

The Capital Crunch in New England

New England banks, among the healthiest in the nation during the 1980s, have recently experienced failures at a rate unprecedented in the postwar period. An average of less than one New England bank insured by the Federal Deposit Insurance Corporation (FDIC) closed each year between 1979 and 1989. Forty-six FDIC-insured banks failed here in 1991, and of those still operating, many are struggling to meet capital requirements. The primary cause of this collapse was the extensive bank exposure to real estate loans.

Real estate lending had been a principal reason for the rapid expansion of New England banks. While banks nationwide substantially increased their exposure to real estate during the 1980s, real estate portfolios at New England banks grew at twice the national rate. When nominal real estate prices began to decline in New England, collateral became impaired and many loans stopped performing. The consequent increased provision for expected loan losses (loan loss reserves) caused a rapid deterioration in bank capital throughout the region.

The timing of this decline in bank capital was most inopportune, occurring just as regulators, in response to new legislation and international agreements, increasingly emphasized the importance of adequate bank capital/asset ratios. Having just lost a significant proportion of their capital, many banks tried to satisfy their capital/asset ratio requirements by shrinking their institutions.

Banks' attempts to shrink can have serious ramifications for the rest of the regional economy. If banks tighten credit conditions, call loans, and discourage new business, bank-dependent borrowers will face serious constraints as their access to external funds is restricted. These bank-dependent borrowers are most likely to be small and medium-sized firms that do not have access to national credit markets or even to banks outside the region.

The first section of this article documents the critical role played by real estate in the loss of bank capital and the way bank capital regulation

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has exacerbated the problem for New England banks. The second section discusses why banks facing binding capital constraints will shrink more than unconstrained banks when an adverse capital shock occurs. The third section shows that New England banks with low capital/asset ratios are in fact shrinking their institutions faster than better-capitalized institutions, and that this behavior has been particularly apparent in those liability categories that are the marginal sources of funds for most banks. The final section summarizes the findings.

I. The Role of Real Estate in the New England Capital Crunch

During the 1980s, New England experienced a real estate boom. With the New England unemployment rate below 3.5 percent and personal income more than 20 percent above the national average, housing prices and construction activity grew at an unprecedented rate. Between 1980 and 1988, employment in the construction sector grew by 84 percent, while the population of New England grew by only 5 percent. Such a rapid expansion in construction could be sustained only with substantial growth in real estate lending, which the banking sector provided in large part.

Table 1 shows the rapid increase in bank assets at FDIC-insured commercial and savings banks from 1984 to 1989. While total assets in FDIC-insured institutions in the nation grew by a little over one-

Much of the growth in New England banking assets in the 1980s was the result of the rapid expansion of real estate lending.

third from 1984 to 1989, assets in New England institutions more than doubled.¹

Much of the growth in New England banking assets was the result of the rapid expansion of real estate lending. In 1984, New England commercial banks had 16.6 percent of their assets in real estate loans, virtually the same percentage as their FDIC-insured counterparts elsewhere in the country. They had slightly higher concentrations in business lend-

ing compared to FDIC-insured institutions nationally, with larger portfolio shares held in commercial and industrial loans, commercial real estate, and leases.

In contrast, New England savings banks had 53.8 percent of their assets in real estate loans in 1984, primarily in mortgages on one- to four-family homes. This difference reflects the historical role of savings banks, which traditionally had specialized in real estate loans and particularly one- to four-family mortgages, much like savings and loans elsewhere in the country.² Savings banks also held a larger proportion of multifamily and commercial real estate loans than did commercial banks in New England, but they had many fewer construction loans, consumer loans, and commercial and industrial loans. Savings banks also were much better capitalized than commercial banks in New England or FDIC-insured institutions nationwide.

With the boom in New England real estate, both commercial and savings banks increased their exposure to real estate lending. The largest increase for both types of institutions was in the construction loan category, which grew 332.1 percent for commercial banks and an astounding 921.5 percent for savings banks (though some of the increase in savings bank assets reflects increases in the number of FDIC-insured banks). By 1989, savings banks had a greater share of their assets in construction loans than either commercial banks in New England or all FDIC-insured institutions nationwide. Furthermore, both commercial banks and savings banks in New England increased their commercial real estate and multifamily mortgage lending by over 250 percent. Although during this period much of the increase in assets occurred in the more risky categories, savings banks were profitable enough to raise their capital ratios by more than did commercial banks.

Other lending categories were growing rapidly as well. At New England's commercial banks, commercial and industrial loans grew by 95.2 percent and consumer loans by 62 percent, both above the growth rate for FDIC-insured institutions nationwide. Savings banks exhibited even more rapid growth, increasing their lending in areas they had traditionally

¹ From 1984 to 1987 the sharp increase is due in part to the greater increase in the number of FDIC-insured institutions in New England than in the rest of the nation.

² In 1989, only 6.6 percent of the total assets of New England depository institutions were held by S & L institutions supervised by the Office of Thrift Supervision.

Table 1
*Percentage Change and Allocation of Assets and Liabilities of FDIC-Insured Banks,
 New England and the United States, 1984 to 1989*

	New England						United States ^a		
	Commercial Banks			Savings Banks			Commercial and Savings Banks		
	Percent Change	Percent of Total Assets		Percent Change	Percent of Total Assets		Percent Change	Percent of Total Assets	
	1989	1984	1989	1989	1984	1989	1989	1984	1989
Assets	94.6						34.1		
C&I	95.2	19.8	19.8	263.7	4.2	5.8	25.4	16.3	15.2
Consumer	62.0	10.4	8.7	97.0	6.6	4.9	55.6	9.6	11.1
Real Estate	269.9	16.6	31.4	223.2	53.8	65.8	99.4	16.5	24.6
Construction	332.1	2.8	6.2	921.5	1.6	6.3	99.5	2.8	4.2
1-4 Family	257.4	8.2	15.0	181.3	41.3	44.0	90.2	8.7	12.3
Multifamily	269.3	.4	.8	278.8	2.8	4.0	81.0	.7	1.0
Commercial	257.4	5.1	9.4	277.5	8.1	11.5	127.3	3.9	6.7
Leases	301.1	1.3	2.6	n.a.	n.a.	.2	106.9	.6	.9
Securities	87.9	14.0	13.5	n.a.	n.a.	14.8	37.0	16.1	16.5
Liabilities									
Total Deposits	87.9	77.3	74.4	140.4	88.3	80.4	32.5	78.1	77.1
NOWs	n.a.	n.a.	4.8	n.a.	n.a.	4.3	n.a.	n.a.	5.7
MMDAs	72.9	15.7	13.9	n.a.	n.a.	10.6	41.8	9.9	10.5
CDs	167.7	8.9	12.2	n.a.	n.a.	7.9	45.6	10.1	11.0
Capital	114.4	5.5	6.0	218.0	7.3	8.8	42.7	6.1	6.4
Memo: Total Assets (\$ billions)		\$93	\$181		\$38	\$100		\$2577	\$3457

^aSavings banks are not broken out nationally because they represented only 6.9% of assets for all FDIC-insured institutions in the United States in 1989.

n.a. = not available.

Source: Call Report data for FDIC-insured institutions.

left to commercial banks. Commercial and industrial loans held by New England savings banks grew by 263.7 percent, dwarfing the 25.4 percent growth rate for all FDIC-insured commercial and savings banks nationwide.

By 1989, New England commercial banks also had much higher concentrations of commercial and industrial loans and real estate loans than banks in the rest of the nation. These concentrations were particularly large in areas viewed as risky, such as construction lending and commercial real estate loans. Savings banks were even more aggressive, with both construction and commercial real estate loans representing a higher percentage of their assets than in New England commercial banks. Initially quite profitable, these loan concentrations were to pose a serious problem when real estate prices began to fall.

Some of the increased lending to real estate was at the expense of investments in other lending categories. The share of assets held in securities by New England banks decreased, although it increased nationally. Similarly, the share of assets in consumer loans decreased in New England, but increased nationally. This difference could also have been related to the rapid rise in New England house prices, which created equity that could be used to substitute home equity loans for consumer loans. Home equity loans were typically a less expensive alternative, especially since the tax-deductibility of interest on consumer loans was phased out. Thus, as a result of the real estate boom, banks in New England moved far more aggressively into real estate lending than banks in the rest of the nation.

On the other side of the balance sheet, deposits were growing almost as fast as assets, and bank

capital grew even faster than assets. The aggressiveness of New England banks can be seen in the pattern of deposit growth rates. For commercial banks, growth in certificates of deposit (CDs) was nearly double the growth rate of total deposits, raising the CD share of liabilities from 8.9 to 12.2 percent, in part by attracting funds from outside the region.³ At the same time, the share of money market deposit accounts (MMDAs) was declining. At the national level, the increase in the CD share was much smaller, and the MMDA share rose rather than fell.

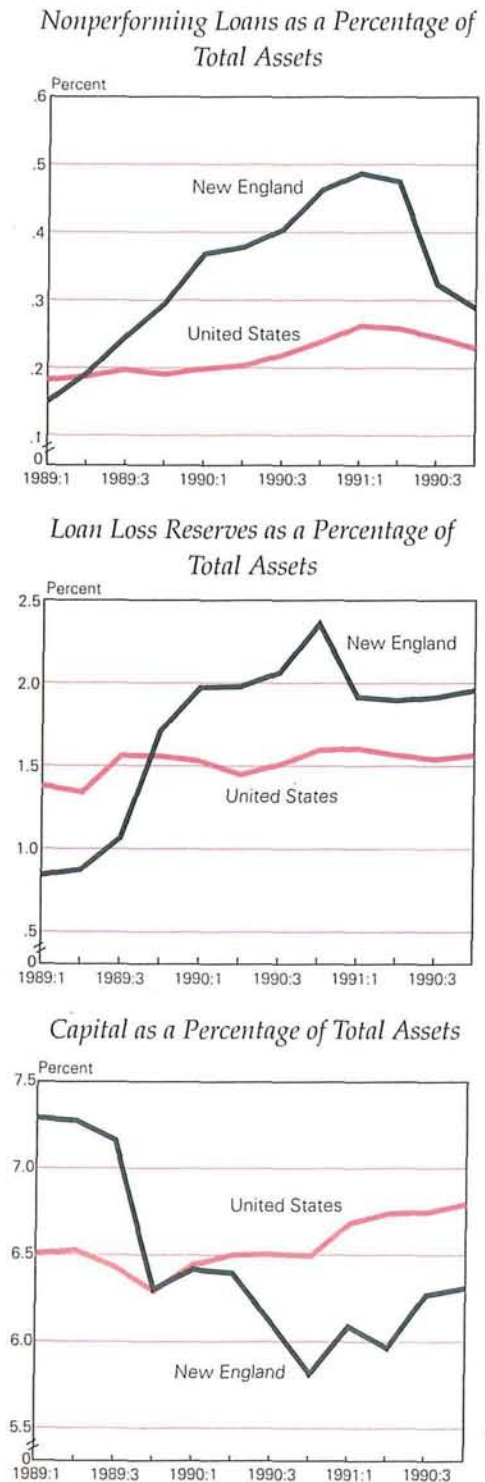
The Impact of Falling Real Estate Prices on Bank Capital

In 1989, it became clear that the real estate boom had ended. The median sales price of a single-family home in Boston, \$96,000 in the second quarter of 1984, peaked at \$186,000 in the second quarter of 1989 before beginning its fall to \$171,000 by the second quarter of 1991. As prices for homes, commercial property, and land began to fall, and as the economy deteriorated and the unemployment rate rose, the risk in most banks' loan portfolios increased significantly. Cash-flow problems and diminished collateral values caused many borrowers to stop making their loan payments.

The top panel of Figure 1 shows that in 1989, New England banks suffered a rapid increase in nonperforming loans, defined here as the sum of loans 90 days past due and nonaccruing loans. (See the box for the accounting treatment of loan losses for banks.) As banks realized that loan losses would be substantially greater than anticipated, they increased their loan loss reserves rather dramatically (middle panel of Figure 1); this, in turn, seriously depleted their capital (bottom panel). The pattern was very different for all U.S. FDIC-insured banks. They experienced substantially slower increases in nonperforming loans and have not increased loan loss reserves as much as New England institutions, and they have actually experienced increases in capital.

Table 2 shows the growth rates of assets, liabilities, and capital for New England commercial and savings banks and for all U.S. FDIC-insured institutions during a more recent period, the two years ending in the third quarter of 1991 (the most recent

Figure 1



Source: Call report data for FDIC-insured institutions.

³ Some historical data are not available from the call report data, either because a subset of institutions did not report that item, or because the definition of that item was significantly different in previous call reports.

Troubled Loans

A loan more than 30 days behind in payments of principal and interest is considered past due. If the loan remains past due, the lending bank will anticipate that some or all of the loan will not be repaid, and it will add to its loan loss reserves. Loan loss reserves are a contra balance sheet account; total loans outstanding minus the loan loss reserve equals the total of loans expected to repay interest and principal. Once a loan is no longer expected to be fully repaid, the expected

loss is charged off, that is, the amount of the expected loss is removed from the loan loss reserve and the loan no longer accrues interest. For these nonaccruing loans, any additional payments by the borrower are subtracted from the principal rather than credited to earnings. Increases in loan loss reserves cause a decrease in earnings. Loan charge-offs have no direct effect on earnings unless the loan loss reserve is replenished. For details on the accounting of problem loans, see Walter (1991).

Table 2
Percentage Change in Assets and Liabilities of FDIC-Insured Banks, New England and the United States, 1989:III to 1991:III

	New England						United States ^a		
	Commercial Banks			Savings Banks			Commercial and Savings Banks		
	Percent Change	Percent of Total Assets		Percent Change	Percent of Total Assets		Percent Change	Percent of Total Assets	
	$\frac{91:III}{89:III}$	89:III	91:III	$\frac{91:III}{89:III}$	89:III	91:III	$\frac{91:III}{89:III}$	89:III	91:III
Assets	-14.3			-11.9			5.4		
C&I	-29.2	20.1	16.6	-42.4	5.8	3.8	-8.7	15.3	13.2
Consumer	-37.8	8.7	6.3	-32.2	4.9	3.7	-2.4	11.2	10.3
Real Estate	-19.0	32.0	30.2	-17.7	65.8	61.1	10.0	25.0	26.0
Construction	-65.2	6.3	2.6	-66.8	6.3	2.4	-22.0	4.2	3.1
1-4 Family	-4.7	15.4	17.1	-9.2	43.8	44.9	17.8	12.5	14.0
Multifamily	-39.0	.9	.6	-31.3	4.3	3.3	5.0	1.0	1.0
Commercial	-9.7	9.4	9.9	-18.4	11.4	10.5	16.1	6.7	7.4
Leases	-43.9	2.8	1.8	-33.1	.3	.2	-2.5	1.0	.9
Securities	21.1	13.1	18.5	22.3	14.7	20.2	19.1	16.5	18.6
Liabilities									
Total Deposits	-9.3	73.7	77.9	-5.8	80.4	85.5	7.1	76.8	78.0
NOWs	13.5	4.7	6.2	14.1	4.2	5.4	22.9	5.6	6.5
MMDAs	-5.7	13.8	15.2	2.1	10.3	11.9	19.0	10.4	11.8
CDs	-39.0	12.4	8.8	-43.7	7.9	5.0	-19.0	11.0	8.4
Capital	-21.5	6.3	5.7	-27.3	8.8	7.2	10.6	6.4	6.7
Memo: Total Assets (\$ billions)		\$182	\$156		\$101	\$89		\$3461	\$3648

^aSavings banks are not broken out nationally because they represented only 6.9% of assets for all FDIC-insured institutions in the United States in 1989.

Source: Call Report data for FDIC-insured institutions.

data available). Capital for all FDIC-insured banks rose by 10.6 percent, compared to declines of 21.5 percent and 27.3 percent for New England commercial and savings banks, respectively. Total assets of U.S. banks also rose over this two-year period, although by less than capital, resulting in an improvement in their average capital/asset ratio. The same was not true for New England banks, however. Assets declined by 14.3 percent for commercial banks and 11.9 percent for savings banks. Because capital for both types of institutions decreased by a greater percentage than their assets, their capital/asset ratios showed sharp declines.

The pattern of lending by New England banks has changed substantially over the past two years.

How much of the contraction in the New England banking system reflected a drop in the demand for bank services, and how much was the result of constraints on the banking system?

Just as New England commercial and savings banks had expanded more aggressively than banks nationwide into construction, commercial real estate, and commercial and industrial loans during the boom, they contracted these same loan categories more rapidly during the decline. For example, the amount of construction loans held by banks in New England contracted by over 65 percent during this two-year period. Construction loans showed a substantial but smaller decrease at the national level, and this was the only loan category to shrink by more than 9 percent. In New England, every bank lending category declined, all but one by more than 9 percent. At the same time, securities holdings in New England banks increased at a rate slightly higher than observed nationwide.

While New England banks grew faster than banks nationwide during the boom, and contracted faster than banks nationwide during the bust, it is possible that banking is merely a microcosm of the overall economy of the region. The New England economy also grew faster than the nation during the boom, and contracted faster during the recession. It is

important to determine how much of the contraction in the New England banking system reflected a drop in the demand for bank services, and how much was the result of constraints on the banking system. The next section examines the particular importance of such supply constraints during this period.

II. Implications of Depleted Bank Capital for Future Lending

New England is not the first region to experience significant problems in its banking sector. During the 1980s, banks in the Midwest with agricultural loans, banks in the Southwest with oil loans, and money center banks with Third World loans all experienced serious erosions of bank capital. The New England experience is distinctive because bank capital was lost during a period of increasing regulatory scrutiny, making forbearance much less feasible. The increased emphasis on bank capital reflects national concerns with the huge costs of the savings and loan debacle and new international and domestic standards.

New international capital requirements, the Basle Accord, were agreed upon in December 1987. The accord set uniform international capital standards for all commercial banks, requiring them to maintain minimum capital ratios based upon the degree of credit risk in their asset portfolios. The standards focused on credit risk for broad asset categories and ignored interest rate risk, liquidity risk, and portfolio risk. While only a rough approximation of the riskiness of most bank portfolios, it was a first step in attempting to set bank capital standards related to a bank's ability to weather future potential losses.

A second standard was set by U.S. regulators, the leverage ratio, which required banks to maintain minimum capital standards without directly weighing the credit risks of the assets. This provided a floor for acceptable capital that all U.S. banks were expected to satisfy. Both capital ratios have been phased in and will be completely operative by the end of 1992.

This emphasis on capital ratios occurred at the same time as a substantial erosion of the capital base of New England banks (Syron 1991). Banks with capital/asset ratios below the required level had to either increase equity capital or shrink their asset portfolios. However, these banks could not raise capital from retained earnings in the face of large, continuing loan losses. The other capital-raising al-

ternative, issuing new shares, also was not feasible for many institutions; investors required a large risk premium, making it difficult for sound banks to issue new shares at what they deemed to be a "fair" price. (This is the "lemons problem." See, for example, Myers and Majluf 1984.) Consequently, the only remaining option for many New England banks was to shrink.

A regulatory incentive to shrink can have serious ramifications for the economy as banks tighten credit standards and refuse to renew loans. While large firms typically have alternatives, most small and medium-sized firms rely on banks to meet their demands for credit. Because of their knowledge of local firms and local economic conditions, banks specialize in this segment of the loan market, where their intermediary services are most valuable. (See, for example, Gertler and Gilchrist 1991; Elliehausen and Wolken 1990.)

To determine whether bank shrinkage is the result of a weak economy or low capital ratios, the response of undercapitalized banks to a decrease in capital must be modeled. Because the assets of a bank always equal its liabilities plus capital, a reduction in capital, given liabilities, will result in a reduction of assets. However, bank liabilities are unlikely to remain constant, and, in fact, respond differently depending on whether capital is constrained (Peek and

ferences between the constrained and the unconstrained cases would be expected when examining deposits rather than assets. Consequently, this study will focus on the liability side of bank balance sheets rather than on bank assets, as is common in previous studies (for example, Bernanke and Lown 1992 and King 1986).

The capital crunch hypothesis includes the empirical prediction that, other things equal, poorly capitalized institutions will shrink liabilities much more than well-capitalized institutions. The next section examines the role of bank capital in the shrinkage of New England banks.

III. Empirical Evidence of a Capital Crunch

Section I shows that capital, assets, and liabilities of New England banks all decreased significantly over the past two years. This two-year period includes a recession that was particularly severe in New England. The aggregate bank data cannot distinguish between the decrease in the demand for bank services that normally occurs in a recession and the shrinkage in bank assets and liabilities caused by binding capital regulations. In an attempt to separate these two explanations of New England bank behavior, this section focuses on a cross section of banks from the First Federal Reserve District (New England) in order to determine if the observed bank shrinkage was associated with bank capital positions.

If decreases in assets and liabilities of banks during recessions were solely due to decreased demand, the degree of contraction should be unrelated to capital/asset ratios. If, however, the capital crunch hypothesis is correct, the shrinkage of liabilities and assets should be greater, the lower the capital/asset ratio of the bank.

The Data

The sample includes 419 commercial banks and savings banks in New England from the first quarter of 1990 to the first quarter of 1991. The first quarter of 1990 coincides with the announcement of serious problems in the real estate portfolio of Bank of New England. At that point, bank management, bank examiners, and bank analysts began scrutinizing all New England banks for problems associated with declining real estate prices. Because seasonal factors distort bank balance sheets, comparisons must be made over periods that are a multiple of four quar-

The regulatory emphasis on bank capital occurred at the same time as a substantial erosion of the capital base of New England banks.

Rosengren 1992). In the unconstrained case, a negative capital shock will cause banks to substitute deposits for some of the diminished capital. Thus bank deposits are increased, mitigating the overall shrinkage of the bank. In the constrained case, banks cannot substitute deposits for capital because of the binding capital constraint. Thus, they must shrink deposits, resulting in a more severe shrinkage of assets compared to the unconstrained case. Loans shrink in either case, but shrink by more when a bank is capital constrained. Therefore, more dramatic dif-

ters. Thus, at this time the study can consider only one full year of data.

The sample of banks analyzed comprises all mature New England commercial and savings banks that operated continuously over the period. Any bank that showed a pattern between capital and lending that did not reflect mature bank behavior was omitted. For example, newly formed banks were not included because initially they will expand much more rapidly than mature banks. Thus, inclusion of new banks would reflect expansion due to new formation rather than regular bank operations, providing a spurious positive relationship between capital and lending for the whole sample.⁴

FDIC-insured institutions that merged between January 1989 and the first quarter of 1991 were combined into a single institution for the sample. That is, they were treated as if the merger were consummated at the beginning rather than in the middle of the sample period. Otherwise, merged institutions would have to be dropped and acquiring institutions would experience large increases in liabilities as a result of the acquisition. A separate file omitting institutions involved in nonaffiliate acquisitions was maintained to ensure that this assumption did not significantly affect the results.⁵

Another potential problem is the definition of capital. Capital regulation includes a variety of definitions that use differing measures of capital and assets and different treatments of intangible assets.⁶ Rather than attempt to test all the different definitions of capital, this study uses total equity capital divided by total assets. This definition most closely conforms

to the leverage ratio, the capital standard that is generally the most binding on banks.⁷

The Empirical Test

The capital crunch hypothesis predicts that poorly capitalized institutions will shrink deposits more rapidly than better capitalized institutions, other things (including loan demand) equal. This hypothesis is tested by estimating the following equation, with a positive predicted sign for a_1 .

$$(1) \text{ DEP}_i = a_0 + a_1 \frac{K_i}{A_i} + a_2 \log(A_i) + a_3 \text{FEE}_i + a_4 \frac{\text{CI}_i}{A_i} + a_5 \frac{\text{RE}_i}{A_i} + \epsilon_i$$

The dependent variable is the percentage change in total deposits (DEP) from the first quarter of 1990 to the first quarter of 1991.⁸ The beginning-of-period capital-to-asset ratio (K/A) is calculated using first-quarter 1990 data for total equity and assets.

Limiting the sample to New England banks greatly reduces (though it may not totally eliminate) the variations in loan demand shocks across banks in our sample. It is possible, however, that banks specializing in particular types of loans may experience different demand shocks. Consequently, the regression includes several control variables in order to try to capture potential differences in demand: the logarithm of assets (A), as of the first quarter of 1990; and 1989 calendar year values for the remaining three variables, the ratio of fee income to the sum of total interest and fee income (FEE), the ratio of commercial and industrial loans (CI) to total assets, and the ratio of real estate loans (RE) to total assets. These control variables are intended to capture changes in demand across banks that otherwise might be attributed incorrectly to the capital/asset ratio.⁹

⁴ This study also omitted failed institutions, banks that acquired assets of failed OTS-supervised institutions, institutions that consistently maintained a capital/asset ratio above 20 percent, and institutions with either no loan loss reserves, no commercial and industrial loans, or no demand deposits. Data from these institutions would not be comparable to the "mature" banks remaining in the sample.

⁵ The full sample included 419 banks: 49 large commercial banks, 146 small commercial banks, 81 large savings banks, and 143 small savings banks. After excluding those banks that merged with institutions outside of their holding company during the 1989-1990 period, the sample size was reduced to 404 banks. Essentially the same empirical results were obtained with this "clean" sample.

⁶ The risk-based ratios required by regulators are 8 percent for the ratio of total capital to risk-weighted assets and 4 percent for tier 1 capital to risk-weighted assets. The leverage ratio (tier 1 capital to total assets) is 3 percent for banks with the most favorable bank rating of 1. All other banks are expected to maintain capital ratios 100 to 200 basis points above the minimum. Tier 1 capital consists of common equity, qualifying preferred stock, and minority interest in consolidated subsidiaries less goodwill. In practice, tier 1 capital is frequently calculated net of all intangible assets.

⁷ As of June 30, 1991, of the 20 largest First District commercial and savings banks, none violated tier 1 risk-based guidelines, seven violated total risk-based guidelines, and nine violated a 5 percent leverage ratio.

⁸ DEP (total deposits) is calculated as a bank's total liabilities excluding its total equity; it is composed primarily but not exclusively of deposits.

⁹ These control variables may capture demand shocks that may not be evenly distributed across all banking markets. For example, asset size could be important if large firms are more severely affected by the recession and tend to use large banks as their primary lender. Similarly, servicing fees, commercial lending, and real estate lending may have experienced different demand shocks.

The sample is further segmented in order to verify that it is controlled for possible differences across banks in the degree to which they are affected by demand shocks. Because New England savings banks generally have been less active in lending to businesses, institutions are categorized by whether they have a commercial or a savings bank charter. This provides a further check on whether CI captures differences in demand shocks across institutions. The sample is further split into large bank and small bank categories. (Large is defined as any institution with at least \$300 million in assets, consistent with the classification used in call reports.)

Table 3 reports the results of estimating equation (1) for all FDIC-insured banks in New England and for the four subcategories: large commercial banks, large savings banks, small commercial banks, and small savings banks. The results provide substantial support for the capital crunch hypothesis. Capital ratios are a statistically significant determinant of deposit growth in four of the five regressions, with the estimated capital ratio coefficient significant at the 1 percent confidence level in the large savings bank and the all banks samples. A decrease of 1 percentage point in a bank's capital/asset ratio corresponds to a decline of more than 1 percent in its deposit growth rate for the small savings bank and all banks samples, and an even more dramatic 1.47 percent drop for the large commercial bank sample.

Asset size has a statistically significant negative estimated coefficient in all five regressions, with coefficients significant at the 1 percent confidence level for the all banks and the two savings banks regressions. Fee income has a positive sign in four of the five regressions, although none are statistically significant. This is consistent with the hypothesis that banks relying heavily on fee income were more insulated from the recent demand shocks. Banks with substantial commercial and industrial loans and real estate loans do not appear to have experienced significantly different demand shocks, with real estate loans having a statistically significant effect only in the small savings bank sample.

The results shown in Table 3 support the capital crunch hypothesis: institutions with lower capital ratios grew more slowly (shrank more rapidly) to try to satisfy capital requirements. Furthermore, the results are fairly consistent across types and sizes of banks. The next section examines how the decrease was distributed across categories of deposits.

Changes in the Composition of Deposits

If banks are shrinking to satisfy capital requirements, presumably they will choose to shrink the most expensive accounts, while trying to leave unchanged deposits that provide low-cost funds. In addition, core deposits, such as NOW accounts, pay

Table 3
Determinants of the Percentage Change in Total Bank Deposits^{a,b} at New England Banks, 1990:1 to 1991:1

Institution	Constant	K/A a ₁	Assets a ₂	FEE a ₃	C&I a ₄	RE a ₅	n	R ²	SEE
Large Commercial Banks	.21 (.19)	1.47* (.72)	-.03* (.01)	.29 (.17)	.04 (.14)	-.10 (.08)	49	.15	.080
Small Commercial Banks	.31 (.20)	.81 (.53)	-.03* (.01)	.17 (.25)	.03 (.13)	.04 (.12)	146	.01	.120
Large Savings Banks	.58** (.16)	.93** (.22)	-.05** (.01)	-.35 (.24)	-.10 (.12)	.01 (.07)	81	.44	.056
Small Savings Banks	.50** (.13)	1.08* (.47)	-.04** (.01)	.45 (.58)	-.04 (.15)	-.18* (.08)	143	.15	.084
All Banks	.38** (.06)	1.03** (.24)	-.03** (.00)	.11 (.14)	-.03 (.07)	-.07 (.05)	419	.23	.093

^aTotal bank deposits are defined here as total bank liabilities less bank capital.

^bEstimated with a White correction for heteroskedasticity; standard errors in parentheses.

*Significant at 5% confidence level.

**Significant at 1% confidence level.

Table 4
Effect of Capital/Asset Ratios on Deposit Growth, by Category of Deposit,^a 1990:I to 1991:I

	NOW Accounts	MMDAs	Large CDs
Large Commercial Banks	4.18** (1.07)	4.86* (2.40)	7.77* (3.74)
Small Commercial Banks	6.44 (4.93)	3.27* (1.31)	3.31** (1.19)
Large Savings Banks	2.00* (.86)	2.13** (.77)	3.23** (.81)
Small Savings Banks	-1.82 (2.67)	.36 (.96)	5.07 (3.07)
All Banks	1.99 (2.25)	1.82** (.55)	4.40** (1.27)

^aThe equations have been estimated with a White correction for heteroskedasticity and include the same set of explanatory variables as the equations in Table 3. Standard errors in parentheses.

*Significant at 5% confidence level.

**Significant at 1% confidence level.

the same rate to all depositors, while certificates of deposit (CDs) pay different rates depending on prevailing market conditions at the time of issue. Thus, by using CDs as their marginal source of funds, banks are able to segment the deposit market.

Three categories of deposits are examined: NOW accounts, money market deposit accounts (MMDAs), and large CDs. The average interest rates paid nationally in 1990 for these accounts were 4.58, 6.29, and 7.99 percent, respectively (Brunner, Duca, and McLaughlin 1991). If poorly capitalized banks are shrinking to satisfy capital requirements, the greatest shrinkage can be expected to occur in CDs, the marginal and most expensive source of funds, and the least shrinkage in NOW accounts, with the shrinkage in MMDAs between the two extremes.

Equation (1) was reestimated with growth rates by deposit category replacing the growth rate of total deposits. The results, indicating the sensitivity of deposit growth by category to a bank's capital position, are reported in Table 4. The capital crunch hypothesis would imply that the capital/asset ratio would have a larger positive sign, the more costly the deposit account and the more the deposit type serves as the marginal source of funds.

The results in Table 4 support the hypothesis that banks have been reducing the most costly ac-

counts. For the all banks category, large CDs have an estimated coefficient more than twice the size of either of the less costly accounts, and the estimated coefficient is statistically significant at the 1 percent confidence level. While capital ratios have a statistically significant effect on MMDA growth in the all-banks sample, their effect is not significant for NOW accounts. Even though MMDAs and NOW accounts have similar responses, the MMDA response is measured with much greater precision.

The point estimate of the sensitivity of large CD growth to the capital ratio is greater than that for MMDAs in each bank category, and greater than that for NOW accounts in all but the small commercial bank category. In three of the four bank subcategories (small savings being the exception), the capital/asset ratio has a significant effect on both CD and MMDA growth. On the other hand, only large commercial and large savings banks show a significant response to the NOW account equations. This evidence is consistent with banks passively accepting changes in such transactions accounts, implying that their changes would not necessarily be related to the capital/asset ratio of the institution. Thus, the general pattern is confirmed, whereby the more managed accounts such as CDs grow more slowly (shrink more) than NOW accounts when institutions become poorly capitalized. The hypothesis that CDs may be distinguishable as the marginal source of funds for many institutions is also confirmed. In fact, a 1 percentage point decline in the capital/asset ratio implies a 4.4 percent decline in the growth rate of large CDs for the all banks sample and a decline of nearly 8 percent in the large commercial bank sample.

IV. Conclusions

New England banks have experienced substantial shrinkage over the past two years. Some contraction was inevitable after the bursting of the New England real estate bubble and the slowdown in the New England (and national) economy. However, their effects were aggravated by an increased emphasis on bank capital regulation at the same time that New England banks experienced a substantial reduction in bank capital. This article has shown that the shrinkage of banks in New England has not been uniform, as might have been expected if it were related solely to the economic downturn. Rather, poorly capitalized banks have contracted more rapidly than well-capitalized banks. Furthermore, banks

have contracted deposits most in those categories that serve as their marginal source of funds.

To date, the capital crunch appears to be concentrated in New England, although large losses in bank capital have occurred in the mid-Atlantic and some western states. Had we had a national banking system, bank capital would have been able to flow more freely across geographical regions, substantially reducing capital shortages. Because banks typically have had asset concentrations in their own region, the disruption of the lending behavior of banks due to regional economic problems tends to be concentrated in that region. With more nationwide banks, a given bank's capital would be less eroded by problems in any one region of the country, and well-capitalized institutions would be available to fill any gap caused by shrinkage of poorly capitalized institutions.

To determine whether the current capital crunch in New England has resulted in a credit crunch, the analysis must be extended to assets. Banks have several options available to reduce their assets. One possibility is selling securities, leaving the loan portfolio unchanged. Assets would shrink, but the size of the loan portfolio would be unaffected. Alternatively, banks can shrink their loan portfolios, either by selling or securitizing loans, by calling loans, or by tightening credit standards. Loan sales should be preferred by banks because they do not disrupt historical lending relationships. It has also become relatively easy to sell certain categories of loans. For

example, an active secondary market exists for residential mortgages that conform to secondary market standards. It has also become common to sell consumer loans. These loan sales can reduce the stock of loans in a bank's portfolio without affecting its flow of new lending. In that case, credit availability for new loans would be unaffected, despite a large decline in loans reported on a bank's balance sheet.

If banks choose to shrink by tightening credit standards and calling loans, borrowers will be affected only if alternative sources of credit are not available. Large firms with access to national credit markets will be insulated from many disruptions in bank lending. Similarly, firms in the middle market may have alternative sources of funds, such as foreign banks or banks inside or outside the region that are not capital constrained. In addition, insurance companies, venture capital firms, and finance companies have expanded operations to lend in markets traditionally serviced by banks. Therefore, even if banks in one region reduce their lending, credit availability becomes a problem only for those firms that must rely on local banks for their credit, either because they are too small to go outside the region or because banks outside the region and nontraditional lenders are not available.

Unfortunately, the data required to adequately address this question are not yet available. However, current research by the authors will develop a more refined data set and investigate further the link between a capital crunch and a credit crunch.

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