Resolving a Banking Crisis: What Worked in New England

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Many Asian economies are now experiencing economic hardship, their troubles stemming in part from crises in their banking sectors. Given the important role the banking sector plays in these economies, resolution of their banking crises is a vital first step toward resuming economic growth. Unfortunately, the steps taken so far to resolve their banking problems appear inadequate. Many observers compare current attempts to those of U.S. regulators during our initial efforts to resolve the S&L crisis. Given the lengthy time it took to resolve the S&L crisis and the high cost of a taxpayer-supported resolution, this is not a comparison the Asian countries should welcome.

The S&L crisis, however, was not the only U.S. banking crisis resolved in recent years. The six New England states also experienced a severe banking crisis, losing more than 15 percent of their banks in the early 1990s. Unlike the S&L crisis, however, the New England crisis was resolved at far less cost and in a much more timely manner. In fact, just a few years after the crisis, the banking sector was healthy and profitable again and the region enjoyed a vibrant economic recovery. This paper examines the behavior and interactions of bankers, regulators, and market participants during the New England banking crisis, in order to determine what factors led to the relatively successful resolution of this banking crisis.[1]

While the S&L crisis has been widely analyzed (for example, see Kane 1989b, Barth 1991, and White 1991), only sparse evidence is available on the resolution of New England's banking crisis. Studies of the S&L crisis examine the role that deposit insurance and regulatory forbearance played in that crisis, contending these policies contributed greatly to the cost of its resolution. Many argue that these policies allowed economically insolvent institutions to conceal the true extent of their weakness and to undertake a "go for broke" strategy in a last-ditch effort to salvage their institution. Did managers of failing New England banks undertake similar "go for broke" strategies in the years prior to

their failures? If not, what made managers of New England banks choose an alternative path? This article examines these two questions.

The primary finding of this study is that failing New England banks, in their final years, did not increase the riskiness of their operations in a last-chance effort to salvage their firms. This lack of excessive risk-taking was likely the basis for the relatively efficient resolution of the crisis. The data also suggest that strict regulatory oversight, public disclosure of banking problems, and market discipline all contributed to the success of the resolution.[2]

I. The New England Banking Crisis

Starting in 1989 and continuing through the early 1990s, the New England banking industry experienced tremendous hardship. Amid a slowdown in the region's economy and the collapse of the region's real estate market, banks faced an increasing number of delinquent loan customers. Profitability deteriorated as loan defaults rose, and many of the region's banks did not survive. Table 1 shows the extent of these problems.[3] More than 15 percent of the region's banks operating in early 1989 had failed by the end of 1994.[4] These failing banks held approximately 20 percent of the region's banking assets as of the beginning of 1989.

Most of the failures were due to loan losses resulting from the region's slumping real estate market (Randall 1993). Table 1 shows that the average bank had 5.87 percent of its assets classified as nonperforming loans by the end of 1991, an increase of more than 5 percentage points from levels at the end of 1987. Given that this figure does not take into account loans already charged off by banks, it understates the true extent of the industry's loan problems. Eventually, these problems affected banks' earnings and capital positions. The average bank's return on assets (ROA) was −1.06 percent in 1990, and the average capital-to-asset ratio fell 1.69 percentage points between 1987 and 1990. A banking crisis resulted, with 8 banks failing in 1990, 34 banks failing in 1991, and 25 failing in 1992.

Failing New England banks, in their final years, did not increase the riskiness of their operations in a last-chance effort to salvage their firms.

All these banks were FDIC-insured, and they represented more than 20 percent of the region's banking assets; these failures could have been quite

[1] Japan, South Korea, Malaysia, Indonesia, Thailand, Hong Kong, Singapore, and the Philippines have all recently experienced banking problems, with varying degrees of severity. Because the structure of the banking sectors differs across these countries, as do the root causes of their banking crises, whether or not the specific steps taken to successfully resolve New England's banking crisis would be the appropriate policy prescription for these countries would have to be determined on a country-by-country basis. This paper does not provide such analysis.

[2] Another important factor in New England's economic recovery, not examined in this paper, was the process through which foreclosed property was dealt with by banks and regulators. Because banks and regulators historically have not had a good track record at managing property themselves, holding property on their books for an extended period of time could have precipitated further declines in the region's real estate values, and thus further troubles for the banking industry. In New England, however, foreclosed properties tended to be sold off rather quickly to private sector developers, many times at bargain prices. Although some criticized banks and regulators for their willingness to sell properties at low prices, the timely transfer of foreclosed properties to the private sector, where the properties could be put to profitable use, likely played a role in the recovery of real estate prices. Recovering real estate values clearly helped the profitability of those banks that survived.

[3] The sample of banks in this study includes all FDIC-insured commercial and savings banks in the First Federal Reserve District (New England) that filed a call report for the first quarter of 1989 and were operating for at least four quarters prior to 1989. Also, to eliminate banks acting essentially as trusts, only banks with loans representing at least 10 percent of their assets are included. Because this sample selection does not include all banks operating in New England (but does include almost all the banks), the number of bank failures cited in this paper may differ slightly from those reported in other studies examining the New England banking crisis.

[4] This percentage is calculated as the number of bank failures between 1989 and 1996 divided by the total number of banks operating in 1989. Because a number of affiliate mergers took place during this time period, this calculation actually underestimates the extent of the crisis. To see why this is the case, consider a bank holding company operating with five bank subsidiaries in 1989. Sometime after 1989, the holding company decides to consolidate the five operations into one bank. If the consolidated bank fails, the above calculation counts this as one bank failure, not five. If affiliate mergers are taken into account, approximately 20 percent of the banks operating in 1989 failed or were merged into a banking institution that failed. In addition, because the sample includes only FDIC-insured banks, the 15 percent figure cited in the text also does not include those non-FDIC-insured financial institutions that failed. For example, 45 credit unions, banks, and loan and investment companies insured by the Rhode Island Share and Deposit Indemnity Corporation failed in the early 1990s (see Pulkkinen and Rosengren 1993).

Table 1
Selected Characteristics of New England Banks,[a] 1987 to 1996

Year	Number of Banks Operating[b]	Average Return on Assets (%)	Average Ratio of Nonperforming Loans to Assets (%)	Average Capital-to-Asset Ratio (%)	Number of Bank Failures in Prior 12 Months
1987	473	1.33	.60	8.90	—
1988	476	1.13	1.12	8.56	—
1989	466	.20	2.54	8.04	1
1990	429	−1.06	3.44	7.21	8
1991	378	−.61	5.87	7.12	34
1992	340	.71	3.87	8.00	25
1993	325	.98	1.53	8.50	1
1994	304	1.21	1.19	8.82	3
1995	292	1.39	1.07	9.67	1
1996	278	1.52	.94	9.95	0

[a]Sample includes all commercial and savings banks operating in New England that (1) filed a call report for the first quarter of 1989, (2) operated for a minimum of one year prior to 1989, and (3) had at least 10 percent of their assets consisting of loans. The total number of banks operating each year declines because of bank mergers as well as bank failures.

[b]The total number of bank failures between 1989 and 1996 was 73, or 15.34 percent of the total number of banks operating at the beginning of 1989 (73/476).

Source: Fourth quarter call reports and the author's calculations.

costly. However, relative to the S&L crisis in the United States, which is estimated to have cost $160 billion to resolve (General Accounting Office 1996), the New England crisis is estimated to have cost just over $7 billion (FDIC 1995). Granted, the S&L crisis was far more widespread than New England's regional crisis; however, as a percentage of the failing institutions' assets, the New England cleanup cost was minor in comparison to that of the S&L debacle.

As bad as the 1990–92 period was for New England banks, in the subsequent years the survivors have steadily improved their performance. With the help of a strong economy, the region's banking industry is now healthy. Table 1 shows that starting in 1992, nonperforming loans at the average bank began to fall, capital-to-asset ratios began to rise, and earnings improved. By the end of 1996, the average ROA in the region was 1.5 percent, nonperforming loans represented less than 1 percent of assets, and the average capital-to-asset ratio was close to 10 percent. These are major accomplishments for an industry on the verge of collapse only a few years earlier.

Three points should be emphasized: 1) the New England banking crisis was severe; 2) resolution costs were relatively low in comparison to those of the S&L crisis; and 3) along with the region's economy, the region's banking industry has made a vibrant recovery. Since the cost of resolving such a crisis depends crucially on how managers of failing banks act in the final years of operation, the next section examines the risk-taking incentives of these bank managers.

II. Risk-Taking Incentives for Bank Managers

Research has shown that the provision of deposit insurance provides an incentive for bank managers to operate a riskier bank than they otherwise would (see Merton 1977, Marcus and Shaked 1984, and Ronn and Verma 1986). Deposit insurance protects depositors, up to $100,000 per account, from losses due to bank failure. This insurance against adverse outcomes makes insured depositors indifferent as to the riskiness of the bank's investment and financing strategies. Given that banks pay a fixed-price premium for deposit insurance, they can undertake a riskier operation without paying higher premiums for deposit insurance and without insured depositors requiring higher interest rates on their deposits. The combination of these two factors provides an incentive for banks to operate a riskier institution than they otherwise would.[5]

[5] In the literature, researchers use option pricing models to show the risk-taking incentives of deposit insurance. The deposit guarantee is modeled as a put option, giving the bank the right to "sell" its assets at a fixed price regardless of the true underlying value of the assets. What makes this put option unique is that bank shareholders receive it for a fixed price. Here, "fixed price" refers to

Whether banks fully exploit the risk-taking incentives provided by deposit insurance depends on a number of factors. Most important, it depends on bank managers' aversion to risk (Benston et al. 1986).[6] Managers who want to avoid losing their jobs and who are concerned about protecting their personal financial wealth, at least partially offset the risk-taking incentives provided by deposit insurance. Most managers invest much of their human capital in the firms they manage and also invest much of their financial wealth in stock and stock options in the firms they manage. This makes them reluctant to take excessive gambles when operating their banks. Given the potentially high downside risk of operating an excessively risky institution, managerial risk aversion likely offsets the risk-taking incentives provided by deposit insurance.

Are the risk-taking incentives of managers at a bank in poor health the same as when that bank was healthy?[7] Since managerial aversion to risky banking activities stems from their financial ties to their bank, the answer depends on what happens to managers' financial ties as bank health deteriorates. When a bank is healthy, managers may view their salaries as near perpetuities. Thus, they will avoid risk-taking that could jeopardize this stream of income. But as an institution nears failure, managers may view their expected tenure with the bank as relatively short; so the present value of their expected salary stream declines sharply. In addition, as firm value deteriorates, the value of managers' stock and stock options in their firm deteriorates. Therefore, as banks approach insolvency, managers' financial ties to their firms diminish.

This weakening of management's financial ties to the firm may cause managers' aversion to operating a risky bank to dissipate as they attempt to restore the value of their stake in the institution. Indeed, managers at a troubled bank may take on extremely risky projects, even projects with very low expected returns, as long as the project provides some chance of having a very high payoff. The problem with these risky projects is that the likelihood of receiving a high payoff is small. Managers who undertake such projects hope for the improbable, that the risky projects will pay off and the bank's health will be restored. Unfortunately, such a strategy generally results in greater losses, not a windfall. Resolution of a banking crisis where managers have driven up the riskiness of their institutions can be very costly, far costlier than if such a shift in risk-taking had not occurred.

This type of risk-shifting was common in the S&L crisis. Because regulators allowed many S&Ls to operate even when they were technically insolvent, managers had tremendous incentives to increase the riskiness of their bank. Edward Kane, a leading expert on the S&L debacle, called these technically insolvent institutions "zombie" S&Ls. In Kane (1989a, p. 39) he describes a typical strategy of technically insolvent S&Ls, where managers were "advertising nationally and regionally for extraordinarily high-rate deposits . . . and investing the proceeds in improbable projects whose paramount attraction is that they offer an outside chance of restoring the zombie to solvency before the FSLIC can pull its charter." One lesson from the S&L crisis is that managers who have little else to lose have a tremendous incentive to undertake a "go for broke" strategy.

III. Did New England Managers Have the Incentive to Increase the Riskiness of Their Banks?

In New England, did the incentives to undertake risky projects change at banks that eventually failed, as their financial troubles grew worse? One way of examining this question is to see how managers' financial ties to their bank changed in the years prior to their failure: that is, how managers' salaries, bonuses, and the value of stock ownership and stock options in their firms changed in the last few years of operation. Unfortunately, detailed data on managerial compensation are not publicly available for most banks. For a subsample of banks, however, those with publicly traded equity, the Securities and Exchange

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the fact that the premium paid does not change with the level of risk taken by the bank. The value of this implicit put option increases with risk. Thus, if shareholders were able to optimally set bank policy to coincide with their preferences, the current fixed-price deposit insurance system would provide risk-taking incentives for shareholders.

[6] Other factors affect managers' decisions regarding the risk-taking activities of their bank, including the charter value of the bank (Keely 1990), market discipline by uninsured depositors (Flannery and Sorescu 1996), and regulatory constraints placed on certain banking activities (Buser, Chen, and Kane 1981).

[7] A bank could be close to insolvency because the bank was hit by an adverse shock that was either the result of making conscious decisions to take on risky projects or the result of experiencing bad luck for those managers who were operating a relatively safe operation. For the analysis in this paper, this distinction is not relevant because the analysis focuses on the behavior of bank managers *after* they experience an adverse shock. However, see Jordan (1998) for an examination of the risk-taking activities of managers at New England banks in the years leading up to the region's banking crisis.

Table 2
The Value of Managerial Shareholdings, 15 Publicly Traded New England Banks That Failed, 1986 to 1994

Date	Mean Dollar Value of Shares per Bank	Total Dollar Value of Shares for All Banks
Jan. 1, 1986	8,168,750	122,531,280
Jan. 1, 1987	12,185,100	182,776,460
Jan. 1, 1988	8,863,650	132,954,690
Jan. 1, 1989	7,628,520	114,427,820
Jan. 1, 1990	2,673,970	40,109,580
Jan. 1, 1991	232,097	3,481,460
Jan. 1, 1992	20,249	303,734
Jan. 1, 1993	13,499	202,490
Jan. 1, 1994	0	0
Maximum Share Value between 1986 and 1984	16,221,080	243,316,140
Share Value Two Years Prior to Failure	6,574,140	98,612,080
Share Value One Year Prior to Failure	2,066,660	30,999,850

See footnote 8 in the text for a detailed description of the methodology used to calculate these figures.
Sample: 297 managers required by the SEC to disclose their stockholdings.
Source: SEC's *Official Summary of Security Transactions and Holdings* and author's calculations.

Commission (SEC) requires top managers to disclose to the public the number of shares they own in the firms they manage. For this subset of banks, we can examine one part of managers' financial ties to their firms, their personal stock holdings in these firms.

In compliance with the Securities and Exchange Act of 1934, officers, directors, and owners of more than 10 percent of the common stock of a firm must disclose any personal security transaction associated with their firm. Along with any transaction that occurs, insiders must also disclose their total stock holdings. For this analysis, the measure of stock holdings (Class A common shares or the firm's equivalent) includes shares owned directly and indirectly by officers and directors of the firm. Of the 73 failed New England banks, 15 have publicly available data on managerial stock ownership. Detailed security holdings of 297 top executives at these 15 banks were available from the SEC's *Official Summary of Security Transactions and Holdings*.

Table 2 shows that at the beginning of 1987, the 297 managers of the 15 failed banks had shares worth in excess of $182 million. Thus, at the average bank, management held shares valued at $12 million.[8] Using the peak share price between 1986 and 1994 for each bank, the value of managerial share holdings on that date for the 297 managers was $243 million, or nearly $820,000 per manager. These figures understate managers' financial ties to their banks, since they do not include annual salaries, bonuses, and stock options. Nevertheless, the dollar amounts in Table 2 suggest that, at least initially, the average manager had a substantial amount of wealth linked to the continued success of his or her bank. This financial link suggests that managers would likely be averse to undertaking excessively risky activities.

However, the value of these share holdings had essentially vanished by 1990. In comparison to their value at the beginning of 1987, the value of managerial holdings had fallen by 37 percent at the beginning of 1989 and by 78 percent at the beginning of 1990. By early 1991, these managers had lost nearly all of the value of their shares. Managers who had $182 million worth of shares to protect in early 1987 had a lot less to protect by the end of 1990, when these holdings were worth only $3.5 million.

Given that managers have the greatest incentive to operate a risky bank when their investment in the firm has been sharply reduced, it is important to consider how long banks operated after management's financial ties to their firms were weakened. Did managers have time to alter the risk-taking activities of their bank? Table 2 shows the value of managerial share holdings in the two years prior to the bank's failure. Two years before the banks' failure dates, managers had already lost 60 percent of the value of

[8] To calculate the value of managerial stock holdings, the percentage of shares owned by managers as of the end of 1989 was obtained for each bank. The change in the value of these holdings is then calculated by multiplying the number of shares by the closing share price on various days between 1987 and 1994. This calculation assumes managers hold the same number of shares throughout the entire sample period. If there are large changes in the number of shares held by managers, either through further accumulation of shares through a compensation plan or from managers buying and selling shares on the open market, the assumption that managers hold the same amount of shares through the sample period may cause misleading results. For example, if managers sold a significant number of their shares prior to their firm's share price falling, the estimated loss in managerial wealth would be overstated (see Jordan 1997b for further implications of such trading activities by bank managers). However, Jordan (1997a) shows that managers at New England banks between 1988 and 1991 were not actively trading shares on the open market. Thus, assuming managerial holdings are constant throughout the sample period does not significantly bias the results. As a check, alternative dates were used to obtain the level of stock holdings. Results using these different dates are not qualitatively different from those presented in the paper.

their share holdings, compared with their peak value between 1986 and 1994. One year before failure, share values were off 87 percent from their peak values. Thus, in the two years prior to failure, managers had far less financial connection to their banks than they did in earlier years, giving them ample time to shift the risk-taking activities of their bank.

The analysis in Table 2 suggests why managers initially may not exploit the risk-taking incentives provided by fixed-rate deposit insurance and why this aversion to risk-taking likely disappears as the firm becomes more troubled. Since data are available for only 15 of the 73 failed New England banks, one should use caution extrapolating these findings to all banks in the sample. However, because compensation plans are similar across banks, there is reason to believe that similar results would hold for the entire sample.

IV. Did Managers Increase the Riskiness of their Institutions?

Table 2 shows that managers likely had a greater incentive to increase the riskiness of their institutions as their financial troubles worsened. But did they? This section examines banks' financial data for the eight quarters prior to failure for evidence of increases in risk-taking activities.

Asset Growth

A possible operating strategy for bank managers attempting to increase the riskiness and, with luck, the profits of their bank is to grow rapidly. By rapidly expanding, managers hope new business will be profitable enough and large enough to offset losses they have already incurred. An increase in bank riskiness usually coincides with such a strategy, however, because the creditworthiness of the marginal loan customer likely deteriorates as the bank grows rapidly. One way to examine whether managers of failing banks chose such a strategy is to examine asset growth prior to their failure.

Table 3 shows asset growth in the eight quarters prior to the quarter the bank fails. Despite incentives to increase the banks' riskiness, managers of failing institutions appear to have contracted operations, rather than expanded. Of the banks that failed, most (65 of 73) were shrinking in the last two years of operation.[9] The median bank's assets fell by more than 19 percent in the final two years of operation. In addition, as banks approached their failure dates and their incentives to take on risk became greater, banks were shrinking at a faster pace. Four quarters prior to the failure quarter, the median bank had asset growth of −2.8 percent. This decline accelerated to −3.4 percent three quarters prior to the failure quarter, to −3.6 percent two quarters prior to the failure quarter, and finally to −4.5 percent one quarter prior to the failure quarter. As for the eight banks that increased assets in the two years prior to their failure quarter, only four had growth rates in excess of 5 percent, and only one had asset growth greater than 5 percent in the final year of operation. Despite the incentives to increase risk, managers did not choose rapid expansion in an attempt to save their institutions.

One explanation of this behavior is that strict

Table 3
Asset Growth at 73 Failing New England Banks, Final 8 Quarters of Operation Prior to Failure Quarter

PANEL A: Quarterly Growth Rates

Quarters Prior to Failure	Median Growth in Assets	Number of Banks with Positive Growth
1	−4.52	6
2	−3.57	7
3	−3.35	8
4	−2.78	15
5	−2.99	16
6	−2.64	20
7	−1.17	32
8	−.15	36

PANEL B: Cumulative Growth Rates

Quarters Prior to Failure	Median Growth in Assets	Number of Banks with Positive Growth
1	−4.52	6
2 through 1	−8.49	5
3 through 1	−11.90	3
4 through 1	−15.14	5
5 through 1	−18.01	4
6 through 1	−19.48	5
7 through 1	−19.60	6
8 through 1	−19.57	8

See footnotes 9 and 10 in the text for a description of the methodology used to calculate these figures.
Source: Call reports and the author's calculations.

[9] Bank data in tables 3, 4, 5, 6, and 9 are merger adjusted. That is, if a merger occurs during the sample period, it is assumed that the surviving bank had always had the acquired bank's operations. For example, if bank 1 acquires bank 2 in 1990 Q1, bank 1's and bank 2's financial data are combined ("forced merged") in quarters prior to 1990 Q1.

regulatory oversight, as well as market discipline, may have influenced managerial policies (this issue is examined more closely in section V). Alternatively, asset shrinkage may be due to a decline in the demand for loans stemming from region's recession. Regardless of the cause, the data show that failing banks did not undertake a growth strategy in an attempt to solve their problems.

Riskier Assets in Portfolio

The preceding section rules out rapid expansion as a means for bank managers to increase the riskiness of their operations. However, it is possible that banks that were shrinking rapidly were unloading the safest assets in their portfolios while increasing (or not decreasing as rapidly) their holdings of risky assets. Such a strategy would leave a smaller but much riskier bank. Did such portfolio shifts occur?[10]

In order to determine if any shift occurred, assets are classified according to their credit risk. Starting in the first quarter of 1989, international standards for capital requirements required banks to classify their assets into four different categories, based on credit risk. Using these risk categories, this study examines whether portfolios shifted toward riskier assets as banks approached their failure dates. The 100 percent risk-weighted category includes the riskiest of bank assets, such as commercial and industrial loans as well as commercial real estate. The 50 percent risk-weighted category consists of less risky assets such as loans secured by first liens on one- to four-family residential property; the 20 percent category is composed of relatively safer assets such as claims on other U.S. depository institutions. Finally, the safest of assets, which include cash and U.S. Treasury securities, receive a risk weighting of 0 percent.

The growth rates in each of these four categories suggest no portfolio shift toward riskier assets. Panel A of Table 4 shows that the median bank was reducing the level of its asset holdings in each of the four risk categories in each of the final eight quarters of operation. As for the riskiest assets, those falling in the 100 percent category, growth rates generally became more negative as the median bank approached its failure date. That is, as banks' capital bases deteriorated and their incentives to take on additional risk increased, the median bank was reducing its holdings of the riskiest type of assets at a greater rate. In fact, the median bank reduced its holdings of 100 percent risk-weighted assets by 26.5 percent in its final two years of operation, more than the lower risk categories.

Failing New England banks did not undertake a growth strategy in an attempt to solve their problems, nor did they shift to riskier assets or increase their interest rate risk.

This evidence suggests that the loan shrinkage documented in Table 3 did not correspond with a portfolio shift toward riskier assets. Assets shrank in all risk categories, with the greatest declines in the riskiest types of assets. Although Table 4 only documents shrinkage for the median bank, shrinkage was widespread among the banks that failed. Of the 64 banks with data for all eight quarters prior to their failure date, 59 reduced their holdings of 100 percent risk-weighted assets in the final two years of operation. Of the five that had increased assets in the 100 percent risk-weighted category in the final two years of operation, much of the increase came seven and eight quarters prior to the failure quarter.

There are a number of possible explanations for this portfolio shift toward safer assets. By reducing assets in the highest risk-based category, banks reduce risk-weighted assets and thus, for a given level of capital, raise their risk-based capital-to-asset ratios. Banks may have chosen to do so in an attempt to meet regulatory-imposed minimum capital. The observed portfolio shift is also consistent with managers, faced with an outflow of deposits, shifting their portfolios toward liquid securities in order to satisfy withdrawal requests more easily. Finally, some part of the decline in risky assets is likely due to a higher rate of loan

[10] Because commercial banks and savings banks filed different call reports prior to 1989, and because substantial changes to the call reports were made starting in 1989, a small number of banks in the sample, those failing prior to 1991, do not have available data for all eight quarters prior to their failure quarter. These banks are included in the quarters when they have available data. For Tables 5 and 6, eight of the 73 banks do not have available data for the entire eight quarters prior to the failing quarter. For Tables 4 and 9, which require the calculation of growth rates, nine of the 73 banks do not have available data for the entire eight quarters prior to the failing quarter. All banks have at least four quarters of data prior to their failure quarter. For Table 3, which requires data on bank assets only, all 73 banks have available data for the entire eight quarters prior to the failing quarter.

Table 4
Growth in Asset Risk Categories at 73 Failing New England Banks, Final 8 Quarters of Operation Prior to Failure Quarter

PANEL A: Quarterly Growth Rates

Quarters Prior to Failure	Median Growth in 0% Risk-Weighted Assets	Median Growth in 20% Risk-Weighted Assets	Median Growth in 50% Risk-Weighted Assets	Median Growth in 100% Risk-Weighted Assets
1	−3.01	−7.25	−2.73	−4.48
2	−5.27	−.23	−2.06	−5.65
3	−3.43	−1.38	−2.17	−3.49
4	−.93	−.19	−1.66	−3.24
5	−1.22	−.14	−2.23	−3.28
6	−2.49	−3.67	−2.10	−2.75
7	−3.45	−4.96	−.07	−1.39
8	−1.32	−.00	−1.02	−1.38

PANEL B: Cumulative Growth Rates

Quarters Prior to Failure	Median Growth in 0% Risk-Weighted Assets	Median Growth in 20% Risk-Weighted Assets	Median Growth in 50% Risk-Weighted Assets	Median Growth in 100% Risk-Weighted Assets
1	−3.01	−7.25	−2.73	−4.48
2 through 1	−8.50	−9.47	−5.68	−9.91
3 through 1	−11.92	−13.41	−8.08	−13.22
4 through 1	−21.01	−15.08	−11.70	−17.35
5 through 1	−21.16	−11.94	−16.15	−20.19
6 through 1	−21.29	−12.32	−16.80	−22.65
7 through 1	−30.07	−16.07	−18.10	−25.27
8 through 1	−19.74	−5.13	−18.21	−26.49

See footnotes 9 and 10 in the text for a description of the methodology used to calculate these figures.
Source: Call reports and the author's calculations.

write-offs for the 100 percent risk-weighted assets and not to a portfolio shift engineered by management. Nevertheless, the share of the median bank's portfolio that consisted of the riskiest assets was lower as of its last call report than it had been two years earlier.

Interest Rate Risk

Another strategy that failing banks could undertake in an attempt to raise their profitability is to increase short-term liabilities to finance longer-term assets. By increasing the maturity mismatch between assets and liabilities, banks can profit in the short run by taking advantage of a term structure premium. However, such a strategy increases the bank's exposure to changes in interest rates. Were failing banks willing to trade off increased short-run profits for increased interest rate risk?

One way to measure interest rate exposure is to measure a bank's net position in short-term assets, that is, assets maturing within 12 months less liabilities maturing within 12 months. The more short-term assets a bank holds relative to its short-term liabilities, the less adverse the effect an increase in interest rates would have on bank profitability. Following Flannery and James (1984), this study defines short-term assets as loan and leases maturing in less than one year, federal funds sold, trading account securities, securities maturing in less than one year, and customer liabilities to the bank for outstanding acceptances. Short-term liabilities include federal funds received, CDs in excess of $100,000 maturing in less than one year, other borrowed money, and bank liabilities on customers' acceptances outstanding.

Table 5 shows that eight quarters prior to the failure quarter, the median bank's net short-term position represented 36 percent of total assets. This ratio remained fairly stable as the median bank approached its failure date. Three quarters prior to the failure quarter, the ratio dropped to 34 percent and then stayed there. This evidence suggests that no significant change occurred in the bank's net short-

Table 5
Interest Rate Exposure at 73 Failing New England Banks, Final 8 Quarters of Operation Prior to Failure Quarter

Quarters Prior to Failure	Median Net Short-Term Assets to Total Assets	Median Short-Term Assets to Total Assets	Median Short-Term Liabilities to Total Assets
1	.339	.449	.086
2	.342	.475	.102
3	.342	.491	.108
4	.360	.498	.106
5	.364	.492	.123
6	.360	.497	.137
7	.363	.527	.144
8	.361	.544	.161

See footnotes 9 and 10 in the text for a description of the methodology used to calculate these figures.
Source: Call reports and the author's calculations.

term position and thus no significant change in the median bank's interest rate exposure.

Table 5 also presents short-term assets' share of total assets at the median bank. Interestingly, the share of short-term assets falls significantly as the median bank approaches its failure date, from 54.4 percent eight quarters prior to the failure quarter to 44.9 percent as of the last call report. If the proportion of short-term liabilities had remained unchanged, this drop in short-term assets would indicate that banks had increased their exposure to changes in interest rates. However, the drop in short-term assets corresponds with a drop in short-term liabilities. Short-term liabilities represented 16.1 percent of the median bank's total assets eight quarters prior to the failure quarter, but only 8.6 percent as of the last call report. This corresponding drop in liabilities offsets the drop in short-term assets and left the median bank only slightly more exposed to an increase in interest rates.

The corresponding drops in short-term assets and liabilities provide some insight into the behavior of New England banks in their final two years of operation. It appears that as short-term assets and liabilities matured, banks simultaneously liquidated their positions in these assets and paid off the liabilities. This strategy causes the bank to shrink in size. If there were no charges on the bank's capital over the same period, this strategy of shrinkage automatically raises the bank's capital-to-asset ratio. Higher capital-to-asset ratios, all else equal, lower the risk of insolvency. Clearly, this strategy is inconsistent with the hypothesis that bank managers attempted to increase the riskiness of their banks. One reason banks may have chosen this strategy was to satisfy regulatory capital requirements.

Off-Balance-Sheet Activities

Tables 3 through 5 focused on bank risk-taking that stems from activities that appear "on" banks' balance sheets. Banks can also increase the riskiness of their institutions through "off"-balance-sheet activities. For example, derivatives activity such as options contracts and forwards and futures contracts are off-balance-sheet activities that could provide managers with a vehicle to increase risk. Banks generally use derivatives to hedge the interest rate risk and exchange rate risk inherent in banking operations. However, instead of using these derivatives products to manage risks, banks could use them to speculate on movements of interest rates and exchange rates, thus driving up the firm's riskiness.

Regulations require banks to report the notional values of swaps, futures and forward contracts, and options for interest rate contracts and foreign exchange rate contracts. Unfortunately, notional values are insufficient to evaluate fully the riskiness of derivatives positions because they fail to distinguish between long and short positions of forward and futures contracts; nor do they distinguish between call and put options written or bought (see Simons 1995). Nevertheless, one crude method of ascertaining whether New England banks increased their riskiness through derivatives activity is to examine changes in the notional value of derivatives. Given that most banks in New England were not actively involved in derivatives activity, observing large increases would suggest that some banks may have attempted to use derivatives to bail themselves out of problems.

As Table 6 shows, 47 of the 65 failing banks with available data had no derivatives activity in their final two years of operation. Seventeen of the 65 banks had minimal derivatives activity, equal to less than 5 percent of total assets, with the median bank having notional derivatives activity of less than 0.4 percent of total assets eight quarters prior to its failure quarter. A few of these 17 banks had modest increases in derivatives activity, but the maximum increase equaled only 1.6 percent of total assets. Given that a bank's loss exposure is generally far lower than the notional value, with such a small change in notional value it is

Table 6
Derivatives Activity[a] at 73 Failing New England Banks in the Final 8 Quarters of Operation Prior to Failure Quarter

Quarters Prior to Failure	Banks with No Derivatives Activity	Banks with Derivatives Activity ≤5 Percent of Total Assets but >0 in Any of the 8 Quarters Prior to Bank Failure		Banks with Derivatives Activity >5 Percent of Total Assets in Any of the 8 Quarters Prior to Bank Failure	
	Number of Banks	Number of Banks	Median Ratio of Notional Value to Total Assets	Number of Banks	Median Ratio of Notional Value to Total Assets
1	51	21	.000	1	.778
2	51	21	.000	1	1.330
3	51	21	.006	1	1.273
4	50	21	.000	1	1.887
5	50	21	.000	1	2.578
6	49	21	.000	1	2.441
7	48	19	.000	1	2.497
8	47	17	.004	1	2.106

[a]Derivatives activity is defined as the notional value of all exchange rate derivatives (which includes spot, forward, and futures commitments, both written and purchased options contracts, and swaps) plus the notional value of all interest rate derivatives (which includes futures and forward contracts, both written and purchased options contracts, and swaps).

See footnotes 9 and 10 in the text for a description of the methodology used to calculate these figures.

Source: Call reports and the author's calculations.

unlikely such shifts altered the risk profile of these banks.

Only one bank that failed in the region, Bank of New England (BNE), had substantial derivatives activity in its last two years of operation. Eight quarters prior to BNE's failure quarter, its total notional value of derivatives activity equaled 210 percent of its assets (end of the first quarter 1990). According to Peek and Rosengren (1997a), this gave BNE the fifteenth largest foreign exchange rate derivatives position and the eighteenth largest interest rate derivatives position among U.S. commercial banks. Since BNE was among the nation's top banks at the time (ranked by total assets), BNE's derivatives activity as measured by notional value does not seem to be out of line with the level of derivatives activity at its peers. Table 6 shows that this activity increased seven quarters prior to the failure quarter, stayed relatively stable for the next two quarters, and then began to decline rapidly in BNE's final year of operation. At least in the final year of operation, BNE was not expanding derivatives activity to take second bets.

Unfortunately, examining notional values alone can be extremely misleading if the bank had used derivatives to speculate on changes in interest rates and exchange rates rather than to hedge interest rate and exchange rate risk. A detailed inquiry was made by the Office of the Comptroller of the Currency into the causes of BNE's failure. The findings were presented to Congress in 1991. The recorded testimony contains no mention of managers using derivatives to increase the riskiness of BNE. Thus, there does not appear to have been any shift toward speculative derivatives activity in the final years of BNE's operations.

Similar analyses were performed for other off-balance-sheet activities such as financial and performance standby letters of credit, commercial and other lines of credit, and participation in acceptances acquired by the banks. In general, these activities represented a very small portion of the sampled banks' operations. Those few banks that were moderately active in these areas reduced rather than increased these activities as they approached their failure dates.

V. No Evidence of Increased Risk-Taking in New England at Failing Banks—Why?

The evidence presented above suggests that managers of failing New England banks did not increase the riskiness of bank operations as they approached their failure dates. Why? Table 2 shows that managers had the incentive to increase risk, and the S&L experience shows that, given the incentive and the means, some managers will exploit the risk-taking incentives

Table 7
Regulatory Discipline at New England Banks

PANEL A: Formal Actions

Total Number of Failed Banks	Number Receiving a Formal Action	Median Number of Quarters Prior to Failure Formal Action Imposed
73	58	6

PANEL B: Bank Exams and Loan Loss Provisions

	Number of Quarterly Observations	Mean Loan Loss Provision	Mean Ratio of Loan Loss Provision to Total Assets
Banks without an Exam in Process	8,358	$1,383,000	.21%
Banks with an Exam in Process	1,869	$2,508,680	.33%
T-stat Difference in Means		−3.66	−7.71
Significance of T-stat		.00	.00

Source: FDIC and OCC for formal action data.
Call reports and author's calculations for loan loss provision analysis.

provided to them. Two factors likely played a role in controlling the risk-taking activities of failing banks in New England. First, they faced tough regulatory discipline in their final years of operation. Second, because failing banks generally disclosed many of their financial troubles, market participants probably played a role in disciplining these banks as well.

Bank regulators have the authority to impose formal regulatory sanctions on a bank if examiners have a serious concern regarding its safety and soundness. These sanctions take the form of cease and desist orders and written agreements and are legally enforceable, with civil penalties for noncompliance, and since 1990 they must be publicly disclosed. Generally, the agreements require banks to increase oversight of their credit risks, to improve their management information systems, to revise their reserving procedures, and to attempt to improve their capital positions (Peek and Rosengren 1997b). Formal actions legally require bankers to take specific steps to address safety and soundness concerns, and the imposition of such regulatory discipline likely limited bankers' ability to exploit any risk-taking incentives. Table 7 shows that 58 of the 73 failed banks in the sample received a formal regulatory action, with the median bank receiving the formal action six quarters prior to the failure quarter.[11] Thus, for approximately 80 percent of the banks that failed in New England, regulatory discipline likely played a role in limiting excessive risk-taking in these banks' last years of operation.

In addition to direct regulatory discipline, regulators can foster greater market discipline by forcing banks to disclose the true extent of their problems. Managers have an incentive to avoid disclosing adverse information about their bank, but the examination process may uncover problems unknown to bank management or examiners may force managers to provide a more accurate assessment of their bank's financial standing. Then, markets can be more effective in disciplining banks. Table 7 presents evidence consistent with the hypothesis that the examination process forced New England banks to reveal more information about their financial standing.

Given that most banks' problems resulted from a deteriorating real estate market, if banks willingly disclosed their problems on a timely basis, one would expect provisioning for loan losses to be highly correlated across banks. As the real estate prices deteriorated, all banks should have increased loan loss provisions. These provisions should be unrelated to the examination process. However, Table 7 shows that banks' loan loss provisions were significantly higher in quarters when a bank exam was ongoing. This suggests that banks deferred the realization of problems until bank examiners pressured them to make provisions. Thus, supervisors not only imposed direct regulatory discipline on troubled banks through formal actions, but also likely contributed to greater transparency of banks' financial health.

For markets to be effective in disciplining banks, market participants must be able to differentiate between healthy and unhealthy banks in a timely manner. Given that the bulk of information market participants use when evaluating banks comes from banks' financial statements, at what point during the crisis

[11] In calculating the number of quarters prior to failure that banks received their formal actions, the date when banks signed the formal action is used. This method underestimates the length of time before failure that regulatory discipline is imposed because most formal actions are signed at the end of a bank exam and most banks start responding to regulators' concerns shortly after the exam starts (see Peek and Rosengren 1995b).

Table 8
Disclosure of Financial Problems at New England Banks

	Median Return on Assets (%)			Median Ratio of Nonperforming Loans to Assets (%)			Median Capital-to-Asset Ratio (%)		
Date	Failed	Survived	Z[a]	Failed	Survived	Z[a]	Failed	Survived	Z[a]
87:Q4	1.10	1.47	4.3**	.55	.35	−2.9**	7.28	7.68	.3
88:Q4	.92	1.22	4.3**	1.06	.73	−4.2**	7.26	7.90	1.78*
89:Q4	−1.50	1.01	9.4**	4.40	1.45	−8.5**	6.01	7.91	6.4**
90:Q4	−4.50	.30	10.9**	6.19	2.31	−8.9**	2.95	7.73	11.0**

[a]Z is the Wilcoxon test statistic for differences in medians.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Source: Call reports and author's calculations.

did differences in banks' financial standings begin to show up in the published financial data?

Table 8 presents evidence that differences between banks that failed and banks that survived showed up as early as the end of 1987. The median failing bank had a significantly lower ROA and a significantly higher level of nonperforming loans in the fourth quarter of 1987, although capital-to-asset ratios were not significantly different across groups. By the end of 1989, there was a wide disparity in ROA, nonperforming loans, and capital-to-asset ratios between banks that went on to fail and those that survived. Table 1 shows that the majority of banks did not fail until after 1990; thus, in the final years of these failing banks' operations, markets were well aware of their severe troubles.

Given that the financial troubles of many failing banks became apparent to market participants some time before the banks failed, how did market participants respond in the final years of these banks' operations? Were these banks able to obtain funds in the purchased funds market? Did stock prices drop for those with publicly traded equity? Table 9 presents evidence on the purchased funds market. First, failing banks' use of CDs in excess of $100,000 as a source of funds fell off sharply in the two years prior to failure. In each of the final eight quarters of the median bank's operation, the percentage change in CDs was negative, and over the last two years of operation the drop totaled 63 percent. This is consistent with market participants being cautious in extending funds to these troubled banks.[12] This is a form of market discipline, because for managers to increase the riskiness of their banks, they often must obtain additional funds to finance new risky projects. If market participants are not willing to extend these funds, banks will face limitations on how much risk they can undertake.

Similarly, banks looking to raise funds in the equities market in order to undertake risky projects will have difficulty, if market participants can successfully identify troubled institutions. Either market participants will refuse to purchase shares in a secondary offering, or the price at which banks would have to issue the shares would be so low that banks would choose not to issue additional shares. One way to judge whether this occurred in New England is to examine share prices of banks with publicly traded equity. Jordan (1997a) examined the pricing of publicly traded bank stocks in New England and found that 14 of the 15 publicly traded banks that went on to fail had share prices declining in 1988. In contrast, share prices of most of the surviving banks did not start to decline until late 1989. By that time, a portfolio consisting of shares in the 15 banks that failed had lost 43 percent of its value compared with March 1, 1988. This suggests market participants were imposing a form of market discipline on troubled banks.

The over-the-counter derivatives market also appears to have played a role in disciplining at least one bank. BNE, as documented in Table 6, was extensively involved in foreign exchange and interest rate derivatives markets. However, as BNE approached its failure date, its derivatives activities dried up. Many contend that potential counterparties in over-the-counter forward and swap contracts refused to deal

[12] It should be noted that this is also consistent with managers, on their own, or by direction of regulators, choosing not to obtain funds from these sources. As existing CDs mature, managers pay off these debts and fail to seek further funding.

Table 9
Source of Funds at 73 Failing New England Banks, Final 8 Quarters of Operation Prior to Failure Quarter

PANEL A: CDs > $100,000 Share of Total Deposits, Quarterly Growth in CDs

Quarters Prior to Failure	Median Percentage CDs > $100,000 Are of Total Deposits	Median Percentage Change in CDs > $100,00
1	6.55	−13.54
2	7.25	−9.79
3	8.75	−14.56
4	10.25	−6.96
5	11.74	−8.82
6	12.68	−7.18
7	11.10	−5.17
8	11.96	−3.78

PANEL B: Cumulative Growth Rates in CDs > $100,000

Quarters Prior to Failure	Median Percentage Change in CDs > $100,000
1	−13.54
2 through 1	−24.95
3 through 1	−35.69
4 through 1	−44.61
5 through 1	−53.68
6 through 1	−56.10
7 through 1	−60.26
8 through 1	−62.65

See footnotes 9 and 10 in the text for a description of the methodology used to calculate these figures.
Source: Call reports and the author's calculations.

with BNE for fear that BNE would not be around long enough to satisfy the terms of the contracts.

This evidence is consistent with market participants' unwillingness to deal with managers at failing institutions, whether in the purchased funds market, the equities market, or the derivatives market. Thus, even if managers had wished to increase the riskiness of their operations, the lack of funds likely deterred any such activity.

VI. Discussion

The above analysis suggests that the resolution of the New England banking crisis was relatively efficient, with bankers, regulators, and market participants interacting to contain the costs involved with its resolution. However, a few points should be noted. First, the resolution was not without faults. Peek and Rosengren (1997c) and Jordan (1997a) suggest that greater disclosure of regulatory and managerial private information could have provided market participants with an even better assessment of failing banks' health and thus could have improved market discipline. In addition, Table 7 shows that a number of failing banks never received formal actions and thus were never placed under close regulatory scrutiny in their final years of operation.

The second point that should be noted is that strict regulatory oversight of banking operations, although limiting the losses at failing banks, does not come without a cost. As Peek and Rosengren (1995a) show, strict enforcement of regulatory policy can also cause a "credit crunch." That is, if banks are shrinking operations in order to meet minimum capital-to-asset ratios, bank-dependent borrowers may have difficulty obtaining credit if their bank is unwilling to extend loans. This can adversely affect macroeconomic activity. Thus, when resolving a banking crisis, policymakers must determine whether lowering the direct costs associated with bank failures, via strict regulatory oversight, overcomes the costs associated with a potential credit crunch.

Finally, this paper highlights the importance of required capital-to-asset ratios. Peek and Rosengren (1997b) have argued that current capital requirements are insufficient in protecting against bank failures. They show that many New England banks reported capital-to-asset ratios above levels that would classify them as "well-capitalized" under current regulatory standards but still failed or required regulatory intervention. This paper, however, highlights another important role of regulatory activities, limiting the losses associated with bank failures when they do occur. Regulatory activities such as frequent bank exams, disclosure requirements, and capital requirements may be unable to prevent bank failures, but they may be quite effective in limiting the losses associated with bank failures.

VII. Conclusion

Countries experiencing banking crises similar to the one in New England could learn from New England's experience. It appears that a combination of regulatory discipline, increased disclosure of banking problems, and market discipline all contributed to the effective resolution of the region's banking crisis.

Currently, those faced with dealing with the Asian banking crises appear to be taking a route similar to that of the early attempts at resolving the S&L crisis in the United States, with banks revealing very little about the true extent of their problems, regulators doing little to encourage more timely and accurate disclosure by banks, and the accepted policy one of allowing insolvent banks to continue to operate. Insolvent banks can continue to operate only with a lack of transparency and with regulatory forbearance. Such an environment can cause two serious problems. First, if outsiders find it difficult to distinguish relatively healthy banks from those in trouble, investors will be cautious about extending funds to all banks, either requiring substantial risk premia on funds or not lending to banks at all. This affects both troubled and relatively healthy banks. The lack of available funds limits bank lending. Any loans firms obtain will likely be at high interest rates, because of the limited supply of funds and the high risk premiums banks must pay to obtain their funds. If firms rely heavily on banks for the extension of credit, such a lending environment can cause otherwise worthy projects not to be undertaken, leading to macroeconomic stagnation. The second problem is that banks operating when they are insolvent, or close to insolvency, have an incentive to undertake a "go for broke" strategy. Given that these strategies generally do not pay off, resolution costs will be much higher if such risk-shifting occurs.

So what strategy should the Asian economies undertake to salvage their banking systems? Given that each country's crisis has its unique features, it is impossible to propose a single solution that would fit all countries. Nevertheless, resolution of the New England banking crisis can provide some lessons. Strong regulatory oversight of troubled institutions, and extensive and timely disclosure of banks' troubles that permits strong market discipline, can force troubled banks to curtail excessively risky activities, while still allowing healthier banks to continue their vital role in the extension of credit in the economy. These strategies worked relatively well in resolving New England's banking crisis.

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