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Explanations for the Increased Riskiness of Banks in the 1980s

INTEREST IN BANKING MATTERS surged in the 1980s, when the U.S. banking system experienced considerable difficulties after several decades of stability. During the decade, the number of bank failures increased sharply, and banks in general experienced increasing problem loans and dwindling capital. Most banks recovered their financial strength in the early 1990s thanks to improved economic conditions and low short-term interest rates that increased interest margins. With the recovery of the banking sector, public interest in bank failures is fading, but many questions remain unanswered. To effectively prevent repetition of the banking turmoil, it is important to study the fundamental causes of the sudden deterioration of the financial health of the banking system in the 1980s. Without recognizing the causes, future banking policies intended to improve the safety and soundness of the banking sector might produce more unintended effects than intended ones.

Numerous studies have proposed explanations for the deterioration of bank asset quality, but empirical evidence is sketchy. This study explores theoretical explanations for the financial problems of commercial banks in the 1980s and examines their empirical consistency. I focus on commercial banks because many previous studies have examined the financial problems of savings and loan associations (S&Ls). Three theoretical

possibilities for the increased riskiness of banks in the 1980s are considered: (1) increased incentives for risk-taking by bank stockholders; (2) desperate attempts of bank managers to increase profits by assuming additional risk; and (3) unexpected economic shocks.

To evaluate the empirical significance of the three hypotheses, the empirical section examines the effects of capital adequacy and earnings on the risk-taking behavior of banks and also looks at the relationship between regional economic conditions and bank performance. Capital ratios and earnings may be related to the risk-taking incentives of stockholders and managers, respectively. Regional economic conditions should largely explain bank performance if unexpected economic shocks are the main reason for the deterioration of bank asset quality. For selected years of the 1980s, I divide banks into several groups based on year-end capital ratios and earnings on assets. I then compare year-to-year changes in various risk measures across groups. Although deliberate risk-taking by stockholders and managers does not appear to apply to the majority of banks, it is found to be consistent with the behavior of a sizable proportion of banks. This result holds even after controlling for the effects of local economic conditions.

The next section describes the economic and institutional developments that are related to

the financial troubles in banking during the 1980s. The following section explores theoretical explanations for increased risk-taking and existing empirical evidence. Empirical results of this study follow. Lastly, the article's findings are summarized.

DEVELOPMENTS IN BANKING

The United States enjoyed stable banking during the four decades following the establishment of the Federal Deposit Insurance Corporation (FDIC) in 1934. The relatively high number of bank failures between 1934 and 1942, about 44 per year, may be regarded as an aftermath of the financial crisis of 1933 and the following years of depressed economic activity.¹ Between 1943 and 1974, only 121 banks failed. Bank failures began increasing in the second half of the 1970s and became notable in the second half of the 1980s. Between 1985 and 1990, the number of bank failures averaged 169 per year. To understand the dramatic increase in bank failures, we need to look at the economic and institutional developments that are relevant to the banking business.

Economic Developments

The banking industry encountered numerous unfavorable shocks in the 1970s and 1980s. These included sudden increases in interest rates, the collapse of many real estate investment trusts (REITs), the Latin American debt crises and sharp declines in real estate values. High inflation in the 1970s and the early 1980s raised interest rates. Unexpected increases in interest rates usually lower bank interest margins because the average maturity of bank liabilities is generally shorter than that of their assets. The mismatch of maturities means that lending rates adjust more slowly than funding rates. Increases in interest rates, hence, tend to lower bank profits.

REITs, which channel investors' money into the real estate, mortgage and construction markets, grew rapidly in the early 1970s. Banks were the major supplier of funds during the rapid expansion and often served as REIT advisors, whose functions included proposing investment projects and overseeing daily operations.² A slump in the construction and real estate industries in the

mid-1970s decreased the asset value of many REITs and the banks that extended credit to them.

After the oil shock of 1974, oil-exporting countries enjoyed large trade surpluses. U.S. banks took an active role in channeling the surpluses to developing countries. As a result, loans by U.S. banks to developing nations increased rapidly during the 1970s to exceed \$100 billion in the early 1980s, when sovereign debt problems emerged.³ Large developing-country debtors, including Brazil, Mexico and Argentina, failed to meet their debt obligations as they were strained by worldwide recession, high interest rates and the second oil shock in 1979. Their debt-servicing difficulties lowered the value of the loans and, hence, the value of lending banks' capital.

A real estate boom in the 1980s resulted in sharp increases in property prices and overbuilding of commercial properties in many parts of the United States. Banks financed the boom by expanding loans rapidly. Toward the end of the decade, the value of commercial properties plunged as vacancy rates surged. The price of residential properties also dropped in some regions, the Northeast and California in particular, where income growth substantially lagged behind increases in housing prices. Declining real estate prices placed many banks in financial trouble by increasing delinquency rates and lowering collateral values.

Institutional Developments

The Banking Act of 1933 transformed a relatively competitive banking system into a highly protected one. Before its enactment, the main barrier to competition was the prohibition of interstate branching. The Banking Act of 1933, however, insulated the banking business by preventing banks from engaging in other businesses, including the securities business, and vice versa. It also prohibited payment of interest on demand deposits and authorized the Federal Reserve Board to limit interest rates on time and savings deposits at member banks. Most notably, the act created the FDIC.

The above measures relieved banks from competitive pressure. The continued prohibition of interstate branching preserved some geographic

¹ The bank failure numbers do not include uninsured banks. See FDIC (1991).

² See Sinkey (1979) for a detailed discussion of REITs.

³ See Cline (1984) for a detailed discussion of sovereign debt crises.

monopoly power. The separation of banking from other industries bolstered monopoly power by deterring other businesses from making inroads into banking. With interest rate ceilings, banks were unable to bid up interest rates to attract deposits. Government-backed deposit insurance made it unnecessary for banks to prove their soundness to depositors. Protected from competition, banks enjoyed relatively stable market shares and profits.

Legislative and institutional developments in the 1970s and 1980s relaxed regulation and permitted greater competition. Many states relaxed their restrictions on bank ownership by out-of-state holding companies. This development lowered geographic entry barriers, despite the prohibition of interstate branching.⁴

The Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA), which phased out interest ceilings and permitted all depository institutions to offer NOW accounts, allowed greater competition for deposits among banks. This act, in combination with the Garn-St. Germain Depository Institutions Act of 1982, also increased competition between banks and S&Ls by expanding the realm of the S&L business.

Institutional developments also added competitive pressure on banks. The 1980s witnessed rapid growth of financial products that could substitute for banking products.⁵ For example, many large corporations with established credit records found it attractive to borrow directly by issuing commercial paper. Money market mutual funds began offering convenient features of bank deposits such as checking privileges, and purchases and redemptions without fees. The emergence of competing products offered by nonbank institutions eroded the profitability of banks.

In sum, the banking industry experienced unfavorable economic shocks and increased competition in the 1970s and 1980s. Slumps in real estate markets and sovereign debt crises impaired the financial health of many banks. Legislative changes lowered geographic entry barriers and restored the mechanism of price competition in the banking sector. In addition, increasing sophistication of financial markets

enabled nonbank institutions to circumvent industry barriers.

THEORETICAL EXPLANATIONS AND EXISTING EVIDENCE

Numerous studies have proposed explanations for the deterioration of bank asset quality during the 1980s, which can be broadly classified into three groups. First, "moral hazard" explanations argue that the changed economic and institutional environment in the 1980s increased the incentives of bank stockholders to take risk. A second explanation is increased risk-taking incentives of managers, rather than stockholders. A third possibility is that the quality of bank assets deteriorated mainly because of unexpected external events rather than deliberate risk-taking.

The three explanations are generally consistent with developments in the banking sector. Convincing conclusions require detailed empirical examination. Unfortunately, the difficulty of obtaining adequate risk measures has discouraged empirical examination. Furthermore, it is difficult to determine causality because the hypotheses are interrelated with one another. For example, a negative economic event that decreases bank capital may increase the incentive to take risk, and risk-taking may make banks more vulnerable to economic shocks.

Moral Hazard

Stockholders implicitly hold a put option, the right to sell their stocks at a prespecified price. With limited liability, stockholders of a corporation can walk away without incurring further losses when the net worth of the corporation falls below zero. Escaping from a firm with a negative net worth is economically equivalent to selling the firm for the price of zero. Stockholders can thus increase their expected wealth at the expense of debtholders by increasing the variance of the return from assets, that is, by taking more risk. With a larger variance, it is more likely that the return from assets will turn out to be very high. A larger variance also increases the possibility of an extremely low return and, hence, a substantially negative net worth. Limited liability, however, protects stockholders

⁴ According to unpublished data compiled by the Board of Governors, bank assets held by out-of-state bank holding companies totaled about \$470 billion as of June 30, 1990, which accounted for about 16 percent of total bank assets.

⁵ Wheelock (1993) discusses the increasing competition faced by banks both in lending and funding markets.

from incurring additional losses once net worth has fallen to zero. In other words, while improved upward potential of asset portfolios clearly benefits stockholders, downside risk mainly harms debtholders. Thus, limited liability gives stockholders an incentive to take higher risk than they otherwise would.

In general, market forces prevent stockholders from taking advantage of the put option value. Debtholders demand interest rates high enough to compensate for higher default risk when a corporation holds a risky portfolio. In addition, bond covenants and needs to refinance short-term debt restrict the portfolio selection of corporations. Thus, it is difficult for stockholders to exploit debtholders because the cost of debt increases with the riskiness of a corporation. The effectiveness of this market mechanism is limited in the banking sector, however, because of government-backed deposit insurance. In the 1980s, most deposits were insured either explicitly or implicitly.⁶ Thus, most depositors, who were the major debtholders of banks, were indifferent about the riskiness of individual banks and, hence, did not demand higher interest rates to riskier banks. Furthermore, the FDIC charged a fixed-rate insurance premium until the end of 1992. Therefore, banks enjoyed risk-insensitive funding costs and had greater incentives to take risk than they would have if deposits were not insured.⁷ Because of the risk-taking incentives created by deposit insurance, banking authorities need to limit the portfolio selection of banks.⁸ In other words, government action must substitute for market forces to prevent banks from taking excessive risk.

Proponents of the moral hazard view argue that banks had increased incentives to take risk in the 1980s for two main reasons: losses that impaired capital and reduced charter values due to greater competition.⁹ Poorly capitalized banks have a greater incentive to take risk. With smaller capital,

it is more likely that losses will be born ultimately by debtholders. Stockholders have less exposure to losses when capital is low and, hence, are less concerned about probable losses resulting from risk-taking.

In addition to tangible capital, firms have charter values, which may be defined as the economic value deriving from the opportunity to do business in the future. If a firm fails, it loses its charter value. Thus, firms with large charter values may refrain from taking risk and inject more tangible capital to avoid failure. Effective restrictions on competition raise charter values. When there is less competition, the opportunity to do business in the future is more valuable because firms can expect larger profits. Increased competition in the banking sector in the 1980s reduced the charter value of banks and, hence, increased their incentives to take risk.¹⁰

Empirical tests of the moral hazard hypothesis present mixed results. Gunther and Robinson (1990) examine the behavior of insured commercial banks in the Dallas and Houston metropolitan areas between 1983 and 1984 and find a negative relationship between capital growth and changes in loan-to-asset ratios. They interpret this result as a negative relationship between capital adequacy and risk-taking. Other studies examine S&L data.¹¹ Barth and others (1986) find that delay in closing insolvent S&Ls increased the resolution costs to the Federal Savings and Loan Insurance Corporation between 1981 and 1985. They suggest that desperate risk-taking by insolvent institutions was largely responsible for the increased costs. McKenzie and others (1992) compare returns of thrifts in 1987 and 1988 on traditional and non-traditional assets allowed by the DIDMCA and the Garn-St. Germain Act. They find that returns were generally lower on nontraditional assets, particularly on those held by capital-deficient institutions, than on traditional assets. They conclude that low-capital thrifts undertook

⁶ Studies on market discipline find that the presence of large deposits exceeding the FDIC insurance limit of \$100,000 was not an effective source of discipline on banks. Gilbert (1990), who surveys the market discipline literature, points out that uninsured depositors and holders of subordinated debt rarely absorbed losses of failed banks. In most cases, failed banks were merged with other banks, and the acquirers assumed all liabilities of the failed banks.

⁷ Merton (1977) makes theoretical arguments based on the option-pricing model.

⁸ Calomiris (1989) compares deposit insurance systems in U.S. history and concludes that a necessary condition for the success of deposit insurance systems is effective enforcements of regulations.

⁹ See Marcus (1984) and Keeley (1990). Relaxed portfolio restrictions are frequently cited as a main cause of the increased risk-taking by S&Ls. The increased risk-taking opportunities are relevant but not equally important to banks. The DIDMCA of 1980 and the Garn-St. Germain Act of 1982 substantially relaxed restrictions on S&L assets but did not notably loosen constraints on bank assets.

¹⁰ Keeley (1990) finds a relationship between risk-taking by banks and declining charter values during the 1980s.

¹¹ The risk-taking behavior of S&Ls may be similar to that of banks in many respects. Both banks and S&Ls benefited from deposit insurance and underwent economic shocks and regulatory reform in the 1970s and 1980s.

projects with low net present values to increase the variance of the return and, hence, took more active advantage of risk-taking opportunities opened by legislative changes.

While the studies discussed above support moral hazard theories, some others fail to find evidence of moral hazard. According to Benston and Carhill (1992), investment in nontraditional assets was a major cause of thrift failures that occurred between 1985 and 1991, but that investment was undertaken primarily by initially solvent thrifts. Thus, the shortage of capital was a result, rather than a cause, of increased risk. Gilbert (1991), who studies the behavior of undercapitalized banks between 1985 and 1989, shows that banks reduced their assets substantially while undercapitalized. This finding does not support a negative relationship between the capital ratio and risk-taking. In addition, recent studies on the credit crunch find a positive relationship between the capital ratio and loan growth in the early 1990s.¹²

Incentives of Managers

Moral hazard theories assume that managers maximize stockholder wealth. Some recent studies, however, suggest that the incentives of managers may differ from those of outside shareholders.¹³ Managers of failed banks may have difficulty finding comparable positions. Thus, bank failure reduces expected future earnings of the bank's managers. In this regard, bank managers are similar to stockholders with a large charter value who tend to refrain from taking risk. Furthermore, managers, whose compensation packages are predetermined in many cases, may not benefit as much from risk-taking as stockholders.¹⁴ In addition, it is difficult for stockholders to monitor managers due to the

problem of analyzing the quality of existing assets and investment opportunities. Many studies recognize that stockholders are not as well-informed as managers about the earnings prospects of firms.¹⁵ These arguments suggest that managers may not act in the best interest of stockholders.

In general, managers may prefer not to take as much risk as stockholders want because they face a larger cost and a smaller benefit from additional risk.¹⁶ Many managers, however, may adopt extremely risky strategies under certain conditions, namely, when a large proportion of managers are incompetent and profits are declining.¹⁷ The banking sector appears to have satisfied these conditions in the 1980s.

Incompetent managers, who cannot effectively control costs and make wise investment choices, may need to pursue more risky strategies to keep their jobs longer. Stockholders want managers to be competent and loyal to them. When stockholders are not accurately informed about the future earnings prospects of their banks, they may rely on some easily identifiable measures to judge the quality of management. Earnings records may reflect the quality of a bank's management. If a bank takes high risk as demanded by stockholders, it will occasionally suffer low earnings resulting from unlucky outcomes. Managers are not to blame in that case. Stockholders may fire managers, however, if earnings turn out to be consistently lower than the industry average. Of course, consistently below-average earnings may be a result of bad management. Since incompetent managers cannot do as well as competent ones on average, a conservative strategy by incompetent managers will consistently result in below-average earnings. One way they can occasionally have above-average earnings

¹² For example, Johnson (1991), Bernanke and Lown (1991) and Peek and Rosengren (1992). Since tightened capital requirements implemented in the early 1990s can partly explain the contraction by capital-deficient banks, the credit crunch does not necessarily contradict moral hazard. Nevertheless, their findings are still suggestive of the magnitude of moral hazard problems.

¹³ See Saunders and others (1990), Allen and Cebenoyan (1991) and Gorton and Rosen (1992).

¹⁴ Houston and James (1993) fail to find any evidence that the structure of management compensation in banking serves to reward managers for exploiting risk-taking opportunities.

¹⁵ See Myers and Majluf (1984), Miller and Rock (1985) and MacKie-Mason (1990).

¹⁶ Jensen (1986) argues that managers with large free cash flow may expand their firms beyond the optimal size to increase their power and perquisites. This argument does

not seem to apply to the banking industry of the 1980s, when banks suffered low profits.

¹⁷ Gorton and Rosen (1992) present a game-theoretic model showing that banks on average pursue risky strategies in these conditions.

is to take on high-variance projects. Occasional high earnings can confuse stockholders, making judgements about the quality of management difficult. Thus, taking risk may be a rational strategy for incompetent managers. Intuitively speaking, one has to take chances and hope for good luck if he or she cannot rely on ability.

In a tightly regulated industry, incompetent managers may be able to survive without taking excessive risk because stockholders do not observe much difference between competent and incompetent managers.¹⁸ Even incompetent ones can generate decent profits when there is little competition. Moreover, it is difficult for competent managers to excel if competition is limited by regulation. Considering that the banking business was tightly regulated until the early 1980s, the proportion of incompetent managers may have been higher in the banking sector than other industries. Deregulation increased competition, and the banking industry experienced declining market shares and profitability in the 1980s. When tight cost control and hard search for profit opportunities are called for, disparities between competent and incompetent managers become clear because managerial ability plays a significant role. The banking developments in the 1980s may have induced some incompetent bank managers to take excessive risks in a desperate attempt to preserve their jobs. Thus, it is possible that a change in managers' incentives may have been largely responsible for the increased riskiness of banks.

Evidence of risk-taking driven by the incentives of incompetent managers is indirect and limited. Gorton and Rosen (1992) show that "entrenched" managers made more risky loans between 1984 and 1990 and interpret the result as evidence that excessive risk-taking was driven largely by managers' incentives.¹⁹ Allen and Cebenoyan (1991) find that the most powerful managers actively acquired other banks between 1980 and 1987 and that those acquisitions were not value-enhancing.²⁰ Although the focus of their study is not risk-taking by banks, this result is consistent with that of Gorton and Rosen.

Unexpected Shocks

Given that banks experienced many external events that impaired their financial structure in the 1970s and 1980s, deliberate risk-taking is not required to explain the increased riskiness of banks. Banks may not have realized that certain categories of loans were particularly risky until many borrowers became unable to repay. Considering that geographic and portfolio restrictions limit the ability of banks to diversify, the financial strength of banks may greatly depend on the quality of major-category loans.

Before the establishment of the FDIC, banking distress was often triggered by the collapse of a major industry or a stock market crash. In the 19th century, it was not unusual for banks to finance the expansion of a booming sector such as cotton or railroads, only to experience financial difficulties when that sector went bust.²¹ In those cases, deterioration in the asset quality of banks could hardly be attributed to increased risk-taking incentives resulting from institutional changes because the banking sector was governed largely by market forces at that time. Thus, it is possible that realization of highly unlikely outcomes or judgement errors were largely responsible for the financial problems of banks in the 1980s. Banks became extremely unlucky, or they unknowingly, rather than deliberately, increased the variance and lowered the expected value of their asset portfolios because of inability to assess the soundness of investment opportunities. For example, banks might have expected that the real estate boom of the 1980s would continue for a long time and were surprised by the bust.

McKenzie and others (1992) and Emmons (1993) find that the condition of local economies significantly contributed to the earnings and failures of financial institutions. These results imply that external shocks had significant effects on the performance of banks, but does not disprove the role of deliberate risk-taking. Risk-taking generally makes banks more vulnerable to external shocks.

¹⁸ Flood (1993) also argues that incompetent managers can survive indefinitely in a protected industry.

¹⁹ By their definition, entrenched managers are the managers with enough shares to be protected from outside shareholders' pressure but not enough shares to have the same objective as that of outside shareholders.

²⁰ The power of managers increases with managerial stake and decreases with concentration of outsiders' shareholdings.

²¹ Park (1993) examines the economic environment that led to banking panics.

EMPIRICAL STUDY

To test the relevance of each hypothesis for explaining bank risk in the 1980s, we need to empirically examine the implications of each hypothesis using a consistent sample and comparable methodology. The application of rigorous econometric techniques to the risk-taking behavior of banks involves many problems, such as determining appropriate measures of risk and specifying a reasonable functional form. To avoid these difficulties, this study divides banks into several groups based on year-end capital ratios and earnings on assets for selected years, and compares changes in various risk measures such as loan growth, the proportions of risky loans and funding strategies during the following year across groups. By looking at the behavior of banks in following years, we can better determine causality. It is difficult to infer causality from contemporaneous relationships because risk measures interact with capital ratios and earnings. For example, a low capital ratio can be either a cause or a result of increased risk.

Aggressive risk-taking by poorly capitalized banks may be interpreted as evidence of moral hazard; stockholders more actively took advantage of deposit insurance when they did not have much of their own wealth to lose. The association of low earnings with more risk-taking can be an indication of desperate profit-seeking by incompetent managers. Incompetent managers, who are more likely to have low earnings, may have adopted risky strategies to obscure their incompetence with occasional high earnings. The hypothesis of unexpected economic shocks may be supported by insignificance of capital adequacy and earnings along with significance of the condition of local economies in explaining the performance of banks.

Data

This analysis uses the Consolidated Reports of Condition and Income (Call Reports) data. The sample consists of domestically chartered, FDIC-insured commercial banks. The sample excludes banks that were less than five years old at the

time of financial statements, and banks that were involved in mergers and acquisitions during the year analyzed. Relatively new banks may behave unusually. For example, they may expand rapidly despite low profits to cultivate a customer base. Mergers and acquisitions can dramatically change the financial characteristics of banks involved.²² In these cases, risk-taking may not have much to do with changed financial characteristics.

The time span covered by this analysis is 1984 to 1988. Changes in risk measures during 1985, 1986, 1987 and 1988 are examined based on capital ratios and earnings on assets at the end of 1984, 1985, 1986 and 1987, respectively. The deregulation of the early 1980s, which undermined the charter values of banks and opened more risk-taking opportunities for them, might have led to active risk-taking in the mid-1980s. Legislative changes in the late 1980s discouraged banks from taking risk. The Federal Reserve Board introduced risk-based capital guidelines in 1988 based on the 1987 Basle Accord, and the Financial Institutions Reform, Recovery and Enforcement Act of 1989 tightened bank and thrift regulation.²³ The FDIC Improvement Act of 1991 added more provisions designed to prevent risk-taking, such as risk-based deposit insurance premiums, prompt corrective action on undercapitalized banks, and more frequent bank examinations. Thus, risk-taking is likely to have been most active during the years examined by this study.

Capital Ratios

Banks are divided into four groups based on the year-end ratio of capital to assets: Group C1—less than 5 percent; Group C2—greater than or equal to 5 percent but less than 7 percent; Group C3—greater than or equal to 7 percent but less than 10 percent; and Group C4—greater than or equal to 10 percent.²⁴ According to moral hazard theories, the first group has the strongest incentive to take risk and the incentive decreases with the capital ratio. The incentive, however, may not translate into actual risk-taking because of regulatory constraints. The capital ratios of

²² Potential biases resulting from the exclusion of merged banks will be discussed below.

²³ For example, the act authorizes federal banking regulators to limit the growth of an institution and to remove any person causing harm to an insured financial institution.

²⁴ This analysis uses the book value of equity capital, consisting of common stock, perpetual preferred stock, surplus and retained earnings. The market value cannot be obtained,

since the stock market data are not available for most small banks. The book value may differ from the market value. The difference, however, may introduce merely a random noise rather than a systematic bias.

most banks in the first group fall short of the required minimum.²⁵ Thus, banks in the first group may have been subjected to tight supervision by regulators and unable to increase risk. Most aggressive risk-taking by the second group, therefore, is also consistent with the moral hazard theory.

Risk measures used here include: the rate of loan growth; the change in the ratio of commercial real estate loans (loans secured by construction and land development, multifamily residential properties and nonfarm, nonresidential properties) to total loans; the change in the ratio of loans to insiders (executive officers and principal shareholders) to total loans; the change in the ratio of large time deposits (time deposits of \$100,000 or more) to total assets; and the interest rate on large time deposits.²⁶ Since sound investment opportunities are limited, rapid loan growth generally increases the risk of banks. Commercial real estate loans are regarded as relatively risky loans, and some banks may apply lower lending standards to insiders. Thus, the riskiness of loan portfolios may increase with the proportions of commercial real estate loans and loans to insiders. Increases in the share of large time deposits and high interest rates on large time deposits may indicate the banks' desire to expand rapidly and to take risk. Bidding up interest rates on large time deposits is a fast way to raise funds for rapid expansion because large time deposits are more sensitive to interest rates than other deposits.

In comparing risk-taking behavior across the four groups, this analysis focuses mainly on the distribution of percentile ranks of each risk measure. The use of percentile ranks, instead of actual values, makes the analysis concise. Examination of the distribution, rather than summary statistics, enables more comprehensive analyses of bank behavior. Furthermore, summary statistics of ratios or growth rates can be seriously contaminated by outliers. This analysis somewhat sacrifices analytical rigor in that it does not rely on formal statistical tests. The lack of formal statistical tests may, however, be partly compen-

sated by the fact that the entire population of commercial banks is examined over an extensive time period.

Table 1 presents summary statistics and a condensed distribution of the percentile rank of loan growth, in which higher percentiles are associated with higher rates of loan growth. The table shows the lowest median rate of loan growth for Group C1 banks in all four years, but fails to show any apparent pattern among the remaining three groups. Although Group C2 generally had high median rates of loan growth, the group with the highest median differs across years. Thus, comparison of median loan growth rates fails to present clear evidence of moral hazard.

The distribution of loan growth is more interesting. The table reports the percentage of banks in each group belonging in a certain percentile rank group of the entire population. For example, 28.6 percent of Group C1 banks in 1984 had loan growth rates ranking them in the 0-10 percentile in 1985. Thus, the proportion of Group C1 banks belonging in the 0-10 percentile group was almost three times as large as that of the entire population of banks. If the distribution of a group is roughly equal to the distribution of the entire population, about 10 percent of the group should belong in the 0-10 percentile group, another 10 percent in the 10-20 percentile group, about 30 percent in the 20-50 percentile group, and so on.

Many Group C1 and Group C2 banks grew very slowly (0-10 percentile ranks), while many other banks in the same groups grew very fast (90-100 percentile ranks). In contrast, well-capitalized banks belonged mostly in the middle percentile groups (20-50 percentile ranks and 50-80 percentile ranks). In 1987 and 1988, the proportion of Group C1 banks belonging in the 90-100 percent group decreased markedly, but remained larger than the proportion in the 80-90 percentile group. A possibility is that regulators more successfully prevented undercapitalized banks from expanding loans in those years, but that some undercapitalized banks continued to

²⁵ The minimum ratio of primary capital to total assets was set at 5.5 percent in 1985 and remained in effect until the end of 1990. Primary capital includes loan-loss provisions. Risk-taking incentives may be more closely related to stockholders' equity than primary capital.

²⁶ The interest rate is estimated by dividing interest expense on time certificates of deposit of \$100,000 or more by the average amount of the same deposit outstanding during the year.

Table 1
Rates of Loan Growth

1984-1985				
Percentile	C1	C2	C3	C4
0-10	28.6%	10.3%	8.6%	10.7%
10-20	11.9	8.0	10.0	12.3
20-50	19.8	22.9	32.6	33.7
50-80	16.7	31.9	31.0	26.8
80-90	10.7	12.7	9.5	7.7
90-100	12.3	14.0	8.4	8.5
Number of banks	318	3,190	6,224	2,620
Mean	0.0074	0.0832	0.0577	0.0548
Median	-0.0104	0.0782	0.0434	0.0249
1985-1986				
Percentile	C1	C2	C3	C4
0-10	34.5%	11.6%	8.4%	7.9%
10-20	12.6	9.6	9.6	11.0
20-50	20.3	24.5	31.6	34.5
50-80	16.8	29.4	31.4	29.5
80-90	4.7	11.4	10.3	8.4
90-100	11.1	13.4	8.8	8.7
Number of banks	380	3,119	6,050	2,541
Mean	-0.0276	0.0598	0.0449	0.0608
Median	-0.0777	0.0484	0.0299	0.0179
1986-1987				
Percentile	C1	C2	C3	C4
0-10	34.8%	12.6%	7.2%	7.1%
10-20	16.5	9.6	9.4	10.4
20-50	22.3	27.5	31.0	32.9
50-80	12.6	27.6	32.7	31.0
80-90	6.2	11.2	9.6	10.3
90-100	7.6	11.5	10.1	8.4
Number of banks	552	3,048	5,597	2,370
Mean	-0.0305	0.0648	0.0757	0.3530
Median	-0.0616	0.0523	0.0579	0.0492
1987-1988				
Percentile	C1	C2	C3	C4
0-10	38.0%	11.4%	7.5%	8.1%
10-20	15.7	10.1	9.4	10.0
20-50	20.4	27.6	31.6	30.8
50-80	15.0	29.5	31.4	30.6
80-90	3.8	9.9	10.7	9.8
90-100	7.1	11.5	9.3	10.7
Number of banks	521	2,550	5,557	2,526
Mean	-0.0170	0.0811	0.0874	0.1532
Median	-0.0356	0.0766	0.0774	0.0779

Notes: Group C1: Capital Ratio < 0.05; Group C2: 0.05 ≤ Capital Ratio < 0.07; Group C3: 0.07 ≤ Capital Ratio < 0.10; and Group C4: Capital Ratio ≥ 0.10.

Table 2
Changes in the Ratio of Commercial Real Estate Loans to Total Loans

1984-1985				
Percentile	C1	C2	C3	C4
0-10	13.5%	12.5%	9.2%	8.5%
10-20	9.1	10.7	10.5	8.1
20-50	20.7	24.2	30.4	37.0
50-80	29.0	28.4	30.9	30.2
80-90	11.6	11.7	9.4	9.1
90-100	16.0	12.5	9.6	7.1
Number of banks	318	3,190	6,224	2,620
Mean	0.0129	0.0092	0.0073	0.0049
Median	0.0052	0.0031	0.0011	0.0000
1985-1986				
Percentile	C1	C2	C3	C4
0-10	10.8%	10.5%	10.1%	9.0%
10-20	7.9	9.7	9.9	10.9
20-50	25.5	23.1	29.9	39.2
50-80	25.7	30.6	31.1	27.4
80-90	14.5	12.7	9.4	7.4
90-100	15.5	13.2	9.6	6.2
Number of banks	380	3,119	6,050	2,541
Mean	0.0215	0.0176	0.0122	0.0065
Median	0.0113	0.0102	0.0047	0.0000
1986-1987				
Percentile	C1	C2	C3	C4
0-10	11.1%	11.4%	9.4%	9.2%
10-20	10.7	10.2	10.2	9.2
20-50	25.5	25.1	29.7	38.1
50-80	24.6	29.2	31.4	29.2
80-90	11.4	11.4	10.2	7.4
90-100	16.7	12.8	9.1	6.9
Number of banks	552	3,048	5,597	2,370
Mean	0.0170	0.0128	0.0092	0.0048
Median	0.0050	0.0054	0.0034	0.0000
1987-1988				
Percentile	C1	C2	C3	C4
0-10	16.3%	10.7%	9.9%	8.2%
10-20	10.4	8.6	10.3	10.7
20-50	22.6	25.6	30.1	35.7
50-80	26.7	31.1	30.0	29.5
80-90	10.6	12.2	9.8	8.0
90-100	13.4	11.8	9.8	8.0
Number of banks	521	2,550	5,557	2,526
Mean	0.0061	0.0089	0.0055	0.0045
Median	0.0007	0.0035	0.0002	0.0000

grow extremely fast when they could circumvent supervision. The rapid loan growth of many poorly capitalized banks may have been motivated by moral hazard.

Tables 2 and 3 show changes in the ratio of commercial real estate loans to total loans, and changes in the ratio of loans to insiders to total loans. The changes in the ratio of commercial real estate loans display patterns similar to the rates of loan growth. While the ratio fell sharply for many Group C1 and Group C2 banks, it increased significantly for many others. Group C3 and Group C4 banks were concentrated in the middle percentile groups. The ratio for Group C1 banks in the highest percentile, however, did not decrease substantially in 1987 and 1988, unlike the rate of loan growth. In addition, the median change was inversely related to the capital ratio. These results may reflect the difficulty of regulating the riskiness of loan portfolios, compared with restricting the rate of loan expansion. In the case of loans to insiders, only Group C1 banks were distributed heavily toward both tails. It appears that only those banks facing the possibility of imminent failure relied on insider loans as a means of increasing risk. The median fails to show a clear pattern.

In general, large time deposits appear to have grown slower at poorly capitalized banks. Table 4 shows smaller changes in the ratio of large time deposits to total assets for many Group C1 and Group C2 banks. A sizable proportion of group C2 banks, however, showed relatively fast increases in the ratio. Furthermore, although a relatively small proportion of Group C1 banks belonged in the 90-100 percentile groups, the proportion was consistently higher than that belonging in the 80-90 percentile group.

Poorly capitalized banks generally paid higher interest rates on large time deposits, but the interest rates were not distributed heavily toward the tails (Table 5). It is complicated to interpret the behavior of large time deposits, which are not fully insured, and the interest rates on those deposits because demand and supply factors interact. In other words, the two variables reflect both the desire of low-capital banks to grow (demand) and the willingness of investors to

deposit at risky banks (supply). Nevertheless, the pattern of changes in the ratio of large deposits appears to be consistent with those of loan growth and shifts in loan portfolios.

In sum, the average behavior of poorly capitalized banks was not notably different from that of well-capitalized banks. A more interesting finding is that a higher proportion of low-capital banks adopted highly risky strategies. This effect might have been more pronounced if the behavior of banks that failed during the year were included in the sample. Failed banks, most of which had been poorly capitalized, might have pursued extremely risky strategies if they were given the opportunity.²⁷

Earnings on Assets

This section compares four groups of banks, representing each quartile of earnings on assets; Group E1 and Group E4 represent the lowest and highest quartiles. Managers of Group E1 banks, who were incompetent or had bad luck, may have had the strongest incentives to increase risk because they needed high earnings in the next period to preserve their jobs. Thus, the theory based on the managers' incentives predicts the most aggressive risk-taking by Group E1 banks and the most conservative strategies by Group E4 banks.

The same risk measures used in the previous section are analyzed. Table 6 shows a positive relationship between earnings on assets and the rate of loan growth. The median growth rate was generally higher for banks with higher earnings. This result suggests that the availability of profitable investment opportunities was the main determinant for loan growth; banks with high earnings, which might have more profitable lending opportunities, grew faster. A notable pattern in the table, however, is that the proportion of Group E1 banks belonging in the 90-100 percentile group consistently exceeded that belonging in the 80-90 percentile group. It is thus possible that the pattern of loan growth reflected the desperate attempts of some bank managers to increase profits.

The pattern of changes in loan portfolios for low-earnings banks is similar to that for

²⁷ Failed banks include FDIC-assisted mergers. Another source of potential bias is voluntary mergers. The proportion of poorly capitalized banks (Groups C1 and C2), however, was not significantly higher than the proportion of well-capitalized banks (Groups C3 and C4) among acquired banks.

Table 3

Changes in the Ratio of Loans to Insiders to Total Loans

1984-1985				
Percentile	C1	C2	C3	C4
0-10	16.0%	10.0%	9.4%	10.7%
10-20	8.0	9.9	10.0	10.4
20-50	26.2	30.1	30.7	28.7
50-80	29.8	31.4	30.0	28.2
80-90	7.6	9.1	10.4	10.6
90-100	12.4	9.6	9.5	11.4
Number of banks	275	2,758	5,379	2,015
Mean	-0.00027	0.00010	-0.00006	0.00088
Median	-0.00001	-0.00001	-0.00001	0.00000

1985-1986				
Percentile	C1	C2	C3	C4
0-10	15.8%	10.2%	9.2%	10.7%
10-20	9.7	8.3	10.9	9.9
20-50	23.5	32.4	29.5	29.0
50-80	27.8	31.7	30.4	27.0
80-90	10.6	8.5	9.9	12.3
90-100	12.6	8.9	10.0	11.1
Number of banks	341	2,665	5,276	1,952
Mean	0.00042	-0.00060	0.00049	-0.00003
Median	0.00000	-0.00002	-0.00001	0.00000

1986-1987				
Percentile	C1	C2	C3	C4
0-10	14.7%	9.8%	10.0%	9.0%
10-20	10.6	8.5	10.2	11.3
20-50	23.8	30.7	30.1	30.3
50-80	30.9	33.7	29.2	26.7
80-90	8.9	8.7	10.5	10.7
90-100	11.0	8.5	9.9	11.9
Number of banks	462	2,565	4,883	1,836
Mean	-0.00046	-0.00045	0.00017	0.00080
Median	-0.00002	-0.00002	-0.00004	-0.00006

1987-1988				
Percentile	C1	C2	C3	C4
0-10	13.6%	9.8%	9.6%	10.4%
10-20	13.6	8.8	10.1	10.3
20-50	19.5	27.8	31.2	32.0
50-80	31.0	33.7	29.9	26.0
80-90	9.0	10.0	9.8	10.5
90-100	13.3	9.9	9.5	10.7
Number of banks	435	2,202	4,858	1,944
Mean	-0.00133	0.00044	-0.00021	0.00001
Median	-0.00005	-0.00004	-0.00015	-0.00025

Table 4

Changes in the Ratio of Large Time Deposits to Assets

1984-1985				
Percentile	C1	C2	C3	C4
0-10	27.7%	14.4%	8.4%	6.1%
10-20	13.5	12.0	10.2	6.8
20-50	26.4	28.4	29.7	33.3
50-80	16.4	26.5	31.6	32.0
80-90	6.9	8.9	10.1	11.5
90-100	9.1	9.8	10.1	10.2
Number of banks	318	3,190	6,224	2,620
Mean	-0.0184	-0.0038	0.0018	0.0049
Median	-0.0128	-0.0024	0.0008	0.0019

1985-1986				
Percentile	C1	C2	C3	C4
0-10	29.5%	12.6%	9.1%	6.1%
10-20	11.8	12.9	9.6	7.0
20-50	26.6	29.8	31.2	28.2
50-80	17.9	25.2	30.2	37.2
80-90	6.3	8.6	10.1	11.9
90-100	7.9	11.1	9.8	9.6
Number of banks	380	3,119	6,050	2,541
Mean	-0.0256	-0.0058	-0.0039	0.0006
Median	-0.0177	-0.0061	-0.0031	-0.0002

1986-1987				
Percentile	C1	C2	C3	C4
0-10	22.6%	12.4%	8.7%	6.9%
10-20	10.7	10.4	9.9	9.4
20-50	26.2	24.4	30.5	37.2
50-80	20.8	29.0	31.1	31.0
80-90	6.9	11.1	10.3	8.6
90-100	12.9	12.6	9.5	7.0
Number of banks	552	3,048	5,597	2,370
Mean	-0.0027	0.0030	0.0038	0.0029
Median	-0.0017	0.0033	0.0024	0.0004

1987-1988				
Percentile	C1	C2	C3	C4
0-10	29.0%	12.8%	8.4%	6.5%
10-20	13.1	12.0	9.8	7.7
20-50	23.7	26.6	29.9	35.1
50-80	18.7	27.3	31.5	31.9
80-90	7.1	10.5	10.3	9.6
90-100	8.3	10.7	10.2	9.3
Number of banks	521	2,550	5,557	2,526
Mean	-0.0130	0.0022	0.0052	0.0066
Median	-0.0062	0.0029	0.0044	0.0040

Table 5
Interest Rates on Large Time Deposits

1985				
Percentile	C1	C2	C3	C4
0-10	7.7%	7.9%	10.1%	12.8%
10-20	8.0	8.6	10.3	11.3
20-50	27.6	34.4	29.6	25.6
50-80	32.8	32.1	30.0	26.9
80-90	12.2	9.1	10.0	11.0
90-100	11.6	8.0	10.0	12.4
Number of banks	311	3,143	6,014	2,360
Mean	0.0882	0.0871	0.0871	0.0868
Median	0.0876	0.0861	0.0863	0.0864

1986				
Percentile	C1	C2	C3	C4
0-10	8.5%	7.4%	10.1%	13.5%
10-20	7.9	9.0	10.2	11.3
20-50	23.5	33.9	29.8	26.6
50-80	35.9	31.8	29.7	27.6
80-90	10.4	9.3	10.4	9.9
90-100	13.7	8.5	10.0	11.2
Number of banks	365	3,067	5,846	2,333
Mean	0.0747	0.0736	0.0733	0.0726
Median	0.0745	0.0725	0.0725	0.0723

1987				
Percentile	C1	C2	C3	C4
0-10	9.7%	7.6%	10.2%	12.8%
10-20	9.8	8.1	9.9	12.8
20-50	24.1	28.5	31.2	30.4
50-80	34.8	35.8	28.9	23.6
80-90	9.8	10.5	9.8	9.9
90-100	11.8	9.5	9.9	10.5
Number of banks	518	2,968	5,407	2,180
Mean	0.0650	0.0654	0.0643	0.0634
Median	0.0658	0.0654	0.0643	0.0633

1988				
Percentile	C1	C2	C3	C4
0-10	8.6%	7.1%	10.0%	13.3%
10-20	10.0	7.4	9.5	13.9
20-50	25.8	26.7	30.7	32.7
50-80	32.6	36.2	30.4	22.0
80-90	12.6	12.1	9.7	7.9
90-100	10.6	10.5	9.6	10.3
Number of banks	501	2,492	5,419	2,357
Mean	0.0700	0.0711	0.0698	0.0684
Median	0.0713	0.0717	0.0703	0.0685

Table 6
Rates of Loan Growth

1984-1985				
Percentile	E1	E2	E3	E4
0-10	21.4%	6.7%	5.3%	6.8%
10-20	15.5	8.1	7.7	8.8
20-50	30.5	29.7	28.7	31.1
50-80	19.2	34.0	35.2	31.7
80-90	6.2	10.9	12.1	10.8
90-100	7.3	10.7	11.1	10.9
Number of banks	3,056	3,082	3,104	3,113
Mean	0.0059	0.0770	0.0835	0.0824
Median	-0.0148	0.0613	0.0721	0.0565

1985-1986				
Percentile	E1	E2	E3	E4
0-10	23.8%	7.3%	4.7%	4.7%
10-20	17.4	9.0	6.8	7.2
20-50	32.0	31.9	27.9	28.3
50-80	16.4	31.4	35.6	36.1
80-90	4.6	10.0	13.1	12.1
90-100	5.8	10.3	12.0	11.6
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0178	0.0541	0.0781	0.0819
Median	-0.0591	0.0354	0.0615	0.0611

1986-1987				
Percentile	E1	E2	E3	E4
0-10	25.6%	7.2%	4.3%	4.1%
10-20	18.1	9.1	7.3	6.2
20-50	30.7	33.4	29.0	26.8
50-80	15.1	31.0	35.3	37.5
80-90	4.3	9.5	12.7	13.0
90-100	6.2	9.7	11.4	12.3
Number of banks	2,722	2,924	2,956	2,975
Mean	0.2278	0.0720	0.0911	0.1143
Median	-0.0375	0.0521	0.0767	0.0863

1987-1988				
Percentile	E1	E2	E3	E4
0-10	25.4%	8.0%	3.8%	4.1%
10-20	16.0	9.7	7.9	6.9
20-50	28.2	32.7	30.8	28.2
50-80	16.8	29.6	35.3	36.9
80-90	4.0	10.2	12.2	12.4
90-100	8.7	9.6	10.0	11.5
Number of banks	2,603	2,845	2,838	2,878
Mean	0.0379	0.0852	0.1045	0.1498
Median	0.0011	0.0727	0.0916	0.1016

Notes: Each group represents a quartile of earnings on assets. During the four years, the cutoff points were about 0.005 between Groups E1 and E2, 0.011 between Groups E2 and E3, and 0.016 between Groups E3 and E4.

low-capital banks but somewhat less pronounced. While many Group E1 banks reduced the ratios of commercial real estate loans and loans to insiders to total loans, a large proportion of banks in the same group rapidly increased the portfolio shares of the risky loans (Tables 7 and 8). No apparent pattern is found for other groups. These findings suggest that a higher proportion of low-earnings banks pursued highly risky strategies.

The ratio of large time deposits to assets increased faster for banks with higher earnings (Table 9). Yet a sizable proportion of Group E1 banks increased the ratio of large time deposits very fast (90-100 percentile ranks). In addition, a relatively high proportion of Group E1 banks paid the highest interest rates on large time deposits (Table 10). Thus, many Group E1 banks appear to have bid up interest rates to attract large time deposits.

Examination of the effects of earnings on risk-taking presents findings similar to the ones derived from the relationship between capital adequacy and risk-taking behavior. Although the majority of banks with low earnings were comparatively conservative, many other banks with low earnings adopted extremely risky strategies. As in the case of low-capital banks, this result could have been strengthened if the behavior of banks that failed during the year were taken into consideration.²⁸ The divergent risk-taking behavior among low-earnings banks, however, is not as pronounced as that among low-capital banks. Thus, although this analysis supports the hypothesis that low earnings induced some banks to increase risk aggressively, evidence is somewhat weaker than that for moral hazard. In addition, the true motivation for risk-taking is not clear for some low-earnings banks because many low-earnings banks also had low capital.²⁹ This problem will be addressed below.

Conditions of Local Economies

If external shocks are the main factor affecting the condition of banks, the strength of local economies should largely explain behavior and performance differences across banks. Table 11 shows the results of two sets of regressions that examine the effects of employment growth in home states on earnings on assets and loan growth. The employment growth, which reflects the condition of local economies, is found to positively affect earnings and loan growth. Although they support the significance of local economic conditions, these results do not disprove the roles of other factors.

We may better assess the roles of stockholders' and managers' incentives by examining whether the behavior of banks that cannot be explained by the condition of local economies is systematically related to capital ratios or earnings on assets of the previous period. Thus, the residual rates of loan growth are examined.³⁰ Higher demand for bank loans generally follows improving economic conditions. Thus, the residuals reflect the loan growth that is unexplained by demand effects. Systematic differences in the residual loan growth across groups may be viewed as consequences of risk-taking in previous periods.

Tables 12 and 13 report the distribution of the residual rates of loan growth. The distribution of the residuals is similar to that of loan growth observed in Tables 1 and 6. Group C2 banks are distributed heavily toward both tails. For Group C1 and E1 banks, the percentage of banks belonging in the highest percentile group is not high, but consistently higher than that in the second highest percentile group. Thus, after considering the condition of local economies, systematic differences still exist in loan growth across the groups classified based on capital ratios and earnings on assets. Accordingly, the

²⁸ The majority of failed banks belonged in Group E1. Among acquired banks, the proportion of Group E1 banks was the highest in three of the four years. The proportion, however, was not overwhelming.

²⁹ The correlation coefficient between capital ratios and earnings on assets was 0.393 in 1984, 0.326 in 1985, 0.335 in 1986, and 0.432 in 1987. The correlation may become even higher if the market value, instead of book value, of capital is used. Banks with high-quality assets are more likely to have high earnings and high market values relative to book values.

³⁰ The residual changes in earnings for low-capital and low-earnings banks are found to be distributed heavily toward both tails. It is possible to interpret large variances in earnings changes as a result of risk-taking in previous periods. The large variances, however, can result from delayed

recognition of large loan loss provisions by banks with low-quality loans. For this reason, the residual changes in earnings are not discussed in detail.

Table 7
Changes in the Ratio of Real Estate Loans to Total Loans

1984-1985				
Percentile	E1	E2	E3	E4
0-10	12.4%	9.3%	8.8%	9.5%
10-20	10.0	10.9	10.6	8.5
20-50	28.2	29.2	31.6	31.0
50-80	28.9	30.6	29.5	31.2
80-90	9.8	10.7	9.9	9.6
90-100	10.7	9.5	9.5	10.2
Number of banks	3,056	3,082	3,104	3,113
Mean	0.0065	0.0078	0.0075	0.0079
Median	0.0010	0.0016	0.0009	0.0018

1985-1986				
Percentile	E1	E2	E3	E4
0-10	10.0%	9.8%	9.7%	10.5%
10-20	9.6	10.4	9.7	10.2
20-50	30.2	30.2	29.4	30.0
50-80	29.2	29.8	30.1	30.8
80-90	10.2	10.0	10.7	9.1
90-100	10.9	9.7	10.1	9.4
Number of banks	2,945	3,036	3,057	3,062
Mean	0.0135	0.0122	0.0130	0.0122
Median	0.0048	0.0046	0.0055	0.0043

1986-1987				
Percentile	E1	E2	E3	E4
0-10	12.2%	10.0%	9.0%	9.0%
10-20	10.9	9.8	9.6	9.7
20-50	28.8	29.9	30.3	30.8
5-80	28.3	31.3	30.6	29.7
80-90	8.7	9.4	11.4	10.4
90-100	10.9	9.6	9.1	10.4
Number of banks	2,722	2,924	2,956	2,975
Mean	0.0081	0.0096	0.0102	0.0106
Median	0.0018	0.0032	0.0036	0.0032

1987-1988				
Percentile	E1	E2	E3	E4
0-10	13.3%	10.0%	8.2%	8.7%
10-20	10.2	10.2	9.8	9.8
20-50	28.9	30.4	30.7	29.9
50-80	26.5	30.1	32.3	30.8
80-90	9.4	9.9	9.5	11.1
90-100	11.7	9.3	9.4	9.7
Number of banks	2,603	2,845	2,838	2,878
Mean	0.0046	0.0056	0.0068	0.0071
Median	0.0000	0.0000	0.0009	0.0013

Table 8
Changes in the Ratio of Loans to Insiders to Total Loans

1984-1985				
Percentile	E1	E2	E3	E4
0-10	13.1%	8.9%	7.6%	10.5%
10-20	10.2	9.2	9.7	10.9
20-50	25.0	31.4	32.7	30.8
50-80	27.9	31.7	31.9	28.3
80-90	11.9	9.4	8.9	9.8
90-100	11.9	9.2	9.2	9.7
Number of banks	2,641	2,694	2,630	2,465
Mean	0.00024	-0.00019	0.00058	-0.00001
Median	0.00003	0.00000	-0.00001	-0.00007

1985-1986				
Percentile	E1	E2	E3	E4
0-10	13.3%	9.4%	8.6%	8.7%
10-20	9.1	10.6	9.1	11.3
20-50	26.3	30.2	31.9	31.6
50-80	29.6	29.9	31.8	28.8
80-90	10.3	10.0	9.7	10.0
90-100	11.5	10.0	9.0	9.6
Number of banks	2,497	2,626	2,654	2,462
Mean	-0.00070	0.00043	0.00037	0.00029
Median	0.00001	-0.00001	0.00000	-0.00006

1986-1987				
Percentile	E1	E2	E3	E4
0-10	12.5%	10.0%	8.6%	9.0%
10-20	9.9	10.0	10.4	9.6
20-50	25.2	29.5	31.8	33.1
50-80	28.1	31.0	30.9	29.7
80-90	11.6	10.2	9.4	9.0
90-100	12.6	9.2	8.8	9.6
Number of banks	2,263	2,500	2,536	2,457
Mean	-0.00014	-0.00005	0.00024	0.00034
Median	0.00003	-0.00002	-0.00006	-0.00008

1987-1988				
Percentile	E1	E2	E3	E4
0-10	13.0%	9.8%	8.3%	9.2%
10-20	11.2	10.3	9.6	9.0
20-50	23.5	30.2	32.8	32.8
50-80	28.0	28.2	31.9	31.8
80-90	11.0	11.4	9.1	8.6
90-100	13.4	10.2	8.1	8.6
Number of banks	2,196	2,429	2,462	2,360
Mean	0.00021	-0.00001	-0.00014	-0.00031
Median	-0.00005	-0.00014	-0.00015	-0.00015

Table 9
Changes in the Ratio of Large Time Deposits to Assets

1984-1985				
Percentile	E1	E2	E3	E4
0-10	16.4%	8.7%	7.8%	7.2%
10-20	12.8	9.5	8.9	8.9
20-50	29.6	30.1	30.7	29.8
50-80	24.7	31.2	32.3	31.5
80-90	7.5	10.4	10.9	11.2
90-100	9.1	10.1	9.5	11.3
Number of banks	3,056	3,082	3,104	3,113
Mean	-0.0064	0.0017	0.0022	0.0043
Median	-0.0038	0.0009	0.0011	0.0021

1985-1986				
Percentile	E1	E2	E3	E4
0-10	17.6%	8.8%	7.3%	6.6%
10-20	11.8	11.2	9.3	7.7
20-50	28.5	32.4	31.3	27.9
50-80	25.0	28.8	31.7	34.2
80-90	8.3	9.5	10.3	11.9
90-100	8.8	9.2	10.1	11.9
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0123	-0.0044	-0.0021	0.0020
Median	-0.0078	-0.0045	-0.0022	-0.0001

1986-1987				
Percentile	E1	E2	E3	E4
0-10	17.2%	10.5%	6.3%	6.6%
10-20	12.6	10.3	8.9	8.4
20-50	30.7	29.1	29.7	30.6
50-80	23.1	29.4	33.4	33.4
80-90	6.8	10.1	11.2	11.7
90-100	9.7	10.5	10.6	9.2
Number of banks	2,722	2,924	2,956	2,975
Mean	-0.0035	0.0031	0.0068	0.0052
Median	-0.0010	0.0020	0.0042	0.0039

1987-1988				
Percentile	E1	E2	E3	E4
0-10	19.2%	8.9%	6.6%	6.2%
10-20	13.5	10.4	8.3	8.1
20-50	27.4	31.7	30.0	30.6
50-80	22.4	29.4	34.7	32.7
80-90	7.5	9.6	10.8	11.8
90-100	9.9	9.8	9.7	10.6
Number of banks	2,603	2,845	2,838	2,878
Mean	-0.0036	0.0039	0.0068	0.0079
Median	-0.0004	0.0033	0.0059	0.0057

Table 10
Interest Rates on Large Time Deposits

1984-1985				
Percentile	E1	E2	E3	E4
0-10	9.4%	8.8%	10.4%	11.4%
10-20	8.9	10.5	9.9	10.7
20-50	27.8	32.7	30.0	29.5
50-80	30.9	29.4	31.1	28.6
80-90	10.8	10.0	9.9	9.3
90-100	12.2	8.5	8.7	10.6
Number of banks	2,928	2,991	3,013	2,899
Mean	0.0886	0.0867	0.0864	0.0865
Median	0.0873	0.0859	0.0862	0.0860

1985-1986				
Percentile	E1	E2	E3	E4
0-10	9.5%	10.1%	9.2%	11.2%
10-20	9.8	9.9	10.1	10.2
20-50	28.0	31.0	31.1	29.8
50-80	29.8	30.4	30.4	29.3
80-90	10.4	9.6	10.0	10.0
90-100	12.5	8.9	9.2	9.5
Number of banks	2,804	2,948	2,972	2,896
Mean	0.0745	0.0728	0.0731	0.0728
Median	0.0732	0.0723	0.0725	0.0723

1986-1987				
Percentile	E1	E2	E3	E4
0-10	10.2%	10.1%	9.2%	10.5%
10-20	11.3	9.9	9.5	9.4
20-50	29.5	30.1	29.8	30.7
50-80	29.6	30.3	30.3	29.8
80-90	9.0	9.5	10.8	10.6
90-100	10.5	10.2	10.4	9.0
Number of banks	2,557	2,797	2,863	2,866
Mean	0.0644	0.0644	0.0649	0.0641
Median	0.0643	0.0645	0.0649	0.0645

1987-1988				
Percentile	E1	E2	E3	E4
0-10	9.4%	10.5%	9.4%	10.6%
10-20	10.8	10.6	8.9	9.8
20-50	30.5	30.8	30.0	28.8
50-80	29.8	28.6	31.6	30.1
80-90	9.7	9.3	10.2	10.7
90-100	9.8	10.1	10.0	10.0
Number of banks	2,487	2,742	2,763	2,786
Mean	0.0697	0.0696	0.0702	0.0696
Median	0.0702	0.0700	0.0707	0.0705

finding that local economic conditions were an important explanation of the performance of banks does not deny the roles of the risk-taking incentives of stockholders and managers.

Characteristics of Risk-Takers

We may better understand the motives for risk-taking by looking at other characteristics of the low-capital and low-earnings banks that took high risks. This section examines more closely the Groups C1, C2 and E1 banks that belonged in the 90-100 percentile group in loan growth (defined as "risky banks").

The positive correlation between capital ratios and earnings mentioned above suggests the possibility that the risky low-capital (Groups C1 and C2) banks may also be low-earnings banks (Group E1). Then, the above analyses cannot distinguish between stockholders' and managers' incentives. Table 14 classifies risky low-capital banks based on earnings and risky low-earnings banks based on capital ratios. In general, the percentage of risky low-capital banks belonging in Group E1 was no higher than that of the entire population of banks. Compared with the composition of the population, a higher proportion of risky low-earnings banks belonged in Group C1 or C2. The proportion, however, was less than 50 percent in three of the four years. Thus, the overlap between risky low-capital and low-earnings banks suggests a more significant effect of moral hazard, but does not appear to be large enough to invalidate independent roles of stockholders' and managers' incentives.

Some researchers argue that the "too-big-to-fail" policy increased risk-taking incentives for large banks because the policy further reduced the expected loss to stockholders in the event of insolvency and weakened market discipline by uninsured depositors.³¹ Table 15 shows the size distribution of risky banks with low capital or low earnings. The percentage of the risky low-capital banks with \$5 billion or more in total assets (Size 3 or Size 4) was no higher in general than that of the population, and it was lower for risky low-earnings banks. Thus, this analysis does not support the too-big-to-fail hypothesis. This result, of course, does not disprove the hypothesis either. It may be difficult for large banks, which already have significant market shares, to expand rapidly. Thus, the selection

Table 11
Regression Results

(dependent variable: change in earnings on assets)				
	1985	1986	1987	1988
Intercept	-0.0031 (-12.44)	-0.0038 (-21.64)	-0.0004 (-1.69)	-0.0013 (-2.19)
State*	0.0789 (8.49)	0.1260 (16.17)	0.0532 (6.29)	0.0731 (3.89)
Adjusted R-Square	0.0057	0.0211	0.0033	0.0013
(dependent variable: rate of loan growth)				
	1985	1986	1987	1988
Intercept	0.0083 (2.04)	0.0195 (4.44)	0.0222 (0.27)	0.0252 (0.62)
State*	2.5195 (16.34)	3.1992 (16.51)	4.7001 (1.67)	2.2534 (1.78)
Adjusted R-Square	0.0211	0.0219	0.0002	0.0002

* State = Rate of employment growth in the home state.

Notes: Numbers in parenthesis are *t*-values. The statistical significance of regressions fluctuates widely across years mainly because of extreme values of dependent variables.

of the risk measure may be responsible for the result. Nevertheless, it indicates that large banks do not account for a large proportion of those driven by risk-taking incentives.

Table 16 classifies risky banks based on holding company status in an attempt to observe the relationship between the ownership structure and risk-taking. Compared with the composition of the entire population, risky banks were more likely to be owned by multi-bank holding companies, less likely to be owned by one-bank holding companies, and about equally likely to be independent. One possibility is that the ownership share of managers is greatest for independent banks and smallest for banks owned by multi-bank holding companies. Under this assumption, the above finding suggests that banks controlled by stockholders took more risk, and, hence, supports the moral hazard view. Another possibility is that stockholders of multi-bank holding companies are least able to monitor managers of member banks because of the complicated organizational structure. In

³¹ See Mishkin (1992) and Boyd and Gertler (1994).

Table 12
Residual Rates of Loan Growth

1984-1985				
Percentile	C1	C2	C3	C4
0-10	28.6%	10.8%	8.3%	10.7%
10-20	13.2	8.6	9.7	12.1
20-50	22.6	24.6	32.1	32.4
50-80	14.4	30.3	31.5	27.9
80-90	10.4	12.6	9.7	7.6
90-100	10.7	13.2	8.6	9.2
Number of banks	318	3,190	6,224	2,620
Mean	-0.0638	0.0137	-0.0021	-0.0038
Median	-0.0841	0.0061	-0.0152	-0.0301
1985-1986				
Percentile	C1	C2	C3	C4
0-10	30.8%	11.5%	8.4%	8.8%
10-20	14.7	9.1	9.9	10.6
20-50	20.5	26.8	30.9	33.1
50-80	17.2	28.5	31.6	30.0
80-90	7.1	11.3	10.2	8.3
90-100	9.7	12.8	8.9	9.2
Number of banks	380	3,119	6,050	2,541
Mean	-0.0673	0.0051	-0.0038	0.0135
Median	-0.0951	-0.0101	-0.0180	-0.0264
1986-1987				
Percentile	C1	C2	C3	C4
0-10	27.9%	11.3%	8.0%	8.8%
10-20	13.9	10.3	9.5	9.8
20-50	25.8	28.1	31.1	31.0
50-80	18.2	29.8	31.5	29.8
80-90	6.7	10.1	10.2	10.3
90-100	7.6	10.6	9.8	10.3
Number of banks	552	3,048	5,597	2,370
Mean	-0.1272	-0.0614	-0.0518	0.2315
Median	-0.1466	-0.0759	-0.0731	-0.0761
1987-1988				
Percentile	C1	C2	C3	C4
0-10	35.1%	12.0%	7.6%	7.9%
10-20	18.6	9.5	9.4	10.2
20-50	18.8	27.3	32.1	30.6
50-80	15.2	29.5	31.2	30.9
80-90	4.8	9.8	10.7	9.7
90-100	7.5	12.0	9.1	10.6
Number of banks	521	2,550	5,557	2,526
Mean	-0.1052	-0.0138	-0.0096	0.0577
Median	-0.1284	-0.0206	-0.0212	-0.0194

Table 13
Residual Rates of Loan Growth

1984-1985				
Percentile	E1	E2	E3	E4
0-10	20.8%	6.8%	5.3%	7.2%
10-20	15.4	8.9	7.6	8.3
20-50	30.0	30.0	29.4	30.6
50-80	19.7	32.6	34.7	33.0
80-90	6.4	11.4	12.1	10.0
90-100	7.8	10.4	10.8	11.0
Number of banks	3,056	3,082	3,104	3,113
Mean	-0.0520	0.0123	0.0201	0.0189
Median	-0.0717	-0.0009	0.0061	-0.0057
1985-1986				
Percentile	E1	E2	E3	E4
0-10	22.6%	8.2%	5.0%	4.7%
10-20	15.3	9.8	7.2	7.8
20-50	30.1	30.1	30.0	29.8
50-80	19.7	31.6	33.7	34.6
80-90	5.1	10.6	11.8	12.2
90-100	7.0	9.7	12.2	11.0
Number of banks	2,945	3,036	3,057	3,062
Mean	-0.0501	0.0017	0.0200	0.0266
Median	-0.0897	-0.0146	0.0033	0.0039
1986-1987				
Percentile	E1	E2	E3	E4
0-10	21.1%	8.1%	6.0%	5.7%
10-20	14.0	10.8	8.2	7.3
20-50	26.8	31.1	31.0	30.8
50-80	22.3	29.8	34.6	32.7
80-90	6.6	10.2	10.6	12.3
90-100	9.1	10.0	9.7	11.1
Number of banks	2,722	2,924	2,956	2,975
Mean	0.1395	-0.0554	-0.0481	-0.0254
Median	-0.1269	-0.0776	-0.0625	-0.0581
1987-1988				
Percentile	E1	E2	E3	E4
0-10	24.7%	8.0%	4.3%	4.2%
10-20	16.1	10.1	7.5	6.8
20-50	27.4	32.4	31.1	28.9
50-80	17.8	29.7	34.9	36.4
80-90	5.2	10.4	12.2	11.8
90-100	8.8	9.3	9.9	11.8
Number of banks	2,603	2,845	2,838	2,878
Mean	-0.0531	-0.0114	0.0069	0.0525
Median	-0.0883	-0.0250	-0.0071	0.0029

Table 14
Earnings on Assets and Capital Ratios of Risky Banks

	1984				Total
	E1	E2	E3	E4	
Population	3,064	3,083	3,106	3,113	12,366
	(24.8%)	(24.9%)	(25.1%)	(25.2%)	
Low capital	107	178	135	66	486
	(22.0%)	(36.6%)	(27.8%)	(13.6%)	
	1985				
Population	2,951	3,039	3,063	3,068	12,121
	(24.3%)	(25.1%)	(25.3%)	(25.3%)	
Low capital	75	154	155	76	460
	(16.3%)	(33.5%)	(33.7%)	(16.5%)	
	1986				
Population	2,734	2,928	2,960	2,982	11,604
	(23.6%)	(25.2%)	(25.5%)	(25.7%)	
Low capital	85	115	122	69	391
	(21.7%)	(29.4%)	(31.2%)	(17.6%)	
	1987				
Population	2,613	2,847	2,838	2,882	11,180
	(23.4%)	(25.5%)	(25.4%)	(25.8%)	
Low capital	104	87	81	59	331
	(31.4%)	(26.3%)	(24.5%)	(17.8%)	
	1984				
	C1	C2	C3	C4	Total
Population	320	3,193	6,229	2,621	12,363
	(2.6%)	(25.8%)	(50.4%)	(21.2%)	
Low earnings	12	95	90	26	223
	(5.4%)	(42.6%)	(40.4%)	(11.7%)	
	1985				
Population	383	3,126	6,056	2,546	12,111
	(3.2%)	(25.8%)	(50.0%)	(21.0%)	
Low earnings	17	58	68	29	172
	(9.9%)	(33.7%)	(39.5%)	(16.9%)	
	1986				
Population	557	3,055	5,606	2,376	11,594
	(4.8%)	(26.3%)	(48.4%)	(20.5%)	
Low earnings	23	62	55	28	168
	(13.7%)	(36.9%)	(32.7%)	(16.7%)	
	1987				
Population	528	2,554	5,559	2,529	11,170
	(4.7%)	(22.9%)	(49.8%)	(22.6%)	
Low earnings	26	78	81	41	226
	(11.5%)	(34.5%)	(35.8%)	(18.1%)	

Note: The numbers in parenthesis are percentages of the Total column.

Table 15
Size Distribution of Risky Banks

	1984				Total
	Size 1	Size 2	Size 3	Size 4	
Population	11,736	576	45	9	12,366
	(94.9%)	(4.7%)	(0.4%)	(0.1%)	
Low capital	408	76	2	0	486
	(84.0%)	(15.6%)	(0.4%)	(0.0%)	
Low earnings	204	19	0	0	223
	(91.5%)	(8.5%)	(0.0%)	(0.0%)	
	1985				
	Size 1	Size 2	Size 3	Size 4	Total
Population	11,453	611	47	10	12,121
	(94.5%)	(5.0%)	(0.4%)	(0.1%)	
Low capital	366	90	4	0	460
	(79.6%)	(19.6%)	(0.9%)	(0.0%)	
Low earnings	154	18	0	0	172
	(89.5%)	(10.5%)	(0.0%)	(0.0%)	
	1986				
	Size 1	Size 2	Size 3	Size 4	Total
Population	10,935	609	51	9	11,604
	(94.2%)	(5.2%)	(0.4%)	(0.1%)	
Low capital	341	48	2	0	391
	(87.2%)	(12.3%)	(0.5%)	(0.0%)	
Low earnings	161	7	0	0	168
	(95.8%)	(4.2%)	(0.0%)	(0.0%)	
	1987				
	Size 1	Size 2	Size 3	Size 4	Total
Population	10,489	629	54	8	11,180
	(93.8%)	(5.6%)	(0.5%)	(0.1%)	
Low capital	293	36	2	0	331
	(88.5%)	(10.9%)	(0.6%)	(0.0%)	
Low earnings	214	12	0	0	226
	(94.7%)	(5.3%)	(0.0%)	(0.0%)	

Size 1 - less than \$300 million in total assets.

Size 2 - between \$300 million and \$5 billion in total assets.

Size 3 - \$5 billion or more in total assets, excluding the 10 largest banks.

Size 4 - the 10 largest banks.

Note: The numbers in parenthesis are percentages of the Total column.

Table 16
Holding Company Structure of Risky Banks

1984				
	Independent	One bank	Multi-bank	Total
Population	4,811 (38.9%)	4,567 (36.9%)	2,988 (24.2%)	12,366
Low capital	134 (27.6%)	150 (30.9%)	202 (41.6%)	486
Low earnings	69 (30.9%)	63 (28.3%)	91 (40.8%)	223
1985				
	Independent	One bank	Multi-bank	Total
Population	4,215 (34.8%)	4,596 (37.9%)	3,310 (27.3%)	12,121
Low capital	138 (30.0%)	138 (30.0%)	184 (40.0%)	460
Low earnings	66 (38.4%)	52 (30.2%)	54 (31.4%)	172
1986				
	Independent	One bank	Multi-bank	Total
Population	3,703 (31.9%)	4,445 (38.3%)	3,456 (29.8%)	11,604
Low capital	100 (25.6%)	109 (27.9%)	182 (46.5%)	391
Low earnings	53 (31.5%)	48 (28.6%)	67 (39.9%)	168
1987				
	Independent	One bank	Multi-bank	Total
Population	3,478 (31.1%)	4,450 (39.8%)	3,252 (29.1%)	11,180
Low capital	101 (30.5%)	93 (28.1%)	137 (41.4%)	331
Low earnings	90 (39.8%)	49 (21.7%)	87 (38.5%)	226

Independent - banks not owned by a holding company.

One bank - banks owned by a holding company that owns one bank.

Multi-bank - banks owned by a holding company that owns more than one bank.

Note: The numbers in parenthesis are percentages of the Total column.

Table 17
Charter Types of Risky Banks

1984				
	National	State Member	Nonmember	Total
Population	3,789 (30.6%)	830 (6.7%)	7,747 (62.6%)	12,366
Undercapitalized	22 (56.4%)	2 (5.1%)	15 (38.5%)	39
Low capital	186 (38.3%)	28 (5.8%)	272 (56.0%)	486
Low earnings	66 (29.6%)	12 (5.4%)	145 (65.0%)	223
1985				
	National	State Member	Nonmember	Total
Population	3,733 (30.8%)	832 (6.9%)	7,556 (62.3%)	12,121
Undercapitalized	18 (42.9%)	5 (11.9%)	19 (45.2%)	42
Low capital	189 (41.1%)	32 (7.0%)	239 (52.0%)	460
Low earnings	48 (27.9%)	19 (11.0%)	105 (61.0%)	172
1986				
	National	State Member	Nonmember	Total
Population	3,531 (30.4%)	825 (7.1%)	7,248 (62.5%)	11,604
Undercapitalized	19 (45.2%)	1 (2.4%)	22 (52.4%)	42
Low capital	146 (37.3%)	31 (7.9%)	214 (54.7%)	391
Low earnings	53 (31.5%)	12 (7.1%)	103 (61.3%)	168
1987				
	National	State Member	Nonmember	Total
Population	3,401 (30.4%)	825 (7.4%)	6,954 (62.2%)	11,180
Undercapitalized	14 (37.8%)	2 (5.4%)	21 (56.8%)	37
Low capital	104 (31.4%)	24 (7.3%)	203 (61.3%)	331
Low earnings	57 (25.2%)	17 (7.5%)	152 (67.3%)	226

National - national banks.

State member - state banks that are members of the Federal Reserve System.

Nonmember - state banks that are not members of the Federal Reserve System.

Note: The numbers in parenthesis are percentages of the Total column.

this case, managerial incentives better explain aggressive risk-taking by banks owned by multi-bank holding companies. It will require more extensive study to draw a clear conclusion. Unfortunately, the scarcity of data on the ownership structure of the majority of banks makes the task difficult.

The enforcement of regulation may also affect risk-taking. Table 17 reports the number of risky banks for each type of charter. A notable pattern is that the proportions of risky undercapitalized (Group C1) and low-capital banks (Groups C1 and C2) were relatively high among national banks throughout the four years examined by this study. No apparent pattern is found for risky low-earnings banks.

SUMMARY

There are numerous explanations for the deterioration of the asset quality of banks during the 1980s. Moral hazard theories explain the problem on the basis of increased risk-taking incentives of bank stockholders, which arise from limited liability and the existence of deposit insurance. Deregulation in the early 1980s, which increased both intra- and interindustry competition, increased stockholders' incentives to take risk by reducing the charter values of banks. Another possible explanation for increased riskiness in banking is desperate profit-seeking by bank managers to preserve their jobs. Increased competition and dwindling profit opportunities sharply lowered profits of the banks managed by incompetent managers. To make profits acceptable to stockholders, incompetent managers needed to increase risks and hope for a good outcome. While these two explanations blame deliberate risk-taking, it is also possible that unexpected external events impaired the financial structure of banks. In other words, although banks did not change their behavior, a sequence of adverse economic events such as the collapse of real estate markets undermined the financial strength of banks.

This study indicates the presence of ex ante risk-taking by both bank stockholders and managers, but evidence is stronger for moral hazard. A main finding is that risk measures for banks with low capital or earnings are distributed heavily toward both tails. In other words, while many banks with low capital or earnings refrained from taking risk, many other banks with similar characteristics adopted highly risky strategies. These findings suggest that moral hazard and desperate profit seeking by incompetent managers are con-

sistent with the behavior of a subset of banks. Aggressive risk-taking may not have been a prevalent phenomenon. The finding that deliberate risk-taking was confined to a subset of banks, however, does not rule out the possibility that increased risk-taking was an important cause of a large number of bank failures in the 1980s.

The condition of local economies is found to have been important for explaining the performance of banks. This finding implies an important role for external economic events but does not disprove the role of deliberate risk-taking. Adverse economic conditions may have been largely responsible for the overall deterioration of the financial health of the banking industry during the 1980s. Yet deliberate risk-taking may have played a significant role in many bank failure cases. It appears that all of the three factors discussed by this article contributed to the banking problems of the 1980s.

REFERENCES

- Allen, Linda, and A. Sinan Cebenoyan. "Bank Acquisitions and Ownership Structure: Theory and Evidence," *Journal of Banking and Finance* (April 1991), pp. 425-48.
- Barth, James R., R. Dan Brumbaugh, Jr., and Daniel Sauerhaft. "Failure Costs of Government-Regulated Financial Firms: The Case of Thrift Institutions," *Federal Home Loan Bank Board Research Working Paper No. 123* (October 1986).
- Benston, George J., and Mike Carhill. "FSLIC Forbearance and the Thrift Debacle," *Proceedings of the 28th Annual Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, 1992), pp. 121-50.
- Bernanke, Ben S., and Cara S. Lown. "The Credit Crunch," *Brookings Papers on Economic Activity* (1991, No. 2), pp. 205-47.
- Boyd, John H., and Mark Gertler. "The Role of Large Banks in the Recent U.S. Banking Crisis," *Federal Reserve Bank of Minneapolis Quarterly Review* (winter 1994), pp. 2-21.
- Calomiris, Charles W. "Deposit Insurance: Lessons from the Record," *Federal Reserve Bank of Chicago Economic Perspectives* (May/June 1989), pp. 10-30.
- Ciine, William R. *International Debt: Systemic Risk and Policy Response*. MIT Press, 1984.
- Emmons, William R. "Increased Risk-Taking versus Local Economic Conditions as Causes of Bank Failures," *Proceedings of the 29th Annual Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, 1993), pp. 189-209.
- Federal Deposit Insurance Corporation. *Annual Report* (1991).
- Flood, Mark D. "Deposit Insurance: Problems and Solutions," *this Review* (January/February 1993), pp. 28-34.
- Gilbert, R. Alton. "Market Discipline of Bank Risk: Theory and Evidence," *this Review* (January/February 1990), pp. 3-18.
- _____. "Supervision of Undercapitalized Banks: Is There a Case for Change?" *this Review* (May/June 1991), pp. 16-30.
- Gorton, Gary, and Richard Rosen. "Corporate Control, Portfolio Choice, and the Decline of Banking," *Federal Reserve Board Finance and Economic Discussion Series No. 215*, Division of Monetary Affairs (December 1992).

- Gunther, Jeffery W., and Kenneth J. Robinson. "Empirically Assessing the Role of Moral Hazard in Increasing the Risk Exposure of Texas Banks," *Financial Industry Studies Research Paper No. 4-90*, Federal Reserve Bank of Dallas (October 1990).
- Houston, Joel, and Christopher James. "Bank Compensation, Turnover and Risk-Taking," *MidAmerica Institute Research Paper* (January 1993).
- Jensen, Michael C. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *The American Economic Review* (May 1986), pp. 323-9.
- Johnson, Ronald. "The Bank Credit Crumble," Federal Reserve Bank of New York *Quarterly Review* (summer 1991), pp. 40-51.
- Keeley, Michael C. "Deposit Insurance, Risk, and Market Power in Banking," *The American Economic Review* (December 1990), pp. 1183-200.
- MacKie-Mason, Jeffrey K. "Do Firms Care Who Provides Their Financing?" in Glenn R. Hubbard ed., *Asymmetric Information, Corporate Finance, and Investment*. University of Chicago Press, 1990, pp. 63-103.
- Marcus, Alan J. "Deregulation and Bank Financial Policy," *Journal of Banking and Finance* (December 1984), pp. 557-65.
- McKenzie, Joseph A., Rebel A. Cole, and Richard A. Brown. "Moral Hazard, Portfolio Allocation, and Asset Returns for Thrift Institutions," *Journal of Financial Services Research* (April 1992), pp. 315-39.
- Merton, Robert C. "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees," *Journal of Banking and Finance* (June 1977) pp. 3-11.
- Mishkin, Frederic S. "An Evaluation of the Treasury Plan for Banking Reform," *Journal of Economic Perspectives* (winter 1992), pp. 133-53.
- Miller, Merton H., and Kevin Rock. "Dividend Policy under Asymmetric Information," *Journal of Finance* (September 1985), pp. 1031-51.
- Myers, Stewart C., and Nicholas S. Majluf. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics* (June 1984), pp. 187-221.
- Park, Sangkyun. "Banking Panics in U.S. History: Causes and Policy Responses," in George Kaufman, ed., *Research in Financial Services: Private and Public Policy*. JAI Press, 1993.
- Peek, Joe, and Eric S. Rosengren. "The Capital Crunch in New England," Federal Reserve Bank of Boston *New England Economic Review* (May/June 1992), pp. 21-31.
- Saunders, Anthony, Elizabeth Strock, and Nickolaos G. Travlos. "Ownership Structure, Deregulation, and Bank Risk Taking," *Journal of Finance* (June 1990), pp. 643-54.
- Sinkey, Jr., Joseph F. *Problem and Failed Institutions in the Commercial Banking Industry*. JAI Press, 1979.
- Wheelock, David C. "Is the Banking Industry in Decline? Recent Trends and Future Prospects from a Historical Perspective," this *Review* (September/October 1993), pp. 3-22.