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Federal Reserve Bank of Boston

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Abstract

Recent studies have found that banks with low capital ratios have significantly decreased their lending to the real estate sector. This correlation between real estate lending and bank capital could be the result of voluntary decisions by banks to recapitalize, or it could be the result of direct actions taken by bank regulators. We find that banks with low capital ratios reduce their real estate lending substantially more after formal regulatory actions have been initiated by regulators. Furthermore, this reduction in lending is particularly large for the categories of real estate borrowers most likely to be bank dependent.

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Bank Regulatory Agreements and Real Estate Lending

Recent studies have highlighted the important role of bank capital in the reduction in real estate lending by banks during the past economic downturn (Peek and Rosengren 1994a; Hancock and Wilcox 1993, 1994a, 1994b). While the association between low levels of bank capital and reduced real estate lending has been established in these studies, a direct regulatory link to the reduction in real estate lending has not been clearly established. This paper examines the specific actions taken by regulators that would cause banks to reduce lending to the real estate sector and establishes such a link.

As a bank's financial condition deteriorates, regulators progressively increase the pressure on banks to take actions to improve their financial condition. If remedial action is necessary, regulators normally will require a bank's board of directors to sign an informal agreement to undertake such actions, called a memorandum of understanding; usually it remains confidential. If the bank fails to abide by a memorandum of understanding, or if the bank's financial condition is more serious, regulators will impose a formal action, which is legally enforceable and publicly disclosed.

The major constraining factor in these regulatory actions is a requirement to improve capital ratios dramatically, usually within two years or less. Given their impaired financial condition, few of these banks are able to raise new equity at a cost they view as reasonable. Thus, given that many of these banks are reporting negative income, the only viable alternative for raising capital ratios for most of these troubled banks is to decrease their assets.

This paper examines the way that bank real estate lending is affected by the imposition of formal actions. We find that substantial shrinkage of a bank's real estate loans follows the imposition of a formal action. While poorly capitalized banks do appear to shrink real estate loans more than their better capitalized peers, the reduction is much more dramatic if regulators have imposed a formal action. In New England, where more than one-third of all banks underwent formal actions during the 1989-93 period, these regulatory constraints were a serious impediment to real estate borrowers dependent on local lenders. In fact, in the real estate loan categories in which borrowers are most likely to be dependent on banks (those other than one- to four-family residential loans), formal actions produced loan declines that were both economically and statistically significant.

New England was the first region of the country to experience a severe banking downturn after regulators enhanced their enforcement of capital regulations with the adoption of new capital standards. Thus, the New England experience is a particularly relevant focus for a study of the regulatory impact on bank lending. The first section of the paper describes the use of regulatory actions in New England. The second section describes the data, a panel including all New England commercial and savings banks for the period 1989:I to 1994:I. Unlike previous studies, this panel data set includes small as well as large banks, savings as well as commercial, failed as well as surviving, and banks involved in mergers and acquisitions as well as those with no structure changes. The third section describes the empirical results of the study. The paper concludes with a summary of the implications of formal regulatory actions on bank lending to the real estate sector.

## I. Formal Regulatory Actions

Initial work examining the association between bank capital and bank lending focused on the adoption of new capital requirements coincident with significant losses in bank capital resulting from the decline in real estate prices in many parts of the country (Bernanke and Lown 1991; Hancock and Wilcox 1992, 1993, 1994a; Peek and Rosengren 1992, 1994b). Two capital standards were adopted in the United States following the Basle Accord. The Basle agreement required that strong banking organizations maintain 4 percent of risk-weighted assets for tier I capital and 8 percent of risk-weighted assets for total capital. The risk weights categorized assets in broad categories related to their credit risk.[1]

Because the risk-weighted capital ratios reflected only credit risk, U.S. regulators adopted an additional capital requirement, the leverage ratio. Unlike the risk-weighted capital ratios, shifts between asset categories have no effect on the leverage ratio because all assets are weighted the same, regardless of their credit risk. The minimum leverage ratio required for strong banking organizations was 3 percent.

Figure 1 shows average capital-to-asset ratios for commercial banks in New England and the United States from 1960:IV through 1994:I, with shading indicating recession periods.[2] The recent attention given to capital requirements is understandable, given the significant changes in capital ratios over the period. From 1960 to the mid 1970s, bank capital ratios declined steadily, showing relatively little sensitivity to recession periods. Both series temporarily rebounded in 1975 and 1976. The national series then rose gradually throughout the 1980s and at an accelerated pace in the early 1990s. In New England, however, the decline continued until 1983, when the ratio began to rise. This rise was then interrupted by a dramatic, but temporary, decline in 1989 and 1990, followed by a sharp rise in the early 1990s.

Figure 1 also shows that the overall decline in bank capital ratios was greater in New England than in the rest of the country. And, unlike the national trend, a final sharp decline preceded the most recent recession. Not only was the overall decline sharper in New England, but the subsequent recovery was more dramatic.

The recent rapid increases in capital ratios for banks in both the nation and New England immediately followed the implementation of the new leverage ratio and risk-based capital requirements. While banks were required to raise capital ratios substantially, they were not required to achieve this increase through increases in capital. In fact, the particularly sharp initial rise in the capital ratio in New England was accomplished in large part through reductions in assets. This asset shrinkage, primarily in the loan portfolio, makes New England an ideal location for examining bank regulatory effects on real estate lending.

A correlation between low bank capital ratios and decreases in bank lending has been documented in several recent studies (Bernanke and Lown 1991; Furlong 1992; Hancock and Wilcox 1992, 1993; Peek and Rosengren 1992, 1994a, 1994b; Cantor and Wenninger 1993; Baer and McElravey 1994), but until recently no evidence of a direct linkage to regulatory action was available. A potential problem with attributing this correlation to the new capital standards was that most banks generally maintained capital ratios well above the statutory minimums. However, the seeming inconsistency between low required capital ratios, much higher average bank capital ratios, and reductions in bank lending was resolved by an examination of the direct effects of specific bank supervisory actions (Peek and Rosengren 1995). Recognizing that most banks in fact are required to maintain leverage ratios well above the statutory minimum, that many banks fall well below their required capital level, and that formal regulatory actions may be required to spur banks to action to raise capital ratios, Peek and Rosengren were able to establish an explicit role for regulatory policy in explaining the shrinkage of bank portfolios during the late 1980s and early 1990s.

Peek and Rosengren (1995) focused on formal regulatory actions, cease and desist orders and written agreements, implemented by the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC). While examiners can make recommendations during the exam process or through memorandums of understanding, these are not legally enforceable agreements. Formal actions, on the other hand, because they are legally enforceable and carry civil penalties, are more stringent guidelines for improving the financial condition of the bank and represent the most severe actions taken by examiners short of closing the institution.

Most formal actions include sections on management, strategic and capital plans to implement the bank's recovery, risk review, and a review of nonperforming assets and reserving procedures. Specific targets for capital ratios are normally included as well. While many of the 1989 and 1990 formal actions required banks to maintain a capital ratio of at least 8 percent under the old capital definitions, all the specific targets in more recent formal actions were tied to the leverage ratio.[3] The most common capital target specified in these actions was a 6 percent leverage ratio. Thus, formal regulatory actions were requiring leverage ratios twice the minimum required for the strongest institutions. While a 3 percent leverage ratio rarely is binding for a bank, a 6 percent leverage ratio was binding on many banks during the period under study here.

The leverage ratio targets not only are binding on many institutions, but must be attained within a relatively short interval, usually two years and often one year or less. With few prospects for external financing and modest earnings, if any, most banks achieved a higher capital ratio by shrinking assets. If the reduction in bank assets was accomplished by reducing lending to real estate, this may have had seriously impaired not only the long-run viability of the bank, but also the operations of local real estate borrowers dependent on the lending relationship.

While a reduction in lending at one bank can disrupt historical lending relationships, the problems should be short-lived if other well-capitalized local lenders can extend additional credit. In New England, however, banking problems were widespread, with few well-capitalized banks remaining to provide alternative financing. Thus, a borrower whose credit had been curtailed or eliminated at its traditional lender might find no local alternative source of credit available. Figure 2 shows the percentage of real estate loans held by banks under enforcement actions in New England. The solid line represents all real estate loans and the dotted line represents real estate loans excluding one- to four-family residential mortgages.

At the peak in 1990:IV, 45 percent of all "bank-dependent" real estate loans in New England were held by banks under formal regulatory actions, with the bank-dependent category defined to include commercial real estate, construction, and multifamily residential loans in bank portfolios. The one- to four-family residential mortgage category is excluded because the presence of many national lenders and a well-established secondary market makes borrowers in this market less dependent on the availability of financing from local banks. While the largest commercial, construction and multifamily residential borrowers are unlikely to be restricted to local banks for their credit needs, and thus are much less likely to appear in our bank loan data, the smaller of such borrowers are likely to be truly bank dependent, and thus would appear in the bank loan data. Unfortunately, call reports do not provide comprehensive data on size of borrower.

Figure 2 understates the depth of the banking problems, for two important reasons. First, formal actions are only the most severe form of regulatory intervention. Many other less severe actions, such as memorandums of understanding, also were widely issued. Because these agreements had similar requirements but were not legally binding, they, too, were likely to have altered bank behavior, although possibly not as dramatically as formal actions. Second, the failure of a bank under a formal action would cause our measure to decline (or, at least, be lower than otherwise) if part or all of the failed bank's assets were acquired by a bank not under a formal action or transferred to the FDIC, which frequently liquidated the loans (Rosengren and Simons 1994). In fact, the sharp, but temporary, declines in the two series in 1990:IV reflect the failure of the Bank of New England, the second largest bank holding company (as measured by assets) in New England at the time. Thus, a measure of loans in all troubled banks and in the portfolio of the FDIC would likely be substantially higher than our measure of loans in banks with formal actions.

## Data and Methodology

To establish whether regulatory enforcement actions have contributed to a decline in bank real estate lending, we constructed a pooled time series and cross-section panel of balance sheet and income statement data from the call reports. The sample includes all FDIC-insured commercial and savings banks in New England (defined here as the First District of the Federal Reserve System) during the 1989:I to 1994:I period. The focus is on New England banks because this is the region where many of the formal regulatory actions have been issued under the new capital guidelines, information about bank structure and regulatory actions was readily available, and complaints of inadequate availability of real estate loans were widespread. Furthermore, limiting the sample to one region of the country reduces the differences across banks in demand shocks compared to what would be found in a national sample. However, even though these banks did experience similar regional economic conditions, this is not equivalent to being subjected to identical demand shocks. For this reason, our estimation technique will further control for demand shocks that are bank specific.

The panel begins in the first quarter of 1989 because information about formal regulatory actions and bank structure was not readily available for earlier periods. For example, only those formal actions signed in October 1989 and later are publicly disclosed. The last available quarter was the first quarter of 1994, providing 21 quarters of data for the panel.

The change in outstanding loans reflects more than just new loan originations (lending). Charge-offs (CO) and transfers of real estate loans to the other-real-estate-owned category (OREO) due to foreclosures each can reduce the quantity of loans outstanding without a corresponding reduction in new lending.[4] The relationship between new lending (NL) relevant for credit availability and the change in outstanding loans ($\Delta L$) is summarized in equation 1:[5]

$$(1) \qquad NL = \Delta L + CO + \Delta OREO.$$

When a loan is charged off, outstanding loans decrease by the amount of the charge-off. This alters gross loans on the balance sheet but does not represent a change in current lending, since it reflects only losses from past loans. When a real estate loan is foreclosed, the difference between the current market value and the face value of the loan is charged off, and the collateral is transferred to the OREO account at its current market value. While additions to OREO reduce outstanding real estate loans, this action reflects a shift between asset categories rather than a decline in funds made available to the real estate sector.

Because we are interested in the effect of credit availability on the real estate sector, the categories of real estate lending of particular interest are those that might be deemed to be bank dependent, that is, having few alternative sources outside of local banking markets. Small to medium-sized construction loans, multifamily residential mortgages and commercial real estate loans are all loans typically made by local banks and, unlike one- to four-family mortgages, they are generally not easily securitized. Because loan data by size of borrower (or even size of loan) are not available for this period in the call reports, we have combined these three loan categories to constitute our measure of bank-dependent real estate loans.

In its simplest form, the equation estimated is:

$$(2) \qquad \frac{\Delta RE_{j,i,t}}{A_{i,t-1}} = \alpha_1 + (\alpha_2 + \alpha_3 \frac{K_{i,t-1}}{A_{i,t-1}}) FA_{i,t} + \alpha_4 \frac{K_{i,t-1}}{A_{i,t-1}} (1 - FA_{i,t}) + \alpha_5 LogA_{i,t} + \epsilon_{i,t}$$

The dependent variable is the change in real estate loan category j of bank i scaled by total assets of bank i. The equation includes a dummy variable for formal actions (FA) with a value of one for any quarter the bank is under a formal regulatory action and zero otherwise. Equations estimated in the existing literature include a special case of this more general formulation with the capital-to-asset ratio as an argument but FA omitted, that is, with $\alpha_2=0$ and $\alpha_3=\alpha_4>0$. However, if it is the imposition of formal regulatory actions, rather than simply the existence of low capital-to-asset ratios alone, that causes banks to shrink (or at least grow more slowly), we would expect to find $\alpha_2<0$ and both $\alpha_3$ and $\alpha_4$ not significantly different from zero.

Because formal actions specify a leverage ratio, usually 6 percent, that the bank is legally required to achieve, the most poorly capitalized banks have the greatest incentive to shrink. Thus, our specification in equation 2 allows the magnitude of the effect of formal actions on the change in assets to differ across banks, in particular being related to a bank's beginning-of-period (end-of-previous-period) leverage ratio, with $\alpha_3$ predicted to be positive. We also include the leverage ratio for banks not under a formal action as an argument in the equation to enable us to test for an effect of formal regulatory actions over and above any voluntary bank response to stated capital requirements. That is, being below minimum capital requirements may not in itself generate a bank response to restore its capital position in the absence of a formal regulatory action.

Many of the differences in the demand for loans across banks will be ameliorated by concentrating on banks in one region, with the remaining differences captured in large part by the bank-specific constant terms. However, because large banks may support different loan markets than smaller institutions and many banks in our sample experienced substantial changes in size over the period being investigated (both shrinkage and growth, especially through acquisitions), we include the logarithm of a bank's total assets as a control variable. If loan demand varies by size of borrower, loan growth may vary by size of institution. For example, national banks are constrained to lend not more than 15 percent of their capital to any one borrower, which prevents smaller institutions from making large loans.

## Empirical Results

We estimated each equation using three alternative techniques: ordinary least squares, a variance components model, and a fixed effects model. Ordinary least squares is the most restrictive estimation technique, since it assumes that all banks share the same overall intercept, $\alpha_1$. The variance components model allows for bank-specific effects, such as bank management, that are not easily quantified. In this case, $\alpha_1$ in equation 2 would become $\alpha_{1,i}$. It is assumed that the $\alpha_{1,i}$s are drawn from a common distribution with a finite variance. The fixed-effects specification treats the $\alpha_{1,i}$s as fixed parameters for each bank.

In each set of regressions, specification tests were able to reject both the ordinary least squares and the variance components models relative to the fixed effects model. The F-test for equality of intercepts across all banks could be rejected at the 5 percent level in each case. In addition, the

Hausman test could reject the variance components specification relative to the fixed effects specification in each instance at the 5 percent level. While we present only the fixed effects estimates, the results were qualitatively the same regardless of estimation technique, with the ordinary least squares and variance components specifications actually producing larger estimated effects of formal actions compared to the fixed effects specifications.

The fixed effects model is economically appealing because it allows an independent intercept term for each individual bank. If demand shocks are bank specific, then the average differences in demand across banks will be captured by the intercept term. For example, if one were concerned that loan demand varied across geographical location (for example, by state), by charter (savings bank versus commercial bank), or by type of lender (for example, as reflected by the average portfolio shares of different loan types), the bank-specific constant term in the fixed effects model would incorporate each of these effects.

Table 1 presents the results of estimating equation 2 for gross and net real estate loans. The results in column 1 show that formal actions do have a significant impact on the shrinkage in the real estate portfolio. The effect of formal actions on the change in real estate loans is captured by two variables, a formal action intercept dummy variable and a formal action dummy variable that interacts with the leverage ratio. The estimated coefficients on both the formal action variable and the formal action*leverage ratio interaction variable are of the predicted signs and significantly different from zero at the 1 percent confidence level. While the estimated coefficient on the leverage ratio for banks not subject to formal actions also is statistically significant, it is only half the magnitude of that for banks with formal actions.

The estimated coefficient on FA indicates that for each quarter that a formal action is in force, total real estate loans relative to bank assets shrink by an additional 1.5 percent, controlling for differences in the leverage ratio. However, because leverage ratios at banks with and without formal actions have different estimated impacts, the effect of the leverage ratio must also be incorporated in order to calculate the net additional impact of formal actions on the shrinkage of real estate loans. For example, for a bank with a 4 percent leverage ratio, the additional shrinkage of real estate loans due to the presence of a formal action is 1 percent of assets <u>per quarter</u>.[6]

Recognizing that a higher leverage ratio will mitigate the degree of loan shrinkage associated with a formal action, an alternative measure of the relative effect of formal actions is the value of the leverage ratio at which formal actions cease to retard asset growth. Again, this can be calculated using the estimated coefficients on formal actions and the two leverage ratio interaction variables.[7] For total real estate loans, this "break-even" value for the leverage ratio is 11.4 percent, a level almost double that most commonly required in formal actions.

Since banks with formal actions tend to have leverage ratios well below the "break-even" leverage ratio, one would expect to find that formal actions have accounted for a significant decline in bank real estate loans. Because real estate loans are scaled by total assets, the estimated effect understates the percentage decline in the real estate loan category itself. For example, if real estate loans accounted for one-third of a bank's total assets, the implied percentage decline in real estate loans would be in the range of 3 percent per quarter. In dollar terms, the reduction in real estate loans attributable to formal actions is $12.8 billion, representing 11.4 percent of the 1989:II (beginning of our sample) value of real estate loans for all New England commercial and savings banks.[8] However, as a share of the total decline in real estate loans, the percentage is much larger. From the peak in New England in 1989:III to the trough in 1993:I, bank real estate loans declined by $29.6 billion, with over 34 percent ($10.2 billion) of this reduction accounted for by formal actions.

Column 2 shows the shrinkage in total net real estate loans. Net real estate loans were calculated using the adjustments in equation 1 to correct the gross change in real estate loans for loan charge-offs and transfers to OREO. These adjustments leave the effect of formal actions statistically significant, with a slight increase (in absolute value) in the magnitude of the effect. Again, the estimated coefficient on the leverage ratio for banks without formal actions is statistically significant, but just under one-half the size of the corresponding coefficient for banks with formal actions. The similarity of results in the two columns indicates that the results for gross real estate loans are not being driven by the reduction in loans due to problems with past loans. New lending at banks is also being reduced by formal actions.

## Effects on Bank-Dependent Real Estate Loans

Table 2 provides the results of estimating equation 2 for one- to four-family residential mortgages, bank-dependent real estate loans (total real estate loans less one- to four-family mortgages), commercial and industrial loans, and consumer loans. In each case, the sample size has been reduced compared to the Table 1 regressions so as to include only those observations where a bank is, in fact, holding a nonzero amount of the loan type in question in its portfolio. Furthermore, given the similarity of the results in the two columns in Table 1, here we estimate regressions only for the gross changes in loan categories.[9]

The estimated coefficients on the formal action dummy variable are negative for all four lending categories, although only those for one- to four-family residential mortgages and bank-dependent real estate loans are statistically significant. Furthermore, all four of the estimated coefficients on the leverage ratio*formal actions interactive variables are positive as predicted, with three of the four statistically significant. The estimated coefficients on the interactive variables for the banks without formal actions are also positive in each instance, although also statistically significant in only three instances. While the estimated effects are well below those for banks with formal actions in three loan categories, that is not the case for commercial and industrial loans.

Using the estimated coefficients on formal actions and the two leverage ratio interaction variables, the "break-even" value for the leverage ratio is 13.1 percent for residential loans and 10.2 percent for bank-dependent real estate loans. Since formal actions tend to specify leverage ratios well below the "break-even" leverage ratio, one would expect to find that formal actions have accounted for a significant decline in one- to four-family residential mortgages and bank-dependent real estate loans. In dollar terms, the reduction in such residential mortgages attributable to formal actions is $6.8 billion, representing 11.1 percent of its 1989:II value for New England commercial and savings banks. For bank-dependent real estate loans, the decrease attributable to formal actions is $5.7 billion, representing 11.3 percent of the 1989:II value of such loans for all New England commercial and savings banks. Again, the percentages are much larger when calculated as a share of the total reduction in these loans.

Total one- to four-family mortgages in bank portfolios in New England declined by $7.65 billion between 1989:III and 1993:I, with 70 percent ($5.39 billion) attributable to formal actions. Similarly, bank-dependent real estate loans declined by $23.43 billion between 1989:II and 1994:I, with 24 percent ($5.69 billion) accounted for by formal actions. The much larger percentage of the decline in one- to four-family residential mortgages attributable to formal actions likely reflects the ease with which banks can dispose of such loans in their portfolio by selling them in the secondary market. The much larger overall decline in bank-dependent real estate loans, as well as the much larger decline not attributable to formal actions, likely reflects the much sharper decline in loan demand for these types of real estate loans compared to that for one- to four-family residential mortgages. Even so, formal actions still account for a very substantial reduction in bank-dependent real estate loans.

Thus, we find that the decline in real estate lending attributable to formal actions is economically and statistically significant. While the one- to four-family residential loans suffered substantial decreases, this is likely to have had little impact on borrowers, because of both the availability of nonbank lenders and the ability of banks to originate such loans without holding them in their portfolios. While borrowers seeking financing for residential assets are likely to find alternative sources of financing, the same is not likely to be true for borrowers in the bank-dependent real estate categories. Small commercial real estate loans are not easily sold, and few nonbank sources of funds are readily available. Thus, reductions in lending in these categories may have had significant effects on borrowers' ability to undertake real estate projects.

### Timing of Banks' Response to Formal Actions

Table 3 relaxes the constraint that a formal action has the same effect in each quarter in which it applies. Formal Action (0) is a dummy variable with a value of one in the quarter of the bank exam that resulted in a formal action and zero otherwise. Similarly, Formal Action (1) has a value of one for the first quarter following the quarter containing the initial exam date and zero otherwise, and so on. Formal Action (8) denotes all observations 8 or more quarters after the initial exam. While this specification asks a lot from the data, it can provide some indication of the relative timing of banks' responses to formal actions.

The results indicate that the loan shrinkage is generally spread out over time. For both one- to four-family residential mortgages and bank-dependent real estate loans, the estimated coefficients on each of the formal action dummy variables are negative, with five of the eight coefficients in each equation significantly different from zero. However, the pattern across the two equations differs. For residential mortgages, much of the shrinkage occurs in the first year, with four of the first five estimated coefficients on the formal action dummy variables significantly different from zero. The effect then attenuates, with only one of the four remaining dummy variables having estimated coefficients significantly different from zero. In contrast, for bank-dependent real estate loans, only one of the first four estimated coefficients on the formal action dummy variables are significantly different from zero. For the remaining formal action dummy variables, four of the five estimated coefficients are significantly different from zero. Thus, the main effects on bank-dependent real estate loans occur somewhat later compared to those on residential mortgages.

The clustering of the coefficients suggests that a bank's first response is to reduce residential mortgage loans, which can be done relatively easily if the bank has loans suitable for the secondary market. If further shrinkage is necessary, banks then reduce their bank-dependent loans. Perhaps this reflects a reluctance by banks to harm existing lending relationships. It may also reflect the nature of the real estate loans. If these are not demand loans (and are not sold), the lender would have to wait until the loan matured or covenants were violated in order to remove the loans from its books. Thus, the reduction in real estate loans, even in the absence of new lending, would occur only after a delay. However, when the shrinkage of bank-dependent loans does finally occur, it is dramatic, representing as much as 1 percent of total assets (roughly 8 percent of bank-dependent real estate loans) in a single quarter.

## Conclusion

This study finds that the shrinkage of real estate loans is directly related to formal actions taken by bank regulators. The shrinkage is likely to be particularly important for borrowers with few alternatives to local bank financing. For the real estate categories most likely to be dependent on local bank financing, we find formal actions result in shrinkage that is both statistically and economically significant. Furthermore, while confirming the results of previous studies that poorly capitalized banks are more apt to shrink, we also find that this effect is significantly enhanced when the bank also has a formal regulatory action. While this study does establish that real estate lending may bear the brunt of formal actions, whether this loan shrinkage actually improves the survival rate of banks is an open question that we are currently exploring.

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Endnotes

1. For both the tier 1 and the total risk-based capital standards, government securities are assigned a zero weight, government-sponsored agency securities a 20 percent weight, residential mortgages a 50 percent weight, and loans not elsewhere included (for example, commercial real estate loans, commercial and industrial loans, loans to individuals) a 100 percent weight. Both ratios also weight off-balance-sheet assets. The ratios differ in their definitions of capital. Tier 1 capital includes equity capital, while total risk-based capital includes tier 1 capital plus subordinated debt and a portion of loan loss reserves. The details of the calculation of Tier 1 and total capital differ somewhat by regulatory agency. See, for example, 12 C.F.R § 325.

2. The ratio used is equity capital divided by unweighted assets, which most closely resembles the leverage ratio. Because some items used in capital ratio calculations were not detailed in the past, it is impossible to replicate exactly the current definition of the leverage ratio.

3. According to the old definition, capital (referred to as primary capital) was principally composed of equity capital, goodwill, and allowance for loan and lease losses, divided by the sum of the quarterly average of assets and the allowance for loan and lease losses minus goodwill. (See Regulation Y, appendix B, pages 58-59 for more details.)

4. In addition, loan sales and purchases result in differences between changes in loans outstanding and new lending. Unfortunately, disaggregated data on loan sales and purchases are not available by lending category and thus have not been included in the calculation of our measure of net new lending.

5. Ideally, we would want the inflow of assets into the OREO category rather than the change in OREO assets. However, sales from the OREO category are not included in the call report data.

6. Using the notation in equation 2, this is calculated as

$$\alpha_2 + (\alpha_3 - \alpha_4)*K/A.$$

In this case, the calculation would be -1.495 + (.264 - .133)*4 = -.971.

7. We solve for the value of the leverage ratio where the impact on real estate loan growth on banks with formal actions is the same as on those without. That is, the value of the leverage ratio that is obtained from solving:

$$\alpha_2 + \alpha_3 * K/A = \alpha_4 * K/A,$$

where $\alpha_2$, $\alpha_3$, and $\alpha_4$ correspond to the equation 2 notation, and their estimated values from column 1 in Table 1 are used.

8. This calculation is based on the estimated coefficients in column 1 of Table 1. The coefficients are used to calculate the effect of formal actions on total real estate loans held by banks under formal actions, quarter by quarter.

9. Prior to 1992:I, data for both charge offs and OREO were not disaggregated into real estate loan subcategories. Thus, net loan equations for one- to four-family residential mortgages and bank-dependent real estate loans could be estimated for only part of the period under consideration here.

Table 1
The Effects of Formal Actions and Leverage Ratios on Total Real Estate Loans
1989:II to 1994:I
Estimation Method: Fixed Effects

| Independent Variable[a] | $\frac{\Delta \text{ Real Estate Loans}}{\text{Assets}_{-1}}$ | $\frac{\Delta \text{ Net Real Estate Loans}}{\text{Assets}_{-1}}$ |
|---|---|---|
| Formal Action | -1.495** | -1.557** |
| | (.293) | (.285) |
| Leverage Ratio* Formal Action | .264** | .286** |
| | (.036) | (.035) |
| Leverage Ratio* No Formal Action | .133** | .141** |
| | (.027) | (.026) |
| Log Assets | -.487* | -.037 |
| | (.249) | (.242) |
| $R^2$ | .053 | .056 |
| SSR | 51050 | 48402 |
| SER | 2.623 | 2.554 |

Standard errors in parentheses.
* Significant at the 5% confidence level.
** Significant at the 1% confidence level.
[a] Each estimated equation also includes a set of dummy variables (not reported in the table) to control for differences in the constant term for each time period.

Table 2
The Effects of Formal Actions and Leverage Ratios on Categories of Bank Loans
1989:II to 1994:I
Estimation Method: Fixed Effects

| Independent Variable[a] | Δ 1-4 Residential Asset$_{-1}$ | Δ BD Real Estate Asset$_{-1}$ | ΔCommercial & Industrial Asset$_{-1}$ | ΔConsumer Asset$_{-1}$ |
|---|---|---|---|---|
| Formal Action | -.723** | -.744** | -.277 | -.146 |
| | (.254) | (.236) | (.237) | (.113) |
| Leverage Ratio* Formal Action | .097** | .167** | .032 | .034* |
| | (.031) | (.029) | (.029) | (.014) |
| Leverage Ratio* No Formal Action | .042 | .094** | .059** | .025* |
| | (.023) | (.022) | (.022) | (.010) |
| Log Assets | -.068 | -.421* | -.475* | -.266** |
| | (.216) | (.200) | (.204) | (.096) |
| $R^2$ | .024 | .023 | .026 | .017 |
| SSR | 38246 | 32670 | 29819 | 7503 |
| SER | 2.274 | 2.110 | 2.095 | 1.008 |

Standard errors in parentheses.
* Significant at the 5% confidence level.
** Significant at the 1% confidence level.
[a] Each estimated equation also includes a set of dummy variables (not reported in the table) to control for differences in the constant term for each time period.

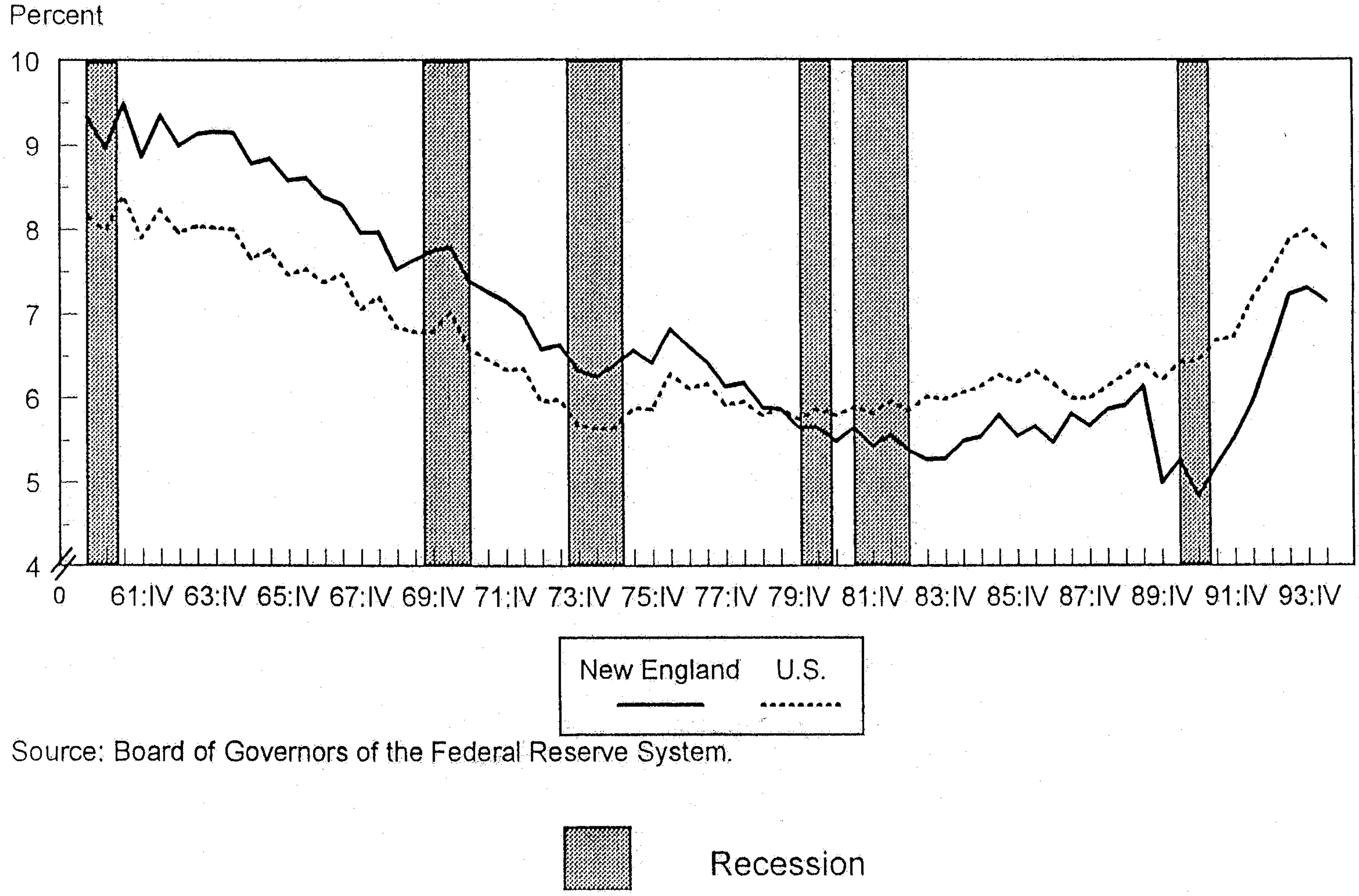
Table 3
Adjustment to Formal Actions
1989:II to 1994:I
Estimation Method: Fixed Effects

| Independent Variable[a] | Δ 1-4 Residential Assets$_{-1}$ | Δ BD Real Estate Assets$_{-1}$ |
|---|---|---|
| Formal Action (0) | -.783* | -.354 |
| | (.324) | (.301) |
| Formal Action (1) | -.711* | -.257 |
| | (.308) | (.285) |
| Formal Action (2) | -.320 | -1.109** |
| | (.304) | (.282) |
| Formal Action (3) | -1.171** | -.431 |
| | (.303) | (.281) |
| Formal Action (4) | -.711* | -1.074** |
| | (.307) | (.285) |
| Formal Action (5) | -.473 | -.959** |
| | (.319) | (.296) |
| Formal Action (6) | -1.014** | -.773* |
| | (.333) | (.309) |
| Formal Action (7) | -.445 | -.379 |
| | (.362) | (.336) |
| Formal Action (8) | -.309 | -.739** |
| | (.307) | (.285) |
| Leverage Ratio* Formal Action | .090** | .146** |
| | (.033) | (.030) |
| Leverage Ratio* No Formal Action | .044 | .090** |
| | (.023) | (.022) |
| Log Assets | .025 | -.490* |
| | (.222) | (.206) |
| $R^2$ | .027 | .027 |
| SSR | 38139 | 32552 |
| SER | 2.272 | 2.107 |

Standard errors in parentheses.
* Significant at the 5% confidence level.
** Significant at the 1% confidence level.
[a] Each estimated equation also includes a set of dummy variables (not reported in the table) to control for differences in the constant term for each time period.

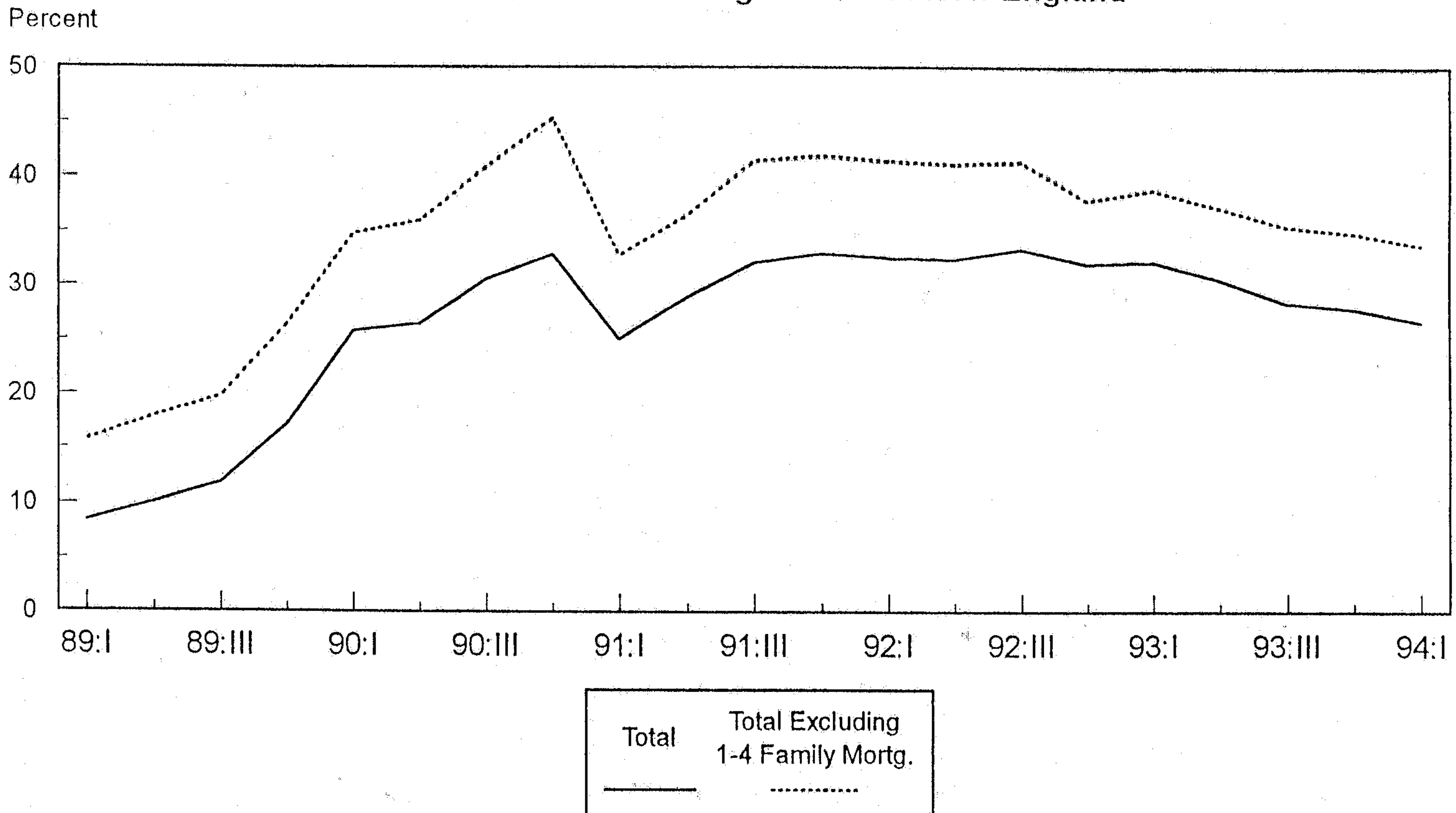
Figure 1

**Ratio of Equity Capital to Total Assets**
**U.S. and New England Commercial Banks, 1960:IV to 1994:I**




Source: Board of Governors of the Federal Reserve System.

## Figure 2
## Share of Real Estate Loans under Enforcement Actions
## Commercial and Savings Banks in New England




Source: Board of Governors of the Federal Reserve System.