Federal Reserve Bank
of Minneapolis

Winter 1994

Quarterly Review

Federal Reserve Bank of Minneapolis

Quarterly Review Vol. 18, No. 1

ISSN 0271-5287

This publication primarily presents economic research aimed at improving policymaking by the Federal Reserve System and other governmental authorities.

Any views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

The *Quarterly Review* is published by the Research Department of the Federal Reserve Bank of Minneapolis. Subscriptions are available free of charge.

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The Role of Large Banks in the Recent U.S. Banking Crisis*

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The 1980s witnessed the greatest crisis in U.S. commercial banking since the Great Depression. Faced with both increased competition from open market sources of credit and nonbank intermediation and a series of adverse shocks to loan portfolios, banks experienced shrinking profits and a growing likelihood of failure. Indeed, the failure rate for banks jumped from an average of 2 per year in the 1970s to roughly 130 per year in the period between 1982 and 1991. Accompanying the increase in the failure rate was a rise in the number of banks in financial distress. By the end of 1992, the Federal Deposit Insurance Corporation (FDIC) listed 863 banks with combined assets of $464 billion as problem institutions (FDIC 1993, p. 7).

It is true that the situation has improved very recently. Low short-term interest rates have permitted banks to widen the spread between deposit and loan rates and to exploit a favorable yield curve. As a consequence, profits have risen over the last several years. Nonetheless, it is still important to examine what went wrong during the 1980s, to identify what lessons can be learned to guide regulatory policy.

In this article, we argue that large banks were mainly responsible for the unusually poor performance of the overall industry. As we show, banks with the largest total assets contributed in a significantly disproportionate way to aggregate loan losses. Two factors allowed this to happen. First, deregulation and financial innovation led to increased overall competition for the banking industry. Second, the existing regulatory environment tended to subsidize risk-taking by large banks more than that by small banks. Under the policy known as *too-big-to-fail,* large banks benefited from a multitude of actions that insulated them (to varying degrees) from the impact of their loan losses. These actions ranged from giving large banks favorable treatment at the discount window to actually providing them with direct subsidies to prevent their failure. (Thus, by *too-big-to-fail* we refer to a menu of policies. And it is likely that only the very largest banks had access to the complete menu.) The rationale behind too-big-to-fail was that, based on the experience of the Great Depression, the failure of a large bank could be contagious. It could greatly disturb the rest of the financial system and cause severe consequences for the entire U.S. economy. But this well-intentioned policy had an unfortunate side effect: it unduly subsidized risk-taking by large banks.

Our view that the too-big-to-fail policy was a key factor behind the recent crisis comes from several pieces of

*This article is an abbreviated version of "U.S. Commercial Banking: Trends, Cycles, and Policy," a paper published in the *NBER Macroeconomics Annual 1993,* ed. Olivier Jean Blanchard and Stanley Fischer, pp. 319–68, Cambridge, Mass.: MIT Press. The article appears here with the permission of the MIT Press. The authors thank, for help, Allen Berger, Fischer Black, Olivier Blanchard, Martin Feldstein, Stan Fischer, Chris Flinn, Jordi Gali, Simon Gilchrist, Stan Graham, Stuart Greenbaum, Jeff Gunther, Ron Johnson, David Jones, Myron Kwast, Cara Lown, Franco Peracchi, Stavros Peristiani, Ken Robinson, Art Rolnick, David Runkle, Gary Stern, and Ken Wolpin. They also thank Gabriele Galati and Joel Krueger for outstanding research assistance.

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information. One is a panel data study that we use to sort out the potential sources of loan losses. It is well known that regional economic factors initiated a significant share of loan losses during the 1980s. For example, collapsing oil prices in the Southwest and real estate prices on the East and West Coasts produced regional banking crises during this time. So it may be possible that the relatively poor performance of large banks could be explained by the fact that these banks tended to be clustered in the hard-hit regions. We show, however, that after regional conditions are controlled for, size still matters in explaining loan losses. That is, on average, even after the influence of region is removed from the data, large banks still performed worse than other banks. As we show, this conclusion is robust to a very general specification of how size and region may interact to influence bank performance.

Our second piece of evidence comes from the composition of portfolios across size classes. We find that in the 1980s large banks tended to operate with a much lower buffer against potential loan losses. In particular, they held unusually low ratios of capital to assets relative to the industry mean. Up to a certain asset size, a negative relationship between the capital/assets ratio and size might be explained by diversification gains and increased access to purchased money markets as a bank grows larger.[1] However, we find that the capital/assets ratio tended to decline markedly with size well beyond the point that might naturally be explained by these scale economy factors. In particular, the capital/assets ratio shrank significantly even after banks moved above $10 billion in total assets. To our knowledge, there is no evidence of the scale economies we have described once banks moved above this size range. In addition to the capital/assets ratio, we consider several other measures of portfolio risk and similarly find that large banks adopted a riskier stance, beyond what could sensibly be explained by scale economies.

In the first section below, we present information on the recent trends in banking, in order to provide a sense of context. We describe the evolution of the combination of factors, including the development of the too-big-to-fail policy, that provided the climate for the subsequent crisis. We also present evidence on the composition of bank portfolios across size classes.

In the next section of the article, we first present measures of bank performance during the 1980s crisis and then present the results of the panel data study. We find that loan losses varied significantly with size, even after we control for regional conditions. We also use our results to compute a rough estimate of the impact of large banks' extranormal loss performance on the industry aggregate and find that this impact was quite substantial. In addition, we present evidence that it was mainly large banks that were constrained during what some call the *capital crunch* of the early 1990s. Thus, though investigating the importance of the capital crunch is clearly beyond the scope of this study, we provide insights into the origin of this phenomenon.[2]

In the final section of the article, we summarize our study and offer some thoughts on related issues. While we think that the regulatory subsidy to large banks has been a significant factor behind the recent banking crisis, we should make it clear that we are not advocating any kind of sweeping withdrawal of the safety net. Indeed, as we discuss, some of the recent banking reforms are steps toward addressing the too-big-to-fail distortion. We are, however, skeptical about the benefits of mergers that create even larger banks.

Documenting Balance Sheet Trends

We begin by describing the changes in U.S. banking over the postwar period that laid the groundwork for the problems of the 1980s. We document the general shift in bank portfolios in favor of riskier asset and liability positions, and we show how the too-big-to-fail policy evolved in this environment. We also show that the shift in favor of increased balance sheet risk was particularly characteristic of large banks.

Banks Take Bigger Risks

□ *Assets*

Judged by a variety of criteria, the composition of bank assets has become riskier over the postwar period.

Chart 1 portrays the relative behavior of the broad categories of bank assets over the postwar period. Most striking are the rise in the share allocated to loans and the fall in the shares allocated to securities and to cash and reserves. The drop in the latter reflects mainly a sequence of reductions in reserve requirements. An important reason

[1] We emphasize that the positive correlation between access to the large certificate of deposit (CD) market and size is not clear evidence of a technological factor that justifies large banks holding low capital. This is because the access may be aided by regulatory policy which implicitly guarantees large banks' money market liabilities. After all, the Continental Illinois Bank enjoyed a period of great access to the money markets, as we discuss below.

[2] Another very important development in banking over this period has been the movement of bank activities off–balance sheet. This development is considered in more detail in Boyd and Gertler 1993.

for the secular (or long-run) decline in the security share is the development of money markets, such as the federal funds and large certificate of deposit (CD) markets. The increased access to short-term money permitted banks to reduce precautionary holdings of securities. Also, certain types of bank loans became increasingly liquid over time due to the advent of securitization and the development of markets for loan sales. Recently, the share of securities has been rising—partly due to the problems in banking and the associated regulatory changes and partly due to banks exploiting the steepness of the yield curve.

Chart 2 disaggregates bank loans. The main categories are commercial and industrial (C&I) loans, mortgages, and consumer credit. Interestingly, the shares of each in bank loan portfolios were relatively stable from 1952 to about 1973. Since then, though, the share of C&I loans has declined, and since the early 1980s, the decline has been fairly precipitous. One factor underlying this trend has been the growth of the commercial paper market, which largely involved a movement of high-quality C&I lending off bank balance sheets. Another factor is the growth of nonbank intermediation, particularly finance company lending, as Chart 3 illustrates.

A less well-known factor underlying the relative decline in C&I loans is the recent growth of offshore commercial lending. While the Federal Reserve's flow of funds measure of C&I lending includes commercial lending both by domestic banks and by branches of foreign banks within the U.S. border, this measure underestimates loans to U.S. firms by banks located offshore. The market for offshore lending grew rapidly during the 1980s. One likely reason for this rapid growth, according to McCauley and Seth (1992), is that differences in reserve requirements on large CDs made intermediating (high-quality) loans cheaper offshore. Banks lending onshore were required to hold 3 percent reserves against large CDs; offshore banks faced no reserve requirements. Chart 4 illustrates the growth of offshore commercial loans. These loans grew from 7 percent of total C&I lending in the United States in 1983 to more than 20 percent by 1991. (For a detailed analysis of this somewhat surprisingly large change, see McCauley and Seth 1992.) Further, since the offshore banks are at some disadvantage in the evaluation and monitoring of small and medium-sized companies, the type of commercial loan business they absorbed was likely the loans to larger, better-rated companies.[3]

While high-quality commercial lending moved off bank balance sheets to both domestic and foreign competition, the relative importance of mortgage lending grew. This phenomenon began in the mid-1970s and accelerated throughout the 1980s. (See Chart 2.) Banks undoubtedly picked up some business from failing savings and loan associations (S&Ls), especially in the latter half of the 1980s. However, the shift to mortgage lending occurred well prior to the S&L debacle.

Disaggregating mortgage lending uncovers another important trend. As Chart 5 shows, commercial mortgage lending has accounted for much of the recent growth in overall bank mortgage lending.[4] In 1980, home mortgages accounted for about 60 percent of bank mortgage lending, and commercial mortgages accounted for about 30 percent. By 1990, the shares of the two types were about equal, each roughly 45 percent of overall bank lending.[5] This phenomenon is of interest since many of the problems in banking stem from losses in commercial real estate lending, as we discuss later. In this context, it is important to note that the marked shift of banks from residential to commercial mortgages was not symptomatic of mortgage lending in general. Chart 6 shows that, for all financial intermediaries, the shares of aggregate mortgage lending going to the residential and commercial sectors have been relatively stable.

The movement of banks into commercial real estate reflects part of a broader trend in bank lending since the 1970s. High-quality assets such as securitized residential mortgages or commercial loans to highly rated firms have moved off bank balance sheets. In a fight to maintain market share, banks have exploited their comparative advantage in information-intensive lending by moving into riskier, less liquid assets. Banks' comparative advantage stems partly from experience in evaluating and monitoring. It also stems partly from the nature of the regulatory system, particularly the nature of the public safety net. Later we will return to these issues.

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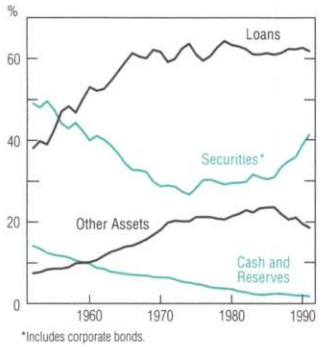
[3]Roughly speaking, we can divide commercial loans into two categories: those made to smaller, less well-known firms, which require evaluation and monitoring, and those made to highly rated firms, which require relatively little information-processing. The former are typically priced off the prime lending rate, while the latter are typically priced off the cost of issuing large CDs, the banks' marginal source of funds.

[4]Underlying the growth of commercial real estate lending were both tax incentives and relaxation of regulatory constraints on banks in the early 1980s. Subsequent reversals of the tax incentives contributed to the decline in real estate. For details, see Hester 1992 and Litan 1992.

[5]Some qualification is in order since government-sponsored securitized mortgages are treated as securities rather than mortgages in intermediary accounting statements. We thank Myron Kwast for pointing this out.

Charts 1–6 Changes in U.S. Bank Assets

Chart 1 Types of Assets as a Percentage of Total Bank Assets
1952–91



*Includes corporate bonds.

Chart 2 Types of Loans as a Percentage of Total Bank Loans
1952–91

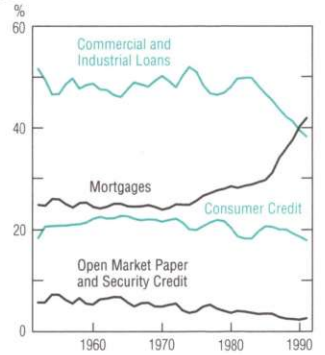
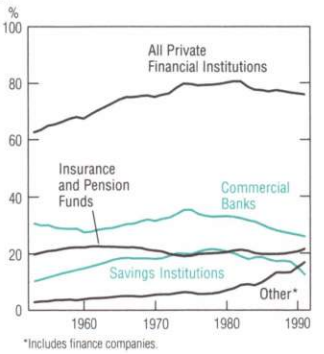


Chart 3 Percentage of Total Credit Held by Each Type of Financial Firm
1953–91



*Includes finance companies.

Chart 4 Percentage of Commercial and Industrial Loans Made by Foreign Banks
1983–91

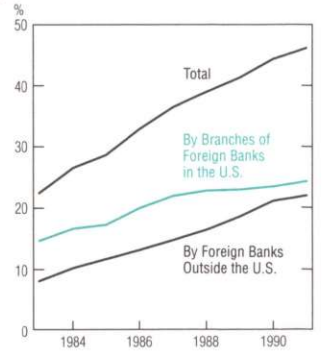
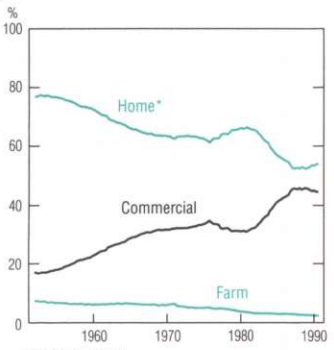
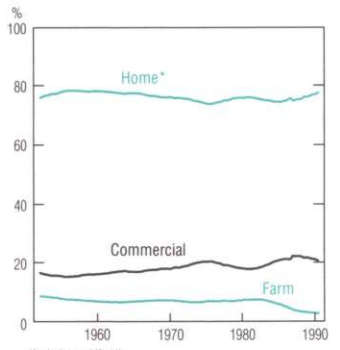


Chart 5 Types of Mortgages as a Percentage of Total Bank Mortgages
1952–91



*Includes multifamily.

Chart 6 Types of Mortgages as a Percentage of Total Mortgages Held by All Financial Firms
1952–90



*Includes multifamily.

Source: Federal Reserve Board of Governors

□ *Liabilities*

Judged by a variety of criteria, the composition of bank liabilities also appears to have become riskier.

The flow of funds accounts divide bank liabilities into four categories: checkable deposits, small time and savings deposits, money market liabilities, and long-term debt. Chart 7 shows the long-term trends. We see two important patterns in the data.

Perhaps the most obvious pattern is the secular decline in the relative importance of checkable deposits, in favor of interest-bearing liabilities.[6] As late as 1960, nearly 60 percent of bank liabilities were checkable deposits and only about 30 percent were small time and savings deposits. The use of money market instruments and long-term debt was negligible. By 1990, checkable deposits were least important, less than 20 percent of total liabilities. Small time and savings deposits had climbed to 40 percent, while money market instruments and long-term debt each had climbed to around 20 percent.

The second important pattern, which is closely related to the first, is the increased use of managed liabilities relative to deposits. *Managed liabilities* are short-term instruments which pay market-determined rates of interest. In contrast to deposits, which are relatively immobile in the short run, managed liabilities are highly interest-elastic. Managed liabilities permit banks to rapidly adjust their stock of loanable funds. Money market instruments are the prime example. There are two main types of money market liabilities (also known as *purchased money*): large time deposits and federal funds plus security repurchase agreements. The former (large CDs) typically have maturities that vary from 90 days to a year, while the latter consist largely of overnight and weekly loans. The use of both types of instruments grew sharply in the early 1970s, as deregulation permitted the development of the money market.

Recently, banks also appear to have been treating small CDs as managed liabilities. With deregulation of rates, small CDs have become increasingly sensitive to market forces. About two-thirds of small time and savings deposits are small CDs. Thus, if we include small CDs along with money market instruments in the measure of managed liabilities, these liabilities now constitute more than half of banks' short-term obligations.

The increased use of managed liabilities—and of money market instruments in particular—has had a number of important effects. One obvious effect is downward pressure on banks' net interest margins (the difference between the return per dollar on the asset portfolio and the interest cost per dollar of liabilities). Another effect is a rise in the interest sensitivity of bank liabilities. Today, in contrast to years past, an adverse movement in short-term rates may substantially raise banks' interest expenses. The development of the money market has also reduced the constraints of restrictions on interstate banking. The money market permits banks to cross state borders (or in the case of the money center banks, to cross international borders) in order to obtain short-term funds.

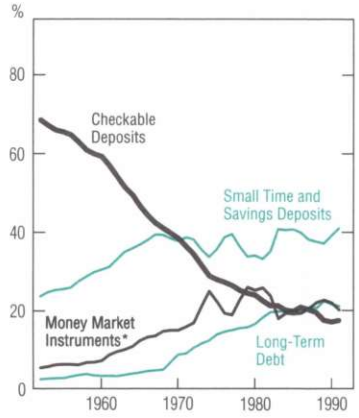
It is also true that the development of the money market has posed a vexing problem for regulators. In some ways, the failure of the regulatory system to appropriately adapt to the changes introduced by the money market was the precursor to the problems the banking industry faces today. With the efficiency gains of the money market came the cost of increased exposure to liquidity risk. While textbook descriptions of bank runs still conjure up images of people rushing through the doors of depository institutions with passbooks in hand, the most likely source of a widespread banking collapse today is a panic withdrawal of money market instruments. Since these instruments typically have values in excess of $100,000, they are not covered by deposit insurance. For this reason, and because they are highly mobile funds, abrupt withdrawal is a possibility. The key point is that, in the current environment, the stability of the banking system—indeed, the stability of the overall financial system—is tied critically to the judgments of lenders in the money market.

The most recent experience with a system-threatening run, the collapse of the Continental Illinois Bank in 1984, essentially involved a panic withdrawal by large CD holders. Rumors of insolvency precipitated the run on the money center bank, which had been funding roughly 90 percent of assets with purchased money (Hetzel 1991). As Greider (1987) describes, the concern of both the Federal Reserve and the FDIC was that, if left unchecked, the Continental crisis could induce a systemwide collapse. Many of Continental's creditors were other banks. More generally, the regulators feared that losses by Continental's creditors might induce runs on a number of other large banks that had been weakened by the 1981–82 recession. It was

[6] *Checkable deposits* include demand deposits and retail transaction deposits such as negotiable order of withdrawal (NOW) accounts. While NOW accounts pay interest, their rates appear much less sensitive to market forces than rates on other interest-bearing bank liabilities.

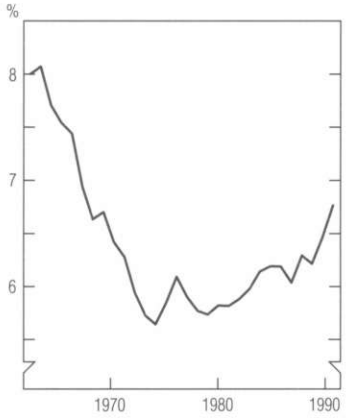
Charts 7–8 **Changes in U.S. Bank Liabilities and Capital**

Chart 7 Types of Liabilities as a Percentage of Total Bank Liabilities
1952–91



* Includes federal funds, security repurchase agreements, and large time deposits

Chart 8 Equity Capital as a Percentage of Total Bank Assets
1962–91



Sources: Federal Reserve Board of Governors and FDIC

this fear that induced the banking authorities to intervene in the Continental crisis and protect the uninsured creditors.

□ *Equity Capital*

Finally, Chart 8 illustrates the secular behavior of the ratio of bank equity capital to assets. By definition, *bank equity capital* equals the difference between assets and liabilities. It specifically equals the sum of common and preferred stock outstanding and undistributed profits. Bank capital is important because it provides a buffer to absorb loan losses. Bank capital/assets ratios must satisfy minimum regulatory standards. From the early 1960s to the early 1980s, the aggregate bank capital/assets ratio dropped by roughly a quarter, from around 8 percent to below 6 percent. The growth in bank assets afforded by the development of the money market (especially over the period 1962–74) was not matched by growth in bank equity.

Since the early 1980s, the aggregate bank capital/assets ratio has climbed, on average. It is important to recognize, however, that this growth is largely a response to increased regulatory pressure in the wake of mounting bank and S&L failures and, relatedly, to new capital standards which have been phased in over the last five years (which we will discuss later). Much of the growth in this ratio also reflects a contraction in the ratio's denominator: assets. Because of the kinds of informational asymmetries stressed by Myers and Majluf (1984), issuing new equity is expensive for banks. Typically, banks use retained earnings to build equity (Baer and McElravey 1993). As a number of studies have indicated (Bernanke and Lown 1991, Peek and Rosengren 1991), meeting capital requirements in recent years has forced many banks to contract asset growth.

Bigger Banks Take Bigger Risks

□ *Policy Incentives*

Another outcome of the collapse of Continental Illinois was that the banking authorities in the United States formally certified the policy of too-big-to-fail. The policy had been implicitly in practice at least since the early 1970s, with the bailout of Franklin National Bank (Hetzel 1991, Boyd and Runkle 1993, and Isaac 1993). However, in September 1984, in the wake of the Continental intervention, the Comptroller of the Currency testified to the U.S. Congress that 11 bank holding companies were too big to fail.

Further, in practice, the policy appears to have been extended in varying degrees to banks outside the top 11.[7] As we said earlier, it is important to recognize that the term *too-big-to-fail policy* actually refers loosely to a menu of policies that vary from lenient treatment at the discount window or in the valuation of assets to direct infusion of capital and protection of uninsured creditors.[8]

Plugging one hole in the dike, however, opened up another. The too-big-to-fail policy, of course, indiscriminately subsidized risk-taking by large banks. At the same time, it created a nontechnological incentive for banks to become large. Despite being a well-intentioned effort to protect against liquidity panics in the money market, the policy nonetheless helped create the climate for the 1980s crisis. We will return to this issue repeatedly, since it is fundamental to the policy debate.

☐ *A Size Breakdown*

The aggregate bank balance sheets mask some important differences across size classes of banks. Generally speaking, smaller banks adopt more conservative asset and liability positions than do large banks. An important policy issue is whether these differences are due to technological factors or to a regulatory environment that favors large banks, owing to an operative too-big-to-fail policy. Before we investigate that issue, however, we will document the differences.

Following the convention of the *Federal Reserve Bulletin*, we divide banks into four size classes, based on the size of their assets: *small* (those with assets less than $300 million), *medium* (those with assets between $300 million and $5 billion), *large* (those with assets greater than $5 billion), and *money center* (the 10 banks with the largest assets). The data are based on averages over the five-year period 1987–91.

Chart 9 disaggregates loans by these size classes. The share of loans allocated to business lending—the sum of C&I and commercial real estate lending—varies positively with size. Both the consumer and residential real estate shares vary negatively. Since business lending generally accounts for the substantial majority of loan losses, the general picture is that larger institutions hold riskier asset positions. Later we will present some information on loan performance that is consistent with this contention.

Chart 10 characterizes the composition of liabilities. The key point here is that the relative use of core deposits (checkable and savings and time deposits) shrinks with size, while the relative use of money market instruments increases. About 85 percent of small bank liabilities are core deposits. Conversely, money market instruments constitute roughly 42 percent of large bank liabilities and 54 percent of money center bank liabilities. Further, the money center banks obtain more than half of their purchased funds from abroad. (Deposits in foreign offices are mainly money market instruments.) An implication of the differences in liability structure is that larger banks have smaller net interest margins. As Chart 11 illustrates, the net interest margin varies from 3.9 percent for small and medium-sized banks to 2.8 percent for the money centers.

In addition to holding riskier asset portfolios and employing greater use of money market instruments, larger banks have lower capital/assets ratios, as Chart 12 shows. Indeed, large banks were responsible for much of the secular thinning of the aggregate bank capital/assets ratio portrayed in Chart 8.

Again, a key policy question is, Why? Does this reflect some kind of technological advantage—for example, a better ability to diversify risks or to use scale economies in loan processing? Or does it instead reflect mainly the effect of regulatory bias induced at least in part by the too-big-to-fail policy? We will return to this issue in the next section through an assessment of the recent performance of banks across size classes.

Analyzing Performance

In this section, we describe the bleak performance of banks in the 1980s and pinpoint the reasons for it. We begin by presenting a set of aggregate measures of bank performance. We then turn to an analysis of data disaggregated by bank size and location. We determine that even after we controlled for locational effects, performance was significantly related to size. And very large banks did worse than the average.

Bank Profitability Plunges

☐ *Overall*

Chart 13 presents the recent trend in two commonly used measures of bank profitability: the rate of return on equity and the rate of return on assets. Both measures exhibit

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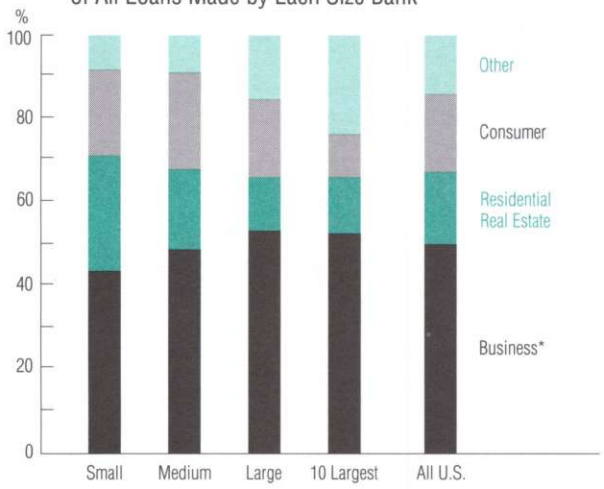
[7] O'Hara and Shaw (1990) present evidence that news of the Continental bailout policy raised the stock prices of large banks, but not the stock prices of small banks [which O'Hara and Shaw (1990, p. 1588) dubbed *too-small-to-save*].

[8] We are not suggesting that the too-big-to-fail policy completely eliminated market discipline over large banks. Indeed, the management of Continental Illinois was fired. One should not focus on this policy in isolation. As we will discuss later, we believe the combined climate of too-big-to-fail, competitive pressures on banking, and possibly problems of managerial entrenchment (as discussed in Boyd and Graham 1991 and Gorton and Rosen 1992) contributed to the substantial rise in risk-taking by large banks.

Charts 9–12 A Balance Sheet Breakdown by Bank Size†

Annual Averages, 1987–91, for U.S. Commercial Banks

Chart 9 Each Type of Loan as a Percentage of All Loans Made by Each Size Bank



* Commercial, industrial, and commercial real estate.

Chart 10 Each Type of Liability as a Percentage of All Liabilities at Each Size Bank

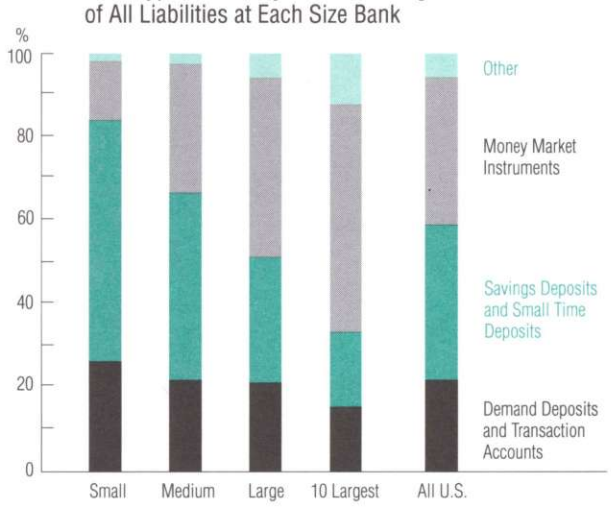
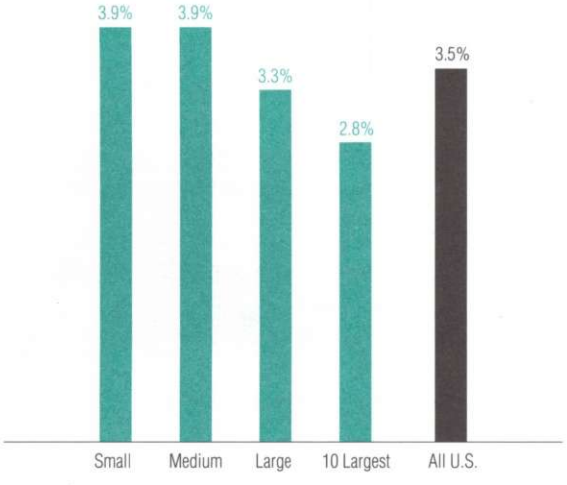
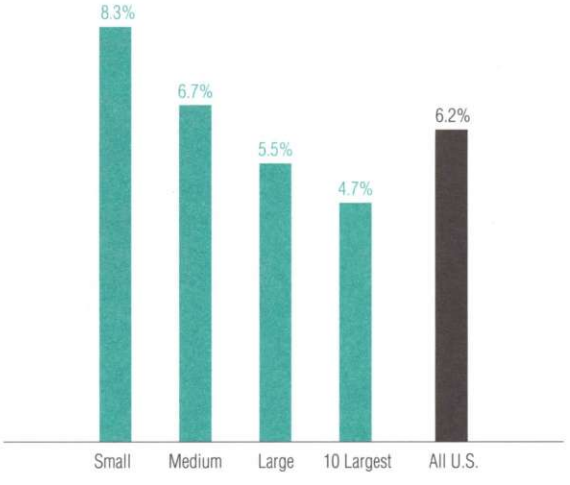


Chart 11 Net Interest Margin* as a Percentage of Assets at Each Size Bank



* Difference between interest earned on assets and interest paid on liabilities; tax equivalent.

Chart 12 Equity Capital as a Percentage of Total Assets at Each Size Bank



†*Small* = Assets less than $300 million, *Medium* = Assets between $300 million and $5 billion, and *Large* = Assets over $5 billion.

Source: Federal Reserve Board of Governors

Charts 13–14 Measures of U.S. Bank Performance

Chart 13 Two Profitability Rates
1973–91

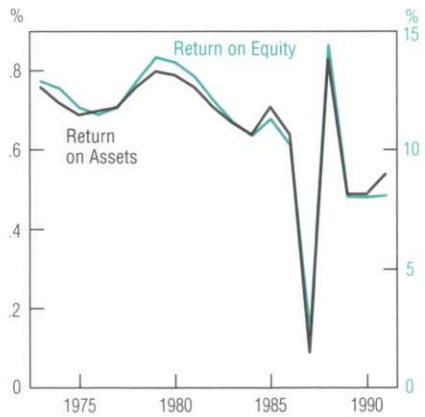
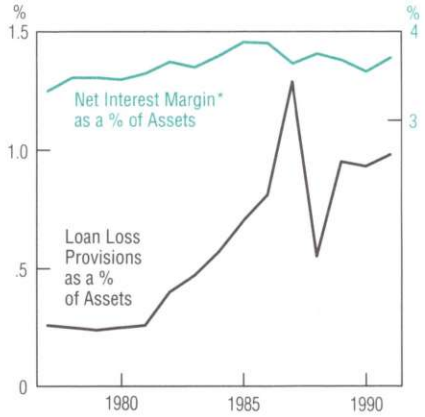


Chart 14 Two Other Performance Ratios
1977–91



Source: Federal Reserve Board of Governors

similar behavior over the period 1973–91. Both decline fairly steadily after 1979. The exception (for both measures) is a sharp drop in 1987 followed by a sharp recovery in 1988. However, the plunge in 1987 reflects large write-offs of international loans, the timing of which was somewhat arbitrary. The main point of Chart 13 is that after trending down since 1979, bank profitability was, in the latter half of the 1980s, significantly below its average for most of the 1970s. The rate of return on equity dropped from about 14 percent in 1979 to an average of about 8 percent over 1989–91. Similarly, the rate of return on assets dropped from about 0.75 percent to 0.50 percent.

Chart 14 shows that a rise in the rate of loan losses accompanied the general decline in profitability. Provisions for loan losses increased during the 1981–82 recession, as would normally be the case in a downturn. However, the upward trend in these provisions continued almost throughout the 1980s. The loan loss rate has risen from about 0.2 percent of assets in the late 1970s to nearly 1 percent of assets over the end of the sample period. Conversely, the net interest margin has actually risen slightly over this period, from about 3.3 percent in 1977 to 3.8 percent in the mid-1980s to an average of about 3.5 percent over the last several years. The aggregate measures thus suggest that the decline in bank profitability stemmed from loan losses rather than from a shrinking net interest margin.

Why didn't the net interest margin drop over this period of increased competition and deregulation of interest rates on bank liabilities? In our view, the slight upward trend of the net interest margin is symptomatic of the decline in bank asset quality over the period. That is, the rise in the aggregate loan spread likely reflects the decline in the asset quality mix over the period. The sharp rise in loan losses over the period also fits the general story. In the sections that follow, we will bring more evidence to bear on this issue.

□ *By Size and Location*

It is first useful to provide some background on the cross-sectional distribution of U.S. banks by size and by region of the country.

We divide banks into six asset-size categories based roughly on the classifications used by the FDIC. The asset-size categories range from less than $50 million to more than $10 billion. Chart 15 presents information on the percentage of banks and the percentage of bank assets across

Charts 15–16

Distribution of U.S. Banks and Their Assets

On Average in 1983–91

Chart 15 By Bank Size

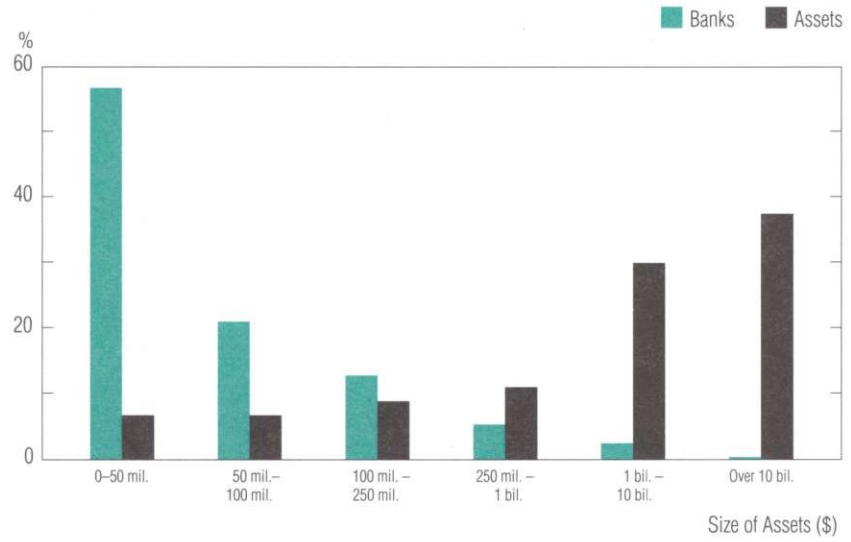
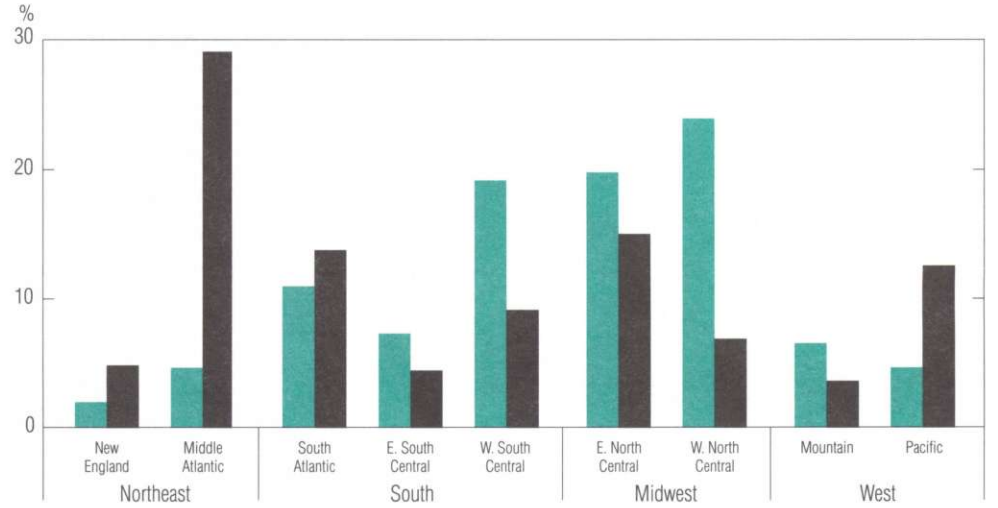


Chart 16 By Bank Location



Source: FDIC

the six size classes, based on averages constructed over the period 1983–91. Clearly, though there are many thousands of banks in the United States, bank assets are concentrated among a relatively tiny percentage. On average over the nine-year sample, banks with more than $10 billion in assets constituted only 0.3 percent of the total number, but they held 37.4 percent of total bank assets. Banks with more than $1 billion in assets numbered 2.5 percent of the total, but held about two-thirds of the assets. At the other extreme, nearly 80 percent of the banks had less than $100 million in assets, but these banks together only held about 13 percent of the assets.

Chart 16 similarly portrays the distribution of banks across regions used by the U.S. Bureau of the Census. Large banks tend to be located near salt water (on the East and West Coasts), while small banks tend to concentrate

Tables 1–2 U.S. Bank Failures

Table 1 By Bank Location
In 1980–91

Region		Number of Failed Banks Each Year												Total Failures in 1980–91
		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	
Northeast	New England	1	0	1	0	0	0	0	2	0	3	9	12	28
	Middle Atlantic	1	3	6	3	1	4	0	3	1	3	7	6	38
South	South Atlantic	2	2	2	0	3	2	3	4	4	7	6	8	43
	East South Central	2	0	5	14	13	9	5	4	0	1	1	2	56
	West South Central	0	3	11	7	12	34	58	108	163	150	115	32	693
Midwest	East North Central	1	3	5	7	8	4	3	7	5	0	1	3	47
	West North Central	4	2	5	10	37	46	43	33	28	9	6	4	227
West	Mountain	2	0	3	5	12	19	26	16	19	11	14	6	133
	Pacific	0	2	3	10	11	10	11	11	13	9	4	2	86
United States		13	15	41	56	97	128	149	188	233	193	163	75	1,351

Table 2 By Bank Size
In 1986–91

Asset Size Class		Number of Failed Banks		Assets of Failed Banks	
		Total	% of Total	Total	% of Total
Small	Less Than $500 Mil.	912	96.6%	$44.4 mil.	40.4%
Medium	$500 Mil. – $1 Bil.	19	2.0	12.1	11.0
	$1 Bil. – $5 Bil.	10	1.1	18.8	17.1
Large	Over $5 Bil.	3	.3	34.6	31.4

Source: FDIC

around fresh water (in the Midwest).

Table 1 presents evidence on U.S. bank failures disaggregated by census region. Over the period 1980–91, 1,351 banks failed. The peak was the five-year interval 1986–90, when nearly 70 percent of the failures occurred. Not surprisingly, there is a strong regional pattern that is closely associated with the temporal pattern of certain regional economic difficulties. The (West South Central) oil states, principally Texas, accounted for the majority of failures: nearly 700. Most of the failures in this region are bunched during 1986–90, roughly the period when oil and real estate prices collapsed there. A distant second in importance are the (West North Central) agricultural states. Agricultural problems in this region during the mid-1980s precipitated over 180 bank failures.

For two related reasons, however, the raw failure numbers portray an incomplete picture. First, these numbers do not take into account the size of failed banks. While small bank failures are far more plentiful, a large bank failure places far greater pressure on the FDIC insurance fund. Despite the rash of failures in the agricultural states, for example, the assets of closed banks never exceeded 1 percent of the total in the region, since virtually all of the banks involved were small. Similarly, despite there being only 12 bank failures in New England in 1991, assets of failed banks amounted to 8.8 percent of that region's total.

Table 2 confirms the general point. It shows that in the peak period of 1986–90, banks with assets more than $500 million accounted for less than 4 percent of total bank failures, but nearly 60 percent of the total assets of failed banks. Further, the three banks with assets more than $5 billion that failed accounted for more than 30 percent of the total failed-bank assets.

The second reason the failure data are misleading is that they do not take into account the historical regulatory bias in favor of large banks. Because the FDIC has been less willing to close large banks, the failure numbers do not accurately capture overall bank performance.

The biases inherent in using failure data as indicators of bank performance lead us to consider several finer measures. Charts 17 and 18 report, by census region, the ratios of loan loss provisions to assets and net income to assets, respectively. The numbers are averages across individual banks within the individual regions over the period 1983–91. By both indicators, the banks in the West South Central region (which includes Texas) performed worst. Both indicators suggest, however, that regional considerations alone do not provide a complete story. In the troubled New England region, for example, banks on average performed at the national mean in terms of loan loss provisions and only slightly worse than the national mean in terms of net income. Similarly, the poor performance of the money center banks located in the Middle Atlantic region was at variance with other banks there, which performed better than the national mean on average.

Examining the same data by bank asset size yields a clearer picture. Chart 19 reports the ratio of loan loss provisions to assets across the six size classes of banks, and Chart 20 reports the ratio of net income to assets. Across size classes, there is a U-shaped pattern to the loan loss provision ratio. Banks in the largest category (more than $10 billion in assets) performed worst by this measure. The ratio of provisions to assets declines with size, reaching a minimum at the class of banks between $100 million and $250 million in assets. The ratio then begins to rise monotonically as size declines further.

The ratio of net income to assets is, of course, a better overall indicator of performance than is the ratio of loan loss provisions to assets. However, the U-shaped pattern of the latter is simply mirrored by a hump-shaped pattern of the former, as Chart 20 illustrates. Gauged by net income to assets, banks larger than $10 billion still performed worst, and banks between $100 million and $250 million still performed best.

Judging from Charts 19 and 20, we see that relative loan loss performance influences the pattern of net income to assets across size classes. Losses on loans to less-developed countries (LDC loans) were likely an important factor since these losses were heavily concentrated among large banks. Perhaps less well known is that large banks also suffered disproportionately from commercial real estate lending. Recall (from Chart 9) that the fraction of commercial real estate loans in bank portfolios varied positively with size. However, even within the category of commercial real estate lending, large banks performed less well. Table 3 shows that in the third quarter of 1992, the percentage of noncurrent, or what are commonly called *problem,* real estate loans ranged from about 1.6 percent for the smallest banks to about 7 percent for the largest banks. For every bank size, business-related real estate lending—the *construction* and *commercial* categories—accounted for most of the noncurrent loans, but the share of noncurrent loans within each loan category rises steeply with bank size. Astonishingly, nearly 22 percent of construction loans at the largest banks were noncurrent.

What's the Problem?

From a policy perspective, it is important to determine how well the negative correlation between size and performance survives, once we control for region. For example, there is a regional dimension as well as a size dimension to commercial real estate problems. Table 4 shows that noncurrent real estate loans are heavily concentrated in the Northeast and the West, the two main areas where real estate problems linger. Thus, it is possible that the correlation between size and performance of the real estate loans is simply due to the fact that the banks in the troubled Northeast and West are larger on average. If this is the case, then restrictions on interstate banking might be primarily responsible for the disproportionate concentration of loan losses. If the negative correlation between size and performance remains after we have controlled for location, then it is possible that distortions induced by a too-big-to-fail safety net may have been important.

□ *Methodology and the Model*

We now investigate the relation between size and performance, after controlling for the influence of region. The data set we use has annual observations on individual U.S. banks over the period 1983–91.[9] The sample is obtained from bank reports of condition and income that are filed with regulators; the sample contains the universe of do-

[9]The organizational entities we study here are banks. It is true that many banks are owned by bank holding companies, which control one or more banks and often nonbank affiliates as well. For many purposes, the most appropriate organizational entity is the consolidated holding company. However, the objective here is specifically to study bank performance. Consolidated statements for holding company banks are not easily available. Finally, though they do not control for regional effects, Boyd and Runkle (1993) do obtain evidence of an inverse relation between performance and holding company size that is similar to the inverse relation between performance and size which we find at the bank level.

Charts 17–20

A Breakdown of U.S. Bank Performance Ratios

Annual Averages, 1983–91

Charts 17–18 By Bank Location . . .

Chart 17 Loan Loss Provisions as a Percentage of Assets

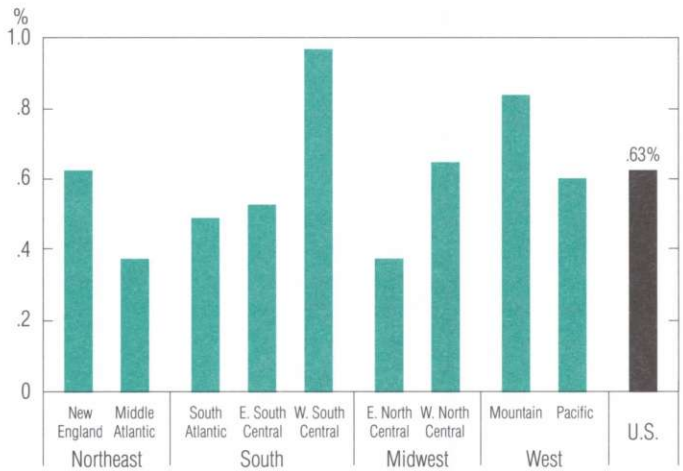
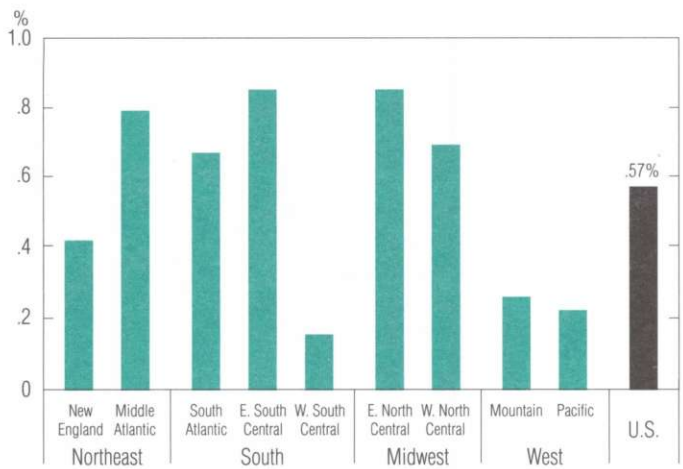


Chart 18 Net Income as a Percentage of Assets



Charts 19–20 . . . And by Bank Size

Chart 19 Loan Loss Provisions as a Percentage of Assets

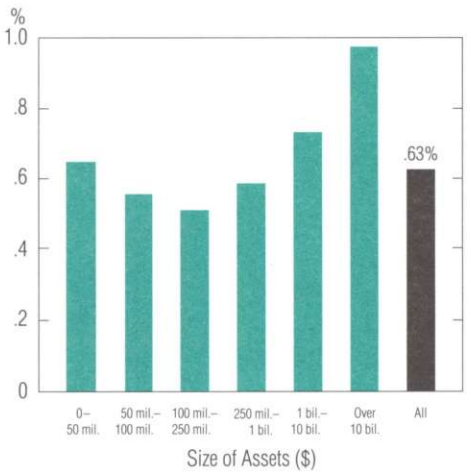
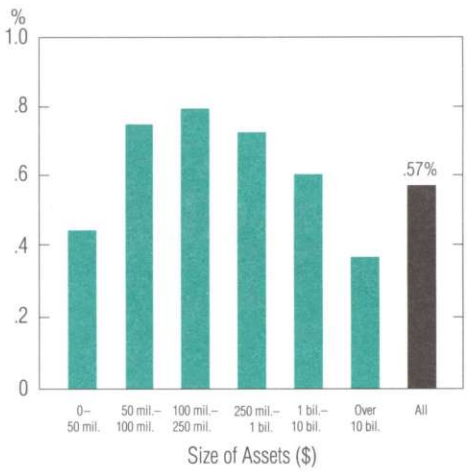


Chart 20 Net Income as a Percentage of Assets



Source: FDIC

mestic insured commercial banks over this period.

We consider two performance measures: the ratios of net loan charge-offs to assets and net income to assets.[10] Each, of course, is a measure of ex post performance. Our working hypothesis, particularly for interpreting the behavior of charge-offs, is that over the sample period a poor ex post performance is the consequence of a high degree of ex ante risk-taking. Ideally, we would like to measure ex ante portfolio risk. However, this is extremely difficult to do for banks, for two main reasons. First, the sample period is relatively short. Second, the data are based on accounting rather than market value measures, and there is considerable evidence that the accounting data are intentionally smoothed. (See, for example, Boyd and Runkle 1993.) This has the effect of causing accounting measures to systematically understate risk. The idea is that during the 1980s there was a series of large negative shocks to the banking system (as Charts 13 and 14 suggest); by examining ex post returns, therefore, we can get some feel for the outer tails of the distributions.

For each bank, we average each of the two performance indicators over the sample period. We work with the time-averaged values of these indicators for several reasons. First, the timing of charge-offs and income is to some degree arbitrary in the short run. Because clean market value assessments of banks' overall portfolio are unavailable, banks have some short-run discretion over when they report gains and losses. Over time, the discrepancy between accounting and market value indicators declines. Second, working with time-averaged data permits a more parsimonious representation of a model. In general, bank performance should vary over time with economic conditions. However, since we are mainly interested in uncovering secular relationships, it seems reasonable to average out the time effects: the benefit is a much simpler model to evaluate.

At least two types of bias are possible in this study. First, some banks drop out of the sample over time. Since exit is most often due to failure, exit and performance are likely correlated. Omitting exiting banks from the sample could, therefore, bias the estimates. We adjust for this problem by averaging each of the performance indicators for a bank over its lifetime in the sample, even if the bank exits partway through the sample period. In this simple way, we include information from the exiting banks in our estimates.

The second type of possible bias is that bank performance could feed back and affect size. If a bank does not perform well, for example, it may decide to contract its assets. We address this issue by using presample data to sort banks. Thus, we use the 1983 data to sort banks into size groups as well as into regions. The performance indicators we use as dependent variables are then time-aver-

Tables 3–4 A Breakdown of Problem Real Estate Loans at U.S. Banks

Percentage of Each Type of Loan That Was Noncurrent* in the Third Quarter of 1992

Table 3 By Bank Size

	Type of Real Estate Loan			
Size of Assets	All	Construction	Commercial	1–4 Family
Less Than $100 Million	1.64%	2.76%	2.10%	1.21%
$100 Million – $1 Billion	2.18	5.62	3.01	1.23
$1 Billion – $10 Billion	4.05	12.65	5.33	1.50
Over $10 Billion	7.07	21.96	10.84	1.75

Table 4 By Bank Location

	Type of Real Estate Loan				
Region of U.S.	All	Construction	Commercial	1–4 Family	Home Equity
Northeast	7.2%	23.8%	10.0%	2.4%	1.7%
Southeast	2.5	6.3	3.8	1.1	.4
Central	1.9	6.0	2.8	.9	.4
Midwest	1.5	2.4	3.1	.6	.3
Southwest	2.5	4.0	3.9	1.3	.7
West	5.1	16.9	5.9	1.5	.7

* A *noncurrent loan* is one that is past due 90 days or more or that is in a nonaccrual status.
Source: FDIC

[10] *Net loan charge-offs* include all loans determined to be uncollectible net of recoveries on (previously written-off) loans. This entry is not an accounting expense, but rather a reduction in a reserve account. *Provision for loan losses* is the accounting expense entry which reduces profits. When the data are averaged over several years, as they are here, the two loan loss measures are highly correlated. Thus, for present purposes, it makes little difference which is employed.

aged over 1984–91. For robustness, we also split the sample and work with time averages of the performance variables over 1987–91. In this latter case, we use 1986 data to sort the banks.

The initial set of independent variables are dummies for census region and for size. We use the FDIC's six size classes defined earlier (in Chart 15). For two reasons, we use discrete indicators rather than a continuous variable for size. First, the earlier descriptive analysis suggests that the relationship between size and performance is likely to be highly nonlinear. Second, by using size class indicators which correspond closely to the categories the FDIC uses to report all types of bank data, we directly link our results with a variety of other types of information on bank performance. A similar consideration motivates the use of census regions to denote location: the FDIC uses this indicator to present information on performance across locations.

Here, then, is our formal model. Let D_j^r denote a dummy for region j, D_k^s a size dummy for size class k, and $\bar{x}_{ijk}$ the time-averaged value of a bank performance indicator. Then the basic model we estimate is given by

$$(1) \qquad \bar{x}_{ijk} = a_j D_j^r + b_k D_k^s + \varepsilon_{ijk}$$

where ε_{ijk} is a random error term and where, to identify the model, one of the coefficients on the six size class dummies is normalized at zero. We model bank performance as a linear function of a region-specific intercept a_j and a slope coefficient b_k that depends on the size class of the bank. Under the initial formalization given by equation (1), we restrict the slope coefficient on size class (b_k) to be identical across regions. We also consider a more general formulation that permits the size class slope coefficients to vary across regions, as given by

$$(2) \qquad \bar{x}_{ijk} = a_j D_j^r + b_{jk} D_k^s D_j^r + \varepsilon_{ijk}.$$

Here the slope coefficient on size (b_{jk}) is region-specific.

Under the null hypothesis that size is unimportant to performance, the slope coefficients on size equal zero for every size class. If the null is true, then restrictions on interstate banking may be paramount in explaining bank performance. Roughly speaking, if the regional dummies capture all the explanatory power, then it is likely that constraints on the banks' ability to diversify nationally have inhibited banking. But if the too-big-to-fail policy has been a significant distortion (in the context of significant competitive pressures on banking and managerial entrenchment problems for large banks), then we should expect to reject the null. Further, after controlling for regional effects, we should expect an inverse connection between size and performance, especially at the upper tail of the size distribution.

☐ *The Result: Size Matters . . .*

Table 5 reports the results from estimating the basic model, described by equation (1). There are four regressions, corresponding to two different dependent variables (the ratios of net charge-offs to assets and net income to assets) and two different sample periods (1984–91 and 1987–91).[11] We normalize at zero the coefficient on the banks in size class 3 ($100 million–$250 million in assets). In each case, we easily reject the null that size class is unimportant. Further, to a first approximation, both the U-shaped pattern of loan losses and the hump-shaped pattern of net income across size classes that appeared in Charts 19 and 20 remain after we control for the influence of region.

For the ratio of net charge-offs to assets, the coefficients on the size dummies increase monotonically, moving from size class 3 up to size class 6 (more than $10 billion in assets).[12] Further, this ordering of coefficients is statistically significant, as Table 6 indicates. An analogous set of results arises when the dependent variable is instead the ratio of net income to assets.[13]

It is also interesting to observe that the smallest banks (those in class 1, with less than $50 million in assets) performed worse than those in the next two larger classes. The difference, however, is sharper on average with the net income ratio than with the net charge-offs ratio. One interpretation is that the smallest banks do not exploit scale economies that seem available at least up to the class 3 category.

We next turn to the more general model described by

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[11]Though we do not report the statistics here, the general results we obtain are robust to using the first half of the sample period, 1984–86, and also to running the regressions year by year.

[12]The results are the same if as the dependent variable we use net charge-offs divided by loans rather than net charge-offs divided by assets. We chose the latter because we are interested in analyzing the ex post performance of the entire bank portfolio.

[13]Because equity is measured in book values, we do not consider the rate of return on equity as an alternative dependent variable. Since this measure does not include capital gains and losses on equity, it could be seriously distorted. For example, a bank with near zero equity due to poor performance could have a high ratio of net income to equity.

It is true that there is a size bias in the ratio of net income to assets, since large banks use systematically more financial leverage. However, a reasonable calculation suggests that this bias is small relative to the differences we observe in the data.

Tables 5–6 The Basic Model, Controlled for Regional Effects

Table 5 Estimating the Coefficients†

Dependent Variable	Time Period	Coefficient (and *t*-Statistic) for Each Asset Size Class** 1	2	3	4	5	6	Proportion of Variation Explained: Adj. R^2	*F*-Statistic (Significance Level)
Ratio of Net Charge-Offs to Assets	1984–91	.00029 (1.64)	−.00042 (−2.04)	0	.00069 (2.16)	.00149 (4.56)	.00467 (4.33)	.11	232.59 (.00)
	1987–91	−.00014 (−.61)	−.00045 (−1.81)	0	.00150 (3.37)	.00254 (6.94)	.00600 (4.81)	.12	135.59 (.00)
Ratio of Net Income to Assets	1984–91	−.00108 (−3.72)	.00077 (2.43)	0	−.00126 (−2.24)	−.00237 (−4.47)	−.00599 (−3.80)	.10	144.66 (.00)
	1987–91	−.00236 (−6.11)	−.0005 (−1.21)	0	−.00185 (−2.34)	−.0035 (−5.57)	−.00556 (−4.30)	.12	129.24 (.00)

equation (2), which permits the slope coefficient on size to vary across regions. Table 7 reports the coefficients on each size class averaged across regions, with the averages weighted by the percentage of banks in the size class of interest that are in the region. The table also reports the joint significance of a size class dummy across regions for each size class. The results from this general model correspond to those from the restricted one. Once again, both the U-shaped pattern for net charge-offs and the hump-shaped pattern for net income emerge, and both are highly significant. Analogously to Table 6, Table 8 presents tests of the equality of coefficients on adjacent size classes within a region, jointly across all regions. The message of Table 6 is preserved: between size classes 3 and 6, the inverse ordering between size and performance is significant, and the smallest banks perform poorly relative to those in the two next-larger size classes.

A question that remains is whether the abnormal risk-taking by large banks could be explained by factors completely unrelated to regulatory policy (that is, the subsidy inherent in the too-big-to-fail policy). Could it be the case that for technological reasons large banks have simply specialized in different types of loans than smaller banks and that the large banks have just been unlucky?

We are skeptical of this hypothesis providing a complete explanation, for a variety of reasons. The largest category of banks (those with assets more than $10 billion)

Table 6 Testing for the Effects of Size

Dependent Variable	Time Period	*F*-Statistic (and Significance Level) for Test of Equality of Size Coefficients for These Asset Size Classes** 6 and 5	6 and 4	5 and 4	2 and 1
Ratio of Net Charge-Offs to Assets	1984–91	8.37 (.00)	13.19 (.00)	4.22 (.04)	22.44 (.00)
	1987–91	7.49 (.01)	12.03 (.00)	4.22 (.04)	2.94 (.09)
Ratio of Net Income to Assets	1984–91	5.00 (.03)	8.36 (.00)	2.66 (.10)	68.21 (.00)
	1987–91	2.32 (.13)	6.39 (.01)	3.31 (.07)	38.23 (.00)

* This model is equation (1). It includes nine regional and six size class dummies. The coefficient of size class 3 is normalized at zero. The dependent variables are time-averaged over each sample period, and the independent variables are based on the year before the sample period.

† The *t*-statistics are corrected for heteroskedasticity with a White correction. The *F*-statistics refer to the test that all regional dummies are equal.

** Asset size class 1 = $0 – $50 million, class 2 = $50 million – $100 million, class 3 = $100 million – $250 million, class 4 = $250 million – $1 billion, class 5 = $1 billion – $10 billion, class 6 = over $10 billion.

Tables 7–8 The More General Model, With Region-Specific Size Effects*

Table 7 Estimating the Coefficients†

Dependent Variable	Time Period	Average of Interaction Coefficients (and F-Statistic) for Each Asset Size Class** 1	2	3	4	5	6	Proportion of Variation Explained: Adj. R^2	% Gain in SSR from Model (1) to Model (2)
Ratio of Net Charge-Offs to Assets	1984–91	.00015 (5.53)	–.00033 (1.77)	0	.00048 (1.79)	.00125 (6.34)	.00347 (28.35)	.12	2.87
	1987–91	–.00038 (1.38)	–.00047 (1.56)	0	.00158 (2.48)	.00233 (9.28)	.00630 (18.70)	.12	2.57
Ratio of Net Income to Assets	1984–91	–.00087 (10.79)	.00082 (2.21)	0	–.00111 (1.59)	–.00192 (6.72)	–.00432 (16.49)	.12	2.57
	1987–91	–.00200 (8.75)	–.00001 (1.36)	0	–.00154 (1.43)	–.00315 (8.20)	–.00389 (11.15)	.12	4.78

Table 8 Testing for the Effects of Size

Dependent Variable	Time Period	F-Statistic (and Significance Level) for Test of Equality of Average Interaction Coefficients for These Asset Size Classes** 6 and 5	6 and 4	5 and 4	2 and 1
Ratio of Net Charge-Offs to Assets	1984–91	4.63 (.00)	44.48 (.00)	6.04 (.00)	4.39 (.00)
	1987–91	6.56 (.00)	11.32 (.00)	4.67 (.00)	2.08 (.00)
Ratio of Net Income to Assets	1984–91	2.89 (.01)	15.55 (.00)	3.77 (.00)	10.53 (.00)
	1987–91	5.86 (.00)	3.69 (.00)	3.13 (.00)	11.57 (.00)

* This model is equation (2). It includes 9 regional and 54 interactive terms between size classes and regions. The coefficient on the interaction terms for size class 3 is normalized at zero. The dependent variables are time-averaged over each sample period, and the independent variables are based on the year before the sample period.

† These are weighted averages of size coefficients, with the weights dependent on the fraction of banks in the size class in each region. The F-statistics are for the test that the coefficient terms for a size class are jointly zero across regions; these statistics are corrected for heteroskedasticity with a White correction.

** Asset size class 1 = $0 – $50 million, class 2 = $50 million – $100 million, class 3 = $100 million – $250 million, class 4 = $250 million – $1 billion, class 5 = $1 billion – $10 billion, class 6 = over $10 billion.

performed significantly worse than the next-largest (those with assets from $1 billion to $10 billion). It is hard to believe that important differences in scale economies exist between these two sizes of banks that permit the former to make loans the latter cannot. In addition, the banks in the next size class down, from $250 million to $1 billion, are still reasonably large and thus still relatively unrestricted in the types of loans they can make. In fact, banks in this size category participated in LDC loan syndications. However, they did not typically adopt the same degree of risk exposure as did the larger banks. Indeed, Dornbusch (1986) observes that some money center banks held LDC loans equal to twice their capital. More generally, scale economies may explain why only large banks can originate certain types of loans such as LDC loans. However, since loan sales are possible, scale economies do not explain why large banks hold a larger share of these assets on their balance sheets.

A purely technological story also has difficulty explaining why the large banks adopted a riskier liability structure as well as a riskier asset structure. As we documented earlier (in Charts 11 and 12), the large banks operated with both thin equity capital-to-assets ratios and thin net interest margins, in the latter instance due to the extensive use of purchased money. It is worth emphasizing that large bank capital/assets ratios were not only lower than the industry mean, but were also substantially lower than those of competing nonbank intermediaries such as finance and

Tables 9–10 Estimating the Cost of the Too-Big-To-Fail Policy

Table 9 How Much Lower Total Loan Losses Would Have Been If Large Banks Had the Same Loss Rate as Middle-Sized Banks

Time Period	Loan Loss Reduction by Bank Asset Size					
	Class 5: $1 Bil.–$10 Bil.		Class 6: Over $10 Bil.		Classes 5–6: Over $1 Bil.	
	%	$ Bil.	%	$ Bil.	%	$ Bil.
1983	5.3	.53	7.5	.75	12.9	1.29
1984	2.6	.28	19.6	2.12	22.3	2.41
1985	–1.2	–.16	13.6	1.79	12.4	1.64
1986	–2.1	–.34	14.6	2.39	12.5	2.04
1987	6.1	.94	13.0	2.01	19.1	2.96
1988	10.4	1.85	20.9	3.71	31.4	5.57
1989	6.8	1.47	31.3	6.75	38.0	8.20
1990	8.6	2.34	32.4	8.83	41.0	11.17
1991	7.2	2.21	25.6	7.83	32.7	10.01
Total in 1983–91	—	9.12	—	36.18	—	45.29
Mean in 1983–91	4.9	1.01	19.8	4.02	24.7	5.03
Mean in 1987–91	7.8	1.76	24.7	5.83	32.5	7.58

Table 10 Where Capital Constraints Were Binding

Assets Held by Capital-Constrained Banks in Each Size Class as a Percentage of (a) All U.S. Capital-Constrained Bank Assets and (b) All Same-Size Bank Assets, 1990–91

	Bank Asset Size			
	Classes 1–3: $0–$250 Mil.	Class 4: $250 Mil.– $1 Bil.	Class 5: $1 Bil.–$10 Bil.	Class 6: Over $10 Bil.
a. Percentage of All U.S. Constrained-Bank Assets				
1990	2.86%	4.05%	24.17%	68.92%
1991	5.65	6.14	28.01	60.20
b. Percentage of All Same-Size Bank Assets				
1990	3.90%	9.81%	20.73%	45.66%
1991	2.78	5.16	8.59	14.15

All Capital-Constrained Bank Assets as a Percentage of All Bank Assets	1990	26.16%
	1991	9.32

Source: Federal Reserve Board of Governors

life insurance companies (Boyd and Rolnick 1989). A natural explanation for this relative position is that the policy of too-big-to-fail led to a mispricing of the (technically) uninsured liabilities of these institutions.[14]

□ . . . *A Lot*

We next conduct a simple experiment to determine the quantitative importance of the poor relative performance of large banks. We compute the reduction in total loan losses that would have resulted if the two largest categories of banks (classes 5 and 6) had performed as well as the third-largest category (class 4). Specifically, for each year and each region, we compute values of net charge-offs for the class 5 and 6 banks, assuming that they had the same net charge-off/assets ratio as the class 4 banks in the same region.[15] We then use this information to compute the yearly reduction in aggregate charge-offs that would have resulted. If the extranormal loan losses of the class 5 and 6 banks reflect the consequences of excessive risk-taking encouraged by regulatory policy, then this computation is a rough estimate of the cost of this policy.

Table 9 shows that under these assumptions, total charge-offs would have averaged about 25 percent lower over 1983–91. This amounts to an extra loss in wealth over the period of about $45 billion—if not quite an Okun gap, then certainly a heap of Harberger triangles. To place the number in context, the total equity capital of the banking system is $232 billion. (Charge-offs ultimately reduce capital.) Note that the class 6 banks (those with assets over $10 billion) account for most of the cost. Finally, we observe that two-thirds of the cost—about $30 billion—arises in the peak period of banking difficulties, 1987–91, mainly due to the poor performance of the class 6 banks.

Our cost estimate is conservative, we think, for two reasons. First, we do not use the best performing banks, those in class 3, as the benchmark for calculating the cost. Using the banks in size class 3 ($100 million–$250 million)

[14] In Boyd and Gertler 1993, we include some empirical results which, due to space limitations, are not reproduced here. In particular, we show that the size effect remains significant after we include portfolio share variables—for example, the ratio of commercial and industrial loans to total loans and the ratio of commercial real estate loans to total loans. However, it is difficult to interpret these regressions. Suppose, for example, that too-big-to-fail induced a large bank to invest more heavily in commercial real estate lending. Because the loan share variable is continuous, it might do better in explaining loan losses than the size dummy which was the true primitive factor. Hence, even if we had found that loan shares displaced size, it would not necessarily be evidence against our hypothesis.

[15] We are assuming that class 4 bank portfolios are available in elastic supply (that is, that the type of portfolio held by class 4 banks is available in elastic supply to class 5 and 6 banks).

as the benchmark for performance instead of those in size class 4 ($250 million–$1 billion) would produce a larger estimate.

Second, to the extent that loan losses forced capital constraints to bind tighter, the shadow value of charge-offs may exceed the dollar amount. Table 10 presents information by size class on the share of assets held by banks that were capital-constrained during the height of what some call the *capital crunch,* in 1990 and 1991. The table shows that the capital crunch was almost exclusively a large bank problem. The banks that were constrained were mainly large, and large banks accounted for nearly all of the assets held by constrained banks. These facts correspond to the recent empirical evidence on the impact of bank capital on loan growth during 1990 and 1991. Both Furlong (1991) and Peek and Rosengren (1991) show that the link between capital declines and loan growth (first documented by Bernanke and Lown 1991) was stronger in magnitude for large banks than for small banks. Thus, to the degree loan losses forced a reduction in lending (via the impact on bank equity), our cost estimate should be adjusted upward. (See also Lown and Peristiani 1993.)

Our calculations are only intended to question the efficiency of the safety net that existed in the 1980s and not that safety net's desirability. As discussed earlier, despite the changes in this industry, a major banking crisis could still potentially disrupt the economy. As Summers (1991) has observed, a financial crisis which raised the unemployment rate by one percentage point for one year would result in a $100 billion loss in output.

In Conclusion

In assessing the impact of the too-big-to-fail policy, we find it useful to make the distinction, common in business cycle analysis, between *impulses* and *propagation*. It is not correct to think of the policy as a primitive causal force, or impulse, in the recent banking crisis. Clearly, the impulses were a series of negative shocks that included defaults on LDC debt and collapsing oil and real estate prices. The too-big-to-fail policy contributed by subsidizing risk-taking and thereby increasing the vulnerability of the banking system to these disturbances.[16] In this way the policy shaped the propagation by creating an environment that enhanced the impact of these impulses. If we accept large banks' extranormal losses as a rough estimate of the impact of this policy, then the cost during the 1980s was $45 billion—or about 20 percent of the capital of the banking industry. An additional cost (even harder to quantify) was that large banks were the main culprits in the 1990–91 capital crunch.

Making the distinction between impulses and propagation clarifies the fact that it is not meaningful to simply argue that bad luck was responsible for the plight of the large banks. Of course, it is the case that large banks were unlucky, since they were heavily invested in assets which experienced negative shocks during the 1980s. However, a similar statement could be made about the savings and loans. They were unlucky in an analogous way. With large banks as with the savings and loans, the key issue is whether the portfolio structure these financial firms adopted was distorted by regulatory bias. As we have discussed, it is hard to believe that the portfolio structure of very large banks (for example, heavy investment in LDC and commercial real estate lending, in conjunction with thin capital/assets ratios) could be explained simply by scale economies. To us this becomes particularly apparent when one examines the behavior of banks above $10 billion in assets, a range in which scale economies are no longer likely to exist.

What are the implications of our analysis for the recently introduced policy reforms? The most significant reforms, of course, are the Basle Accord of 1988, which introduced risk-based capital standards, and the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA). Both reforms appear to directly confront what our analysis suggests has been the main problem: the subsidy to risk-taking by large banks. As we have argued, an important way the subsidy has played out has been that large banks have held less capital than they might have otherwise. The new Bank for International Settlements capital requirements should help offset this distortion and, in this way, force the large banks to better internalize the costs of their portfolio decisions. And the increased cushion of capital reduces the probability that taxpayers will have to finance loan losses.

Provisions of the FDICIA attempt to roll back the too-big-to-fail policy. Saving a large U.S. bank now requires the formal concurrence of bank regulators, the secretary of the Treasury, and even the president. These provisions also restrict discount window lending, a favorite tool used over the last decade to keep troubled large banks afloat. Finally, and importantly, the provisions impose restrictions on interbank lending to banks that fail to meet adequate capital standards. The goal here is to reduce the likelihood

[16]This statement presumes that it is possible to have a banking safety net in the absence of the particular too-big-to-fail policy that prevailed over the last decade. We expand on this issue a few paragraphs below.

that closing a large bank will precipitate a wave of failures throughout the banking system. The idea is to avoid the kind of trap regulators fell into during the Continental Illinois crisis.

Whereas we are generally optimistic, the new policy regime has not really been tested yet, and it is impossible to predict how it will ultimately work. Moreover, the new regime contains a number of provisions which are undesirable in our view. However, these issues are beyond the scope of the present study.

Finally, we discuss some of the implications of our analysis for two related policy issues—namely, interstate branching and bank mergers. Our tests indicate that very small banks also did rather poorly during the 1980s. This finding suggests that the inability to exploit scale economies, rather than disproportionate loan losses, may be the main problem for the smallest category of banks (those with less than $50 million in assets). Encouraging these banks to merge with larger banks may therefore be desirable. At the same time, we are skeptical about the benefits of permitting mergers among very large banks. The clear pattern of our results is that in the 1980s banks in the middle of the size distribution (with assets of $100 million–$1 billion) performed best. Several detailed studies of the issue have also concluded that recent large bank mergers have not produced efficiency gains (Berger and Humphrey 1991 and references therein).

Restrictions on interstate banking have likely contributed to the high number of bank failures, particularly failures of small banks in the oil and agricultural regions. But as we have argued, the main stress on the system has not been the raw number of bank failures; rather, it has been the poor performance of large banks. Restrictions on interstate banking do not prevent large banks from diversifying their loan portfolios nationally. Specifically, these restrictions do not preclude banks from opening loan production offices across state borders. While scale economies may inhibit smaller banks from pursuing this activity, large banks do not face formidable obstacles to national (or even international) lending. Accordingly, we do not think that interstate branching restrictions have been primarily responsible for bank failures. We do think, however, that there is a case for further reducing restrictions on interstate banking. It is true that branching facilitates lending to smaller borrowers. In this vein, branches may be more efficient conduits than loan production offices for cross-state lending. Any reform which improves the efficiency of large banks is worth taking seriously.

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