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The Losses Realized in Bank Failures

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ABSTRACT

This paper examines the losses realized in bank failures. Losses are measured as the difference between the book value of assets and the recovery value net of the direct expenses associated with the failure. I find the loss on assets is substantial, averaging 30 percent of the failed bank's assets. Direct expenses associated with bank closures average 10 percent of assets. An empirical analysis of the determinants of these losses reveals a significant difference in the value of assets retained by the FDIC and similar assets assumed by acquiring banks.

THE 1980S HAVE WITNESSED an unprecedented number of commercial bank and savings and loan failures. For example, between 1982 and year-end 1988, 791 commercial banks failed, more than twice the number of failures that occurred in the previous 40 years.[1] The magnitude and sources of the losses realized in these and future bank failures have important implications for the adequacy of the deposit insurance fund and the resources of the Resolution Trust Corporation, as well as the efficacy of the policies these agencies use to dispose of a filed institution's assets.[2]

In this paper I examine the losses realized in bank failures during the period 1985 through mid-year 1988. Losses are measured using data from the Federal Deposit Insurance Corporation (FDIC) as the difference between the book value of a bank's assets at the time of its closure and the value of the assets in an FDIC receivership or the value of the assets to an acquirer. This measure of loss I refer to as "loss on assets". Losses include expenses incurred in the liquidation and sale of assets, losses associated with forced liquidation including lost charter value (i.e., the value of the right to continue to operate) and past unrealized losses (i.e., losses on assets that occur prior to the bank's failure but are not reported on the bank's balance sheet at the time of the failure).[3]

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[1] Source: FDIC *Annual Report* 1988.

[2] The Resolution Trust Corporation (RTC) was established in 1989 to resolve thrift institution insolvencies. The RTC is administered by the FDIC.

[3] The administrative cost associated with a bank's closure and the direct costs associated with the early forced liquidation or sale of a bank's assets are components of loss on assets that would be similar to bankruptcy costs as defined in Warner (1977). Past unrealized losses, however, are not similar to bankruptcy costs as traditionally defined. Past unrealized losses on assets are not

This paper focuses on three issues. The first concerns the relative importance of past unrealized losses and the losses directly attributable to a bank's failure. The importance of these sources of losses are of public policy interest for two reasons. First, the magnitude of losses directly attributable to a bank's failure are important in establishing minimum capital requirements. Specifically, if one purpose of capital requirements is to protect the deposit insurance fund against losses, the minimum level of capital will depend on the direct losses associated with a bank's closure. Second, the magnitude of past unrealized losses provides an indication of the effective level of capital prior to a bank's failure. In particular, the larger the past unrealized losses, the smaller the effective level of capital (relative to a given level of book capital). Moreover, if this lower effective level of capital serves to distort investment decisions, then implementing market value accounting (which requires timely recognition of losses) and strictly adhering to capital standards will reduce the losses realized in bank failures.

A second issue concerns whether the method used by the FDIC to dispose of a failed bank's assets affects the loss on assets. The FDIC uses two types of transactions when dealing with financially distressed institutions. First, the FDIC may engage in either open bank assistance or arrange for the purchase or merger of the troubled institution with another bank. These are called "live bank" transactions. Second, the institution may be declared insolvent so that the bank fails.[4] This paper focuses on the losses associated with the second type of transaction. When a bank fails, the FDIC can resolve the failure either by assuming all the assets of the failed bank and paying off depositors (a so-called "payoff") or through auctioning some or all of the bank's assets (a so-called purchase and assumption (P&A) transaction). These transactions are discussed in detail below.

Losses on assets may vary with the type of transaction used by the FDIC for two reasons. First, there may be charter value that is lost when the FDIC liquidates a bank which can be preserved if the bank is sold to a private concern. Second, the FDIC may be less efficient in liquidating assets than a private concern. For example, the FDIC may have less of an incentive to maximize the value of assets in liquidation than private market participants since the compensation of government liquidators does not depend on the outcome of their actions.[5] If regulators are less efficient, the value of assets is

reported by the FDIC separately from the losses directly attributable to the bank's closure. One reason is that banks do not mark their asset portfolios to market and, therefore, information is not available on the market value of the bank's assets prior to its closure.

[4] The state bank chartering agency, or the Office of the Comptroller of the Currency, in the case of national banks are responsible for declaring a bank insolvent.

[5] For example, Campbell, Chan, and Marino (1990) show that shareholder's incentive to undertake risk enhancing negative net present value investments increases with leverage. Therefore, lower levels of capital can increase bank risk taking.

expected to be less to a FDIC receivership than to a purchasing bank. I refer to the hypothesis that the value of a failed bank's assets is less when retained by the FDIC than sold to the private sector as the "differential loss hypothesis".[6]

A third and final issue concerns the determinants of bank charter values. Buser, Chen, and Kane (1981) and Marcus (1984) argue that charter values arise from barriers to entry in local loan and deposit markets. I show that the premium purchasers pay in failed bank auctions depends on charter value. Information on premiums is used to examine the sources and magnitude of the charter values of failed banks.

I find that losses on assets are substantial, averaging 30 percent of the failed bank's assets. Direct costs of resolution (i.e., administration and legal expenses associated with the failure) are also substantial, averaging 10 percent of the assets of the failed bank. There are however, significant economies of scale with respect to direct costs of liquidation.

Past unrealized losses are found to contribute significantly to the losses on assets realized at the time of failure. Losses also appear to vary with the method used by the FDIC to resolve the failure. In particular, there is significant going concern value that is preserved if the failed bank is sold to another bank but is lost if the failed bank is liquidated by the FDIC. In addition, after controlling for possible differences in asset quality, the value of assets appears to be lower in FDIC receiverships than in the private sector. Finally, an examination of determinants of the premiums paid in failed bank auctions suggests significant differences in the value of assets retained by the FDIC and the value of similar assets to the purchasing bank.

The remainder of my paper is divided into four sections. In Section I, I discuss how loss on assets is measured and describe my sample. In Section II, I empirically test the differential loss hypothesis. In Section III, I examine the determinants of premiums in failed bank auctions. The final Section IV discusses the policy implications of my findings.

[6] Losses on assets may *appear* to vary with the type of transactions because of the provisions of tax benefits to the acquirer. The conveyance of tax benefits to purchasers through preserving tax-loss carry forwards in P&A transactions or through the FDIC providing tax exempt assistance payments may make the costs born by the FDIC lower (even though these benefits do not reduce the losses to the government as a whole). Certain acquirers were permitted to retain the failed bank's tax-loss carry forwards beginning with the First Republic of Texas transaction in July of 1988. However, the policy of providing purchasers tax-loss carry forwards was abandoned after the third quarter of 1988. In addition, beginning in mid-year 1988 and continuing until the enactment of the Financial Institutions Reform, Recovery, and Enforcement Act of 1989, in certain transactions FDIC assistance payments were exempt from Federal taxes.

It is important to note that the differential loss hypothesis, if correct, does not necessarily imply that the losses the *FDIC* incurs are lower for certain types of transactions. The losses the FDIC incurs may be less than the loss on assets because losses are borne by other bank claimants (e.g., uninsured depositors and bank shareholders). Moreover, the liability the FDIC assumes varies with the type of transaction used. (See FDIC 1984)

I. Losses Realized in Bank Failures

A. Methods of Resolving Bank Failures and The Calculation of Losses

The FDIC uses several methods to resolve bank failures. The most common is a "clean bank" purchase and assumption transaction (P&A) in which the FDIC auctions a package of the failed bank's assets and the obligation to assume the failed bank's liabilities. The auctioned package contains the bank's nonclassified assets: cash, securities, and certain performing loans, as well as the right to operate the bank. The second method is an insured deposit payoff. In this transaction the FDIC pays off all insured depositors and establishes a receivership to manage all of the failed bank's assets. In a payoff the FDIC receivership either 1) sells the loans and other assets or 2) holds them until they mature or can be called. The third method is a deposit transfer in which the FDIC pays a bank to assume the failed bank's deposits, but as in a payoff, the FDIC retains all of the failed bank's assets.[7] Finally, in 1987, the FDIC began using "whole" bank transactions where all of the failed bank's assets and liabilities are assumed by the acquiring bank. Because the acquired assets are generally worth less than the failed bank's liabilities, the FDIC pays the purchaser a fee to assume the assets and liabilities.

The loss on assets is measured as the difference between the book value of a failed bank's assets and the market value of the assets at the time of the failure (net of the direct expenses of resolving the failure). The calculation of this loss varies with the method used by the FDIC to resolve the failure. In the case of a whole bank transaction, the loss on assets is simply the amount the FDIC pays the purchaser to assume the failed bank's assets and liabilities plus the direct expenses the FDIC incurs. In a payout, the loss is the difference between the book value of assets at the time of failure and the estimated value of the failed bank's assets to the FDIC receivership (net of direct expenses). The value of the assets to the receivership is estimated at the time of the bank's closure by the FDIC. This estimate is updated quarterly until the receivership is closed.

Finally, in a clean bank P&A transaction, the loss on assets is calculated as the book value of the assets retained by the FDIC less the estimated value of the assets to the FDIC receivership and any premium that the purchaser pays to the FDIC (net of FDIC cash payments).[8]

The loss on assets does not necessarily equal the loss borne by the FDIC. In payoff transactions for example, uninsured depositors bear a pro rata share of

[7] Unless otherwise referenced, information about the FDIC's procedures for handling bank failures is from FDIC (1984). Except where noted, I treat deposit payoffs and insured deposit transfers as similar transactions because in both transactions the FDIC receivership disposes of all of the failed bank's assets.

[8] Because the liabilities assumed by the purchaser exceed the assets of the failed bank that are assumed, the FDIC provides the purchaser enough cash to equate the assets acquired with the value of the liabilities assumed. Assets assumed by the purchaser are transferred at book value.

the loss on assets in the receivership. In all transactions, bank shareholders and subordinated debtholders may share in any losses.

B. Sample description

The book values of assets at the time of failure and other balance sheet information were obtained from the FDIC's Division of Accounting and Corporate Services. The value of assets in liquidation was obtained from the FDIC's Estimated Cash Recovery System (ECR).[9] My analysis is based on realized losses and loss estimates as of December 1988 for 412 bank failures occurring during 1985 through mid-year 1988.[10] The analysis of the direct expense of resolving failures is limited to the 1985 through 1986 period because direct expenses are reported separately only in those years.

The sample includes 96 insured deposit payoffs and deposit transfer transactions, 287 P&As and 29 "whole bank" transactions. Table I provides descriptive statistics for the banks in the sample. Loss on assets as a percentage of the failed bank's assets averages 30.5 percent. The average ratio of loss on assets to total assets is significantly higher (at the 5 percent level) for bank failures handled through payoffs (34.25 percent) than for failures handled through P&A transactions (30.4 percent).[11] In addition, the average loss on assets for whole bank transactions is significantly less than the average loss in the other transactions (at the 1 percent level). Finally, the average ratio of direct expenses to total assets ratios is not significantly different in P&A transactions than in payoffs (at the 0.10 level).[12]

The difference in average losses for P&As, payoffs, and whole bank transactions may arise in part from differences in the quality of failed bank assets. In particular, notice that the percentage of assets classified as loss and total

[9] Estimates of asset values net of expenses are revised semi-annually to reflect any difference between the actual and expected cash flows associated with the liquidation. See Bovenzi and Murton (1988) for a discussion of the FDIC's liquidation cost estimates. The FDIC (ECR) tracks the value of assets in liquidation for all but a few of the largest bank failures.

[10] The analysis is limited to failures during this period for two reasons. First, 1985 is the first year in which estimates of asset values are reported in a consistent fashion. Failures occurring after mid-year 1988 were excluded from the sample to avoid using asset values estimated after less than 6 months of liquidation experience. The 412 failures represent all failures in which complete data was available from the FDIC.

[11] The loss on assets and the loss to the insurance fund differ because a portion of the loss is borne by bank shareholders and uninsured depositors (in the case of payoffs). Moreover, in a P&A the premium paid serves to offset any loss to the FDIC. By subtracting from the loss on assets the book value of equity, the premium paid and the losses borne by uninsured depositors, an estimate of the loss borne by the FDIC can be obtained. For P&As the loss to the FDIC per dollar of failed bank assets averaged 28.4 percent. For payoffs the loss averaged 35.3 percent of assets. The difference is not statistically significant at the 0.10 level. Finally, the loss of assets and the loss to the insurance fund will differ if purchasers are provided favorable tax treatment.

[12] The examiner's failed bank case report indicated fraud and insider abuse were the causes of 26 percent of the failures. The presence of fraud and insider abuse is not significantly related to the type of transaction used.

Table I

Summary Statistics for a Sample of Bank Failures 1985 through Mid-Year 1988

This table provides descriptive statistics concerning bank balance sheet characteristics and the loss on assets for bank failures during the period from 1985 through June 1988. Assets and equity capital are the book value of assets and equity in thousands at the time of the bank's failure. The capital ratio is the ratio of equity capital to total assets. Classified assets are assets classified by bank examiners as loss, substandard, or doubtful prior to the bank failure. Loss on Assets is the difference between the book value of assets and the estimated market value of assets made by the FDIC at the time of the failure plus the direct legal and administrative costs associated with the failure. Core deposits are total deposit accounts (in thousands) under $100,000.

	Total sample (n = 412)	P&A (n = 287)	Payoffs/ transfers (n = 96)	Whole bank (n = 29)
Variable	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
Assets[a]	$32,575 ($25,680)	$32,639 ($24,639)	$32,745 ($18,745)	$31,378 ($16,948)
Equity capital[b]	$389 ($649)	$416 ($235)	$324 ($399)	$326 ($154)
Capital ratio	1.59% (1.21%)	1.80% (1.78%)	.98% (2.01%)	1.48% (1.21%)
Ratio of loans to assets[c]	65.58% (64.25%)	66.50% (63.35%)	65.42% (66.35%)	65.82% (65.94%)
Ratio of classified assets to total assets	27.21% (28.22%)	27.13% (25.15%)	29.23% (31.51%)	21.56% (20.98%)
Ratio of assets classified as loss to total assets	9.44% (8.53%)	9.43% (8.54%)	10.45% (8.74%)	6.60% (3.78%)
Present value of liquidation costs	$12,195 ($5,306)	$10,447 ($5,473)	$12,161 ($4,459)	$4,714 ($3,362)
Ratio of liquidation costs to total assets in liquidation	30.51% (27.68%)	30.41% (29.73%)	34.25 (39.50%)	19.12% (19.20%)
Ratio of administration and legal expense to assets	9.96% (9.51%)	9.50% (9.22%)	11.24% (12.94%)	N/A
Ratio of core deposits to total assets[d]	84.11% (88.64%)	84.20% (85.82%)	82.40% (77.30%)	88.84% (87.18%)

[a]All dollar values are in thousands. Assets are from the failed bank file.
[b]Book equity is from the failed bank file.
[c]Loans are from the Call Report prior to failure.
[d]Administration costs are reported only for failures occurring in 1985 and 1986.
[e]Core deposits are calculated from the Call Report.

classified assets are highest in payoff transactions. In the next section I examine whether asset quality affects the loss on assets.[13]

[13] I find no significant difference in losses by year. The average loss on assets is 31.22 percent, 30.44 percent, 32.33 percent, and 29.88 percent for 1985, 1986, 1987, and 1988, respectively.

II. Asset Losses and the Differential Loss Hypothesis

I assume that the loss on assets is a function of the quality and type of assets in the failed bank, the failed bank's book value of equity, charter value, and the transaction used by the FDIC.

I test the differential loss hypothesis in two ways. First, I compare the value of assets in FDIC receiverships to the value of similar assets when sold to an acquiring bank in a P&A or whole bank transaction. Second, I examine the relation between the purchase premium paid in P&A transactions and the volume of assets assumed by the acquiring bank. This analysis provides an estimate of the purchaser's expected loss on assets that can be compared to the FDIC's expected loss on similar assets.

A. Determinants of the Loss on Assets

To measure asset quality I divide the assets of the failed bank into two groups: nonrisk assets and risk assets. Nonrisk assets include cash, government securities (at market value), and federal funds sold. Risk assets include all other assets. Next, I divide risk assets into three groups based on examiner classifications immediately preceding the bank's failure: assets classified as loss, substandard, and nonclassified risk assets.[14] In addition to examiner classifications, I also include as a measure of asset quality the amount of "income earned but not collected" reported in the failed bank's last Call Report. This item is used by bank regulators to define nonperforming assets and is included in the model to account for possible differences in the risk of nonclassified assets.

Losses on assets are expected to vary inversely with asset quality for two reasons. First, losses on assets include losses incurred prior to the bank's closure which have not been reported on the bank's balance sheet. The poorer the quality of assets the greater the likelihood of unrealized losses. Second, losses arise from early liquidation of assets. These losses arise in part because there is not a well developed secondary market for the assets of banks. One factor contributing to the lack of a secondary market is the existence of information asymmetries between the bank and other market participants concerning the quality of the bank's assets. This problem is likely to generate greater losses for the bank's riskiest assets.

[14] The Federal Reserve's *Commercial Bank Examination Manual* (December 1985, Section 217.1) defines three categories of classified assets:

Substandard Assets—A substandard asset is inadequately protected by current sound worth and paying capacity of the obligator or the collateral pledged, if any.

Doubtful Assets—An asset classified doubtful has all the weakness inherent in one classified substandard with the added characteristic that the weakness makes collection or liquidation in full highly questionable and improbable. Assets classified as doubtful are reported consistently only for failures occurring in 1985 and 1986.

Loss Assets—Assets classified loss are considered uncollectible and of such little value that their continuance as bankable assets is not warranted.

To determine the importance of past unrealized losses I examine the relation between the loss on assets and the book value of equity of the failed bank. If the book value of assets systematically overstates the market value of the bank's assets because of unrealized losses, then the book value of equity will overstate the market value of equity at the time of failure by the amount of these unrealized losses. Therefore, if loss on assets includes past unrealized losses, one would expect a positive relation between loss on assets and the book value of equity. On the other hand, if losses arise solely from the sale or liquidation of the bank's assets and/or administration expenses, no relation is expected between loss on assets and the book value of equity.

A third factor affecting losses is the charter value of the bank. Bank charters may be valuable because federal and state regulations limit entry into local deposit markets and require banks and other depository institutions to have a charter to operate. I assume that charter value is positively related to the bank's volume of core deposits. Core deposits are defined as demand deposits and small denomination time and savings deposits (i.e., deposits less than $100,000).[15]

The method used to dispose of a failed bank's assets can affect the FDIC's ability to capture charter value. For example, in a P&A transaction, the failed bank's charter as well as its deposits and a subset of its assets are assumed by an acquiring bank. In an insured deposit payoff the bank is closed, and the FDIC liquidates all of the failed bank's assets and pays off insured depositors. Therefore, if charter value arises from core deposits it will be preserved in a P&A or whole bank transaction and not in a payoff.

The types of assets assumed by the purchaser vary with the transaction used by the FDIC to resolve the failure. In a whole bank transaction the purchaser acquires all of the failed bank's assets. In a clean bank P&A, the purchaser assumes all nonrisk assets (cash and securities) and a portion of the nonclassified risky assets but none of the classified assets.[16]

To test the differential loss hypothesis, I constructed a set of interactive variables which equal the volume of assets assumed by the purchaser in each of the classification categories, if the failure was resolved through a P&A or whole bank transaction, zero otherwise. Under the differential loss hypothesis the expected sign on these interactive variables is negative. On the other hand, if the value of an asset is the same whether the FDIC or acquiring bank assumes it, then losses on assets will not vary with the volume of assets sold.[17]

[15] Charter value may also vary because of branching restrictions. However, I find no significant relation between losses and state branching laws.

[16] However, in a P&A the FDIC assumes an average of 51 percent of the nonclassified assets of the failed bank. All nonrisk assets are marked to market by the FDIC at the time of the bank's closure so that their market value equals their book value.

[17] This follows from the fact that the purchaser pays book value plus a premium for the assets it assumes. Therefore, if the purchaser assumes an additional dollar in assets, assets in liquidation decrease by a dollar, and the FDIC's cash outlay changes by the amount of the premium.

To examine the determinants of loss on assets and to test the differential loss hypothesis, I estimated the following ad hoc model:

$$\begin{aligned} Loss_i = {} & \alpha_1 + \alpha_2 LoanLoss_i + \alpha_3 Substandard_i + \alpha_4 UNCOLL \\ & + \alpha_5 Nonclassified_i + \alpha_6 Book_i + \alpha_7 Core_i + \alpha_8 INTERC_i \\ & + \alpha_9 Loss\ Assets\ Assumed + \alpha_{10} Substandard\ Assumed \\ & + \alpha_{11} Nonclassified\ Assumed + \varepsilon_i \end{aligned} \quad (1)$$

where

Loss	Loss on assets
LoanLoss	Assets classified as loss
Substandard	Assets classified as substandard
UNCOLL	Income earned but not collected
Nonclassified	Nonclassified risk assets
Book	Book value of equity
Core	Core deposits
INTERC	Core if a payoff is used, 0 otherwise
Loss Assets Assumed	Assets classified as loss assumed by purchaser
Substandard Assumed	Assets classified as substandard assumed by purchaser
Nonclassified Assumed	Nonclassified risky assets assumed by purchaser

I include in the model an interactive dummy variable (*INTERC*) which equals core deposits if the failure is resolved through a payoff, zero otherwise. I include this variable because any charter value associated with a bank's core deposits is less likely to be captured by the FDIC in a payoff than in a P&A transaction. If the charter value is lost in payoff transactions, the coefficient on INTERC is expected to be positive.[18]

B. Empirical Results

Estimates of the model are reported in Table II. To correct for heteroskedasticity, I used weighted least squares, weighing each variable by the square root of asset size.[19] The results indicate a positive and statistically significant relation between the loss on assets and examiner classifications and the nonperformance measure *UNCOLL*. The estimated coefficients on

[18] Equation (1) is estimated using OLS. A potential problem when examining losses on assets, particularly in the thrift industry, is selection bias; i.e., only a subset of the insolvent thrifts failed and were resolved by the FSLIC. However, OLS is appropriate if, as is the case in this study, the purpose is to examine losses under existing closure rules. Estimating a model to predict future losses under an alternative set of closure rules would require a correction for selection bias.

[19] The pairwise correlations for the volume of assets in the classification categories are between 0.40 and 0.46. However, collinearity between the independent variables does not appear to be a problem in that none of the condition indices associated with the eigen values exceed 12.

Table II

Weighted Least Squares Regression Relating the Loss on Assets of Failed Banks to the Balance Sheet Characteristics of the Failed Bank and the Method of Disposal for a Sample of Banks, 1985 through Mid-Year 1988

The dependent variable is the dollar value of the loss on assets calculated as the difference between the book value of assets and the market value of assets at the time of the bank's failure plus administrative costs associated with the failure. Assets classified as loss and substandard are assets classified by bank examiners at the time of the failure. Nonclassified risky assets are loans not classified by examiners. *UNCOLL* refers to income earned but not collected which is interest revenue accrued by the bank but not received and is a measure of asset quality. Assumed assets refers to assets acquired by a purchasing bank. Book equity is the book value of retained earnings, preferred stock, and loan loss provisions. Core deposits are total deposit accounts under $100,000. *INTERC* equals core deposits, if the bank failure is resolved through a payoff transaction, zero otherwise. All variables in the regression are weighted by the square root of total assets. Data are from the FDIC. (t-statistics are in parentheses.)

Independent variable	Estimated coefficient
Intercept	181.83 (1.455)
Assets classified as loss	0.934 (10.886)
Assets classified as substandard	0.674 (16.537)
Nonclassified risky assets	0.127 (5.556)
UNCOLL	1.992 (4.100)
Assumed assets classified as loss	−0.119 (−0.322)
Assumed assets classified as substandard	−0.403 (−2.934)
Assumed risky assets nonclassified	−0.036 (−2.524)
Book value of equity	0.128 (2.596)
Core deposits	−0.022 (−1.688)
INTERC	0.024 (2.384)
$R^2 = 0.799$ Sample size = 412	

the asset classification categories suggest that the losses on these assets are substantial. For example, the coefficient estimate for assets classified as *loss* implies effectively no recovery value for assets in this category. Even for nonclassified risk assets the estimates imply a recovery value of only $0.87 per dollar of assets.

The positive coefficient on the book value of equity capital indicates that past unrealized losses contribute significantly to loss on assets. In particular, the larger the book value of equity of a failed bank the larger the expected loss on assets.[20] One explanation for this result is that conditional on being declared insolvent, banks with more book value equity are more likely to have unrealized losses at the time of failure. One potential reason for this finding is that fraud and insider abuse is more prevalent in well capitalized banks. The FDIC data base contains information on whether fraud and insider abuse contributed to failures occurring in the 1985–1986 period. Consistent with this explanation, I find that capital ratios are significantly higher (at the 0.05 level) in the 67 failures where fraud was indicated (1.7 percent equity for failures in 1985–1986 where fraud was present versus 0.8 percent for failures during this period where fraud did not cause the failure).[21]

The negative coefficient on core deposits is consistent with the hypothesis that at least a portion of the bank's charter value accrues to the FDIC thereby reducing realized losses. Moreover, the positive and statistically significant coefficient on *INTERC* suggests that charter value is lost when a payoff is used.

The results reported in Table II are consistent with the differential loss hypothesis. The estimated coefficients on the interactive variables (*Loss Assets Assumed*, *Substandard Assumed*, and *Nonclassified Assumed*) are all negative. The coefficients for *Substandard Assumed* and *Nonclassified Assumed* are significantly different from zero at the 0.05 level. The coefficient on *Substandard Assumed* implies losses of \$0.40 less on assets assumed by purchasers than losses on assets in the same category that are liquidated by the FDIC. Even for nonclassified assets assumed the difference in loss is \$0.04. Using an *F*-test, I can reject at the 1 percent level the hypothesis that the loss on assets for all of the classification categories is the same for the two types of transactions (the *F*-statistic is 18.25).

Assuming examiner classifications are a consistent measure of asset quality, these results indicate that the FDIC recovers more when assets are sold than when they are retained by the FDIC. This result suggests that, assuming no difference in the quality of assets the FDIC retains and the purchaser acquires, losses would be lower if more assets were passed to the acquiring bank.[22]

Differences in asset values may arise because of differences in the quality of assets liquidated by the FDIC and the purchasing bank. In particular, if the FDIC were to sort assets on the basis of quality and retain for liquidation

[20] The positive coefficient on bank equity does not simply proxy for bank size. When the ratio of book equity to assets is included in the model I obtain similar results.

[21] However, I find no significant difference between the loss on assets in failures caused by fraud and failures caused by other factors.

[22] However, this conclusion is based on the assumption that the FDIC appropriately prices and accounts for put back provisions and indemnifications provided purchasers in P&A and whole bank transactions.

only the worst assets, then losses would vary in a manner consistent with the differential loss hypothesis. Specifically, if the FDIC were to sort in this manner and if the FDIC has a comparative advantage in working these assets, then finding differences in losses would *not* imply a reduction in losses by selling more assets to acquiring banks. If this argument is correct, one would expect that the volume of risk assets assumed by an acquiring bank to be positively correlated with asset quality. To test whether the difference in the loss on assets arises from differences in asset quality, I ordered the 287 P&A transactions in my sample according to the ratio of risk assets assumed to nonclassified assets. I then divided the sample into two groups. One group consisted of transactions in the highest quartile of risk assets assumed and the second group consisted of transactions in the lowest quartile. I then estimated the model using data from the highest and lowest quartile (since the difference in asset quality, if any, should be greatest between these two groups). If the difference in the loss on assets is the result of differences in the quality of assets (and the volume of assets assumed proxies for asset quality) the coefficients on asset classifications should be significantly larger for transactions with the lowest proportion of risk assets assumed. I do not find a significant difference between the two groups (the F-statistic is 0.169).

C. *Analysis of Direct Expenses*

I also estimated the relation between direct expenses and the quality and type of the failed bank's assets and the method used by the FDIC to dispose of the bank. I performed this analysis to determine whether the negative relation between loss on assets and asset quality is solely the result of past unrealized losses. If it is, no relation is expected between administrative costs and asset quality.

The analysis of the relation between direct expenses and asset quality are reported in Table III. Because direct costs are reported separately only in 1985 and 1986, the analysis is based on failures in those years. I find a positive and statistically significant relation between direct expenses and the volume of assets classified as substandard, doubtful, and nonclassified assets. This result suggests that the positive relation between loss on assets and asset quality is not attributable solely to past unrealized losses. Finally, notice that the estimated coefficient on assets classified as loss is not significantly different from zero (at the 0.10 level). This result is consistent with the argument that all of the losses attributable to this category of assets are past unrealized losses.

There appear to be significant scale economies in the direct costs of resolving bank failures. In particular, Table IV contains estimates of the direct costs of resolving failures per dollar of failed bank assets. Included as explanatory variables are the amount of classified assets per dollar of assets, nonclassified assets per dollar of assets, income accrued but not collected per dollar of assets (*UNCOLL*) and the natural logarithm of assets of the failed

Table III

Weighted Least Squares Regression Relating Administrative Expenses to Balance Sheet Characteristics of the Failed Bank and the Transaction Used for a Sample of Banks, 1985-1986

The dependent variable is the dollar value of administrative costs associated with the failure. Assets classified as loss, doubtful, and substandard are assets classified by bank examiners at the time of the failure. Nonclassified risky assets are loans not classified by examiners. *UNCOLL* refers to income earned but not collected which is interest revenue accrued by the bank but not received and is a measure of asset quality. All variables in the regression are weighted by the square root of total assets. Data are from the FDIC. (*t*-statistics are in parentheses.)

Independent variable	Estimated coefficient
Intercept	326.258
	(5.159)
Assets classified as loss	0.0110
	(0.304)
Assets classified as doubtful	0.395
	(3.243)
Assets classified as substandard	0.108
	(4.675)
UNCOLL	0.561
	(2.548)
Nonclassified risky assets	0.0722
	(6.423)
$R^2 = 0.591$	
Sample size = 206	

bank. Notice the coefficient on the natural logarithm of assets is negative and statistically significant at the 0.01 level.[23]

III. Analysis of Purchase Premiums

The second test of the differential loss hypothesis involves an examination of the purchase premiums in P&A transactions. An analysis of the determinants of the premiums paid in failed bank auctions can provide insights into the source of the difference in loss on assets. In particular, assuming a competitive auction market and risk neutral bidders, the premium paid represents the difference between the charter value of the bank and the expected loss on assets assumed by the acquiring bank. That is,

$$Premium = Charter\ Value - Expected\ Loss\ on\ Assets\ Assumed$$

[23] While I find significant scale economies in the direct expenses associated with failure resolution, I find no evidence of scale economies in terms of losses on assets. In particular, I fail to find any significant relation between the loss on assets per dollar of assets and the volume of assets in liquidation.

Table IV

Regression Relating the Direct Expenses Associated with Failure Resolution per Dollar of Bank Asset to Balance Sheet Characteristics of the Failed Bank and the Asset Size of the Bank at the Time of Failure, for Bank Failures 1985–1986

The dependent variable is the dollar value of administrative costs associated with the failure. Assets classified as loss, doubtful, and substandard are assets classified by bank examiners at the time of the failure. Nonclassified risky assets are loans not classified by examiners. *UNCOLL* refers to income earned but not collected which is interest revenue accrued by the bank but not received and is a measure of asset quality. Data are from the FDIC. (*t*-statistics in parentheses.)

Independent variable	Estimated coefficient
Intercept	0.270
	(8.882)
Assets classified as loss per dollar of assets	0.083
	(1.640)
Assets classified as substandard per dollar of assets	0.160
	(4.321)
Assets classified as doubtful per dollar of assets	0.182
	(2.295)
Nonclassified assets per dollar of assets	0.070
	(2.721)
UNCOLL	0.091
	(.669)
Natural log of failed bank assets	−0.025
	(−8.484)
$R^2 = 0.324$	
Sample Size = 206	

or

$$\textit{Charter Value} = \textit{Premium} + \textit{Expected Loss on Assets Assumed}.$$

The purchase premium reflects therefore the losses purchasers expect as well as the charter value of the bank. Moreover, the purchaser's willingness to incur losses on assets acquired is limited to the bank's charter value if the bidding procedure requires that premium be greater than or equal to zero. A comparison of the loss on assets implied in the purchase premium and loss on assets for certain categories of assets obtained by estimating equation (1) (which is based on FDIC loss estimates) can therefore provide another test of the differential loss hypothesis.

Because of the limited number of whole bank transactions I focus on P&A transactions. P&A auctions are first price sealed bid auctions. Auction theory (see Milgrom and Weber (1982)) predicts that the expected winning bid is a function of the expected value of the object, the number of bidders participating in the auction, and the uncertainty concerning the value estimates.

I therefore assume that the premium or winning bid in a failed bank auction depends on; (1) the value of the assets assumed including the failed bank's charter, (2) uncertainty concerning the value of assets assumed, and (3) the number of bidders participating in the auction.

As a proxy for the failed bank's charter value, I use the volume of core deposits in the failed bank. A positive relation is expected between the premium paid and the volume of core deposits.

The value of the failed bank is also assumed to be a function of the assets acquired by the purchaser. The relation between the premium paid and the volume of assets assumed depends upon the expected loss on assets which, in turn, depends on the type of put back provision the FDIC provides the acquirer. A put back provision gives the purchaser an option to sell back to the FDIC a portion of the assets she acquires. The put option typically has an expiration date of 90 to 120 days with an exercise price equal to the book value of assets. Most put back provisions limit the amount that can be put back to the FDIC.

When put backs are provided and are not binding, purchasers will retain assets with market values equal to or greater than their book value (and put back all assets with market values less than book value). Therefore, the premium paid for the *assets assumed* will equal the difference between the market and book value of the assets (since the purchaser pays the FDIC book *plus* a premium). This discussion implies that with nonbinding put back provisions

$$\frac{\mathrm{d}(Premium)}{\mathrm{d}(RSKASM)} \geq 0 \tag{2}$$

where *RSKASM* are book values of assets assumed by the acquirer.

For P&A transactions without put back provisions or for transactions in which the put back provision is binding, the relation between the premium and the assets assumed by the purchaser will depend on the relation between the book and market value of the assets acquired, i.e.,

$$\frac{\mathrm{d}(Premium)}{\mathrm{d}(RSKASM)} = (\text{market value} - \text{book value}) \gtreqless 0 \tag{2'}$$

The effect of *RSKASM* on the premium may therefore differ between transactions in which put back provisions are nonbinding and transactions in which put backs are binding or not provided at all. In particular, with put back provisions available, the relation between the premium and *RSKASM* is expected to be nonnegative. Without put back provisions the relation depends on the expected loss or gain on assets assumed.

Information on put back provisions is available only for P&A in 1983 and 1986. Of the 160 P&A transactions in those years, the FDIC provided put backs in 122 transactions. Unfortunately, while information is available on

whether a put back option is provided, no information is available on the amount of assets put back. I cannot therefore determine a priori those transactions in which put back provisions are binding. However, the likelihood that the put back provision is binding will increase with the percentage of nonclassified assets retained by the FDIC. I employed Quandt's switching regression methodology (see Quandt (1958)) to determine the critical level of assets assumed beyond which the put back provisions are presumed to be binding. The switch point is 30 percent of nonclassified risk assets retained by the FDIC. Transactions with 100 percent put backs or transactions with limited put back provisions in which the FDIC assumed less than 30 percent of the nonclassified assets were assumed to have nonbinding put backs. I then constructed an interactive dummy variable (*NO PUT-BACKS*) which equals *RISK ASSETS ASSUMED*, if no put backs are provided or put back provisions are binding, zero otherwise. The expected coefficient on *NO PUT BACKS* is negative.

As a proxy for asset quality I used the asset performance measure "Income Earned but not Collected" (*UNCOLL*). This variable was obtained from the last Call Report filed by the failed bank. This measure was used because, unlike the examiner's asset classifications, it is publicly available to all bidders (both actual and potential bidders) at the time of bidding. Auction theory predicts, absent FDIC put back provisions, a negative relation between the premium and the level of uncertainty concerning asset values. With FDIC indemnification against loss however, no relation is expected between the premium and the risk of the assets. I therefore include an interactive variable with "*NO UNCERTAINTY*" which equals *UNCOLL*, if put back provisions are provided, zero otherwise. The expected sign on this variable is positive; i.e., for a given level of uncertainty, premiums are higher when the FDIC indemnifies losses.

The final factor examined is the number of bidders in the auction. The number of bidders may affect the premium in several ways. First, it may provide a measure of the degree of rivalry among bidders. Finding a positive relation between the premium and the number of bidders is not, however, inconsistent with competition in the acquisition market. In particular, if bidders are heterogeneous, the auction can be characterized as a private values auction (see Milgrom and Weber (1982)). In a private values auction, competition implies only that the premium rises until the acquisition is a negative net present value investment to all unsuccessful bidders. The greater the number of bidders the greater is the expected value of the second highest bid and therefore the value of the winning bid.[24] I use the natural logarithm of the number of bidders to account for the diminishing marginal impact of additional bidders on the outcome of the auction.

[24] Riley and Samuelson (1981) prove that when bidders are risk neutral the expected winning bid in a first price sealed bid auction with private values equals the second order statistic of the underlying distribution of the bidder's values.

The following equation describes the model

$$PREMIUM_i = \alpha + \alpha_1 LNBID_i + \alpha_2 UNCOLL_i + \alpha_3 CORE_i + \alpha_4 RISK\ ASSETS\ ASSUMED_i + \alpha_5 NO\ PUT\ BACK_i + \alpha_6 NO\ UNCERTAINTY + \varepsilon_i \quad (3)$$

where

PREM	Premium paid by the acquirer
LNBID	Natural logarithm of the number of bidders
UNCOLL	Income earned but not received
CORE	Core deposits
RISK ASSETS ASSUMED	Risk assets assumed by the acquirer
NO PUT BACK	Risk assets assumed if no put backs or put backs are binding, zero otherwise
NO UNCERTAINTY	Income earned but not collected if put backs are provided, zero otherwise.

Table V contains summary statistics for the failed bank auctions in the sample. The average premium paid by acquirers is $916,050. The premium paid averaged about 2 percent of the assets of the failed bank and 4 percent of the assets assumed by the purchaser. The relatively small premiums paid suggest that bank charter values represent a small proportion of the assets of the failed bank.

Table V

Summary Statistics for 160 Purchase and Assumption Transactions, 1985 through Mid-Year 1988

This table provides summary statistics for 160 bank failures resolved through purchase and assumption (P&A) transactions in which a portion of the failed bank's assets are sold to an acquiring bank. Premium refers to the acquiring bank's bid (winning bid) for the failed bank's assets (net of liabilities) (in thousands). Core deposits are total deposit accounts under $100,000. Assets assumed are assets that are acquired by the purchasing bank. The number of bidders refers to the number of banks submitting bids in the P&A auction. The range of bids is the highest bid received less the lowest bid. Data are from the FDIC.

Variable	Mean	Maximum	Minimum
Premium	$916.05	$62,600.00	0.00
Ratio of premium to core deposits	0.026	0.222	0.00
Ratio of premium to assets assumed	0.044	0.277	0.00
Ratio of premium to total assets of failed bank	0.019	0.178	0.00
Number of bidders	2.56	10.00	1.00
Ratio of range of bids to winning bid	0.584	18.58	0.00

I estimated equation (3) using both ordinary least squares and a truncated regression model described in Maddala (1983) and Heckman (1976). A truncated regression model is employed because during the 1985–1986 period the FDIC accepted only positive bids, resulting in the dependent variable in equation (3) being truncated at zero. Thus, the expected value of the error term in equation (3) may not equal zero and may be correlated with the explanatory variables. Estimates by OLS of equation (3) are reported in Table VI. Estimates using a truncated regression model are virtually identical to those reported in Table VI.

The results are generally consistent with the predictions of auction theory. I find a negative and statistically significant relation between the premium and the measure of bidder uncertainty concerning asset values. However, when the FDIC indemnifies losses through the provision of put-backs, I find no relation between premiums and *UNCOLL*. (The coefficient on *NO*

Table VI

Regression Relating Premiums in 160 Purchase and Assumption Transactions to Bank Characteristics, the Number of Bidders, and Assets Assumed by the Purchaser, 1985 through Mid-Year 1988

The dependent variable is the dollar value of the premium paid by the winning bidder in the purchase and assumption transaction. *CORE* refers to total deposits in accounts less than $100,000. *UNCOLL* equals income earned but not collected and refers to bank revenues accrued but not received in the year and is a measure of asset quality. *LNBID* is the natural logarithm of the number of bidders participating in the failed bank auction. *RISK ASSETS ASSUMED* are assets excluding government securities and reserves assumed by the purchaser. *NO PUT BACK* equals one, if the purchaser is provided the option to put assets back to the FDIC, zero otherwise. *NO UNCERTAINTY* equals income earned but not collected, if put back options are provided purchasers, zero otherwise. Data are from the FDIC. (*t*-statistics are in parentheses.)

Variable	Coefficient estimate
Intercept	−943.124
	(−3.987)
CORE	.029
	(3.148)
UNCOLL	−1.450
	(−3.289)
LNBID	887.020
	(3.729)
RISK ASSETS ASSUMED	.205
	(10.461)
NO PUT BACK	−.178
	(−7.242)
NO UNCERTAINTY	1.467
	(4.195)
R^2 = 0.883	
Sample Size = 160	

UNCERTAINTY is positive and statistically significant). Moreover, when equation (3) is estimated for the sample where put backs are provided the coefficient on *UNCOLL* is not different from zero.

The positive and statistically significant relation between the premium paid and the volume of core deposits is consistent with the hypothesis that core deposits contribute to charter value and also with the negative relation between the loss on assets and core deposits reported in the previous section. The positive relation between the premium paid and the number of bidders is consistent with either imperfect competition in the auction market or with the hypothesis that bidders are heterogeneous. Under either explanation, the result suggests that the full value of the bank's charter or differences in operational efficiencies are not captured by the FDIC.[25]

The positive coefficient on *RISK ASSETS ASSUMED* implies that assets liquidated by the acquiring bank have a market value in excess of their book value (i.e., they expect to realize a gain on assets assumed). In contrast, the results reported in Section II indicate that assets liquidated by the FDIC have market values that are *less* than their book values.

The difference in value of failed bank assets to the FDIC and the purchaser of the bank may result from differences in the quality of assets liquidated, even within the category of nonclassified assets. There are two reasons to expect quality differences. First, as discussed earlier, when put back provisions are provided the acquiring bank will keep only assets with a market value above book value. Second, to attract bidders the FDIC may sort assets by quality and offer only the best assets to bidders. The results in Table VI indicate that when put back provisions are not provided or are binding, the value of *Risk Assets Assumed* to bidders is lower than when put backs are available.[26]

IV. Conclusion

The results of this paper have two important public policy implications. First, the magnitude of the direct costs associated with bank failures (10 percent of the failed bank assets) suggests that the costs of thrift and bank failures are substantial. Moreover, the direct costs of failure appear to be larger than the direct costs of bankruptcy for nonfinancial firms. For example, Warner (1977) reports for railroads that direct costs of bankruptcy average about one percent of the market value of the firm. Second, since the analysis suggests there is significant lost going concern value in bank

[25] This result is consistent with the results reported by James and Wier (1987). Gilberto and Varaiya (1989) provide evidence that bidders are heterogeneous. My results support this hypothesis but also suggest that heterogeneity arises in part from the ability to work assets acquired.

[26] However, when equation (3) is estimated using only data from transactions in which put backs are not provided or are binding, I still find a positive and statistically significant relation between the premium and *RSKASM*. This result is consistent with the hypothesis that the FDIC offers bidders assets with market values equal to or greater than their book value.

failures, increasing the volume of assets assumed by the purchaser can significantly reduce losses on failed bank assets. Consistent with this implication, the average loss in whole bank transactions, where all of a failed bank's assets are sold, is less than the losses in other transactions.

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