1980) correction. The adjusted capital/asset ratio effect is always positive and is significant at the 1 percent confidence level for the all banks sample, for both commercial bank samples, and for the large savings bank sample. The positive coefficient indicates that poorly capitalized institutions contracted their real estate loan portfolios more than did well capitalized institutions. For large commercial banks, a 1 percent drop in the capital/asset ratio resulted in a more than 3 percent decline in real estate loans. For the all banks sample, the response was in excess of 1 percent. This evidence supports the hypothesis that poorly capitalized institutions are shrinking their real estate portfolios to satisfy capital requirements. Furthermore, larger institutions have larger positive coefficients than smaller institutions,

Table 3
Determinants of the Percentage Change in Total Real Estate Loans¹
1990:1 - 1991:1

	Constant	Adj. K/A	ASSETS	FEE	C&I	CONSTR	SINGLE	MULTI	COMMERCIAL	n	R ²	SEE
Large Commercial Banks	.14 (.51)	3.21** (1.00)	-.009 (.027)	-.41 (.24)	.51 (.37)	.27 (.55)	.07 (.27)	.29 (.64)	-.21 (.35)	36	.383	.117
Small Commercial Banks	.19 (.21)	1.63** (0.55)	-.012 (.018)	-.62* (.29)	.20 (.13)	-.48 (.28)	-.28* (.12)	-.20 (.40)	-.30* (.15)	140	.238	.135
Large Savings Banks	.54** (.20)	.89** (.27)	-.037** (.014)	-.64* (.30)	-.31* (.15)	-.77** (.19)	.05 (.10)	-.60* (.24)	-.22 (.14)	73	.623	.065
Small Savings Banks	.25 (.16)	.21 (.31)	-.012 (.012)	.24 (.47)	.10 (.23)	-.91** (.18)	-.14 (.09)	-.27 (.23)	-.20 (.15)	140	.344	.078
All Banks	.31** (.07)	1.21** (0.24)	-.022** (.005)	-.54** (.14)	.23* (.09)	-.70** (.12)	-.16** (.06)	-.35* (.16)	-.29** (.09)	389	.361	.104

¹Estimated with a White correction for heteroskedasticity; standard errors in parentheses.

*Significant at 5% confidence level

**Significant at 1% confidence level

which are generally better capitalized. And commercial banks have larger coefficients than the generally better capitalized savings banks.

Thus, it is reasonable to focus on the all banks sample. In that case, each of the control variables is significantly different from zero at the 5 percent (or better) confidence level, although none are consistently so in the subsamples. F-tests cannot reject combining large with small commercial banks, large commercial banks with large savings banks, small commercial banks with small savings banks, or the combination of all four subcategories into the all banks aggregate. However, the data do reject at the 5 percent confidence level the combination of large savings banks with small savings banks.

All of the real estate variables except for two in the large commercial bank category enter with negative coefficients, indicating that a larger real estate exposure results in a larger percentage decrease in total real estate loans over this period. The logarithm of assets has a negative coefficient in all of the subsamples and is significant for the large savings bank category. FEE has a negative effect in all but the small savings bank category and is statistically significant in the small commercial bank and large savings bank categories. Exposure to commercial and industrial loans has a positive effect in three of the four subsamples, but is significant only for the large savings bank category (with a negative sign).

Results for Adjusted Real Estate Loans

While the evidence from the previous section is supportive of a role for capital in the reduction of real estate loans, the result suffers from one major flaw; the calculation of the percentage change in real estate loans does not correct for a reduction in loans as a result of charge-offs. An

institution that extended no new loans but charged off real estate loans would appear to be contracting its lending. The change in the stock of loans, therefore, would reflect past loans gone bad rather than a lack of willingness to extend credit to the real estate sector. Since we are primarily concerned with bank credit availability to real estate, we want to correct the stock of loans for loans gone bad.

When a real estate loan is charged off, the charge-off equals the difference between the current market value of the loan and the face value of the loan. If the loan is foreclosed, the collateral is transferred to the other real estate owned category (OREO) at its current market value. Properties in OREO are held by the bank until the property can be sold. Thus, the full face value of the loan is subtracted from the stock of loans when a loan is foreclosed. To correct for this, our new dependent variable becomes:

$$\frac{(LNRE911 - LNRE901) + (RECO - RERECOV) + (OREO911 - OREO901)}{(LNRE901 + OREO901)}$$

where:

LNRE911 = stock of real estate loans in 1991:1

LNRE901 = stock of real estate loans in 1990:1

RECO = real estate charge-offs over the period

RECOV = real estate recoveries over the period

OREO911 = the stock of other real estate owned in 1991:1

OREO901 = the stock of other real estate owned in 1990:1

The first expression in the numerator is the change in the stock of loans.

The second expression in the numerator is charge-offs net of recoveries and is

added, since an increase in charge-offs lowers the stock of loans but does not reduce the amount of funds made available to real estate by the bank. The third expression in the numerator reflects loans transferred to OREO rather than a reduction in lending so it, too, is added back. The denominator reflects the total funds available to real estate, real estate loans outstanding plus the stock of foreclosed properties currently held.

Correcting the stock of loans for loans gone bad is particularly important for the capital crunch hypothesis because a failure to make this correction could result in a conclusion that credit was less available when, in reality, the drop in the stock of loans reflected only losses on loans made in the past. During periods of large losses, such as experienced in New England during our sample period, this will be particularly important. Therefore, the decrease in the stock of loans overstates the decrease in credit availability.

Table 4 provides results from estimating equation 2 with the percentage change in real estate loans corrected for loan loss experiences as the new dependent variable. The coefficients on the adjusted capital/asset ratio remain positive although, as would be expected, the coefficients have a smaller magnitude than in the corresponding regressions in Table 3. The small commercial bank, large savings bank, and all banks samples still have capital/asset coefficients that are significant at the 1 percent confidence level, while the coefficient for large commercial banks is now significant only at the 10 percent confidence level.

Table 4
 Determinants of the Percentage Change in Total Real Estate Loans Adjusted for Net Charge-Offs and OREO¹
 1990:1 - 1991:1

	Constant	Adj. K/A	ASSETS	FEE	C&I	CONSTR	SINGLE	MULTI	COMMERCIAL	n	R ²	SEE
Large Commercial Banks	.14 (.50)	1.79 (0.93)	-.021 (.027)	-.09 (.22)	.30 (.36)	.10 (.52)	.00 (.27)	.30 (.63)	-.21 (.35)	36	.173	.113
Small Commercial Banks	.30 (.20)	1.35** (.50)	-.012 (.017)	-.74* (.30)	.18 (.14)	-.22 (.27)	-.43** (.13)	-.24 (.29)	-.33* (.15)	140	.278	.132
Large Savings Banks	.52** (.18)	.67** (.24)	-.033* (.012)	-.59* (.26)	-.13 (.12)	-.28 (.17)	-.12 (.09)	-.44 (.24)	-.23 (.12)	73	.485	.057
Small Savings Banks	.25 (.14)	.17 (.25)	-.013 (.010)	.16 (.31)	.28 (.21)	-.51** (.10)	-.14 (.09)	-.29 (.18)	-.16 (.13)	140	.244	.065
All Banks	.32** (.07)	.98** (.22)	-.020** (.005)	-.47** (.14)	.26** (.09)	-.34** (.10)	-.20** (.06)	-.21 (.12)	-.25** (.09)	389	.305	.098

¹Estimated with a White correction for heteroskedasticity; standard errors in parentheses.

*Significant at 5% confidence level

**Significant at 1% confidence level

As was the case with Table 3, F-tests can reject only the combination of large savings banks with small savings banks and cannot reject the combination of all four subcategories into the all banks aggregate. For the all banks aggregate, each of the coefficients with the exception of that on MULTI is significant at the 1 percent confidence level. Among the control variables, the magnitudes of the coefficients are little changed from those in Table 3 with the exception of that on CONSTR, which is now only half as large (in absolute value). This difference in estimated coefficients likely reflects the large proportion of real estate loan charge-offs accounted for by construction loans. While charge-off data by real estate loan type are not available prior to the first quarter of 1991, in that quarter charge-offs on construction loans represented 30 percent of total real estate loan charge-offs, even though construction loans accounted for only about 8 percent of real estate loans. Furthermore, it is likely that most charge-offs in this category are associated with foreclosures so that the entire loan, not just the charged-off amount, is removed from construction loans outstanding. Unfortunately, call report data do not include information on foreclosures by real estate category.

While real estate loans have been reduced, at least in part, because of the capital constraints on banks, some of this decline in bank loan portfolios may reflect the securitization of real estate loans, so that the net effect on credit made available to real estate lending may still be overstated. Unfortunately, no good data exist on sales of real estate loans. While this is unlikely to be a major factor for construction and commercial real estate loans, it may be important for the one- to four- family mortgage category.

Results Including Real Estate Securities

While poorly capitalized banks have reduced their loans to real estate by more than their better capitalized peers, this may represent, in part, a decision to become more liquid. If so, the drop in real estate loans could be partially offset by an increase in the holdings of real estate securities. The correlations between the change in loans corrected for loan losses and the change in mortgage securities holdings are: -0.53 for large commercial banks, 0.16 for large savings banks, 0.06 for small commercial banks, and -0.35 for small savings banks. Thus it appears that large commercial banks may have partially offset their reductions in real estate loans with increases in their holdings of mortgage securities. While the correlation is also negative for small savings banks, the average change in adjusted real estate loans was positive (and larger than that for mortgage securities) for these banks, likely reflecting the fact that they were the best capitalized of the four bank categories and thus least likely to face binding capital constraints.

While the substitution of mortgage securities for mortgage loans by banks in a region may not change the amount of total funds supplied by those banks to the real estate sector, the total amount supplied to that region as well as the composition among real estate lending categories may change. First, the mortgage securities market is national in scope and local banks likely would prefer mortgage securities collateralized by loans from other geographical regions to better diversify their real estate portfolios. (At the same time, mortgage funds available to the region would be increased if a local bank originated a mortgage and sold it to a lender in another geographical region.) Second, the majority of mortgage securities are collateralized by single-family homes. A substitution of mortgage securities

collateralized by single-family homes for construction loans in a lender's portfolio would reduce the funds available by that bank to the construction sector.

Total real estate securities held are approximately the same magnitude as total real estate loans held when we sum across the banks in our sample. To test whether capital constraints restrict extensions of credit in the form of securities plus real estate loans, we reestimated equation 2 with a new dependent variable, *p716~~the~~ percentage change in the stock of real estate securities plus loans corrected for loan losses. The results are reported in Table 5.

As was the case with the data in Tables 3 and 4, F-tests can reject only the combination of large savings banks with small savings banks. In particular, the data cannot reject combining all four subcategories of banks into the all banks aggregate. In that regression, the coefficient on the adjusted capital/asset ratio is now smaller, but still significant at the 1 percent confidence level. This is consistent with the capital crunch hypothesis whereby the lower a bank's capital/asset ratio, the more it reduces its overall exposure to real estate assets. Thus, increases in real estate securities holdings have not offset the reductions in the real estate loan portfolios of poorly capitalized banks. ASSETS as well as three of the four real estate control variables are also significant, while FEE and C&I are no longer significant. In the four subcategory regressions, the adjusted capital/asset ratio is significant only for the small commercial bank category, and in each case the point estimate is smaller than in the corresponding Table 4 regression. Similarly, the coefficients on the control variables tend to be less significant and often of a smaller magnitude.

Table 5
 Determinants of the Percentage Change in Total Mortgage Securities plus Total Real Estate Loans Adjusted for Net Charge-Offs and OREO¹
 1990:1 - 1991:1

	Constant	Adj. K/A	ASSETS	FEE	C&I	CONSTR	SINGLE	MULTI	COMMERCIAL	n	R ²	SEE
Large Commercial Banks	.17 (.48)	1.24 (1.00)	.011 (.027)	.32 (.25)	.11 (.41)	.05 (.61)	.18 (.31)	.81 (.63)	.47 (.38)	36	.192	.129
Small Commercial Banks	.27 (.21)	1.27* (0.53)	-.008 (.018)	-.70* (.31)	.12 (.15)	-.10 (.29)	-.41* (.15)	-.41 (.31)	-.39* (.17)	140	.224	.140
Large Savings Banks	.64** (.20)	.47 (.30)	-.038* (.015)	-.60* (.27)	-.23* (.15)	-.43** (.19)	-.16 (.09)	-.10 (.28)	-.27 (.10)	73	.375	.070
Small Savings Banks	.36* (.14)	.11 (.25)	-.016 (.011)	.62 (.73)	.24 (.21)	-.56** (.12)	-.23 (.09)	-.27 (.21)	-.26 (.13)	140	.266	.068
All Banks	.33** (.08)	.82** (.23)	-.015** (.006)	-.30 (.19)	.17* (.10)	-.34** (.10)	-.27** (.07)	-.25 (.14)	-.36** (.10)	389	.245	.106

¹Estimated with a White correction for heteroskedasticity; standard errors in parentheses.

*Significant at 5% confidence level

**Significant at 1% confidence level

IV. Conclusion

Banks in New England have experienced major losses of capital as a result of their exposure to risky real estate loans. While their large exposure was profitable during the real estate boom, it made large real estate lenders particularly vulnerable to a real estate bust. This loss of capital and the increased importance of capital requirements have caused banks to attempt to improve their capital/asset ratio by shrinking their assets and liabilities.

Poorly capitalized banks in New England have been contracting their real estate loans more than their better capitalized peers. Large commercial and savings banks, which hold the bulk of loans, experienced the largest drop in capital. These institutions have been particularly aggressive in reducing their real estate loan portfolios. After controlling for exposure by loan categories, size, and fee income, we still find that poorly capitalized institutions have been decreasing their real estate lending more than better capitalized institutions. This is also the case after adjusting the change in real estate loans for the reduction attributable to charge-offs and foreclosures. Poorly capitalized banks have made less new funds available (contracted funds more) for real estate loans compared to the better capitalized banks. And this reduction has not been offset by an increase in holdings of mortgage securities. For the all banks sample, the adjusted capital/asset ratio has a significant positive effect on the growth rate of total funds (loans plus mortgage securities) made available to the real estate sector.

Extending our analysis from aggregate real estate lending to consider individual types of real estate loans might provide further insights into the

real estate lending market in New England during this difficult period. However, loan charge-offs and recovery data by categories of real estate loans are not available prior to the first quarter of 1991, the end of our sample period. Available evidence indicates that charge-offs are concentrated in the construction and commercial real estate categories and thus their omission could have important consequences for results related to the relative performance of the different real estate loan categories. As the data become available, we plan to explore such questions in future research.

While the limited potential for real estate investments in the current market would naturally discourage lending, real estate lending is suffering not only from reduced demand by borrowers but also from a drop in credit availability from capital constrained lenders. Borrowers who have their loans called or not renewed may find few alternative lenders, given the widespread financial problems in the New England banking industry.

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