
Appendixes

Methods of Evaluating the Financial Condition of Banks

The criteria for safety and soundness require that regulators monitor banks to target financially weak institutions. Regulators employ two methods to monitor the financial condition of banks and identify banks that are in danger of failing: on-site examinations and off-site monitoring through the use of economic models. Although banks must submit financial reports to regulatory authorities every quarter, the on-site examination process remains the primary method of monitoring banks. The Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 requires on-site examinations at least once a year.¹

On-Site Examinations

Regulatory agencies conduct periodic audits and on-site examinations at banks under their jurisdiction. Bank examiners consider a bank's financial condition, review its compliance with laws and regulations, and project its prospects for the future. Examinations usually include (1) an analysis and appraisal of the bank's assets, (2) an analysis of its earnings, (3) an evaluation of the bank's management and review of management policies, (4) an evaluation of audit and internal and external control procedures, and (5) a determination of the bank's capital and liquidity positions. Part of the examination process is designated solely for purposes of certifying safety and soundness. The intent of the

safety and soundness examination is to verify that an institution has adequate capital and liquidity to conduct business within safe operating guidelines.

The three federal bank regulatory agencies--the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation (FDIC), and the Federal Reserve--have a method of incorporating the results of an examination into a uniform interagency system for rating the condition and soundness of banks. The system involves an assessment of five critical aspects of a bank's operations and condition and is generally known by the acronym CAMEL--capital, asset quality, management, earnings, and liquidity. First, the examiner determines a numerical index from 1 to 5 for each of the five criteria categories--an index of 1 being the most favorable. The second part of the evaluation system involves combining these five indexes into a composite CAMEL rating of the bank's condition and soundness.

The FDIC uses the CAMEL rating to rank banks insured by the Bank Insurance Fund according to the financial risk they impose on the fund. Institutions with financial, operational, or managerial weaknesses that threaten their continued financial vitality are given a composite rating of 4 or 5, depending on the degree of risk and supervisory concern. The FDIC places banks in this category on its list of "problem" institutions, and they are monitored more frequently. Meanwhile, regulators move to address problems identified by the examiner and mandated by provisions in FDICIA for prompt corrective-action.

1. Section 111 of the Federal Deposit Insurance Corporation Improvement Act of 1991, 12 U.S.C. 1820, 105 Stat. 2240.

The process of on-site examination is expensive. It is labor-intensive and incurs heavy travel expenses for examiners. How effective the on-site system of monitoring banks is depends on the judgment, experience, and training of the examiners, the size of the examination staff, and the frequency of the examinations. Various methods have been used over the years to help reduce the expense of the examination process, such as alternating examinations with qualified state agencies.

In order to monitor bank operations between examinations, regulatory agencies review detailed financial and operating data—essentially book-value income and balance-sheet information—that banks must supply to the authorities on a quarterly basis. These detailed financial statements are known as "call reports." Beginning in the 1970s, the three federal regulatory agencies developed computerized information systems based primarily on call-report data. Transfer of the call-report data to computers made it possible to use electronic information processing for detecting emerging weaknesses.² When used for this purpose, the information system is generally known as an early-warning system (EWS).

Off-Site Detection: Early-Warning Systems

Computer-based models designed to act as early-warning systems complement the on-site examination process for detecting problem banks. As a practical matter, the time lapse between examinations makes it desirable for regulatory authorities to have more current information on a bank's underlying financial condition. Regulatory agencies use early-warning systems to determine which institutions may require more frequent examinations and which may present excessive risks to the deposit insurance fund.

There are two major categories of EWS models. One consists of models that measure degrees of risk

or financial condition associated with individual banks. Examples of EWS models in this category include both discriminant models and options-pricing models. The second category includes various types of econometric models that estimate the probability of resolution of an institution based on its financial, structural, and economic characteristics. The logit statistical model and proportional hazards model are examples of econometric procedures used to estimate the probability of resolution.

Discriminant analyses represents one of the earliest attempts at using call-report data to spot possible problem banks. The discriminant model generates a statistical formula that separates banks into various categories of financial soundness based on an index value derived from the formula.³ The variables used in estimating the formula are generally related to factors that examiners assess when determining a CAMEL rating. The factors include management quality (net earnings, dividends, and borrowing as a percentage of capital), asset quality, and capital adequacy (equity-to-asset measures). In order to calibrate the model and measure its usefulness for projections, the results of the off-site discriminant model can be compared with CAMEL ratings from on-site examinations. This kind of comparison was done by Eric Hirshorn, a financial analyst at the FDIC.⁴ (CAMEL ratings are not available to the public). In his analysis, Hirshorn developed a risk-index formula using discriminant analysis to compare with CAMEL ratings. The index correctly classified about 70 percent of the financially weakened banks that the examiner assigned a CAMEL rating of 3, 4, or 5.

2. John F. Bovenzi, James A. Marino, and Frank E. McFadden, "Early Warning Systems and Financial Analysis in Book Monitoring," *Economic Review of the Federal Reserve Bank of Atlanta* (November 1983), pp. 1-34.

3. David P. Stuhr and Robert Van Wickler, "Rating the Financial Condition of Banks: A Statistical Approach to Aid Bank Supervision," *Monthly Review*, Federal Reserve Bank of New York (September 1974). See also Edward Altman and others, *Applications of Competitive Techniques in Business and Finance* (Greenwich, Conn.: JAI Press Inc., 1981); and Joseph Sinkey, Jr., "A Multivariate Statistical Analysis of the Characteristics of Problem Banks," *Journal of Finance*, vol. 30, no. 1 (March 1975), pp. 21-36. One analysis by John Myers and Howard W. Pifer, "Production of Bank Failure," *Journal of Finance*, vol. 25, no. 4 (September 1970), pp. 853-869, uses a discriminant analysis to demonstrate that real estate lending may lead to bank failure.

4. Eric Hirshorn, "Risk Related Deposit Insurance Premiums," *Banking and Economic Review* (Federal Deposit Insurance Corporation, 1986).

The options-pricing models are an outgrowth of the discriminant models. These models use data from the stock market and call reports to estimate the market value of assets for openly traded banks, which tend to be large banks and bank holding companies. These models can also be used to evaluate changes in risk over time. One study uses the options-pricing approach to examine risk for a sample of nine bank holding companies over the 1985-1991 period. Their results indicate little change in risk for these nine institutions during the seven-year period.⁵

Statistical techniques including the logit and proportional hazards models are used to help identify potential resolutions by estimating the contribution of various factors to the probability of failure.⁶ Variables describing the financial condition and economic environment facing a bank are used in these statistical formulas to derive an index indicating the likelihood of failure for an institution over a particular time period. These models are a useful complement to other methods of projecting failures in the short run.

Type I and Type II Errors in Predicting Bank Failure

The process of identifying an institution at risk of failure is somewhat uncertain. It is important to understand that early-warning system models can erroneously predict the future status of an institution. A model can make two types of errors in projecting whether or not an institution will fail. It is possible to predict that a bank will not fail when, in fact, it does--this is known as a Type I error. Alternatively, it is possible to classify an institution that does not fail in the time period being considered as a failure--this is known as a Type II error.

5. Congressional Budget Office, "The Asset Risk of Money Center Banks," unpublished draft (June 1992).

6. Recent studies using logit and proportional hazards methods are J.B. Thompson, "Predicting Bank Failures in the 1980s," *Economic Review*, Federal Reserve Bank of Cleveland (1st Quarter 1991), pp. 9-20; and G. Whalen, "A Proportional Hazards Model of Bank Failure: An Examination of its Usefulness as an Early Warning Tool," *Economic Review*, Federal Reserve Bank of Cleveland (1st Quarter 1991), pp. 21-31.

In using an EWS, an analyst must choose a critical level (R) below or above which a bank can be classified as sound. In discriminant analysis, if the index of a bank exceeds a certain discriminant level (as the index rises the risk of failure increases), it is classified as a failure. Similarly, using logit analysis, the analyst must choose an index level of probability above which the bank is assumed to fail. For example, for a critical level of 0.5, any bank evaluated at a probability of 50 percent or more using the logit function will be classified as a failure.

The choice of the critical level (R) should not be arbitrary. Certain costs are associated with committing both classes of errors. If the value of R is too low, the model will tend to commit more Type II errors (predicting more nonfailures as failures) and fewer Type I errors (predicting fewer failures as nonfailures). The converse is true if the R value is too high. If increased exams or other supervisory actions are based on EWS projections of failures that turn out to be false alarms, the cost to regulatory agencies could increase unnecessarily. And yet, if banks that require supervisory actions between examinations are missed because of a high level of Type I errors, it could be costly to the Bank Insurance Fund.

One way to calibrate an EWS model is to use it to project failures for the historical sample period. By recording the number of correct and incorrect classifications at alternative levels of R, it becomes possible to choose a critical level that in principle minimizes the expected costs of misclassification. If the costs of classifying a failure as a nonfailure greatly exceed the costs of classifying a nonfailure as a failure, it may be reasonable to choose a low critical value. If the costs of committing a Type II error (classifying a nonfailure as a failure) are viewed as higher, choosing a relatively high R value will reduce the probability of committing a Type II error.

Given the uncertainty involved in spotting troubled banks, regulators do not rely on a single technique to evaluate an institution. They use reports from on-site examinations, CAMEL ratings, and various types of off-site early-warning system models to monitor the condition of banks.

Types of Resolutions: Data on Resolution Costs and Bank Resolutions

The incidence and size of failed banks and the least-cost criteria of resolving them have led to three general types of resolutions: payoffs and transfers, purchase and assumptions, and assistance transactions. As the need arises, the Federal Deposit Insurance Corporation (FDIC) develops methods of resolving institutions based on their legislative mandate and the condition of the market. (Table B-1 on page 57 presents summary measures for banks resolved by the FDIC over the 1987-1992 period by type of resolution transaction. Tables B-2 through B-6 provide information on the number, assets, and costs of resolved institutions over the period by year and by type of resolution transaction.)

Payoffs and Transfers

Payoffs and transfers are used here to describe a resolution in which virtually all of the liabilities of an institution are retained by the FDIC as receiver. As the receiver, the FDIC determines how the liabilities will be handled--in particular, whether to pay off insured depositors directly or transfer their accounts to a paid agent bank. The FDIC may also act as a receiver of some part or all of the assets of a failed bank in this or other methods of resolution. Generally, the FDIC chooses to become a receiver as a last resort--when it is unable to sell a bank to a private party. If insured deposits are relatively small, the bank may be a likely candidate for liquidation simply because the FDIC may be unable to attract competitive bids from other banks. Com-

pared with other methods of resolving an institution, payoffs can require a large initial payout for covered liabilities.

The FDIC must perform a statutory cost test for all proposed resolution transactions. Before the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA), the cost test required that a method of resolution be no more costly than the payoff (of insured depositors) and liquidation (of assets) method. FDICIA requires that the FDIC now consider all feasible methods of resolution and choose the least costly alternative.

The average-size bank that was resolved using a payoff or transfer over the 1987-1992 period held approximately \$66 million in assets (see Table B-1). During this period, payoffs and transfers accounted for 18 percent of all resolutions and an estimated \$3.8 billion in losses to the Bank Insurance Fund.

Payoffs. A payoff is a receivership in which the FDIC issues checks to insured depositors up to the \$100,000 limit per account. The FDIC seeks to recover as much of this initial disbursement as possible by selling the assets of the failed bank. Disposition of the assets of a failed bank usually takes between five and seven years.¹

1. For a discussion of the time distribution of recoveries on failed-bank assets, see Richard A. Brown and Seth Epstein, "Resolution Costs and Bank Failures: An Update of the FDIC Historical Loss Model," *FDIC Banking Review*, vol. 5, no. 1 (Spring/Summer 1992), p. 4.

Payoffs have generally been used for small banks with less than \$100 million in assets; the average failed institution in this category held \$63 million in assets by the time it was resolved. During the 1987-1992 period, losses per dollar of assets for payoffs were higher than for any other form of resolution, averaging 33 percent (see Table B-1). Even with such a high recorded cost per dollar of assets, since the institutions involved were small, these payoffs represented less than 3 percent of the cumulative resolution costs during this period.

Deposit Transfers. Another type of resolution in which the FDIC acts as a receiver of liabilities is the deposit transfer. Rather than pay out funds directly, the FDIC finds an agent bank to assume the insured and secured liabilities of the insolvent bank. In this case, the FDIC may pay the agent bank a premium with the expectation of recouping some of these losses from the assets of the failed institution. This method of resolution is called an insured deposit transfer and could be less costly than a payoff if an agent bank perceives some franchise value associated with the insured deposits. If the agent bank also acquires some portion of the assets of the failed bank, the resolution is referred to as a deposit insurance transfer and asset purchase.

In a deposit transfer transaction, the insolvent bank is closed and the insured and secured deposits often remain in the community in which they originated. Other eligible creditors share in the FDIC asset liquidation and may recoup some portion of their losses. In general, deposit transfers are costly in relation to other forms of nonreceivership resolutions, and losses averaged 31 percent of assets in the 1987-1992 period (see Table B-1).

Purchase and Assumptions

The second class of resolutions used by the FDIC are called purchase and assumption (P&A) transactions. In this method of resolution, solvent banks are permitted to bid on the assets and liabilities of a failed bank with the objective of assuming them. In a traditional purchase and assumption transaction, the failed bank is closed and an acquiring institution buys some of its assets, assuming its deposits and certain other liabilities (including nonsubordinated

liabilities) with or without FDIC assistance. Before FDICIA, it was usual for all depositors, including those who were uninsured, to receive full payment on claims. In many cases, the failed institution is simply merged with another bank or reopened under new ownership and management. The main benefit of this form of purchase and assumption settlement is that it can to some degree avoid interruption in the availability of funds to all depositors.

Typically, purchase and assumption transactions involve smaller disbursements from the FDIC and lower losses per dollar of assets than payoffs or transfers. Acquiring banks usually pay a premium for a failed bank's charter that is large enough to reduce the estimated cost of a P&A transaction below that of a deposit payoff. For the P&A to be more cost-effective than a liquidation or deposit transfer, the franchise value of the failed-bank assets must be greater than the additional uninsured and secured liabilities that the acquiring bank must assume. In 1992, the FDIC developed a form of purchase and assumption in which only insured deposits are transferred. This relatively new form of resolution came about as a way of meeting the statutory least-cost requirements of FDICIA. It may encourage more bids for an institution because potential acquirers of a failed institution can balance failed-bank assets against covered liabilities only.

As a general class of resolutions, P&As made up 78 percent of resolutions between 1987 and 1992. For that period, average losses on assets for P&As was 13 percent (see Table B-1). The average size of P&A transactions was about \$228 million, and this class of resolution accounted for 81 percent of the losses over the period.

Total Bank Purchase and Assumption. In a "total bank" or "total assets" purchase and assumption (TAPA), the FDIC sells virtually all of the assets of the closed insolvent bank to the assuming institution. In a TAPA transaction, all assets and liabilities--the insured and secured deposits as well as other liabilities--are removed from FDIC responsibility. Approximately 28 percent of resolutions from 1987 to 1992 were TAPAs. These resolutions made up 33 percent of total Bank Insurance Fund losses and averaged 14 percent of losses per dollar of assets over the period. The average size of a

bank resolved using the TAPA method was about \$250 million at resolution.

As a way of minimizing losses, the FDIC tries to keep as many of the assets of a failed bank under private control as possible. In a TAPA transaction, virtually all assets are assumed by the acquirer in exchange for one-time financial assistance. That is, the assuming bank is paid a "negative premium" by the FDIC to assume the risks associated with assets of the failed bank. In a total bank P&A, the acquiring institution faces uncertainty about the value of troubled assets. Because of the risk of loss associated with some of the assets in the portfolio, a potential acquirer may request a larger premium than the least-cost test can justify. Some of the uncertainty can be reduced if the FDIC retains the problem assets and allows the purchaser to assume the "clean" assets in the transaction.

Clean Bank and Other P&As. At the other extreme from a TAPA is the "clean bank" transaction in which only assets that are assessed to be of relatively low risk are transferred to the acquiring institution. In other variations of purchase and assumption transactions, the FDIC agrees to purchase back some or all of the risky assets, if the assuming bank chooses to "put back" these loans in a specified time period. In some cases, the assuming bank agrees to keep all loans under a predetermined size with a no putback option. The larger the original loans and the higher the risk determination, the more putbacks a P&A will probably involve. As more putback options are invoked, a greater amount of assets must be held by the FDIC.

Clean banks and non-TAPA forms of assumptions were the most common resolution methods used during the 1987-1992 period, averaging 46 percent of all resolutions and 42 percent of BIF losses. Losses per dollar of assets averaged 13 percent and the average size of a failed bank in this category was \$200 million (see Table B-1).

P&As Covering Insured Deposits Only. After FDICIA, the FDIC deviated from the traditional purchase and assumption transaction in which all deposits are assumed by the acquiring bank. In the newly developed form of P&A, the acquiring bank assumes only insured deposits (PIs). This type of

transaction may make an institution more attractive to potential acquirers and can reduce losses to the insurance fund. The PI method of resolution was used for 42 banks with an average size of more than \$400 million during the first year it became available (1992). The cost per dollar of failed bank assets is lowest among all forms of resolutions used over the 1987-1992 period. Losses to the insurance fund from these transactions amount to almost \$2 billion, however, because of the asset size of failed banks in this class of resolutions.

Assistance Transaction Resolutions

The third class of resolutions involves assistance to banks that are experiencing temporary financial problems or are on the verge of failing for which the FDIC has become a conservator. This is the most controversial form of resolution because it may either subsidize the stockholders of potentially insolvent banks--open-bank assistance (OBA)--or, in the case of bridge banks, involve government investment, ownership, and operation of insolvent banks. The FDIC used assistance transactions to resolve 47 banks from 1987 to 1992, causing about \$1.8 billion in losses to the Bank Insurance Fund. These banks were larger than banks that were resolved through either traditional P&As or receiverships. Although assistance transactions made up only 4 percent of recent resolutions, they accounted for 6 percent of estimated losses to the insurance fund over the period. Estimated losses per dollar of assets were, on average, the second lowest of any resolution method during the period.

Open-Bank Assistance. All forms of direct financial assistance by the FDIC to an operating bank are known as open-bank assistance. Such assistance can take the form of promissory notes, net worth certificates, cash, assumptions of debt, guarantees against loss, and infusions of equity. In OBAs, unlike all other forms of resolution, the original charters are not revoked.

The FDIC first used its OBA authority in 1971. Before 1982, OBA was not considered a method of resolution. But the use of OBA as a method of resolution became more prominent after the Federal Depository Institutions Act of 1982, which allowed

the FDIC to grant financial assistance in the form of OBA to any bank in a weakened condition, as long as the cost of OBA was less than the cost of liquidation. Granting aid under open-bank assistance generally requires less capital than either P&As or liquidations.

The government declared no losses in four of the first five cases of OBA. Open-bank assistance has usually been used for larger institutions that require assistance (for example, Continental Illinois, a \$33.6 billion bank resolved in September 1984, and First City Bancorporation, an \$11.2 billion bank resolved in April 1988). This resolution method has been criticized because, although management often changes under OBAs, it may subsidize stockholders of a potentially insolvent institution by allowing it to continue to operate.

Bridge Banks. The Competitive Equality Banking Act of 1987 expanded the FDIC's powers to handle bank failures by temporarily granting "bridge bank authority." Under this authority, the FDIC operates a failed institution for up to two years, with options

to extend operation for up to three years. Two examples of bridge bank transactions are the First Republic Bancorporation, a \$33.7 billion bank resolved in 1988, and MCorp, a \$15.4 billion bank resolved in 1989. Bridge banks are a type of conservatorship in which prospective buyers can assess the bank's condition.

Under a bridge bank transaction, management is replaced and holding company creditors and shareholders lose their investments. This option gives the FDIC additional time to arrange a merger or purchase and assumption transaction, the expected costs of which are included in the initial estimate of bridge bank losses. Bridge banks are only temporary resolutions. The potential for moral hazard problems associated with operating a collection of failing institutions is, in principle, limited because the FDIC is technically managing bank operations. Bridge banks, however, are not without their problems. If the FDIC applies a bridge bank solution to a local bank, other banks in the region are placed in competition with a government-run bank.

Table B-1.
Summary Statistics for Banks Resolved by the Federal Deposit Insurance Corporation,
by Type of Resolution, 1987-1992

Type of Resolution	Banks Resolved, 1987-1992		Estimated Losses to the Bank Insurance Fund		Assets Recorded at Time of Resolution		Losses as a Percent- age of Assets ^a	Average Asset Size of Resolved Banks (Millions of dollars) ^a
	Number of Banks	Percentage of Total	Millions of Dollars	Percent- age of Total	Millions of Dollars	Percentage of Total		
Payoffs and Transfers								
Deposit payoff	49	5	1,031	3	3,105	1	33	63.4
Deposit transfer	135	13	2,755	9	9,020	4	31	66.8
Subtotal	184	18	3,786	13	12,125	6	31	65.9
Purchase and Assumption								
Total bank	291	28	9,802	33	72,120	34	14	247.8
Insured deposits only	42	4	1,771	6	17,159	8	10	408.5
Other	485	46	12,536	42	97,015	45	13	200.0
Subtotal	818	78	24,109	81	186,294	87	13	227.7
Assistance Transactions	47	4	1,753	6	16,196	8	11	344.6
Total	1,049	100	29,648	100	214,615	100	14	204.6

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

NOTES: Sample includes commercial and savings banks insured by the Bank Insurance Fund that were resolved between 1987 and 1992.

Assets are those recorded at time of resolution.

a. Figures represent averages for each type of resolution.

Table B-2.
Number of Banks Resolved by the Federal Deposit Insurance Corporation,
by Year and Type of Resolution, 1987-1992

Type of Resolution	1987	1988	1989	1990	1991	1992	Banks Resolved, 1987-1992	
							Number of Banks	Percentage of Total
Payoffs and Transfers								
Deposit payoff	11	6	9	8	4	11	49	5
Deposit transfer	<u>40</u>	<u>30</u>	<u>22</u>	<u>12</u>	<u>17</u>	<u>14</u>	<u>135</u>	<u>13</u>
Subtotal	51	36	31	20	21	25	184	18
Purchase and Assumption								
Total bank	19	110	87	43	24	8	291	28
Insured deposits only	0	0	0	0	0	42	42	4
Other	<u>114</u>	<u>54</u>	<u>88</u>	<u>105</u>	<u>79</u>	<u>45</u>	<u>485</u>	<u>46</u>
Subtotal	133	164	175	148	103	95	818	78
Assistance Transactions	<u>19</u>	<u>21</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>2</u>	<u>47</u>	<u>4</u>
Total	203	221	207	169	127	122	1,049	100

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

Table B-3.
Resolution Costs as a Percentage of Assets for Banks Resolved by the
Federal Deposit Insurance Corporation, by Year and Type of Resolution, 1987-1992

Type of Resolution	1987	1988	1989	1990	1991	1992	Banks Resolved, 1987-1992
Payoffs and Transfers							
Deposit payoff	34	29	50	28	28	29	33
Deposit transfer	27	32	33	31	35	25	31
Transaction Average	28	31	37	30	34	28	31
Purchase and Assumption							
Total bank	16	12	20	12	15	4	14
Insured deposits only	n.a.	n.a.	n.a.	n.a.	n.a.	10	10
Other	29	30	22	17	10	12	13
Transaction Average	27	12	20	17	10	10	13
Assistance Transactions	6	12	33	13	5	3	11
Overall Transaction Average	22	13	21	19	11	11	14

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

NOTES: Figures represent averages for each category of resolution by year. Averages are calculated as the total resolution costs divided by the total assets of failed banks for each type of resolution.

n.a. = not applicable.

Table B-4.
Average Asset Size of Banks Resolved by the Federal Deposit Insurance Corporation,
by Year and Type of Resolution, 1987-1992 (In millions of dollars)

Type of Resolution	1987	1988	1989	1990	1991	1992	Average Asset Size of Resolved Banks, 1987-1992
Payoffs and Transfers							
Deposit payoff	30.3	21.8	64.5	104.9	16.8	105.0	63.4
Deposit transfer	53.0	40.3	73.8	137.9	89.2	64.0	66.8
Transaction Average	48.1	37.2	71.1	124.7	75.4	82.0	65.9
Purchase and Assumption							
Total bank	30.0	330.2	270.6	53.5	37.7	1,060.1	247.8
Insured deposits only	n.a.	n.a.	n.a.	n.a.	n.a.	408.5	408.5
Other	32.3	26.3	41.4	104.1	769.9	366.8	200.0
Transaction Average	32.0	230.1	155.4	89.4	599.3	443.7	227.7
Assistance Transactions	132.4	644.7	6.0	16.0	28.0	17.5	344.6
Overall Transaction Average	45.4	238.1	142.0	93.1	499.2	362.6	204.6

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

NOTES: Averages are derived from assets recorded at time of resolution.

Figures represent averages for each category of resolution transaction by year. Averages are calculated as total bank assets divided by the number of banks resolved for each type of resolution.

n.a. = not applicable.

Table B-5.
Total Assets of Banks Resolved by the Federal Deposit Insurance Corporation,
by Year and Type of Resolution, 1987-1992 (In millions of dollars)

Type of Resolution	1987	1988	1989	1990	1991	1992	Assets Recorded at Time of Resolution, 1987-1992	
							Total for Period	Percentage of Total
Payoffs and Transfers								
Deposit payoff	333	131	580	839	67	1,154	3,105	1
Deposit transfer	<u>2,121</u>	<u>1,209</u>	<u>1,624</u>	<u>1,655</u>	<u>1,517</u>	<u>895</u>	<u>9,020</u>	<u>4</u>
Subtotal	2,454	1,340	2,204	2,494	1,584	2,049	12,125	6
Purchase and Assumption								
Total bank	570	36,321	23,543	2,300	905	8,481	72,120	34
Insured deposits only	n.a.	n.a.	n.a.	n.a.	n.a.	17,159	17,159	8
Other	<u>3,686</u>	<u>1,422</u>	<u>3,647</u>	<u>10,928</u>	<u>60,824</u>	<u>16,508</u>	<u>97,015</u>	<u>45</u>
Subtotal	4,256	37,743	27,190	13,227	61,730	42,148	186,294	87
Assistance Transactions	<u>2,516</u>	<u>13,539</u>	<u>6</u>	<u>16</u>	<u>84</u>	<u>35</u>	<u>16,196</u>	<u>8</u>
Total	9,226	52,622	29,400	15,737	63,398	44,232	214,615	100

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

NOTE: n.a. = not applicable.

Table B-6.
Resolution Costs of Banks Resolved by the Federal Deposit Insurance Corporation,
by Year and Type of Resolution, 1987-1992 (In millions of dollars)

Type of Resolution	1987	1988	1989	1990	1991	1992	Estimated Losses to the Bank Insurance Fund, 1987-1992	
							Total for Period	Percentage of Total
Payoffs and Transfers								
Deposit payoff	114	39	289	231	19	339	1,031	3
Deposit transfer	<u>574</u>	<u>382</u>	<u>535</u>	<u>513</u>	<u>525</u>	<u>226</u>	<u>2,755</u>	<u>9</u>
Subtotal	688	421	824	744	544	565	3,786	13
Purchase and Assumption								
Total bank	90	4,254	4,701	286	133	338	9,802	33
Insured deposits only	n.a.	n.a.	n.a.	n.a.	n.a.	1,771	1,771	6
Other	<u>1,065</u>	<u>433</u>	<u>786</u>	<u>1,904</u>	<u>6,311</u>	<u>2,036</u>	<u>12,536</u>	<u>42</u>
Subtotal	1,155	4,686	5,488	2,190	6,445	4,145	24,109	81
Assistance Transactions	<u>160</u>	<u>1,583</u>	<u>2</u>	<u>2</u>	<u>4</u>	<u>1</u>	<u>1,753</u>	<u>6</u>
Total	2,003	6,690	6,315	2,937	6,993	4,710	29,648	100

SOURCE: Congressional Budget Office analysis based on Federal Deposit Insurance Corporation, *Failed Bank Cost Analysis, 1986-1992* (1993).

NOTE: n.a. = not applicable.

A Simulation of Embedded Costs

The process of determining when a bank has failed, thereby requiring resolution by regulators, has many uncertainties. In most cases, before the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) regulators closed banks when they became book-value insolvent--that is, when the book value of equity dropped to zero. An insolvency test based on book-value accounting, however, can be misleading because it may disguise an insolvent institution as book-value solvent for some time before book values reveal insolvency. At least two studies imply that the actual market value of assets revealed through the resolution process was only about 70 cents per dollar of the recorded book value at the time the resolution process began.¹ Had the condition of the banks been detected when the market value of assets was equal to liabilities and promptly resolved, perhaps some of the loss on assets (embedded losses) could have been avoided, thus reducing the costs to the Bank Insurance Fund.

FDICIA authorizes a policy of prompt corrective action under which the kind of action required of regulators is guided by the way in which a bank is rated in terms of minimum prescribed capital levels. Under FDICIA, the FDIC may take ac-

tion to resolve institutions when their equity-to-asset ratios slip below 2 percent. If banks suffer embedded losses before the 2 percent threshold is reached, resolution-cost savings from early closure may be minimal. If banks suffer only embedded losses after reaching the 2 percent threshold, savings may be substantial. The possible savings under early closure rules depend on (1) how well book-value measures approximate market values, and (2) how long the losses realized at resolution are actually embedded in the book value of assets before the resolution of an undercapitalized bank.

As an illustrative exercise, this appendix uses a simulation model to examine the extent to which early closure might mitigate losses to the insurance fund. The model uses FDIC data on resolution costs, assets, and a few other financial variables from a sample of 140 banks that operated between 1986 and 1990 and were resolved sometime in 1990.² By making assumptions about when these losses actually occurred--as early as the end of 1986 or as late as 1990--it is possible to gauge market values and possible resolution costs to provide a range of estimates for the potential savings associated with early closure.

1. See John F. Bovenzi and Arthur J. Murton, "Resolution Costs of Bank Failure," *FDIC Banking Review*, vol. 1, no. 1 (Fall 1988), pp. 1-13; and Richard A. Brown and Seth Epstein, "Resolution Costs and Bank Failures: An Update of the FDIC Historical Loss Model," *FDIC Banking Review*, vol. 5, no.1 (Spring/Summer 1992), pp. 1-16.

2. The banks making up this sample of 140 resolutions represent 83 percent of the resolutions in 1990. The remaining 17 percent were excluded because of data limitations on some variables necessary for the simulation. Hence, the average values reported here are different from those recorded in the tables in Appendix B.

Sample averages (displayed in Table C-1) construct a time profile of the "representative" bank used in the simulation. Average assets for these banks resolved in 1990 were about \$94 million (in 1990 dollars) in 1986. Assets for the group grew on average through 1987, at which time average net income became negative and remained that way until 1990. The average size of these banks fell from 1987 to 1990 to about \$74 million at the time of resolution. In 1986, the representative bank held a book-value equity-to-asset ratio of 6.5 percent (on an asset-weighted basis). The average book-value ratio fell over the next four years until 1990, when these banks were resolved. Under FDICIA, the representative bank would have been resolved at least one year earlier because its equity-to-asset ratio on a book-value basis was below the 2 percent threshold in 1989.

Embedded losses can be defined as resolution costs above the costs that can be attributed to administrative expenses. For the purposes of the simulation, administrative costs of resolution are assumed to be 10 percent of the book value of assets at closure in 1990. Using this assumption and the average characteristics of failed banks, it is possible to estimate embedded losses and, hence, the market value of assets. The estimate of administrative costs for the representative 1990 closure is \$7.4 million (see Table C-2). Embedded losses are thus \$8.6 million and the market value of assets of the representative bank at closure is \$65.1 million--roughly 12 percent below the book-value measure.

The simulation model assumes three banks identical in every way except for the timing of embedded losses on assets (see Table C-3). The first bank degenerates slowly over four years, and then experiences most of its embedded losses in 1990. The second bank experiences all embedded losses in 1986 (four years before resolution) with little deterioration of assets after the initial losses. The last bank experiences a gradual rise in embedded losses over the four-year period until resolution in 1990.

Savings could be substantial in the first case because early closure could avoid a significant amount of the embedded losses. Under the early closure rule of FDICIA, the FDIC might have saved as much as 59 percent of the resolution costs by acting in 1989. The closer to resolution that embedded losses occur, the greater the potential savings to be had from early closure. In the case of the second bank (Case 2 in Table C-3), the early closure rule would save only 5 percent of costs to the Bank Insurance Fund; losses were embedded long before the book-value measures showed signs of insolvency. In Case 3, the 1990 embedded losses are allowed to accumulate gradually from 1987 until 1990. Using the 2 percent closure rule of FDICIA, there are still savings that the FDIC could have achieved by resolving the bank in 1989: 13 percent compared with 1990 resolution costs.

Information on market values shows that the representative bank in Case 2 would have already been insolvent on the basis of its market value as early as 1987. If this bank had been closed using a market-value insolvency test, the FDIC could have avoided additional operating losses, dividend payments, and so on between 1987 and 1990. Resolution costs in 1987 would have been about \$11 million, which represents a 33 percent savings for the fund over resolution costs realized in 1990. For the representative bank in Case 3, it would have been least costly based on market values if the FDIC had closed this bank during 1988. This estimate of savings assumes that there are reliable market-value measures. Although examiners can determine which banks are financially distressed, determining when a bank first becomes insolvent is very difficult because of the uncertainty of market-value estimates.

Using such a simple simulation model ignores the difficulties of monitoring and accurately predicting bank resolutions, but it illustrates the importance and potential cost savings if a weak bank is caught early enough in the process of deterioration.

Table C-1.
A Five-Year Profile of Some Average Financial Characteristics of Banks Resolved in 1990

	1986	1987	1988	1989	1990
In Millions of 1990 Dollars					
Assets	93.6	94.4	90.2	80.1	73.7
Liabilities	87.5	89.1	86.5	79.3	73.7
Equity	5.2	4.7	3.4	0.7	0
Net Income	0.1	-0.6	-1.4	-2.7	n.a.
In Percent					
Equity as a Percentage of Assets	6.5	5.6	4.1	0.9	0
Rate of Return on Equity	2.0	-12.0	-34.0	-352.0	n.a.

SOURCE: Congressional Budget Office analysis based on data provided by the Federal Deposit Insurance Corporation and W.C. Ferguson and Company.

NOTES: Sample includes 140 banks resolved by the Federal Deposit Insurance Corporation in 1990. The banks making up this sample represent 83 percent of the resolutions in 1990. The remaining 17 percent were not included because of data limitations.

n.a. = not applicable.

Table C-2.
Resolution Costs and Estimated Embedded Losses
Using Average Characteristics of 1990 Resolutions

Simulation Variables	Millions of 1990 Dollars
Resolution Cost	16.0
Book Value Assets at Resolution	73.7
Estimated Administrative Costs of Resolution ^a	7.4
Estimated Embedded Losses on Assets ^b	8.6
Estimated Market Value of Assets at Resolution ^c	65.1

SOURCE: Congressional Budget Office analysis based on data provided by the Federal Deposit Insurance Corporation and W.C. Ferguson and Company.

NOTE: Average values are derived from a sample of 140 banks resolved by the Federal Deposit Insurance Corporation in 1990. The banks making up this sample represent 83 percent of the resolutions in 1990. The remaining 17 percent were not included because of data limitations.

- a. Administrative costs are estimated as 10 percent of the book value of assets at resolution.
 - b. Embedded losses on assets equal resolution costs minus administrative costs.
 - c. Estimates of the market value of assets equal assets at book value minus embedded losses.
-

Table C-3.
Three Simulated Cases Involving Embedded Losses on Assets
Using Average Characteristics of 1990 Resolutions (In millions of 1990 dollars)

	1986	1987	1988	1989	1990
Case 1. Asset Losses Embedded in 1990					
Estimated Market Value of Assets ^a	93.6	94.4	90.2	80.1	65.1
Estimated Market Value of Equity ^b	6.1	5.3	3.7	0.8	-8.6
Estimated Resolution Costs ^c	n.a.	n.a.	n.a.	6.6	16.0
Estimated Savings (Percent)	n.a.	n.a.	n.a.	59.0 ^d	0
Case 2. Asset Losses Completely Embedded Starting in 1987					
Estimated Market Value of Assets ^a	93.6	85.8	81.6	71.5	65.1
Estimated Market Value of Equity ^b	6.1	-3.3	-4.9	-7.8	-8.6
Estimated Resolution Costs ^c	n.a.	10.7	12.3	15.2	16.0
Estimated Savings (Percent)	n.a.	33.0 ^e	23.0 ^e	5.0 ^d	0
Case 3. Rising Embedded Asset Losses from 1987 to 1990					
Estimated Embedded Loss on Assets	0	2.5	5.0	7.4	8.6
Estimated Market Value of Assets ^a	93.6	91.9	85.2	72.7	65.1
Estimated Market Value of Equity ^b	6.1	2.8	-1.3	-6.6	-8.6
Estimated Resolution Costs ^c	n.a.	n.a.	8.7	14.0	16.0
Estimated Savings (Percent)	n.a.	n.a.	46.0 ^e	13.0 ^d	0
Memorandum:					
Value of Liabilities Used for All Cases	87.5	89.1	86.5	79.3	73.7

SOURCE: Congressional Budget Office analysis based on data provided by the Federal Deposit Insurance Corporation and W.C. Ferguson and Company.

NOTES: Administrative costs remain fixed at \$7.4 million. The estimate of full embedded losses on assets is equal to \$8.6 million; embedded losses remain constant at this amount except as stated in Case 3. This analysis assumes all liabilities are covered by deposit insurance.

Estimates are derived from average values of a sample of 140 banks resolved by the Federal Deposit Insurance Corporation in 1990. The banks making up this sample represent 83 percent of the resolutions in 1990. The remaining 17 percent were not included because of data limitations.

n.a. = not applicable.

- a. Estimates of the market value of assets equal book value of assets minus embedded losses in each period.
- b. Estimates of the market value of equity equal market value of assets minus liabilities.
- c. Estimated resolution costs equal liabilities minus market value of assets plus administrative costs.
- d. Savings in resolution cost if bank was closed using 2 percent capital threshold of the Federal Deposit Insurance Corporation Improvement Act of 1991.
- e. Savings in resolution cost if bank was closed on the basis of market-value insolvency.



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