Challenges to the Dual Banking System: The Funding of Bank Supervision *(page 1)*

by Christine E. Blair and Rose M. Kushmeider

As the powers of state-chartered and national banks have converged, the cost of supervision has assumed a greater importance in the competition between regulators for member institutions. This article examines the funding of bank supervision in the context of the dual banking system.

Troubled Banks: Why Don't They All Fail? *(page 23)*

by Robert Oshinsky and Virginia Olin

This article focuses on troubled banks to create a four-state model that predicts failure and three alternative outcomes to failure: recovery, merger, and continuation as a problem. The results show that the four-state model not only predicts failure, but also offers more information about the possible future states of problem banks than a two-state model can.

Challenges to the Dual Banking System: The Funding of Bank Supervision

by Christine E. Blair and Rose M. Kushmeider*

This article examines the funding of bank supervision in the context of the dual banking system. Since 1863, commercial banks in the United States have been able to choose to organize as national banks with a charter issued by the Office of the Comptroller of the Currency (OCC) or as state banks with a charter issued by a state government. The choice of charter determines which agency will supervise the bank: the primary supervisor of nationally chartered banks is the OCC, whereas state-chartered banks are supervised jointly by their state chartering authority and either the Federal Deposit Insurance Corporation (FDIC) or the Federal Reserve System (Federal Reserve).[1] In their supervisory capacity, the FDIC and the Federal Reserve generally alternate examinations with the states.

The choice of charter also determines a bank's powers, capital requirements, and lending limits. Over time, however, the powers of state-chartered and national banks have generally converged, and the other differences between a state bank charter and a national bank charter have diminished as well. Two of the differences that remain are the lower supervisory costs enjoyed by state banks and the preemption of certain state laws enjoyed by national banks. The interplay between these two differences is the subject of this article. Specifically, we examine how suggestions for altering the way banks pay for supervision may have (unintended) consequences for the dual banking system.

For banks of comparable asset size, operating with a national charter generally entails a greater supervisory cost than operating with a state charter. National banks pay a supervisory assessment to the OCC for their supervision. Although state-chartered banks pay an assessment for supervision to their chartering state, they are not charged for supervision by either the FDIC or the Federal Reserve. A substantial portion of the cost of supervising state-chartered banks is thus borne by the FDIC and the Federal Reserve. The FDIC derives its funding from the deposit insurance funds, and the Federal Reserve is funded through

[1] In addition, the Federal Reserve supervises the holding companies of commercial banks, and the FDIC has backup supervisory authority over all insured depository institutions.

the interest earned on the Treasury securities that it purchases with the reserves commercial banks are required to deposit with it. By contrast, the OCC relies almost entirely on supervisory assessments for its funding.

The current funding system is a matter of concern because—with fewer characteristics distinguishing the national bank charter from a state bank charter—chartering authorities increasingly compete for member banks on the basis of supervisory costs and the ways in which those costs can be contained. Furthermore, two recent trends in the banking industry have been fueling the cost competition: increased consolidation and increased complexity. Consolidation has greatly reduced the number of banks, thereby reducing the funding available to the supervisory agencies, while the increased complexity of a small number of very large banking organizations has put burdens on examination staffs that may not be covered by assessments. Together, these three factors—the importance of cost in the decision about which charter to choose, the smaller number of banks, and the special burdens of examining large, complex organizations—have put regulators under financial pressures that may ultimately undermine the effectiveness of prudential supervision. Cost competition between chartering authorities could affect the ability to supervise insured institutions adequately and effectively and may ultimately affect the viability of the dual banking system.

The concern about the long-term viability of the dual banking system derives from changes to the balance between banking powers and the costs of supervision. If the balance should too strongly favor one charter over the other, one of the charters might effectively disappear. Such a disappearance has already been prefigured by events in the thrift industry.

The next section contains a brief history of the dual banking system and charter choice, explaining why the cost of supervision has become so important. Then we examine the mechanisms currently in place for funding bank supervision, and discuss the two structural changes in the banking industry that have fueled the regulatory competition. Next we draw on the experiences of the thrift industry to examine how changes in the balance between powers and the cost of supervision can influence the choice of charter type. Alternative means for funding bank supervision, and a concluding section, complete the article.

A Brief History of the Dual Banking System and Charter Choice

Aside from the short-lived exceptions of the First Bank of the United States and the Second Bank of the United States, bank chartering was solely a function of the states until 1863. Only in that year, with the passage of the National Currency Act, was a federal role in the banking system permanently established. The intent of the legislation was to assert federal control over the monetary system by creating a uniform national currency and a system of nationally chartered banks through which the federal government could conduct its business.[2] To charter and supervise the national banks, the act created the Office of the Comptroller of the Currency (OCC). The act was refined in 1864 with passage of the National Bank Act.

Once the OCC was created, anyone who was interested in establishing a commercial bank could choose either a federal or a state charter. The decision to choose one or the other was relatively clear-cut: the charter type dictated the laws under which the bank would operate and the agency that would act as the bank's supervisor. National banks were regulated under a system of federal laws that set their capital, lending limits, and powers. Similarly, state-chartered banks operated under state laws.

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[2] The new currency–U.S. bank notes, which had to be backed by Treasury securities–would trade at par in all U.S. markets. The new currency thus created demand for U.S. Treasuries and helped to fund the Civil War. At the time, it was widely believed that a system of national banks based on a national currency would supplant the system of state-chartered banks. Indeed, many state-chartered banks converted to a national charter after Congress placed a tax on their circulating notes in 1865. However, innovation on the part of state banks–the development of demand deposits to replace bank notes–halted their demise. See Hammond (1957), 718–34.

When the Federal Reserve Act was passed in 1913, national banks were compelled to become members of the Federal Reserve System; by contrast, state-chartered banks could choose whether to join. Becoming a member bank, however, meant becoming subject to both state and federal supervision. Accordingly, relatively few state banks chose to join. The two systems remained largely separate until passage of the Banking Act of 1933, which created the Federal Deposit Insurance Corporation. Under the act national banks were required to obtain deposit insurance; state banks could also obtain deposit insurance, and those that did became subject to regulation by the FDIC.[3] The vast majority of banks obtained federal deposit insurance; thus, although banks continued to have their choice of charter, neither of the charters would relieve a bank of federal oversight.

As noted above, over the years, the distinctions between the two systems greatly diminished. During the 1980s, differences in reserve requirements, lending limits, and capital requirements disappeared or narrowed. In 1980, the Depository Institutions Deregulation and Monetary Control Act gave the benefits of Federal Reserve membership to all commercial banks and made all subject to the Federal Reserve's reserve requirements. In 1982, the Garn–St Germain Act raised national bank lending limits, allowing these banks to compete better with state-chartered banks. Differences continued to erode in the remaining years of the decade, as federal supervisors instituted uniform capital requirements for banks.

As these differences in their charters were diminishing, both the states and the OCC attempted to find new ways to enhance the attractiveness of their respective charters. The states have often permitted their banks to introduce new ideas and innovations, with the result these institutions have been able to experiment with relative ease. Many of the ideas thus introduced have been subsequently adopted by national banks. In the early years of the dual banking system, for example, state banks developed checkable deposits as an alternative to bank notes. Starting in the late 1970s, a spate of innovations took root in state-chartered banks: interest-bearing checking accounts, adjustable-rate mortgages, home equity loans, and automatic teller machines were introduced by state-chartered banks. During the 1980s the states took the lead in deregulating the activities of the banking industry. Many states permitted banks to engage in direct equity investment, securities underwriting and brokerage, real estate development, and insurance underwriting and agency.[4] Further, interstate banking began with the development of regional compacts at the state level.[5] At the federal level, the OCC expanded the powers in which national banks could engage that were considered "incidental to banking." As a result, national banks expanded their insurance, securities and mutual fund activities.

Then in 1991, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) limited the investments and other activities of state banks to those permissible for national banks and the differences between the two bank charters again narrowed.[6] In response, most states enacted wildcard statutes that allowed their banks to engage in all activities permitted national banks.[7]

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[3] While most states subsequently required their banks to become federally insured, some states continued to charter banks without this requirement. Banks without federal deposit insurance continued to be supervised exclusively at the state level. After the savings and loan crises in Maryland and Ohio in the mid-1980s, when state-sponsored deposit insurance systems collapsed, federal deposit insurance became a requirement for all state-chartered banks.

[4] For a comparison of state banking powers beyond those considered traditional, see Saulsbury (1987).

[5] Beginning in the late 1970s and early 1980s, the states began permitting bank holding companies to own banks in two or more states. State laws governing multistate bank holding companies varied: some states acted individually, others required reciprocity with another state, and still others participated in reciprocal agreements or compacts that limited permissible out-of-state entrants to those from neighboring states. In 1994, Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act, which removed most of the remaining state barriers to bank holding company expansion and authorized interstate branching. See Holland et al. (1996).

[6] As amended by FDICIA, Section 24 of the Federal Deposit Insurance Act (12 U.S.C. 1831a) makes it unlawful, subject to certain exceptions, for an insured state bank to engage directly or indirectly through a subsidiary as principal in any activity not permissible for a national bank unless the FDIC determines that the activity will not pose a significant risk to the funds and the bank is in compliance with applicable capital standards. For example, the FDIC has approved the establishment of limited-liability bank subsidiaries to engage in real estate or insurance activities.

[7] For a discussion of the legislative and regulatory changes affecting banks during the 1980s and early 1990s, see FDIC (1997), 88–135.

Most recently, competition between the two charters for member institutions has led the OCC to assert its authority to preempt certain state laws that obstruct, limit, or condition the powers and activities of national banks. As a result, national banks have opportunities to engage in certain activities or business practices not allowable to state banks.[8] The OCC is using this authority to ensure that national banks operating on an interstate basis are able to do so under one set of laws and regulations—those of the home state. In this regard, for banks operating on an interstate basis, the national bank charter offers an advantage since states do not have comparable preemption authority. (In theory, however, nothing prevents two or more states from harmonizing their banking regulations and laws so that state banks operating throughout these states would face only one set of rules.) Thus, the OCC's preemption regulations reinforce the distinction between the national and state-bank charters that characterizes the dual banking system.

Funding Bank Supervision

The gradual lessening of the differences between the two charters has brought the disparities in the fees banks pay for supervision into the spotlight as bank regulators have come under increased fiscal pressure to fund their operations and remain attractive choices. How bank supervision is ultimately funded will have implications for the viability of the dual banking system. It has always been the case that most state bank regulators and the OCC are funded primarily by the institutions they supervise,[9] but it used to be that differences in the fees paid by banks for regulatory supervision were secondary to the attributes of their charters. Now, however, the growing similarity of attributes has made the cost of supervision more important in the regulatory competition between states and the OCC to attract and retain member institutions. This competition has tempered regulators' willingness to increase assessments and has left them searching for alternative sources of funding that will not induce banks to switch charters. The question for state bank regulators

and the OCC, then, is how to fund their operations while remaining attractive charter choices in an era of fewer but larger banks. Here we summarize the funding mechanisms currently in place, and in a later section we discuss alternative means for funding bank supervision.

The OCC's Funding Mechanism

In the mid-1990s, after charter changes by a number of national banks,[10] the OCC began a concerted effort to reduce the cost of supervision, especially for the largest banks. The agency instituted a series of reductions in assessment fees and suspended an adjustment in its assessment schedule for inflation.[11] When the inflation adjustment was reinstated in 2001, it was applied only to the first $20 billion of a bank's assets. In 2002, the OCC revised its general assessment schedule and set a minimum assessment for the smallest banks. These changes reduced the cost of supervision for many larger banks, while increasing the cost for smaller banks—thus, making the assessment schedule even more regressive than previously. For example, national banks with assets of $2 million or less faced an assessment increase of at least 64 percent, while larger banks experienced smaller percentage increases or actual reductions in assessments.

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[8] On January 7, 2004, the OCC issued two final regulations to clarify aspects of the national bank charter. The purpose cited was to enhance the ability of national banks to plan their activities with predictability and operate efficiently in today's financial marketplace. The regulations address federal preemption of state law and the exclusive right of the OCC to supervise national banks. The first regulation concerns preemption, or the extent to which the federally granted powers of national banks are exempt from state laws. State laws that concern aspects of lending and deposit taking, including laws affecting licensing, terms of credit, permissible rates of interest, disclosure, abandoned and dormant accounts, checking accounts, and funds availability, are preempted under the regulation. The regulation also identifies types of state laws from which national banks are not exempt. A second regulation concerns the exclusive powers of the OCC under the National Bank Act to supervise the banking activities of national banks. It clarifies that state officials do not have any authority to examine or regulate national banks except when another federal law has authorized them to do so. See OCC (2004b, 2004c).

[9] Although the OCC is a bureau of the U.S. Treasury Department, it does not receive any appropriated funds from Congress.

[10] For example, in 1994, 28 national banks chose to convert to a state bank charter; another 15 did so in 1995. See Whalen (2002).

[11] The OCC's assessment regulation (12 C.F.R., Part 8) authorizes rate adjustments up to the amount of the increase in the Gross Domestic Product Implicit Price Deflator for the 12 months ending in June.

The OCC charges national banks a semiannual fee on the basis of asset size, with some variation for other factors (see below). The semiannual fee is determined by the OCC's general assessment schedule. As table 1 and figure 1 show, the marginal or effective assessment rate declines as the asset size of the bank increases.

The marginal rates of the general assessment schedule are indexed for recent inflation, and a surcharge—designed to be revenue neutral—is placed on banks that require increased supervisory resources, ensuring that well-managed banks do not subsidize the higher costs of supervising less-healthy institutions. The surcharge applies to national banks and federal branches and agencies of foreign banks that are rated 3, 4, or 5 under either the CAMELS or the ROCA rating system.[12] For banking organizations with multiple national bank charters, the assessments charged to their non-lead national banks are reduced.[13] In 2004, these general assessments provided approximately 99 percent of the agency's funding.[14] The remaining 1 percent was provided by interest earned on the agency's investments and by licensing and other fees. As indicated in note 9, the OCC does not receive any appropriated funds from Congress.

[12] As part of the examination process, the supervisory agencies assign a confidential rating, called a CAMELS (Capital, Assets, Management, Earnings, Liquidity, and Sensitivity to market risk) rating, to each depository institution they regulate. The rating ranges from 1 to 5, with 1 being the best rating and 5 the worst. ROCA (Risk management, Operational controls, Compliance, and Asset quality) ratings are assigned to the U.S. branches, agencies, and commercial lending companies of foreign banking organizations and also range from 1 to 5. See Board et al. (2005).

[13] Non-lead banks receive a 12 percent reduction in fees in the OCC's assessment schedule. See OCC (2003b).
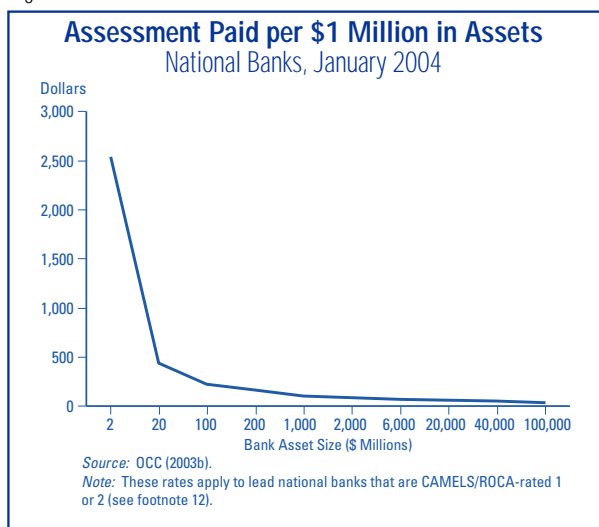
[14] See OCC (2004a), 7.

Figure 1

Assessment Paid per $1 Million in Assets
National Banks, January 2004

Source: OCC (2003b).
Note: These rates apply to lead national banks that are CAMELS/ROCA-rated 1 or 2 (see footnote 12).

Table 1

OCC General Assessment Fee Schedule
January 2004

If total reported assets are		The semiannual assessment is		
Over ($ million)	But not over ($ million)	This amount ($)	Plus	Of excess over ($ million)
0	2	5,075	.000000000	0
2	20	5,075	.000210603	2
20	100	8,866	.000168481	20
100	200	22,344	.000109512	100
200	1,000	33,295	.000092663	200
1,000	2,000	107,425	.000075816	1,000
2,000	6,000	183,241	.000067393	2,000
6,000	20,000	452,813	.000057343	6,000
20,000	40,000	1,255,615	.000050403	20,000
40,000		2,263,675	.000033005	40,000

Source: OCC (2003b).
Note: These rates apply to lead national banks that are CAMELS/ROCA-rated 1 or 2 (see footnote 12).

The States' Funding Mechanisms

The assessment structures used by the states to fund bank supervision vary considerably, although some features are common to most of them. Most states charge assessments against some measure of bank assets, and in many the assessment schedule is regressive, using a declining marginal rate. (See the appendix for several representative examples of state assessment schedules.) More than half of all states also impose an additional hourly examination fee. Only a few states link their assessments to bank risk—for example, by factoring CAMELS ratings into the assessment schedule.[15]

To illustrate the differences in the supervisory assessment fees charged by the OCC and the states, we calculated approximate supervisory assessments for two hypothetical banks, one with $700 million in assets and one with $3.5 billion. We used assessment schedules for the OCC and four states—Arizona, Massachusetts, North Carolina, and South Dakota—whose assessment structures are representative of the different types of assessment schedules used by the states. Like the OCC, Arizona and North Carolina use a regressive assessment schedule and charge assessments against total bank assets; however, neither makes any adjustment based on bank risk. Arizona's assessment schedule makes finer gradations at lower levels of asset size than does North Carolina's schedule. Massachusetts uses a risk-based assessment schedule in which assessments are based on asset size and CAMELS rating. Banks are grouped as CAMELS 1 and 2, CAMELS 3, and CAMELS 4 and 5. Within each CAMELS group there is a regressive assessment schedule so that banks are charged an assessment based on total bank assets. South Dakota charges a flat-rate assessment against total bank assets.

The results are shown in table 2. As expected, the assessments for supervision paid by state-chartered banks are significantly less than those paid by comparably sized OCC-supervised banks. As noted above, a likely cause of this disparity is that the states share their supervisory responsibilities with federal regulatory agencies (that is, with the FDIC and the Federal Reserve) that do not charge for their supervisory examinations of state-chartered banks.

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[15] Among the states that rely primarily on hourly examination fees to cover their costs are Delaware and Hawaii. States relying on a flat-rate assessment include Maine, Nebraska, and South Dakota. Those using a risk-based assessment scheme include Iowa, Massachusetts, and Michigan. Those assessing on the basis of their expected costs include Colorado, Louisiana, and Minnesota. One state, Tennessee, explicitly limits its assessments to no more than the amount charged by the OCC for a comparable national bank. For a listing of assessment schedules and fees by state, see CSBS (2002), 45–63.

Table 2

Comparison of Annual Supervisory Assessment Fees
OCC and Selected States, 2002

	$700 million bank		$3.5 billion bank			
	Assessment	Effective Asssessment per Thousand $	Assessment	Effective Assessment per Thousand $	Difference in Assessments (percent)	Incidence of Assessment Schedule
Arizona	$ 54,000	$.077	$205,000	$.058	+279%	Regressive
Massachusetts	52,000	.074	227,000	.064	+336	Regressive
North Carolina	62,500	.089	177,500	.051	+184	Regressive
South Dakota	35,000	.050	175,000	.050	+400	Flat
OCC	159,000	.227	569,000	.163	+257	Regressive

Source: CSBS (2002) and OCC (2002).

Note: The calculation of assessments for state-chartered banks is based on rate schedules provided by the states to CSBS. Where applicable, the assessment is calculated for a CAMELS 1- or 2-rated bank.

The Effect on Regulatory Competition of Changes in the Banking Industry

Cost competition between state regulators and the OCC, and among state regulators themselves, has been fueled by two important structural changes that have occurred in the banking industry over the past two decades. The number of bank charters has declined, largely because of increased bank merger and consolidation activity, and the size and complexity of banking organizations has increased.

The first change—a decline in the number of charters—means that the OCC and state regulators are competing for a declining member base. As we have seen, the cost of supervision remains one of the few distinguishing features of charter type. In ways that we explain below, the declining member base puts an additional constraint on the regulators' ability to raise assessment rates, even in the face of rising costs to themselves.

The second important structural change of the past two decades—the increasing complexity of institutions—also complicates the funding issue, for it may impose added supervisory costs that are not reflected in the current assessment schedules. As explained in the previous section, the OCC and most states currently charge examination fees on the basis of an institution's assets, but for a growing number of institutions, that assessment base does not reflect the operations of the bank.

The Net Decline in the Number of Bank Charters

The net decline in the number of banking charters since 1984 has resulted from two main factors. One is the lifting of legal restrictions on the geographic expansion of banking organizations—a lifting that provided incentive and opportunity for increased mergers and consolidation in the banking industry—and the other is the wave of bank failures that occurred during the banking crisis of the late 1980s and early 1990s.[16]

Until the early 1980s, banking was largely a local business, reflecting the limits placed by the states on intra- and interstate branching. At year-end 1977, 20 states allowed statewide branching, and the remaining 30 states placed limits on intrastate branching.[17] However, as the benefits of geographic diversification became better understood, many states began to lift the legal constraints on branching. By mid-1986, 26 states allowed statewide branch banking, while only 9 restricted banks to a unit banking business. By 2002, only 4 states placed any limits on branching.[18] Interstate banking, which was just beginning in the early 1980s, generally required separately capitalized banks to be established within a holding company structure. Interstate branching was virtually nonexistent.[19]

The passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 imposed a consistent set of standards for interstate banking and branching on a nationwide basis.[20] With the widespread lifting of the legal constraints on geographic expansion that followed, bank holding companies began to consolidate their operations into fewer banks. Bank acquisition activity also accelerated.

Bank failures took a toll on the banking industry as well, reaching a peak that had not been seen since the Great Depression: from 1984 through 1993, 1,380 banks failed.[21] Mergers and acquisitions, however, remained the single largest contributor to the net decline in banking charters. Overall, the number of banks declined dramatically from 1984 through 2004, falling from 14,482 to 7,630. At the same time, the average asset size of banks increased. (See table 3.)

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[16] See FDIC (1997).

[17] Twelve of the 30 states permitted only unit banking, and the other 18 permitted only limited intrastate branching. See CSBS (1977), 95.

[18] See CSBS (2002), 154. The four states were Iowa, Minnesota, Nebraska, and New York.

[19] By the early 1980s, 35 states had enacted legislation providing for regional or national full-service interstate banking. Most regional laws were reciprocal, restricting the right of entry to banking organizations from specified states. See Saulsbury (1986), 1–17.

[20] The act authorized interstate banking and branching for U.S. and foreign banks to be effective by 1997. See FDIC (1997), 126.

[21] See FDIC (2002a), 111.

The rise in interstate banking, in particular, fueled competition both among state regulators and between state regulators and the OCC. Mergers of banks with different state charters caused the amount of bank assets supervised by some state regulators to decline, and the amount supervised by other state regulators to increase commensurately.[22] Similarly, mergers between state-chartered and national banks caused assessment revenues and supervisory burden to shift between state regulators and the OCC. While the number of banks was thus declining, the average asset size of the banks was increasing. Because of the regressive nature of most assessment schedules, this resulted in a decline of assessment revenues per dollar of assets supervised. For bank holding companies, this provided an incentive to merge their disparate banking charters. For supervisors, mergers have proved more problematic. In general, the regressive nature of most assessment schedules suggests that regulators enjoy economies of scale in supervision. However, given the increased complexity of many large banks (discussed below), the existence of such economies is questionable.[23]

A hypothetical example (taken from table 2) further highlights the effects of consolidation and merger activity on the regulatory agencies. All else equal (that is, holding constant the assessment schedules shown in table 2), changes in the structure of the industry over time have reduced the funding available to the supervisory agencies. Consider a bank holding company with five national banks, each with an average asset size of $700 million. The lead bank would pay an annual assessment to the OCC of $159,000, and each of the remaining banks would be assessed $139,920.[24] The total for the five banks would be $718,680. But if these banks were to merge into one national bank with $3.5 billion in assets, the assessment owed the OCC would decline to $569,000—a saving to the bank of $149,680 in assessment fees for 2002. Similar results can be derived for each of the states in the table except South Dakota, which has a flat-rate assessment schedule.

The Growth of Complex Banks

During the 1990s, we have seen the emergence of what are termed large, complex banking organizations (LCBOs) and the growth of megabanks

[22] When banks merge, management must choose which bank charter to retain. That decision will determine the combined bank's primary regulator.
[23] The nature and amount of such scale economies in bank examination are beyond the scope of this article to investigate.
[24] This calculation reflects the 12 percent reduction in fees that non-lead banks receive. See OCC (2003b).

Table 3

Number and Average Assets of Commercial Banks by Charter, 1984–2004						Change	Percent change
	1984	1989	1994	1999	2004	1984–2004	
Number of Banks							
National Charter	4,902	4,175	3,076	2,365	1,906	(2,996)	(61)%
State Charter	9,580	8,534	7,376	6,215	5,724	(3,856)	(40)
Total	14,482	12,709	10,452	8,580	7,630	(6,852)	(47)
Average Asset Size ($Millions)							
National Charter	$305.6	$473.8	$733.9	$1,383.2	$2,938.9	$2,633.3	862%
State Charter	105.5	154.8	237.9	396.4	491.2	385.7	366
All Banks	173.2	259.6	383.9	668.4	1,102.6	929.4	537

Source: FDIC Call Reports and FDIC (2002a). Figures not adjusted for inflation.

owned by these organizations.[25] In 1992, 90 banks controlled one-half of industry assets; by the end of the decade, the number of banks that controlled one-half of industry assets had shrunk to 26, and at year-end 2004 to 13.[26] These large banks engage in substantial off-balance-sheet activities and hold substantial off-balance-sheet assets. As a result, existing assessment schedules based solely on asset size have become less-accurate gauges of the amount of supervisory resources needed to examine and monitor them effectively.

Because of their size, geographic span, business mix (including nontraditional activities), and ability to rapidly change their risk profile, mega-banks require substantial supervisory oversight and therefore impose extensive new demands on bank regulators' resources. In response, supervisors have created a continuous-time approach to LCBO supervision with dedicated on-site examiners—an approach that is substantially more resource-intensive than the traditional discrete approach of annual examinations used for most banks.

For example, the OCC—through its dedicated examiner program—assigns a full-time team of examiners to each of the largest national banks (at year-end 2004, the 25 largest). In size, these teams of examiners range from just a few to 50, depending on the bank's asset size and complexity. The teams are supplemented with specialists—such as derivatives experts and economists—who assist in targeted examinations of these institutions.[27]

Like the trend toward greater consolidation of the industry, the trend toward greater complexity leads us to question the adequacy of the funding mechanism for bank supervision. The need for additional resources to supervise increasingly large and complex institutions, combined with the regulators' limited ability to raise assessment rates given their concerns with cost competition, creates a potentially unstable environment for banking supervision. If regulatory competition on the basis of cost should yield insufficient funding, the

quality of the examination process might suffer. To ensure the adequacy of the supervisory process, the potential for a funding problem must be addressed. In addressing this issue, however, the possibility for other unintended consequences must not be overlooked. In particular, solutions to the funding problem could bring into question the long-term survivability of the dual banking system. In the next section we look at a lesson from the thrift industry to illustrate this problem.

Funding Supervision: Lessons from the Thrift Industry

The history of the thrift industry shows how the choice of charter type can be influenced by changes in the tradeoff between the powers conferred by particular charters and the cost of bank supervision, and what that implies for the viability of the dual banking system. Like the commercial banking industry, the thrift industry also operates under a dual chartering system. States offer a savings and loan association (S&L) charter; some states also offer a savings bank charter. At the federal level, the Office of Thrift Supervision (OTS) offers both a federal S&L charter and

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[25] LCBOs are domestic and foreign banking organizations with particularly complex operations, dynamic risk profiles and a large volume of assets. They typically have significant on- and off-balance-sheet risk exposures, offer a broad range of products and services at the domestic and international levels, are subject to multiple supervisors in the United States and abroad, and participate extensively in large-value payment and settlement systems. See Board (1999). The lead banks within such organizations form a class of banks termed megabanks. Like their holding companies, they are complex institutions with a large volume of assets–typically $100 billion or more. See, for example, Jones and Nguyen (2005).

[26] The 13 banks that held one-half of banking industry assets as of December 2004 (according to the FDIC Call Reports) were JPMorgan Chase Bank, NA; Bank of America, NA; Citibank, NA; Wachovia Bank, NA; Wells Fargo Bank, NA; Fleet National Bank; U.S. Bank, NA; HSBC USA, NA; SunTrust Bank; The Bank of New York; State Street Bank and Trust Company; Chase Manhattan Bank USA, NA; and Keybank, NA. Of these, only three were state-chartered.

[27] After JPMorgan Chase converted from a state charter (New York) to a national charter (in November 2004), the OCC indicated it would increase its supervisory staff. The OCC is also emphasizing "horizontal" examinations, which use specialists to focus supervisory attention on specific business lines. See *American Banker* (2005).

a federal savings bank (FSB) charter.[28] All state-chartered thrifts are regulated and supervised by their state chartering authority and also by a federal agency—the OTS in the case of state-chartered S&Ls, and the FDIC in the case of state-chartered savings banks.[29]

The Thrift Industry to 1989

Before the 1980s, S&Ls and savings banks operated under limited powers, largely because they served particular functions: facilitating home ownership and promoting savings, respectively.[30] In 1979, changes in monetary policy resulted in steep increases in interest rates, which in turn caused many S&Ls to face insolvency. The books of a typical S&L reflected a maturity mismatch—long-term assets (fixed-rate mortgage loans) funded by short-term liabilities (time and savings deposits). When interest rates spiked, these institutions faced the prospect of disintermediation: depositors moving their short-term savings deposits out of S&Ls and into higher-earning assets. In response, many S&Ls raised the rates on their short-term deposits above the rates they received on their long-term liabilities. The resultant drain on their capital, coupled with rising defaults on their loans, caused some institutions to become insolvent.

In 1980 and again in 1982, Congress enacted legislation intended to resolve the unfolding S&L crisis, turning its attention to interest-rate deregulation and other regulatory changes designed to aid the suffering industry.[31] For federally chartered thrifts, the requirements for net worth were lowered, ownership restrictions were liberalized, and powers were expanded. The Federal Home Loan Bank Board (FHLBB) subsequently extended many of these relaxed requirements to state-chartered S&Ls by regulatory action.[32] Congress also raised the coverage limit for federal deposit insurance from $40,000 to $100,000 per depositor per institution, and lifted interest-rate ceilings. In turn, many states passed legislation that provided similar deregulation for their thrifts.[33]

Despite efforts to contain the thrift crisis throughout the 1980s, the failure rate for S&Ls reached unprecedented levels. Between 1984 and 1990, 721 S&Ls failed—about one-fifth of the industry. At the end of the decade, with passage of the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA), Congress and the administration finally found a resolution to the crisis. FIRREA authorized the use of taxpayer funds to resolve failed thrift institutions, and it significantly restructured the regulation of thrifts.[34] Federal regulation and supervision of all S&Ls (both state- and federally chartered) and of federally chartered savings banks were removed from the FHLBS and placed under the newly created OTS.[35] Federal regulation and supervision of state-chartered savings banks remained with the FDIC.

[28] Originally S&Ls were chartered to facilitate the home ownership of members by pooling members' savings and providing housing loans. Savings banks, by contrast, were founded to promote the savings of their members; the institutions' assets were restricted to high-quality bonds and, later, to blue-chip stocks, mortgages, and other collateralized lending. Over time, distinctions between S&Ls and savings banks largely disappeared. Additionally, an institution's name may no longer be indicative of its charter type.

[29] Before 1990, federal savings institutions were regulated and supervised by the Federal Home Loan Bank System (FHLBS), which was comprised of 12 regional Federal Home Loan Banks and the Federal Home Loan Bank Board (FHLBB). The FHLBS was created by the Federal Home Loan Bank Act of 1932 to be a source of liquidity and low-cost financing for S&Ls. In 1933, the Home Owners' Loan Act empowered the FHLBS to charter and to regulate federal S&Ls. Savings banks, by contrast, were solely chartered by the states until 1978, when the Financial Institutions Regulatory and Interest Rate Control Act authorized the FHLBS to offer a federal savings bank charter. In 1989, the Financial Institutions Reform, Recovery, and Enforcement Act abolished the FHLBB and transferred the chartering and regulation of the thrift industry from the FHLBS to the OTS. Additionally, the act abolished the thrift insurer, the Federal Savings and Loan Insurance Corporation, and gave the FDIC permanent authority to operate and manage the newly formed Savings Association Insurance Fund. Although the FHLBB was abolished, the Federal Home Loan Banks remained—their duties directed to providing funding (termed advances) to the thrift industry.

[30] For example, thrifts were prohibited from offering demand deposits or making commercial loans—the domain of the commercial banking industry.

[31] These pieces of legislation were respectively, the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn–St Germain Act of 1982.

[32] See FHLBB (1983), 13, and Kane (1989), 38–47.

[33] FDIC (1997), 176. More generally, see FDIC (1997), 167–88 (chap. 4, "The Savings and Loan Crisis and Its Relationship to Banking").

[34] For a discussion of FIRREA and the resolution of the S&L crisis, see ibid., 100–110 and 186–88.

[35] Ibid., 170–72.

FIRREA also imposed standards on thrifts that were at least as stringent as those for national banks. Such standards covered capital requirements, limits on loans to one borrower, and transactions with affiliates. Moreover, FIRREA placed limits on the activities of state-chartered thrifts, with the result that differences in the powers of state- and federally chartered thrift institutions largely disappeared.

The Demise of the State-Chartered S&L

FIRREA's replacement of the FHLBS with the OTS as the regulator of state-chartered S&Ls at the federal level and the restrictions placed on those institutions' powers were especially important in terms of the subject of this article. Like the OCC—but unlike the FHLBS—the OTS does not have an internally generated source of funding for its supervisory activities.[36] The OTS funds itself by charging the institutions it supervises for their examinations.[37] As a result, since 1990 state-chartered S&Ls have faced a double supervisory assessment: they have been assessed both by their state chartering authority and, at the federal level, by the OTS. In contrast, a second set of thrifts—state-chartered savings banks (regulated by the FDIC at the federal level)—continue to pay supervisory assessments only to their state chartering authority. (As noted above, the FDIC does not charge for supervisory exams.) And a third set of thrifts—federally chartered thrifts (both S&Ls and FSBs)—are assessed only by the OTS.

Figure 2 demonstrates that between 1984 and 2004, the number of state-chartered savings institutions declined relative to the number of federally chartered institutions. In 1984, the industry was almost evenly split between the two chartering authorities, but by 2004, only 42 percent of the industry was state chartered. Further, the percentage of all savings institutions whose regulator at the federal level was the OTS or its predecessor (the FHLBS) also declined significantly—dropping from 92 percent in 1984 to 66 percent in 2004.
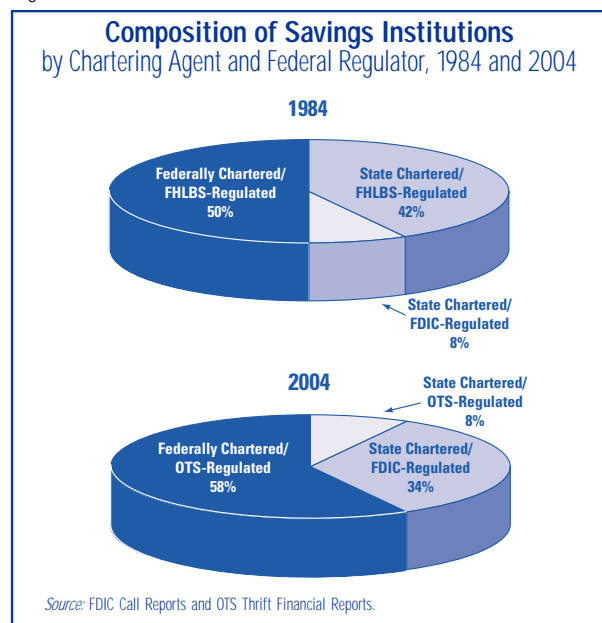
The trends in the composition of the savings industry are further depicted in figures 3 and 4. Figure 3 illustrates trends in charter type and federal regulator for all savings institutions for selected years from 1984 and 2004, and figure 4 depicts trends in the federal regulation specifically of state-chartered savings institutions.[38]

[36] Because the FHLBS had an internal source of funding (the Federal Savings and Loan Share Insurance Fund), it did not impose supervisory fees on either federally or state-chartered thrifts.

[37] The OTS, like the OCC, bases its fees on an institution's asset size, and uses a regressive assessment schedule. Until January 1999, the OTS general assessment schedule based assessments on consolidated total assets. The assessments for troubled institutions were determined by a separate "premium" schedule. Both schedules were regressive: as asset size grew, the marginal assessment rate declined. In January 1999, the assessment system was revised and assessments were based on three components: asset size, condition, and complexity. Two schedules implemented the size component–a general schedule for all thrifts, and an alternative schedule for qualifying small savings associations. The condition component replaced the premium schedule; and the complexity component set rates for three types of activities–trust assets, loans serviced for others, and assets covered in full or in part by recourse obligations or direct credit substitutes. Rates were adjusted periodically for inflation, and other revisions were introduced. Effective July 2004, the OTS implemented a new assessment regulation that revised how thrift organizations are assessed for their supervision. Examination fees for savings and loan holding companies were replaced with a semiannual assessment schedule, and the alternative schedule for small savings institutions was eliminated. The stated goal was to better align OTS fees with the costs of supervision. See OTS (1990, 1998, and 2004).

[38] In the following discussion and in the notation to figures 3, 4 and 6, we use "OTS-regulated" as a proxy for federal regulation that was conducted by the FHLBS for the years before 1990 and has been conducted by the OTS starting in1990.

Figure 2

Composition of Savings Institutions
by Chartering Agent and Federal Regulator, 1984 and 2004

1984

Federally Chartered/
FHLBS-Regulated
50%

State Chartered/
FHLBS-Regulated
42%

State Chartered/
FDIC-Regulated
8%

2004

State Chartered/
OTS-Regulated
8%

Federally Chartered/
OTS-Regulated
58%

State Chartered/
FDIC-Regulated
34%

Source: FDIC Call Reports and OTS Thrift Financial Reports.

The shift in the composition of federally regulated state-chartered institutions is most noticeable between 1989 and 1994—the period since the inception of the OTS. During this period, the number of state-chartered/OTS-regulated S&Ls declined by approximately two-thirds, whereas the number of federally chartered/OTS-regulated savings institutions declined by only one quarter. At the same time, the number of state-chartered/FDIC-regulated savings banks grew by almost 30 percent. Since 1994, the number of state-chartered/OTS-regulated S&Ls has declined at almost double the rate of federally chartered/OTS-regulated savings institutions. In fact, state-chartered/OTS-regulated S&Ls have almost disappeared. At year-end 2004, only 104 such institutions remained—a decrease of 93 percent since 1984.

Figure 4, focusing on the trends for state-chartered savings institutions alone, juxtaposes the growth in the number of state-chartered savings institutions regulated by the FDIC against the declining numbers of state-chartered savings institutions regulated by the OTS.

Analysis of the Demise

The demise of the state-chartered/OTS-regulated S&L was probably inevitable after the special

powers enjoyed by these institutions were eliminated, as their cost of supervision was higher than that of federally chartered S&Ls. In fact, the federal charter might have displaced the state charter to an even greater extent than that noted above if not for two important changes. First, numerous states began to offer a savings bank charter in the early 1990s. Second, FIRREA allowed all S&Ls to change their charter to either a savings bank or a commercial bank charter. (Institutions that changed their charter were required to remain insured by the Savings Association Insurance Fund [SAIF] and were designated as Sasser banks.)[39] For S&Ls chartered in states that offered a savings bank charter, converting to that charter became a way to eliminate OTS supervision and the accompanying fees. In contrast to the demise of the state-chartered S&L, the population of state-chartered/FDIC-regulated savings banks increased substantially during the same period. Although their powers were also constrained by FIRREA, these institutions avoided supervisory costs at the federal level.

Between 1989 and year-end 2004, 350 savings institutions took advantage of the Sasser option to become state-chartered savings banks, regulated by the FDIC but insured by the SAIF. Figure 5

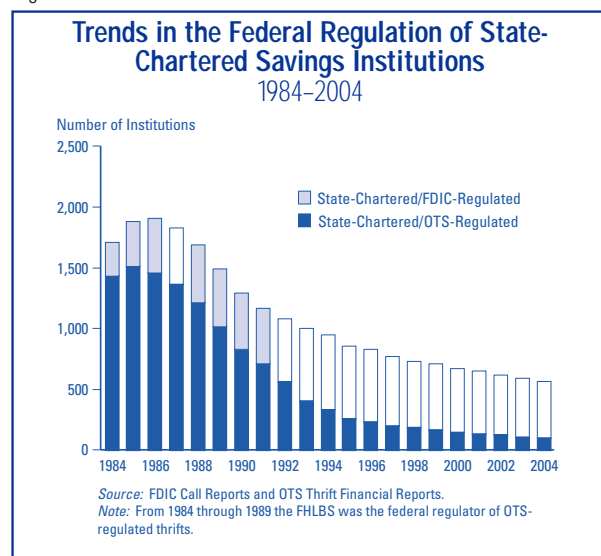[39] See FDIC (1997), 133, footnote 181.

Figure 3

Trends in Composition of Savings Institutions
by Chartering Agent and Federal Regulator, 1984–2004

Number of Institutions

Legend:
- Federally Chartered/OTS-Regulated
- State-Chartered/OTS-Regulated
- State-Chartered/FDIC-Regulated

Source: FDIC Call Reports and OTS Thrift Financial Reports.
Note: In 1984 and 1989 the FHLBS was the federal regulator of both federally chartered/OTS-regulated thrifts and state-chartered/OTS-regulated thrifts.

Figure 4

Trends in the Federal Regulation of State-Chartered Savings Institutions
1984–2004

Number of Institutions

Legend:
- State-Chartered/FDIC-Regulated
- State-Chartered/OTS-Regulated

Source: FDIC Call Reports and OTS Thrift Financial Reports.
Note: From 1984 through 1989 the FHLBS was the federal regulator of OTS-regulated thrifts.

depicts this increase. One reason for these charter changes could have been a desire to escape the reputational effects of being known as an S&L after the bankruptcy of the Federal Savings and Loan Insurance Corporation. However, in the years following that bankruptcy, many S&Ls were able to change their name—and leave behind the reputational problems associated with the term S&L—without having to change their charter. A more likely cause of the growth in Sasser banks was the elimination of special powers enjoyed by state-chartered institutions coupled with the extra assessment cost that they could no longer justify.

Evidence on de novo thrifts also supports the belief that the double assessment coupled with the elimination of special powers played a role in the demise of state-chartered S&Ls. An analysis of the thrifts chartered after the passage of FIRREA shows that the majority were OTS charters (see figure 6). From 1989 through 2004, 34 institutions were chartered at the state level, and 33 of them chose to become FDIC-regulated savings banks; only one chose to become an OTS-regulated S&L.[40] By contrast, 147 institutions received OTS charters. Thus, 99.4 percent of thrifts chartered from 1989 to 2004 chose a charter that allowed them to avoid paying a double assessment.

These aggregate data have showed the importance of maintaining balance in the trade-off between powers and the cost of supervision in charter choice. The experiences of individual states show something more: the consequences for a dual chartering system when that balance disappears so that one charter becomes clearly favored over the other and there is no alternative. In California, for example, the imposition of a double assessment on state-chartered institutions and the absence of a state-chartered savings bank alternative have contributed to the demise of the state charter for thrifts. In 1984, 73 percent of California thrifts were state chartered; in 2004, there were no state-chartered thrifts. Conversely, the experience in Illinois illustrates that when there is an alternative, the state charter can remain a viable choice. In 1984, 44 percent of Illinois thrifts were state chartered, although no state savings bank charter was available. Following the enactment of FIRREA, Illinois created a state savings bank charter and institutions began to convert to Sasser banks. By 2004, the percentage of state-chartered thrifts had increased to 52 percent, with state-chartered savings banks dominating the mix—accounting for 88 percent of state-chartered thrifts.

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[40] This institution voluntarily liquidated and closed in June 2003.

Figure 5

Increase in the Number of Sasser State-Chartered Savings Institutions
1989–2004

Number of Institutions

Total Number of Sasser Institutions

Number of Institutions becoming Sassers, by Year

Source: FDIC Call Reports and OTS Thrift Financial Reports.

Figure 6

De Novo Savings Institutions
1989–2004

Number of Institutions

OTS-Chartered/OTS-Regulated

State-Chartered/OTS Regulated

State-Chartered/FDIC-Regulated

Source: FDIC Call Reports and OTS Thrift Financial Reports.

Charter Choice—Maintaining an Attractive Charter

The narrowing of differences in state and national bank charters has both simplified the process of choosing a bank charter and focused greater attention on how to remain a viable charter choice. For bankers, charter choice is now generally a question of whether the higher assessment cost associated with a national charter is offset by the benefits of operating under a single set of laws and regulations—the OCC's preemption authority. For bank regulators, charter choice entails working to contain the cost of supervision and finding alternative ways to make charters attractive.

For the public, the competition between federal and state bank regulators to offer an attractive charter and the choices that banks ultimately make will affect them in a number of ways. Concerns will be raised about the dual banking system's ability to generate adequate funding (and therefore whether there is an effective level of prudential supervision, especially in an era of larger and more complex banks). Concerns will also be raised about how consumer protection and other laws affected by preemption are applied and enforced. Ultimately, concerns will be raised about the long-term viability of the dual banking structure and whether such a system is still relevant.[41]

Switching Charters—A State Responds

The recent experience of New York shows the effects of the decision to switch charters on the chartering authorities. In July 2004, J. P. Morgan Chase & Co. and Bank One Corporation merged. The result was a combined company that had over one trillion dollars in assets, five banking charters (four national and one state), and operations in all 50 states. In November 2004, the charter of the lead bank, J. P. Morgan Chase Bank ($967 billion in assets), was converted to a national bank charter. As a result, the State of New York Banking Department (NYBD) lost significant revenue from supervisory assessments. In

addition, HSBC Holding PLC had converted the New York charter of its lead bank, HSBC Bank USA ($99 billion in assets), to a national charter in July 2004. Together, the assessment revenue from J. P. Morgan Chase Bank and HSBC Bank USA had accounted for approximately 30 percent of the NYBD's operating budget.[42]

Before the loss of these two banks, the NYBD had already been working to change its funding mechanism. An NYBD study had found that state-chartered banks, which represented 10 percent of their state-licensed institutions, were carrying the department's entire budget.[43] The NYBD found it necessary to revise its assessment schedule and expand its assessment base. Effective with the 2005 fiscal year, the assessment base was revised to include all licensed and regulated financial institutions. For the first time, financial institutions other than banks paid annual fees for supervision in addition to any exam and licensing fees. The NYBD is also considering revising its charter to make it more attractive to banks and thrifts. In an attempt to modernize, the NYBD proposed the adoption of a wild-card statute that would convey federal bank powers to banks chartered in New York.[44]

Switching Charters—The OCC Responds

Although J. P. Morgan Chase Bank and HSBC Bank USA indicated their preference for a national charter, the OCC did not fare as well in the mid-1990s. For example, when The Chase Manhattan Bank N. A. completed its merger with Chemical Bank in 1995, it chose to retain Chemical's New York state charter. The loss of this large bank followed the loss of 28 banks under its

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[41] In addition, concerns have been raised about the fairness of the current funding mechanism (especially to the extent that national banks may be said to subsidize state-chartered banks) and about the fairness of allowing national banks to disregard state laws that affect their operations.

[42] See State of New York Banking Department (NYBD) (2005), hereinafter, NYBD (2005).

[43] *American Banker* (2004). The New York Banking Department licenses and regulates over 3,500 financial institutions, including foreign and domestic banks, thrifts, mortgage brokers and bankers, check cashers, money transmitters, credit unions, and licensed lenders.

[44] NYBD (2005).

charter in 1994. Beginning in 1995, the OCC instituted a series of reductions in assessment fees and suspended the inflation adjustment factor in its 1995 assessment schedule. It continued to lower total assessments in 1996, and then in 1997, the OCC implemented a restructured assessment schedule to more accurately differentiate among banks and the resources they were likely to require in an examination. The number of national banks that switched charters declined after 1994, remaining at about 10 per year, until 2001 when the number again jumped.[45]

The conversion of J. P. Morgan Chase Bank to a national charter cited above also poses issues for the OCC. The charter switch brought additional assets under the OCC's supervision, and subsequently increased the agency's supervisory burden. The OCC indicated that additional supervisory resources would be focused on the risks posed by and across business lines. It planned to hire additional examiners and to increase its specialized supervisory skills in areas such as derivatives and mortgage banking—areas in which J. P. Morgan Chase Bank is highly active.[46] Revenues from the assessments paid by the bank will offset these increases in supervisory costs. However, whether the revenues will be enough is problematic as a one-to-one relationship does not necessarily exist between costs and revenues in the assessment schedule.

Approaches to Funding Bank Supervision

Following the increase in the number of banks switching charters in 2001, then Comptroller of the Currency, John D. Hawke Jr., began a series of speeches calling for reform of the bank supervisory funding system. Arguing that the viability of the dual banking system should not rest on the maintenance of a federal subsidy for state-chartered banks, he proposed that a new approach to the funding of bank supervision be found.[47] That new approach should "strengthen both the federal and state supervisory processes, protect them from the impact of random structural changes, and

ensure that all supervisors, state and national, have adequate, predictable resources available to carry out effective supervisory programs."[48]

Passing the Cost through the Deposit Insurance Funds

Specifically, Hawke argued that if the costs of bank supervision were passed through the deposit insurance funds (for example, if the interest earned on the deposit insurance funds were used to pay for all bank supervision), the subsidy provided to state-chartered banks at the expense of national banks could be eliminated and at the same time an adequate source of funding for bank supervision could be ensured.[49] For this result to be achieved, all costs for bank supervision (costs of the states and the OCC) or some or all of the OCC's supervisory costs would have to be covered. In either case, the federal subsidy (that is, the national-bank subsidy) to state-chartered banks for the cost of bank supervision would be eliminated. The effect on the dual banking system is less clear. Once the states and the OCC were no longer competing for member banks on the basis of cost, the state charter might become relatively less attractive.

To discover the effects of funding total supervisory costs for the states and the OCC through the

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[45] For a discussion of reasons behind charter switches see Whalen (2002) and Rosen (2005).

[46] *American Banker* (2005).

[47] Because state-chartered banks do not pay for federal supervision whereas nationally chartered banks do, it is argued that state-chartered banks are effectively subsidized by nationally chartered banks through the assessments that the latter pay to the deposit insurance funds. See Hawke (2000, 2001) and Rhem (2004).

[48] See Hawke (2001).

[49] Work on this article was completed prior to passage of the Federal Deposit Insurance Reform Act of 2005, which will merge the two deposit insurance funds. A variation on the above proposal would have the FDIC rebate to national banks–or through the OCC for pass-through to national banks–an amount equal to its contribution to the cost of state-bank supervision. Although the case can be made that nationally chartered banks have subsidized the FDIC's supervision of state-chartered nonmember banks, it would be difficult to calculate the precise size of that subsidy. An accurate accounting of the share of the deposit insurance fund(s) attributable to national banks would necessarily have to account for both premiums paid into the funds and the relative expense to the funds of national bank failures.

deposit insurance funds, we performed a sensitivity analysis of four large banks—two regulated by the OCC and two by the states—and an average community bank. The immediate effects would be twofold. First, the operating expenses of the FDIC would increase, which in turn would cause the reserve ratio—the ratio of the deposit insurance fund balance to estimated insured deposits—to be lower than it otherwise would be. Second, the assessment base for supervisory costs would be changed from assets to domestic deposits because deposit insurance premiums are assessed against domestic deposits. The incidence of the supervisory assessment would shift, falling more heavily on institutions funded primarily by domestic deposits. In other words, relying on the deposit insurance funds to cover the cost of bank supervision would change the basis on which supervision is paid and would therefore alter the allocation of cost among banks.

First we calculated the asset-based fee paid by these banks for supervision in 2002 (the latest date for which state assessment data were available). For the average community bank, we calculated this cost for three chartering authorities—the OCC, Georgia, and North Carolina. For 2002, the supervisory costs of the states and the OCC totaled approximately $698 million.[50]

If the FDIC had paid the cost of supervision for the OCC and the states through the deposit insurance funds, the five banks would have borne the cost on the basis of their domestic deposits rather than assets. To understand the effect that changing the assessment base could have on individual banks, we assumed that the total cost of supervision ($698 million) would be passed on to the banks. Under this scenario, a flat-rate premium assessment of 1.9 basis points (bp)—or about 2/100ths of a percent—of domestic deposits would be required.[51]

As table 4 shows, the incidence of the supervisory assessment shifts toward banks that have relatively high domestic deposit-to-asset ratios. Bank of America would have owed approximately $23 million more in assessments. By contrast,

Citibank would have owed approximately $14 million less. For the average community bank, the difference would depend on its charter. If the bank were chartered in Georgia, its assessment would have declined by approximately $3,000, but in North Carolina, its assessment would have risen by approximately $5,000.

Although this approach would eliminate one inequity—the subsidization of state-chartered banks by nationally chartered banks—it would likely create others. First, assessment fees (and supervisory costs) vary considerably from state to state, and as a result, states with relatively high supervisory costs would benefit at the expense of states with lower supervisory costs. Second, funding supervision through the insurance funds would remove the incentives for the states and the OCC to keep their supervisory costs low. Third, the deposit insurance funds were designed for other purposes and therefore passing all supervisory costs through the funds would obscure the purpose of the funds.

Other Approaches to Funding Bank Supervision

Although Hawke's approach focuses on funding bank supervision through the use of the deposit insurance funds, other approaches exist. One suggestion would be to fund bank supervision through the Federal Reserve, another would be to alternate examinations between the OCC and the other federal regulators, and a third approach would be to develop an assessment schedule for bank examination at the federal level. These approaches are briefly discussed below.

[50] The costs for the OCC represent supervisory and regulatory costs as reported for 2002. To obtain approximate supervisory and regulatory costs for the states, we computed from the OCC data an average cost per $1 million of assets and then applied that to the assets represented by state banks. See OCC (2003a).

[51] In this scenario, it is assumed that supervisory costs would be funded in the same manner as shortages in the deposit insurance funds are currently handled. That is, the costs of supervision would be funded through a flat-rate assessment or surcharge that is levied against the assessable deposits–total (adjusted) domestic deposits–of each insured institution. The effect would be to replace the current regressive assessment system with a flat-rate assessment levied against domestic deposits. Modifications to this system could be made, if desired; however, in the interest of simplicity, we did not attempt to make any adjustments for bank risk or size.

One alternative approach is to fund bank supervision through the Federal Reserve. Banks do not earn any interest on funds they hold in reserve accounts at the Federal Reserve, and policy makers (including the Federal Reserve itself) have long advocated that interest be paid on required reserve balances—sterile reserves. In this suggestion, in lieu of paying interest on sterile reserve balances, the Federal Reserve could dedicate that implicit interest to cover supervisory costs for all banks. All banks are required to hold the same percentage of reserves on their deposits, so the incidence of this proposal would be neither progressive nor regressive, although banks that were especially reliant on deposits would be hit the hardest. In effect, a portion of the surplus that the Federal Reserve currently transfers to the U.S. Treasury would be diverted to cover the costs of bank supervision. For the same reasons as enumerated above, this proposal would likely eliminate one inequity but create others.

Another alternative is for the OCC and other federal bank regulators to rotate examination of nationally chartered banks, as is done with state-chartered banks. If this were done, state and national banks would be treated comparably, and the shared examination function would give the FDIC a better understanding of its risk exposure to national banks. A disadvantage, however, is that requiring multiple federal regulators to maintain the resources necessary to examine the same set of national banks would introduce inefficiencies to the supervisory process. And where the OCC uses a resident examination staff (as it currently does in 25 national banks), alternating exams with the FDIC (or the Federal Reserve) might be problematic. A second disadvantage is that the proposal does not resolve the cost competition between the OCC and the state bank chartering authorities.

The last approach we discuss is for the FDIC and the Federal Reserve to assess state-chartered banks directly for the cost of their supervision. To do this, the FDIC and the Federal Reserve would have to unbundle the cost of supervision from the cost of their other activities. In the case of the FDIC, the assessment it imposes on financial institutions could be broken into a deposit

Table 4

Comparison of Bank Supervisory Costs
Current Funding versus Funding by the Deposit Insurance Funds, June 2002

	Bank of America (OCC)	Citibank (OCC)	SunTrust Bank (GA)	BB&T (NC)	Average Community Bank[a]
Assets ($Millions)	$562,116	$487,074	$105,158	$58,156	$139
Domestic Deposits (DD) ($Millions)	$326,230	$103,347	$69,028	$33,082	$114
DD/Assets	58%	21%	66%	57%	82%
Annual Assessment Cost: Assets–rates set by chartering authority	$38,928,315	$33,974,793	$4,205,479	$1,982,180	OCC: $51,982 GA: $24,819 NC: $16,680
DD (1.9 bp)	$61,983,700	$19,635,930	$13,115,320	$6,285,580	$21,660
Incidence of Change in Funding Base	$23,055,385	($14,338,863)	$8,909,841	$4,303,400	OCC: ($30,322) GA: ($3,159) NC: $4,980
Percent change	59%	(42%)	212%	217%	OCC: (58%) GA: (13%) NC: 30%

Source: Data on deposits and assets are from the FDIC Call Reports and FDIC (2002b). Supervisory assessment schedules are from OCC (2002) and CSBS (2002). The calculations are approximations that do not reflect all the nuances inherent in the respective assessment schedules.

[a] "Average community bank" represents the weighted average of all banks with $1 billion or less in assets.

insurance component and a supervisory component. The deposit insurance component would be charged to all FDIC-insured institutions, and the supervisory component would be charged to institutions for which the FDIC is the primary federal regulator.[52] Similarly, the Federal Reserve could charge state-chartered member banks for their cost of supervision. To implement this proposal, the federal regulators could develop separate assessment schedules for each of their agencies, or they could work together to establish a single, uniform assessment schedule.

Proponents argue that the imposition of federal fees would end the federal subsidy of state-chartered banks. Opponents argue that the proposal would damage the dual banking system by eliminating one of its few remaining differences. Proposals to impose federal fees on state-chartered banks for their federal supervision have often been included in the annual federal budget process but Congress has routinely rejected them.

Conclusion

As the powers of state-chartered and national banks have converged, the number of reasons for a bank to choose either a state or a federal charter has declined. One of the few remaining differences between the charters is cost. In the competition between regulators for institutions, therefore, the cost of supervision has assumed greater importance, and in this area, state-chartered banks have the advantage. State-chartered banks generally pay lower exam fees, at least partly, because the federal agencies—FDIC or Federal Reserve—alternate examinations with the states and these federal agencies do not charge for exams. The OCC, and national banks, in contrast, must cover the full costs of bank examinations.

The thrift experience demonstrates how the choice of charter type can be influenced by changes in the balance between powers and the cost of supervision. When differences in the powers of state- and federally chartered savings and loans disappeared, the proportion of S&Ls with state charters changed dramatically. Many converted from an S&L charter to a savings bank charter. In states where this was not an option, the number of state-chartered S&Ls declined dramatically, almost disappearing.

Currently the higher supervisory assessments for national banks are offset by the preemption benefits that they enjoy. Conversely, state-chartered banks do not receive the benefits of preemption, but their supervisory costs are lower. As the situation is developing, the OCC is becoming the regulator of large, complex banks—banks that are likely to have an interstate presence and benefit from preemption. Smaller, more traditional banks continue to find the state charter attractive. Although both charters remain viable, a bifurcation within the dual banking system appears to be developing.[53] If either of these components is materially changed, then banks—like state-chartered S&Ls —may be induced to switch charters. The result may be to undermine the dual banking system.

Before any modification is made to the structure for funding bank supervision, a public-policy debate should be undertaken. Supervisors need a funding mechanism that reflects not only the costs they incur to supervise banks but also proves to be a stable source of funding in the long term. To this end, a number of proposals have addressed this issue. Each may provide a solution to the funding problem. However, given the few differences that remain between the bank charters, any change in the funding mechanism will affect the viability of the dual banking system. If the dual structure of the banking system still serves a purpose, then its disappearance should not be an unintended consequence.

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[52] The FDIC engages in many activities currently included in its supervisory budget that are required for both its role as deposit insurer and its role as primary federal supervisor. The complete separation of these functions might be neither possible nor practical.
[53] See Jones and Nguyen (2005).

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APPENDIX
2002 Supervisory Assessment Schedules
Arizona, Massachusetts, North Carolina and South Dakota

Arizona Assessment Fee Structure
Annual assessment based on total assets as of June 30.

If total reported assets are		The assessment is		
Over ($ millions)	But Not Over ($ millions)	This Amount ($)	Plus	Of Excess Over ($ millions)
0	5	2,322		
5	20	2,322	0.000144	5
20	85	4,477	0.000113	20
85	200	11,848	0.000079	85
200	900	20,914	0.000067	200
900	2,000	67,786	0.000056	900
2,000	4,000	129,562	0.000050	2,000
4,000	6,000	228,922	0.000044	4,000
6,000		317,482	0.000039	6,000

■ The Arizona State Banking Department is an independent agency.

■ Examination fees and supervisory assessments are set by the commissioner and by statute. The commissioner determines how collected funds are allocated, appropriated, and spent. Assessments are levied annually.

■ Additional hourly fees: $60 per hour per examiner for trust exams.

■ Fee-sharing agreements: Permitted by the state; the Arizona State Banking Department has fee-sharing agreements with Alabama and North Dakota.

■ Agreements to share examiner resources: The state of Arizona permits such agreements. The Arizona State Banking Department currently has none in place.

■ Rebate authority: None.

Source: CSBS (2002).

Massachusetts Assessment Fee Structure
The Division of Banking uses a risk-based assessment system in which assessments are based on assets and CAMELS rating.

For banks with CAMELS Rating	For assets		The charge per $1000 is
	Over ($ millions)	But Less Than ($ millions)	This Amount ($)
1 and 2	0	10	0.3000
	10	50	0.1000
	50	250	0.0850
	250	5,000	0.0625
	5,000	30,000	0.0500
3	0	10	0.6000
	10	50	0.2000
	50	250	0.1700
	250	5,000	0.1250
	5,000	30,000	0.1000
4 and 5	0	10	0.9000
	10	50	0.3000
	50	250	0.2550
	250	5,000	0.1875
	5,000	30,000	0.1500

■ Statute authorized the Executive Office of Administration and Finance to set examination fees and supervisory assessments. The Massachusetts Division of Banking has wide discretion over how collected funds are allocated, appropriated, and spent.

■ Additional hourly fees: A per diem fee of $220 per examiner for nonbank licenses.

■ Fee-sharing agreements: Permitted by the state; the Massachusetts Division of Banking has none in place.

■ Agreements to share examiner resources: Permitted by the state; the Massachusetts Division of Banking has none in place.

■ Rebate authority: None.

Source: CSBS (2002).

North Carolina Assessment Fee Structure
Annual assessment based on asset size.

For assets		The assessment is
Over ($ millions)	But Less Than ($ millions)	This Amount ($)
0	50	6,000
5	250	.00012
250	500	.00009
500	1,000	.00007
1,000	10,000	.00005
10,000		.00003

■ The North Carolina Commissioner of Banks operates under guidelines set by the Department of Commerce and by state policies. Examination fees and supervisory assessments are set by statute. Any discounts or premiums from the statutory rate must be approved by the Commission. The Commissioner of Banks also determines how collected funds are allocated, appropriated, and spent.

■ Additional hourly fees: None.

■ Fee-sharing agreements: Not permitted by the state.

■ Agreements to share examiner resources: Not permitted by the state.

■ Rebate authority: None.

Source: CSBS (2002).

South Dakota Assessment Fee Structure
Semiannual assessment of 2.5 cents per $1,000 of total assets; Nondepository banks pay an additional $500 semiannually.

■ South Dakota Assessment Fee Structure

■ Semiannual assessment of 2.5 cents per $1,000 of total assets;

■ Nondepository banks pay an additional $500 semiannually.

■ Examination fees and supervisory assessments are set by the Banking Board and by statute. The Division of Banking's total budget is appropriated by the South Dakota legislature. Expenditures are approved by the Director of Banking. Assessments are levied semiannually.

■ Additional hourly fees: None.

■ Fee-sharing agreements: Permitted by the state; agreements are in place with Minnesota and North Dakota.

■ Agreements to share examiner resources: Permitted by the state; agreements are in place with Minnesota and North Dakota.

■ Rebate authority: None.

Source: CSBS (2002).

Troubled Banks: Why Don't They All Fail?

by Robert Oshinsky and Virginia Olin*

A wealth of literature examines the determinants of bank failures and of bank mergers or consolidations. Also numerous are studies that develop failure-prediction models and early-warning systems. But both groups of studies use samples of all banks, and therefore most of this research focuses on pairs of outcomes: failure versus nonfailure, merger versus consolidation,[1] or problem bank versus nonproblem bank. But in reality, future status is more than a binary choice.

Here we study only troubled banks—banks that receive a composite CAMELS rating of either 4 or 5 when examined.[2] A focus on troubled banks is valuable to the FDIC and bank researchers for four reasons. First, when a bank is troubled, failure is but one possible outcome; alternative outcomes are recovery, merger, or continuation as a problem. Second, between 1990 and 2002, 96 percent of all banks that failed had first been troubled banks. Including nonproblem banks would add bias towards non-failure as a possible outcome since a vast majority of nonproblem banks do not fail. Third, if the FDIC can better predict the number of troubled banks that will not fail, it will be better able to estimate the size of its contingent loss reserve.[3] Finally, development of a multistate model identifying financial characteristics that

contribute to recovery as well as to failure is important for the FDIC's long-term strategic planning: accurate predictions of the future states of problem banks would affect the resources applied to these banks.

[1] In previous studies, a merger is the absorption of a bank by a previously unrelated bank while consolidation is the absorption of a bank by a related bank. For purposes of this paper, we combine the two types of absorptions and refer to them as mergers.

[2] Because of the nature of the resolution process, we deliberately omit troubled thrifts, including those resolved by the Resolution Trust Corporation, which kept insolvent thrifts open during the resolution process. CAMELS is an acronym for the six components of the regulatory rating system: **C**apital adequacy, **A**sset quality, **M**anagement, **E**arnings, **L**iquidity, and (since 1998) market **S**ensitivity. Banks are rated from 1 (the best) to 5 (the worst), and banks with a composite rating of 4 or 5 are considered problem banks. A rating of 4 generally indicates that the bank exhibits unsafe or unsound practices or is in an unsafe or unsound condition, while a rating of 5 means that the bank's practices or condition are extremely unsafe or unsound.

[3] The mission of the FDIC is to protect depositors and promote the safety and soundness of insured depository institutions and the U.S. financial system by identifying, monitoring, and addressing risks to the deposit insurance funds. The FDIC's Financial Risk Committee quantifies risks to the deposit insurance system for purposes of financial reporting and fund management, and each quarter it meets to set a contingent loss reserve estimated from total assets of banks that may fail within two years.

As noted, troubled banks have four possible outcomes: recovery, merger, continuation as a problem, and failure. Knowing the future states of banks in our sample,[4] we construct a financial profile using pre-examination data for the banks grouped by their future state and then use these profiles to develop a multinomial logit estimating procedure that predicts a bank's likely future state. We show that a four-state model predicts failure at least as well as binary failure-prediction models and, in addition, provides predictive ability for three alternative future states.

The next section describes previous empirical studies of bank failures, mergers, and financial distress. The three subsequent sections discuss the methodology we use, the sample and data, and the results. The concluding section gives a brief summary.

Empirical Studies

Most of the numerous studies that examine the determinants of bank failures and bank mergers and consolidations, like most of the numerous studies that develop early-warning systems predicting deterioration in banks' financial condition, construct financial ratios based on information in the Consolidated Reports of Condition and Income (Call Reports) that banks file quarterly with the FDIC.[5] The idea is to construct financial ratios that closely resemble the CAMELS rating system used by bank examiners and to use the ratios to predict pairs of outcomes: failure versus nonfailure, merger versus consolidation, or problem bank versus nonproblem bank.[6] While the information used by examiners is preferable, it is not available without an examination, unlike Call Report data, which are readily available quarterly.

Only a few studies have extended this research beyond pairs of outcomes. In an effort to improve predictive accuracy, DeYoung estimates the long-run probability of failure and acquisition in de novo banks by defining three states: failure, merger by acquisition, and conversion of a whole-bank affiliate of a bank holding company to a branch bank of that same bank holding company.

Wheelock and Wilson use a competing-risks model to consider the joint determination of the probability of being acquired, failing, or surviving. Hannan and Rhoades predict that a bank may experience one of three outcomes: not be acquired, be acquired by a firm operating within the bank's market, or be acquired by a firm operating outside the bank's market.[7] DeYoung expects that including the other two exit states (merger by acquisition, and conversion) will make the failure estimates more accurate. Wheelock and Wilson find that inefficiency increases the risk of failure while reducing the probability of a bank's being acquired. And Hannan and Rhoades find that adding the third state (distinguishing between types of mergers) yields a number of firm and market characteristics that earlier studies did not yield and that significantly influence the likelihood of acquisition.

Rarely in life are the possible outcomes binary. While studies that examine two-state outcomes have benefit, much is lost by not studying other possible outcomes. Further, by limiting our universe to only problem banks, we are able to remove the inherent bias towards the prediction of non-failure status.

Methodology

Referencing previous studies, we select certain financial variables proven in binary models to be useful in determining future bank state. In our multistate model we use univariate trend analysis to determine whether prior-period financial characteristics differ by future bank state.

Specifically, in the existing literature on bank performance the reasons suggested for failure include

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[4] Our sample consists of institutions assigned a CAMELS rating of 4 and 5 between 1990 and 2002. The sample is described in detail in a later section of this article.

[5] For reviews of the literature, see Demirgüç-Kunt (1989), Jagtiani et al. (2003), and King et al. (2005).

[6] See Whalen (1991), Cole and Gunther (1998), Kolari et al. (2002), and Jagtiani et al. (2003).

[7] DeYoung (2003), Wheelock and Wilson (2000), and Hannan and Rhoades (1987).

low capital, risky asset portfolios, poor management, low earnings, and low liquidity. Thus, the financial variables we select are from those same broad categories: capital adequacy, asset quality, management, earnings, and liquidity. In addition, we run a one-way analysis of variance to examine the financial characteristics of recovered banks versus banks in the other three states (merged or acquired, remained a problem, and failed).

We use a multinomial logistic estimating procedure to model future bank state. Outcomes are nominal, and therefore the multinomial logit model's assumptions are the closest fit to the specification of the model being estimated. This model simultaneously estimates three binary logits for pairwise comparisons among the outcome categories to a reference outcome. These binary logits are (1) recover relative to failure, (2) merge relative to failure, and (3) remain a problem relative to failure.

A general form of the model tested is shown in equation 1, where *Probability of State (k)$_{i,t}$* is the probability that bank *i* will be in state *k* at time *t*.

(1) *Probability of State (k)$_{i,t}$ =
    F(Financial condition$_{i,t-1}$, Economic conditions$_t$)*

We gauge the model's effectiveness in several ways. First, we compare the out-of-sample forecasting accuracy for each of the four states with the actual number of banks ending up in each state. We compare two competing binary models with the multistate model for failure predictions: one of the two competing models uses the same variables that our multistate model uses, and the other uses the same explanatory variables that Jarrow et al. use, referred to as the loss-distribution model.[8] These two comparisons allow us to test whether including additional alternative states improves the accuracy of failure estimates over the accuracy of binary models. Second, we investigate the economic and statistical effect of our explanatory variables. Third, we check to determine that the banks with the highest predicted probability of failure from our model are the ones that actually fail.

Sample and Data

Our sample consists of 1,996 banks on the FDIC problem-bank list from 1990 through 2002. Each bank has at least one first event and second event that are paired as an observation. The first event occurs when a bank is examined and receives a CAMELS rating of 4 or 5. The second event occurs when the bank does one of the following: recovers (improves to a CAMELS rating of 1, 2, or 3 at the next examination), merges (either merges with a bank outside of its multibank holding company or consolidates within its multibank holding company),[9] remains a problem bank (continues to have a CAMELS rating of 4 or 5 at the next examination), or fails.[10] We use only observations in which first events are paired with second events that occurred 6 to 24 months after the first events. Any second events sooner than 6 months or later than 24 months are ignored, and the observation is dropped from the sample. The reason for this restriction is twofold: first, we want to allow enough time to pass for changes in financial condition to occur; second, during most of our period, all banks except those with assets under $250 million and a composite CAMELS rating of 1 or 2 were required by law to receive safety-and-soundness examinations annually.[11] As noted above, a pairing of events is considered one observation in our sample. Our sample consists of 3,747 observations.

To control implicitly for the effects of economic conditions and banking legislation, we divide these 3,747 observations into annual cohorts corresponding to the year of the first event. But because second events usually occur in a different year from the first events, we recognize that using annual

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[8] Jarrow et al. (2003).

[9] We recognize that mergers and consolidations have different characteristics. However, during the period we study, the number of consolidations is small (39), so we combined both events into one state.

[10] Here we define failure either as a closing that results from an action by a regulator or as a merger assisted by the FDIC.

[11] The frequency of examinations was set by the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA). Further exceptions to the requirement for annual safety-and-soundness exams are listed in the act.

cohorts does not completely control for these effects.

A bank appears as an observation in a cohort only once, and each observation belongs to only one cohort.[12] All observations end with the occurrence of the second event. If the bank in a given cohort reaches the second event as recovered (or merged, or a continued problem), the outcome for the observation for that bank in the cohort is considered a recovery (or a merger, or continuation as a problem).

The same bank can be an observation in multiple cohorts depending on when it first receives a CAMELS rating of 4 or 5 and on its outcome at the second event. If, at the second event, the bank upon reexamination continues as a problem bank, the first observation ends with an outcome of continuation as a problem bank, and concurrently a second observation for that bank begins and is paired with its corresponding subsequent event, which takes place 6 to 24 months later. At this subsequent event, an outcome is determined for that second observation. In contrast, when a bank's first observation ends with a second event of recovery or merger, the bank has no concurrent second observation since it is no longer a problem bank. However, recovered banks may reemerge in our sample in a later cohort (for example, the bank recovers but later reverts to problem-bank status), whereupon the bank would be considered a new observation. Banks cannot appear in cohorts after they fail or merge.

Our sample has the following characteristics: The number of problem banks declines drastically during the 1990s as the banking crisis that began in the mid-1980s and lasted through the early 1990s subsided. As figure 1 shows, the 1991 cohort has the highest number (897) and the 1997 cohort the lowest (62). Figure 2 shows that the 1990 and 1998 cohorts have the highest percentage of problem banks that fail—5 percent—and that in the 1997 and 2002 cohorts, no problem banks fail before the second event. Throughout the period most banks remain a problem at the second event: the range is from a high of 69 percent in the 1990 cohort to a low of 40 percent in the 1997 cohort,

with an average of 49 percent. The proportion that merge by the second event is small, ranging from 3 percent in the 1990 cohort to 20 percent in the 1998 cohort. The proportion that recover by the second event ranges from a low of 23 percent in the 1990 cohort to a high of 53 percent in the 1997 cohort (figure 2). Moreover, for banks that recovered we found that large increases in internal capital injections (as a percentage of average assets) peaked in 1996. For those banks, external capital injections increased sharply from 1994 to 1995 but did not peak until 1999 (figure 3).[13] Figure 4 shows that most banks that remain a problem at the second event ultimately recover.[14]

Using data from the Call Reports, we calculate beginning and ending event financial ratios for each bank. The beginning event ratios are calculated from the Call Report filed just before the first event and the one filed 12 months previously.[15] Balance-sheet items are averaged for the two reporting periods and taken as a ratio of average assets for the same two periods; income items are summed over the 12-month period and taken as a percentage of average assets for the two periods. Similar calculations are made for the ending event, using the Call Report filed immediately before the second event and the one filed 12 months previously.

We group banks by future state to compare their condition and performance. We then compare data reported at the ending period with those reported at the beginning. We compute the percentage of banks in each state that showed an

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[12] Technically a bank may appear as a second observation in the same cohort since the window for the second event is as short as six months.

[13] Jones and Critchfield (2004) note three reasons that might explain the 1997 and 1998 peak years for merger activity and recoveries: (1) banks were highly profitable, liquid, and operating in favorable economic and interest-rate environments; (2) in 1994 the Riegle-Neal Interstate Banking and Branching Efficiency Act removed the remaining barriers to interstate banking and branching; and (3) a record-breaking bull market in stocks pushed market valuations of banks and thrifts to unprecedented levels, encouraging many banking firms to use their stock as currency to purchase other firms.

[14] The reason for the decline beginning in 2001 in the percentage of still-a-problem banks that ultimately recover is that enough follow-up events have not yet occurred. Most banks remain a problem beyond a second event.

[15] Gunther and Moore (2000) find atypical movements in Call Report data for the quarters in which banks are downgraded by examiners. These Call Reports are more subject to revisions. For that reason, we also did our univariate analysis on the Call Reports filed before the ones specified in this article. The resulting trends in data were similar to the trends reported here.

Figure 1

Number of Troubled Banks by Cohort

Number of Banks

Figure 2

Cohort Composition of Troubled Banks at Second Event

Percent

Fail   Remain a Problem   Merge   Recover

Figure 3

External and Internal Capital Injections in Troubled Banks That Recovered

Percent of Average Assets   Percent of Banks that Recovered

External Injections
Internal Injections

Note: 12 months before recovery.

Figure 4

Number of Troubled Banks That Remain a Problem and Ultimately Recover

Number of Troubled Banks   Percent of Banks that Recovered

Number of Troubled Banks   ——   Percent that Ultimately Recovered

increase between the two periods for each of the financial ratios. Assuming that banks that recover are able to improve net income and net noninterest income more than those that fail, we expect to see that the percentages of banks with increases in such ratios will be greater for banks having a future state of recovery than for banks with a future state of failure. For expense items, we expect the opposite. Assuming that banks that recover shed nonperforming and past-due assets, we expect that the percentages of banks with increases in such assets will be less for banks that recover than for those that fail. We expect that the percentages of banks with increases in volatile liabilities and illiquid assets will be smaller for banks having a future state of recovery than for banks with a future state of failure and that the percentages of banks with

increases in capital will be larger for banks that recover than for those that fail. For the various financial ratios, we have no expectations for the ranking of banks that merge or are still a problem except that their increases or decreases will fall between the levels for banks that recover and banks that fail.

For measures of earnings, we compare the percentage of banks in each state that showed increases in net interest income, in net noninterest income, and in provision for loan losses. For measures of risky asset portfolios, we compare the percentage of banks in each state that showed increases in average allowance for loan and lease losses, average loans and leases past due 30–89 days, average loans and leases past due 90 days or more, average

nonaccrual loans and leases, and average other real estate owned. For measures of capital adequacy we compare the percentage that showed average risk-based capital and average tangible equity capital; for measures of liquidity, the percentage that showed average volatile liabilities and loans and securities with maturities greater than or equal to five years. And for the management measure, we use the efficiency ratio (noninterest expense as a percentage of net interest income plus noninterest income). A lower efficiency ratio is better.

To model future bank states, we selected almost the same financial variables that we used in the univariate trend analysis.[16] For measures of the economy, we added capital injections from a bank holding company and capital injections from outside.[17] From the univariate trend analysis we are able to form expectations about the sign that coefficients on these variables will take when they are estimated by logit analysis. A negative coefficient implies that an increase in the variable will result in the future state's becoming less likely relative to failure. A positive coefficient implies the opposite.

Table 1 shows the expected sign of explanatory variables used in the multistate model. The financial ratios associated with not failing are capital, capital injections, allowance for loan losses, interest income, noninterest income, and longer-term assets (assets and securities with maturities equal to or great than five years). Although we expect a negative sign for the efficiency ratio's coefficient (because lower is better), we associate this ratio, too, with not failing. The financial ratios associated with failure are those measuring poor asset quality (past-due loans, nonaccruing loans, and real estate owned), expense items (interest expense, loss provision, loan charge-offs, salaries, expenses on premises, and other noninterest expense), and volatile liquidity as measured by volatile liabilities.[18]

Results

Our results from both the univariate trend analysis and the multistate logit estimating procedure generally agree with expectations. Of banks that recover, the percentage with increases (between the beginning and ending periods) in performance

ratios such as net income and net noninterest income is greater than the percentage of banks in any alternative state. For loan-loss provisions, the opposite occurs. In addition, the percentage of banks that have increases in any of the risky asset measures is smaller for banks that recover than for banks in any alternative state. These results can be seen graphically in the appendix.

[16] For the logits we used total income and detailed expense items instead of net interest and net noninterest income as used in the univariate analysis. In addition, we also estimated the model using Call Report data from the quarter before the quarter that precedes the examination, as in the univariate. The results differed little from those reported here.

[17] As pointed out in footnote 13, the economy (a record-breaking bull market) was one reason noted for increased acquisitions.

[18] Volatile liabilities are defined in the FDIC data dictionary as (1) federal funds purchased and sold under agreements to repurchase, (2) demand notes issued to the U.S. Treasury and other borrowed money, (3) time deposits over $100,000 held in domestic offices, (4) foreign-office deposits, (5) trading liabilities less trading liabilities' revaluation losses on interest rate, (6) foreign exchange rate, and (7) other commodity and equity contracts.

Table 1

Explanatory Variables and Expected Signs for Predicting Nonfailure versus Failure States

Variable	Sign
Capital	
Tangible Equity Capital	+
Capital Injections:	
From BHC	+
Outside	+
Asset Quality	
Past-Due Loans (30–89 days)	–
Past-Due Loans (90+ days)	–
Nonaccrual Loans and Leases	–
Other Real Estate Owned	–
Allowance for Loan Loss	+
Management	
Efficiency Ratio	–
Earnings	
Total Interest Income	+
Total Noninterest income	+
Total Interest Expense	–
Loan-Loss Provision	–
Loan Charge-offs	–
Expenses on Premises	–
Salaries	–
Other noninterest expense	–
Liquidity	
Volatile Liabilities	–
Loans + Securities > Five Years	+

In the logit analysis, we find that increases in financial ratios associated with nonfailure have positive coefficients, and increases in financial ratios associated with failure have negative coefficients.

Analysis of Variance

Results from the analysis of variance, reported in tables 2 and 3, complement the results of the univariate trend analysis. Both tables use the beginning-period data. Table 2 shows the mean and standard errors for financial variables in each of the four states. Table 3 shows the differences in means and statistical significances for six pairings: (1) recover versus merge, (2) recover versus remain a problem, (3) recover versus fail, (4) remain a problem versus merge, (5) remain a problem versus fail, and (6) merge versus fail.

The results reported in table 2 show that at the first event, the mean value for each financial variable is statistically different from zero. The results also show that the mean values in financial ratios associated with not failing are generally larger for banks that recover, merge, or remain a problem than for banks that fail. The opposite is true for the mean values in financial ratios associated with failing.

There are three exceptions, however: the mean values for total interest income, total noninterest income, and loans and securities with maturities greater than or equal to five years are largest for banks that fail. These results seem counterintuitive until we consider that banks with a future state of

Table 2

Mean and Standard Errors for Financial Variables, by State
(Standard Errors in Parentheses)

Variable	Recover	Merge	Remain a Problem	Fail
Number of Banks	1,326	228	2,077	116
Capital				
Tangible Equity Capital	6.68 ***	6.57 ***	6.39 ***	3.90 ***
	(0.08)	(0.20)	(0.07)	(0.29)
Capital Injections:				
From BHC	0.19 ***	0.41 ***	0.20 ***	0.14 *
	(0.02)	(0.06)	(0.02)	(0.08)
Outside	0.36 ***	0.29 ***	0.29 ***	0.42 ***
	(0.04)	(0.09)	(0.03)	(0.13)
Asset Quality				
Past-Due Loans (30–89 days)	1.88 ***	2.12 ***	2.43 ***	3.08 ***
	(0.04)	(0.10)	(0.03)	(0.14)
Past-Due Loans (90+ days)	0.59 ***	0.65 ***	0.92 ***	1.17 ***
	(0.04)	(0.09)	(0.03)	(0.13)
Nonaccrual Loans and Leases	2.17 ***	2.56 ***	2.64 ***	3.82 ***
	(0.06)	(0.14)	(0.05)	(0.20)
Other Real Estate Owned	2.00 ***	1.88 ***	2.60 ***	3.19
	(0.07)	(0.17)	(0.06)	(0.23) ***
Allowance for Loan Loss	1.69 ***	1.97 ***	1.72 ***	2.11 ***
	(0.03)	(0.07)	(0.02)	(0.10)
Management				
Efficiency Ratio	88.32 ***	94.15 ***	94.43 ***	115.77 ***
	(0.67)	(1.62)	(0.54)	(2.28)
Earnings				
Total Interest Income	8.80 ***	8.99 ***	9.59 ***	10.58 ***
	(0.09)	(0.21)	(0.07)	(0.29)
Total Noninterest income	1.41 ***	1.44 ***	1.45 ***	1.98 ***
	(0.06)	(0.15)	(0.05)	(0.21)
Total Interest Expense	4.47 ***	4.51 ***	5.27 ***	6.51 ***
	(0.06)	(0.14)	(0.05)	(0.20)
Loan-Loss Provision	1.35 ***	2.23 ***	1.81 ***	3.21 ***
	(0.07)	(0.16)	(0.05)	(0.22)
Loan Charge-offs	1.46 ***	1.78 ***	1.80 ***	2.86 ***
	(0.05)	(0.12)	(0.04)	(0.17)
Expenses on Premises	0.68 ***	0.75 ***	0.77 ***	0.96 ***
	(0.01)	(0.03)	(0.01)	(0.04)
Salaries	2.06 ***	2.08 ***	2.18 ***	2.56 ***
	(0.03)	(0.08)	(0.03)	(0.11)
Other noninterest expense	2.23 ***	2.54 ***	2.43 ***	3.29 ***
	(0.05)	(0.11)	(0.04)	(0.16)
Liquidity				
Volatile Liabilities	13.26 ***	13.62 ***	14.96 ***	15.04 ***
	(0.27)	(0.65)	(0.22)	(0.91)
Loans + Securities > Five Years	66.13 ***	68.11 ***	68.71 ***	68.04 ***
	(0.31)	(0.76)	(0.25)	(1.06)

Significance at 1%, 5% and 10% levels ar eindicated by ***, **, and * asterisks, respectively.

Table 3

Differences in Means and Standard Errors of Financial Variables for Selected Pairs
(Standard Errors in Parentheses)

Variable	Recover Merge	Recover-Remain a Problem	Recover-Fail	Merge Remain a Problem	Remain a Problem Fail	Merge Fail
Capital						
Tangible Equity Capital	0.10	0.29 **	2.78 ***	0.19	2.49 ***	2.68 ***
	(0.22)	(0.11)	(0.30)	(0.22)	(0.29)	(0.35)
Capital Injections:						
From BHC	-0.22 ***	(0.01)	0.04	0.21 ***	0.05	0.26 **
	(0.06)	(0.03)	(0.08)	(0.06)	(0.08)	(0.10)
Outside	0.07	0.08	(0.06)	0.00	-0.14	-0.13
	(0.10)	(0.05)	(0.13)	(0.10)	(0.13)	(0.16)
Asset Quality						
Past-Due Loans (30–89 days)	-0.24 **	-0.55 ***	-1.20 ***	-0.31 **	-0.65 ***	-0.96 ***
	(0.11)	(0.05)	(0.15)	(0.11)	(0.15)	(0.18)
Past-Due Loans (90+ days)	-0.06	-0.33 ***	-0.58 ***	-0.27 **	-0.25 *	-0.52 ***
	(0.10)	(0.05)	(0.13)	(0.10)	(0.13)	(0.16)
Nonaccrual Loans and Leases	-0.39 **	-0.47 ***	-1.65 ***	-0.09	-1.18 ***	-1.27 ***
	(0.15)	(0.07)	(0.20)	(0.15)	(0.20)	(0.24)
Other Real Estate Owned	0.12	-0.59 ***	-1.19 ***	-0.72 ***	-0.59 **	-1.31 ***
	(0.18)	(0.09)	(0.24)	(0.18)	(0.24)	(0.29)
Allowance for Loan Loss	-0.29 ***	-0.04	-0.42 ***	0.25 **	-0.38 ***	-0.13
	(0.08)	(0.04)	(0.11)	(0.08)	(0.11)	(0.13)
Management						
Efficiency Ratio	-5.83 ***	-6.10 ***	-27.44 ***	-0.28	-21.34 ***	-21.62 ***
	(1.76)	(0.86)	(2.37)	(1.71)	(2.34)	(2.79)
Earnings						
Total Interest Income	-0.19	-0.79 ***	-1.78 ***	-0.60 **	-0.99 ***	-1.59 ***
	(0.22)	(0.11)	(0.30)	(0.22)	(0.30)	(0.36)
Total Noninterest income	-0.03	-0.04	-0.57 **	-0.01	-0.53 **	-0.54 **
	(0.17)	(0.08)	(0.22)	(0.16)	(0.22)	(0.26)
Total Interest Expense	-0.03	-0.79 ***	-2.03 ***	-0.76 ***	-1.24 ***	-2.00 ***
	(0.15)	(0.07)	(0.21)	(0.15)	(0.20)	(0.24)
Loan-Loss Provision	-0.88 ***	-0.46 ***	-1.85 ***	0.42 **	-1.40 ***	-0.97 ***
	(0.17)	(0.08)	(0.23)	(0.17)	(0.23)	(0.27)
Loan Charge-offs	-0.32 **	-0.33 ***	-1.39 ***	-0.02	-1.06 ***	-1.08 ***
	(0.13)	(0.07)	(0.18)	(0.13)	(0.18)	(0.21)
Expenses on Premises	-0.07 **	-0.09 ***	-0.28 ***	-0.02	-0.19 ***	-0.21 ***
	(0.03)	(0.02)	(0.04)	(0.03)	(0.04)	(0.05)
Salaries	-0.03	-0.12 **	-0.50 ***	-0.09	-0.38 ***	-0.48 ***
	(0.08)	(0.04)	(0.11)	(0.08)	(0.11)	(0.13)
Other non-interest expenses	-0.30 **	-0.20 ***	-1.06 ***	0.11	-0.86 ***	-0.76 ***
	(0.12)	(0.06)	(0.16)	(0.12)	(0.16)	(0.19)
Liquidity						
Volatile Liabilities	-0.36	-1.70 ***	-1.78 *	-1.34 *	-0.09	-1.43
	(0.70)	(0.35)	(0.95)	(0.69)	(0.94)	(1.12)
Loans + Securities > Five Years	-1.98 **	-2.57 ***	-1.91 *	-0.60	0.66	0.07
	(0.82)	(0.40)	(1.11)	(0.80)	(1.09)	(1.31)

Significance at 1%, 5% and 10% levels ar eindicated by ***, **, and * asterisks, respectively.

fail probably take on riskier assets that will have higher yields than banks with one of the alternative future states. Or, turning the statement around, we can say that banks with riskier assets have a higher probability of failure. Fee income from these riskier assets may have resulted in higher noninterest income. And in banks with a future state of fail, the ratio between loans and securities in the longer-term assets may be geared toward loans that are usually considered riskier than more-liquid securities.

The results reported in table 3 show that except for two variables (capital injections from the bank holding company and from outside), the difference in means between banks that recover and those that fail is statistically significant. Also significant for most variables are the differences in means between banks that fail and both banks that merge and banks that remain a problem.

The results from table 3 indicate as well that the differences in means between banks that remain a problem and both banks that merge and banks that recover are statistically significant. For the recovery-versus-merger pairing, fewer variables are statistically different from one another. And for the pairing remain-a-problem versus merge, even fewer variables are statistically different from one another.

Logit Analysis

For our multivariate analysis, we rely on a multinomial unordered logit probability model that takes into account all four future bank states. Equation 2 shows the model tested:

(2) *Probability of State* $(k)_{i,t} =$
    F(Financial condition$_{i,t-1}$)

For a number of reasons, we did not include variables for economic condition in our model. First, Nuxoll et al. found that state and local economic data did not contribute to the performance of standard off-site models.[19] Second, much of the literature theorizes that the economy is subsumed in the balance sheet, so any effect of the economy will already have shown up in the financial data.[20] Finally, we included capital injections as a proxy for changes in the economy (see footnote 13).

We used a stepwise logit estimation procedure to identify the terms that have a significant relationship in predicting the likelihood that a bank will end up in one of the four states. The stepwise estimation procedure allows us to include several measures of the same attribute in the logit model, yet isolates the most important factors in terms of predicting future bank state.

Table 4 shows summary statistics for the variables used in the logistic regressions. The beginning-period data, as explained in the section on sample and data, are used in this table.[21] We estimate the logits for each of our cohorts, 1990 through 2002. However, because of the small number of failures after 1993, beginning with the 1994 logit we combine cohorts. The 1994 model is a combination of the 1993 and 1994 cohorts, and the 1995 model combines 1993 through 1995. We continue combining cohorts up to five years (the 1993 through 1997 cohorts for the 1997 logit). For the 1998 through 2002 models, we use a panel of the most recent previous five years.

Tables 5 through 7 show the results. The reference state is failure, so the coefficients are interpreted relative to failure. As mentioned above, a negative coefficient means that an increase in a variable will have the result that the future state relative to failure becomes less likely.

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[19] Nuxoll et al. (2003).

[20] As a robustness check, we estimated the model using three variables for the United States economy: a ratio of the number of problem banks to total number of banks by state, a ratio of the assets of problem banks to total assets by state, and the percentage change in state housing permits. The first test was an estimation using only the economic variables as explanatory variables. We did two estimations: one used the ratio of the number of problem banks to total number by state and the percentage change in state housing permits; the second used the ratio of the assets of problem banks to total assets by state and the percentage change in housing permits. These variables were significant for most of these estimations. However, when these variables were included in estimations with the rest of the explanatory variables, their significance disappeared.

[21] As with the univariate analysis, we also ran the logits using a beginning period one quarter before the quarters specified previously. The results revealed little difference.

Eight of the findings are fairly interesting. First, more recent cohorts (beginning with the 1995–1999 cohort) have fewer statistically significant variables than those in the early 1990s. This result is most likely because of the small number of failures, despite the paneling of data.[22] However, those variables that are statistically significant in the more recent cohorts have the expected sign (as shown in table 1) except for capital injections. For example, in the 1997–2001 cohort, expenses on premises is significant and has a negative sign in table 5 (recovery) and table 7 (still a problem). An increase in this variable will have the result that a future state of either recovery or continuation as a problem becomes less likely relative to failure.

On the other hand, for the cohorts 1994–1998 through 1998–2002, capital injections from outside are significant—but have the unexpected sign both for table 6 (merger) and, in two of those four cohorts, for table 5 (recovery). Perhaps the negative sign indicates that the institution expects to be acquired and either does not or cannot raise capital. As mentioned in footnote 13, the Riegle-Neal Interstate Banking and Branching Efficiency Act was enacted in 1994.

[22] From the 1995–1999 cohort through the 1998–2002 cohort, the number of failures totaled 7, 7, 8, and 8, respectively, compared with 45, 36, and 17 for the cohorts 1990 through 1992.

Table 4

Selected Descriptive Statistics for Data in Logits: Mean Standard Deviation, and Minimum and Maximum Values of Financial Ratios for Each State

Variable	All	Recover	Merge	Remain a Problem	Fail
Number of Banks	3,747	1,326	228	2,077	116
Capital					
Tangible Equity Capital					
Mean	6.42	6.68	6.57	6.39	3.90
Standard Deviation	3.12	2.54	3.42	3.37	2.76
Minimum	-4.77	-0.10	-4.77	-1.26	-1.37
Maximum	63.10	38.34	34.52	63.10	15.79
Capital Injections:					
From BHC					
Mean	0.20	0.19	0.41	0.20	0.14
Standard Deviation	0.87	0.82	1.41	0.84	0.65
Minimum	-1.07	-1.07	0.00	-0.93	-0.02
Maximum	12.87	9.98	12.87	8.97	4.74
Outside					
Mean	0.36	0.36	0.29	0.29	0.42
Standard Deviation	1.38	1.46	1.52	1.25	2.24
Minimum	-2.03	-1.89	-0.07	-2.03	-0.62
Maximum	25.16	15.98	15.98	25.16	18.38
Asset Quality					
Past-Due Loans (30–89 days)					
Mean	2.24	1.88	2.12	2.43	3.08
Standard Deviation	1.58	1.38	1.84	1.60	1.95
Minimum	0.00	0.00	0.00	0.00	0.25
Maximum	18.66	12.41	18.66	13.96	9.59
Past-Due Loans (90+ days)					
Mean	0.79	0.59	0.65	0.92	1.17
Standard Deviation	1.39	0.81	0.81	1.66	1.82
Minimum	0.00	0.00	0.00	0.00	0.00
Maximum	44.66	10.25	6.22	44.66	14.42
Nonaccrual Loans and Leases					
Mean	2.51	2.17	2.56	2.64	3.82
Standard Deviation	2.13	1.83	2.62	2.19	2.36
Minimum	0.00	0.00	0.00	0.00	0.05
Maximum	24.71	15.60	24.71	17.67	11.18
Other Real Estate Owned					
Mean	2.36	2.00	1.88	2.60	3.19
Standard Deviation	2.55	2.13	1.97	2.79	2.63
Minimum	-10.05	0.00	0.00	-10.05	-0.24
Maximum	20.20	18.61	10.99	20.20	12.48
Allowance for Loan Loss					
Mean	1.74	1.69	1.97	1.72	2.11
Standard Deviation	1.13	1.08	2.01	1.03	0.95
Minimum	0.11	0.11	0.36	0.14	0.28
Maximum	26.45	19.82	26.45	14.13	5.63
Management					
Efficiency Ratio					
Mean	92.91	88.32	94.15	94.43	115.77
Standard Deviation	25.00	22.85	25.34	25.09	29.99
Minimum	-30.64	-30.64	35.09	29.38	26.72
Maximum	198.71	193.89	195.03	198.71	194.40

Second, both the pairing of recovery versus failure (table 5) and the pairing of merger versus failure (table 6) have more statistically significant variables than the pairing of continuation as a problem versus failure (table 7). We expect that banks that remain a problem more closely resemble banks that fail than they resemble banks that recover or merge. In fact, the univariate trend analysis showed that for most of the financial variables, the percentage of banks that remained a problem was closer to the percentage that failed than were the percentages for the other two future states.

Third, for all cohorts and in each future state, asset-quality variables are statistically significant more often than other variables (tables 5, 6, and 7). Moreover, the variable nonaccrual loans and leases is more often statistically significant than past-due loans (either 30–89 days or 90 days or more), a result we would expect inasmuch as past-due loans are more likely to improve and be worked out than nonaccrual loans and leases. Further, these asset-quality variables are often negative (as expected from table 1), a sign indicating that an increase in the variable will have the result that the future state relative to failure becomes less likely.

Fourth, surprisingly, tangible equity is highly statistically significant for only the 1990, 1991, and 1992 cohorts in

Table 4 *(continued)*

Selected Descriptive Statistics for Data in Logits: Mean Standard Deviation, and Minimum and Maximum Values of Financial Ratios for Each State

Variable	All	Recover	Merge	Remain a Problem	Fail
Earnings					
Total Interest Income					
Mean	9.30	8.80	8.99	9.59	10.58
Standard Deviation	3.14	2.60	4.63	3.14	4.11
Minimum	-0.01	-0.01	5.24	0.97	4.47
Maximum	64.32	33.69	64.32	32.78	26.25
Total Noninterest income					
Mean	1.45	1.41	1.44	1.45	1.98
Standard Deviation	2.31	2.18	1.84	2.38	3.20
Minimum	-0.09	-0.09	0.00	-0.05	0.18
Maximum	46.35	37.82	16.34	46.35	30.51
Total Interest Expense					
Mean	4.98	4.47	4.51	5.27	6.51
Standard Deviation	2.18	1.76	2.25	2.28	2.95
Minimum	-0.68	-0.68	1.25	0.25	0.95
Maximum	17.01	14.74	15.42	17.01	16.57
Loan-Loss Provision					
Mean	1.72	1.35	2.23	1.81	3.21
Standard Deviation	2.43	1.72	6.07	2.02	2.69
Minimum	-13.56	-2.17	-1.54	-13.56	-0.42
Maximum	87.33	23.14	87.33	24.55	13.82
Loan Charge-offs					
Mean	1.71	1.46	1.78	1.80	2.86
Standard Deviation	1.89	1.41	3.52	1.86	2.06
Minimum	-6.32	-0.49	-6.32	0.00	0.25
Maximum	47.20	19.12	47.20	24.12	11.50
Expenses on Premises					
Mean	0.75	0.68	0.75	0.77	0.96
Standard Deviation	0.46	0.40	0.44	0.47	0.67
Minimum	-0.48	-0.48	0.00	-0.04	0.15
Maximum	4.46	3.38	2.79	4.35	4.46
Salaries					
Mean	2.14	2.06	2.08	2.18	2.56
Standard Deviation	1.18	0.95	0.99	1.23	2.32
Minimum	0.00	0.06	0.00	0.04	0.43
Maximum	22.99	16.14	9.17	22.36	22.99
Other noninterest expense					
Mean	2.39	2.23	2.54	2.43	3.29
Standard Deviation	1.68	1.55	2.43	1.61	2.12
Minimum	-3.03	-3.03	0.45	-0.41	0.71
Maximum	32.70	22.46	32.70	25.38	14.86
Liquidity					
Volatile Liabilities					
Mean	14.28	13.26	13.62	14.96	15.04
Standard Deviation	9.85	9.51	11.08	9.90	9.26
Minimum	0.00	0.00	0.00	0.00	0.00
Maximum	90.19	86.08	90.19	89.43	51.54
Loans + Securities > Five years					
Mean	67.74	66.13	68.11	68.71	68.04
Standard Deviation	11.51	11.39	12.15	11.43	11.21
Minimum	19.40	24.31	19.40	22.14	37.34
Maximum	102.02	102.02	96.38	101.05	90.33

Table 5

Multinomial Logit Regressions of Determinants of Bank State: Recovery versus Failure
(Estimation Period in Years)

Explanatory Variables	1990	1991	1992	1993	1993-94	1993-95	1993-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02
Intercept													
Constant	-0.2388	10.6388 ***	-2.0548	-2.8325	8.4024 *	7.0800 *	6.2905	6.0942	14.2305	-2.8352	3.9788	1.0819	-0.6638
Capital													
Tangible Equity for PCA	0.7743 ***	1.0350 ***	0.7071 ***	-0.1248	-0.1827	-0.0345	-0.0198	-0.0262	1.4338	0.2043	-0.0802	-0.0156	-0.0120
BHC Capital Injections	2.0621	-0.3816	0.6065	0.5490	0.4402	0.3137	0.3806	0.3978	-3.1364	-0.6126	-0.3481	-0.6839 *	-0.6238
External Capital Injections	0.0021	0.1636	5.1764 **	0.8219	1.1397	1.5649	1.5940	1.6146	-0.9101	-0.3444 *	-0.2561	-0.2861 **	-0.2477
Asset Quality													
Loans Past Due 30 to 89 Days	-0.4142 ***	-0.4417 ***	-0.2429	-0.8305 **	-0.4773 **	-0.2567	-0.1913	-0.1730	0.5548	0.3001	0.5276	0.1184	0.0400
Loans Past Due 90 Days or More	-0.4630 ***	-0.1805	-0.5600	-0.3232	-0.1968	-0.3677 **	-0.4260 ***	-0.4530 ***	-1.0422 **	-0.5484 ***	-0.3320	-0.1901	0.0021
Nonaccrual Loans and Leases	-0.2163 **	-0.3689 ***	-0.4007 **	-0.7762 *	-0.6210 ***	-0.5803 ***	-0.6002 ***	-0.6283 ***	-2.9354 **	-0.6012 **	-0.3506	-0.2224	-0.1628
Other Real Estate Owned	-0.3847 ***	-0.2984 ***	0.1820	0.3759	0.3007	0.2900	0.3299	0.3245	7.6096 **	0.6112	0.0660	-0.0690	-0.1354
Allowance for Loan Losses	0.3333	0.7585 ***	0.1987	2.5538 **	0.9456 *	0.7284	0.7687 *	0.7911 *	4.1672	0.8971	1.0031	1.0392	0.9083
Management													
Efficiency Ratio	-0.0010	-0.0218	-0.0233	0.0277	-0.0398	-0.0406	-0.0328	-0.0341	-0.0417	0.0685	0.0308	0.0411	0.0498
Earnings													
Total Interest Income	1.0295	-0.9335	0.6710	2.3293	-0.3460	-0.3550	-0.1461	-0.1235	-3.0691	0.4429	0.4718	0.6600	1.0897
Total Noninterest Income	0.6360	-0.6387	0.3575	2.2171 *	0.4048	0.1514	0.2814	0.2917	-2.3035	0.7560	0.4635	0.5670	0.7607
Total Interest Expense	-1.2585 *	-0.0224	-0.6493	-1.2851	0.7541	0.3780	0.0680	0.0577	-0.7468	-0.9387	-1.0633	-1.3890 *	-1.6172
Loan-loss Provision	-0.7479 ***	-0.6765 ***	-0.1868	-1.2186 *	-0.9301 **	-0.8185 **	-0.9011 **	-0.9159 **	0.1979	-0.5587	-0.8741	-0.6199	-0.3175
Loan Charge-offs	0.7248 ***	0.6950 ***	-0.4833	0.8751	0.6614	0.7422	0.7013 *	0.6955 **	1.5349	0.6323	0.6174	0.4337	0.2000
Expenses on Premises	-0.3109	-0.3120	-2.5638	-1.7553	-0.6163	-0.9336	-1.0243	-0.9938	-2.3193	-2.3415	-2.7488 *	-3.4456 **	-3.7522 **
Salaries	-1.4292 **	0.5001	0.9138	-1.6762	-0.0150	0.1143	-0.0836	-0.1369	7.9328	-0.6335	-0.3216	-0.3277	-0.2640
Other Noninterest Expense	-0.3044	0.0733	-0.4493	-3.4496 **	-0.7108	-0.3225	-0.4617	-0.4250	-0.0248	-1.1180	-0.7435 *	-0.7250	-1.2015
Liquidity													
Volatile Liabilities	-0.0130	0.0180	0.0191	-0.0726	-0.0456	-0.0072	0.0087	0.0117	-0.3340 *	-0.0723 *	-0.0434	-0.0387	-0.0349
Loans Plus Securities >= Five years	0.0225	0.0033	0.0730	0.0743	0.0807	0.0792	.0798	0.0856	0.0863	0.0708	0.0208	0.0473	0.0345
Log Likelihood	-584.9	-662.5	-561.8	-328.8	-505.8	-597.7	-660.9	-708.4	-416.7	-339.3	-315.9	-348.5	-410.6
Number of Observations	866	897	713	413	607	717	781	843	495	377	341	375	428
Akaike Information Criteria	1289.8	1445.0	1243.6	777.6	1131.6	1315.4	1441.8	1536.8	953.4	798.5	751.7	816.9	941.3
Pseudo R squared	0.090	0.222	0.170	0.195	0.162	0.159	0.144	0.145	0.172	0.121	0.102	0.103	0.078

Significance at 1%, 5% and 10% levels are indicated by ***, ** and * asterisks, repectively.

Table 6

Multinomial Logit Regressions of Determinants of Bank State: Merger versus Failure
(Estimation Period in Years)

Explanatory Variables	1990	1991	1992	1993	1993-94	1993-95	1993-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02
Intercept													
Constant	-4.4684	9.6836 **	-7.5929	-5.191	4.203	4.6942	4.5547	4.7692	11.3291	-5.1144	0.9346	-0.6199	-1.9189
Capital													
Tangible Equity for PCA	0.5301 ***	0.8500 ***	0.7454 ***	-0.0461	-0.1382	-0.0093	-0.0002	-0.0191	1.4089	0.2249	-0.0238	-0.0080	-0.0014
BHC Capital Injections	2.1647	-0.1048	0.3075	1.0384	0.7004	0.5830	0.5993	0.5579	-3.1430	-0.8561	-0.5000	-0.7831 *	-0.5443
External Capital Injections	-0.9151	-0.0810	5.0893 **	0.8027	0.9729	1.3522	1.3519	1.3907	-1.6622 **	-1.2036 **	-0.5297 *	-0.4764 *	-0.4560 *
Asset Quality													
Loans Past Due 30 to 89 Days	-0.6823 ***	-0.4077 **	-0.2239	-0.8464 **	-0.4781 **	-0.1863	-0.2035	-0.1915	0.6182	0.3477	0.5696	0.2731	0.2128
Loans Past Due 90 Days or More	-0.3236	-0.0706	-0.5440	-0.1931	-0.2134	-0.5354 **	-0.5049 **	-0.5198 **	-0.9865 **	-0.3893 *	-0.2086	-0.1001	0.0566
Nonaccrual Loans and Leases	-0.2397	-0.4158 ***	-0.3294 **	-0.7045	-0.6407 ***	-0.5988 ***	-0.6019 ***	-0.6018 ***	-2.9516 **	-0.4764 *	-0.1760	-0.0955	-0.1115
Other Real Estate Owned	-0.1902 *	-0.4054 ***	0.2594	0.3367	0.3322	0.2715	0.3054	0.3055	7.6746 **	0.5882	0.0078	-0.0945	-0.1525
Allowance for Loan Losses	0.3356	0.8715 ***	0.3666	2.6342 **	1.2752 **	0.9467 **	0.9844 **	0.9958 *	4.3713	0.5819	0.7722	0.8808	0.8598
Management													
Efficiency Ratio	0.0094	-0.0345	-0.0171	0.0437	-0.0179	-0.0297	-0.0320	-0.0379	-0.0522	0.0580	0.0218	0.0396	0.0435
Earnings													
Total Interest Income	1.1992	-1.5633 **	0.5040	2.2421	-0.1898	-0.5105	-0.3677	-0.3640	-3.3443	0.2597	0.5499	0.6946	0.9715
Total Noninterest Income	0.7799	-1.4107 **	0.2819	2.5038 **	0.5521	0.1408	0.1259	0.0759	-2.6277	0.6042	0.4134	0.6291	0.6470
Total Interest Expense	-0.9474	0.7870	-0.4657	-0.8863	0.7604	0.6581	0.4352	0.4075	-0.3228	-0.5881	-0.7982	-1.1075	-1.3550
Loan-loss Provision	0.1164	-0.1086	0.0177 ***	-1.0359	-0.6691	-0.5882	-0.6731 **	-0.7569 **	0.2790	-0.6447	-0.7495	-0.5020	-0.2115
Loan Charge-offs	-0.0145	0.0398	-0.7365 **	0.8755	0.3109	0.3865	0.3321	0.3975	1.0550	0.7349	0.5245	0.3932	0.1833
Expenses on Premises	-0.8320	1.1644	-1.5325	-1.7446	-0.2103	-0.4991	-0.4863	-0.3517	-1.2111	-1.3686	-1.4539	-2.0358	-2.7002
Salaries	-1.7712 *	1.4012 *	0.8435	-1.5131	-0.0220	0.2606	0.1441	0.1638	8.1622	-0.6658	-0.5979	-0.7600	-0.4629
Other Noninterest Expense	-0.2371 *	0.6104 **	-0.0030 **	-4.1409	-1.3090	-0.4806	-0.4177	-0.3441	0.2520	-0.8389	-0.6434	-0.8411	-1.0175
Liquidity													
Volatile Liabilities	-0.0085	-0.0177	0.0025 -	0.1507 *	-0.1159	-0.0679	-0.0431	-0.0379	-0.3553 **	-0.0813 *	-0.0253	-0.0431	-0.0287
Loans Plus Securities >= Five years	0.0159	0.0091	0.0927 **	0.0593	0.0729	0.0791	0.0805	0.0855 *	0.1157	0.0861	0.0125	0.0277	0.0228
Log Likelihood	-584.9	-662.5	-561.8	-328.8	-505.8	-597.7	-660.9	-708.4	-416.7	-339.3	-315.9	-348.5	-410.6
Number of Observations	866	897	713	413	607	717	781	843	495	377	341	375	428
Akaike Information Criteria	1289.8	1445.0	1243.6	777.6	1131.6	1315.4	1441.8	1536.8	953.4	798.5	751.7	816.9	941.3
Pseudo R squared	0.090	0.222	0.170	0.195	0.162	0.159	0.144	0.145	0.172	0.121	0.102	0.103	0.078

Significance at 1%, 5% and 10% levels are indicated by ***, ** and * asterisks, repectively.

Table 7

Multinomial Logit Regressions of Determinants of Bank State: Remain a Problem versus Failure
(Estimation Period in Years)

Explanatory Variables	1990	1991	1992	1993	1993-94	1993-95	1993-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02
Intercept													
Constant	-1.7037	9.8229 ***	-5.7298	-8.1433	3.4994	1.9090	2.3718	2.9545	11.8183	-4.7010	2.4569	-0.1438	-1.3300
Capital													
Tangible Equity for PCA	0.6653	0.9255	0.6366	-0.0180	-0.1213	0.0157	0.0210	0.0161	1.4656	0.2476	0.0092	0.0247	0.0209
BHC Capital Injections	1.8868	-0.2906	0.5581	0.8628	0.4019	0.2479	0.2982	0.3084	-3.3388	-0.8366	-0.3956	-0.6834	-0.6538
External Capital Injections	-0.2729	0.1045	5.0410 **	0.4656	0.9132	1.4138	1.4588	1.4872	-0.9185	-0.3014	-0.1564	-0.1621	-0.1645
Asset Quality													
Loans Past Due 30 to 89 Days	-0.1508 *	-0.1852 *	-0.0386	-0.6301	-0.2901	-0.0618	-0.0480	-0.0389	0.6652 *	0.3108	0.5140	0.1504	0.1100
Loans Past Due 90 Days or More	-0.1451	-0.0449	-0.2691	-0.1211	0.0590	-0.0202	-0.0798	-0.0852	-0.6682	-0.2518	-0.1519	-0.0492	0.0091
Nonaccrual Loans and Leases	-0.0503	-0.0609	-0.2043	-0.5441	-0.4911 ***	-0.4661 ***	-0.5049 ***	-0.5101 ***	-2.9075 ***	-0.5721	-0.3620	-0.2440	-0.2381
Other Real Estate Owned	-0.1520 *	-0.0992	0.3269	0.5932	0.5444 **	0.5269 **	0.5422 **	0.5437 **	7.8727	0.7603	0.1889	0.0840	-0.0439
Allowance for Loan Losses	0.2190	0.4678 **	-0.1398	2.0740	0.6592	0.3662	0.4775	0.4219	3.8584	0.5901	0.8449	0.7692	0.8030
Management													
Efficiency Ratio	-0.0094	-0.0479 **	-0.0088	0.0608	-0.0183	-0.0160	-0.0218	-0.0298	-0.0504	0.0616	0.0153	0.0351	0.0417
Earnings													
Total Interest Income	0.5102	-1.4084 **	0.8538	2.3853	-0.2317	-0.2204	-0.1554	-0.2602	-3.2794	0.3022	0.3374	0.6819	0.9719
Total Noninterest Income	0.0929	-1.6561 ***	0.4092	2.3166 *	0.4836	0.2710	0.2199	0.1216	-2.5602	0.6202	0.2145	0.5437	0.6399
Total Interest Expense	-0.4149	0.7310	-0.8402	-1.6448	0.4186	0.0461	-0.0415	0.0889	-0.4817	-0.5840	-0.6594	-1.1102	-1.3588
Loan-loss Provision	-0.5443 *	-0.2876	0.0509	-0.8631	-0.5969	-0.4833	-0.5775 *	-0.5975 *	0.4569	-0.4709	-0.8459	-0.6286	-0.3183
Loan Charge-A5offs	0.5898 *	0.2622	-0.6566 *	0.8309 *	0.5432	0.6234	0.5602	0.5720	1.3316	0.6531	0.6585	0.5533	0.3056
Expenses on Premises	-0.0152	1.0657	-1.8408	-1.8289	-0.4222	-0.9661	-0.7504	-0.6864	-1.6630	-1.7840	-2.0767	-3.3064 *	-3.3969 **
Salaries	-0.4521	1.5279 ***	0.6316	-1.4041	0.2488	0.3225	0.2618	0.3786	8.4899	-0.3599	0.0343	-0.2674	-0.2008
Other Noninterest Expense	0.1244	0.8622 **	-0.4144	-3.9178 **	-1.0867 *	-0.6549	-0.5648	-0.4626	0.1029	-1.0150	-0.5520	-0.6832 *	-0.9796
Liquidity													
Volatile Liabilities	-0.0006	0.0166	0.0404	-0.0821	-0.0456	-0.0061	0.0126	0.0192	-0.3160 *	-0.0456	-0.0169	-0.0090	-0.0073
Loans Plus Securities >= Five years	0.0273	0.0089	0.0877 **	0.0966	0.1024 *	0.1027 **	0.0997 **	0.1050 **	0.1040	0.0777	0.0213	0.0394	0.0348
Log Likelihood	-584.9	-662.5	-561.8	-328.8	-505.8	-597.7	-660.9	-708.4	-416.7	-339.3	-315.9	-348.5	-410.6
Number of Observations	866	897	713	413	607	717	781	843	495	377	341	375	428
Akaike Information Criteria	1289.8	1445.0	1243.6	777.6	1131.6	1315.4	1441.8	1536.8	953.4	798.5	751.7	816.9	941.3
Pseudo R squared	0.090	0.222	0.170	0.195	0.162	0.159	0.144	0.145	0.172	0.121	0.102	0.103	0.078

Significance at 1%, 5% and 10% levels are indicated by ***, ** and * asterisks, repectively.

table 5 (recovery) and table 6 (merger). It is not statistically significant in the remaining years in tables 5 or 6, nor is it significant in any year in table 7 (continuation as a problem).[23]

Fifth, another surprise is in the 1992 cohort, where external capital injections are significant and positive for all three future states (and yet are not significant again until the 1994–1998 cohort for merger [table 6], where the sign is negative).

Sixth, the efficiency ratio is significant only for the 1991 cohort for continuation as a problem versus failure (table 7). Since this ratio uses income and expense variables, we omitted the earnings variables from the model as a robustness check. The results showed that without the earnings variables, the frequency of significance improved in the efficiency ratio. For example, in the 1993–1997 and 1994–1998 cohorts, the efficiency ratio is significant in all three future states and has the expected sign. In the 1991 and 1992 cohorts, it is significant for recovery versus failure and has the expected sign.

Seventh, among the earnings ratios, loan-loss provision is the most consistently significant ratio in all three future states, but more so for recovery (table 5) than for the other two outcomes (table 6 and table 7). This result makes sense since the sooner loan losses are recognized, the more likely it is that a bank will survive. We also tried running the logits without the efficiency ratio to see whether we could gain more significance in the earnings ratios. However, the significance in the earnings ratios still did not become more frequent.

Finally, the most startling result is in the 1994–1998 cohort for all three future states: the coefficients for loans past due 90 days, nonaccrual loans and leases, and other real estate owned are much larger than in any other cohorts, and the sign on other real estate owned is positive (indicating that an increase in this variable is more likely to result in nonfailure). The likely explanation lies in the small number of failures and the particular nature of the banks in the 1994–1998 cohort. The number of failures fell from 10 in the 1993–1997 cohort to 7 in the 1994–1998 cohort,

and one of the failures in 1998 was a bank that failed because of fraudulent activity and therefore had a very low amount of other real estate owned—perhaps low enough to skew the model. For example, the mean of other real estate owned (as a percentage of assets) for failed banks in the 1993–1997 cohort equaled 3.0 percent; for the 1994–1998 cohort, the mean dropped to 0.62 percent.

Prediction of State: Out-of-Sample Results

The true measure of the logit model's contribution is its accuracy in making out-of-sample predictions. To test the accuracy, we forecast future bank states using prior-period estimations from our unordered logit model on the following year's cohort. For example, we use the coefficients from the 1990 cohort to predict the future state of the 1991 cohort, coefficients from the 1991 cohort to predict the future state of the 1992 cohort, and so on. Since our model is estimated from paired observations of first events and outcomes at second events, no observations that are in the 1990 cohort can be in the 1991 cohort (see explanation of observations in the section above on sample and data). To determine all predictions of state, we summed predicted probabilities of state for the cohort, deriving the expected number of banks in each future state. Figures 5 through 7 show the results.

All three figures show that the number of banks predicted for each state is very close to the number of banks that actually ended up in the state. For 1996, for example, figure 5 shows that the logit predicts 27 banks to recover, and 26 banks actually recovered; figure 6 shows that 5 banks are predicted to be acquired, compared with 3 that actually were; and figure 7 shows that 26 banks are predicted to remain a problem, compared with 29 that actually did remain a problem.

To test binary forecasts against our multistate model, we do two comparisons. First, we run a

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[23] Thinking that tangible equity would be correlated with capital injections, we ran the models using only tangible equity. However, taking out capital injections made no difference in significance.

binary model using the same financial variables as in the multistate model to predict failure versus nonfailure. We then compare the predicted probabilities of failure from this binary model with predicted probabilities of failure from the multistate model.

The first comparison is shown in figure 8, which compares the forecasts of the two models with the actual number of failed banks. As can be seen, both models predict failure fairly accurately. The second comparison is shown in figure 9, which compares the predicted probabilities of failure from our multistate model with predictions from the loss-distribution model (LDM). This model uses variables found in conventional bank-failure literature to predict bank failure within the second quarter after the Call Report is filed. In our test, we use the betas from the LDM estimated one year earlier to predict failures of problem banks for the following year. For example, the LDM predicted that eight banks would fail in 1994 (figure 9). The predictions resulted from the use of the betas estimated in the 1993 LDM.

However, as noted above in the section on sample and data, a second event for an observation may occur as many as 24 months after the first event. A bank on the problem list in December 1993 may be in our 1992 cohort that used Call Report data after 1993 in the estimation. Thus, to get a true out-of-sample prediction using our model, we have to use the estimated betas from a cohort two years before the date for which we are predicting failures for problem banks. The prediction that six banks would fail in 1994 resulted from the use of estimated betas from our 1992 model (figure 9). But since the LDM requires only a one-year prediction horizon, one would expect it to be a better predictor of failure than our model. This expectation is not quite borne out. As figure 9 shows, the two models are comparable. The advantage of ours is that we can predict not only problem-bank failure but also problem-bank recovery, merger, and continuation as a problem.

Figure 5

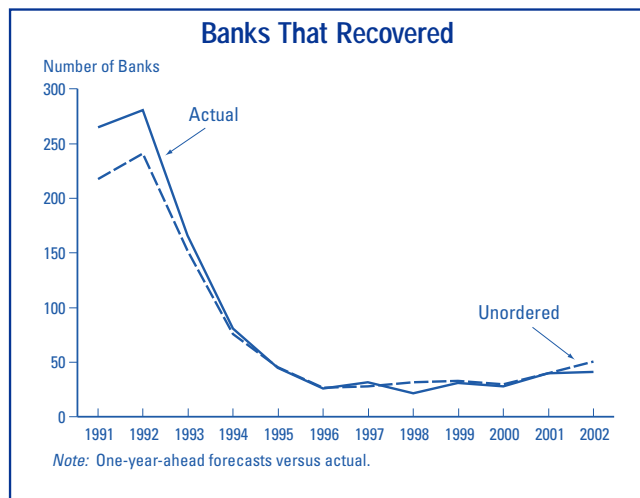**Banks That Recovered**

Note: One-year-ahead forecasts versus actual.

Figure 6

Banks That Were Acquired

Note: One-year-ahead forecasts versus actual.

Figure 7

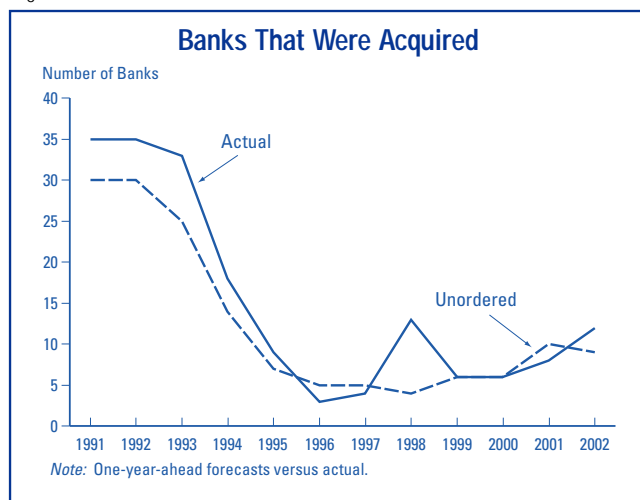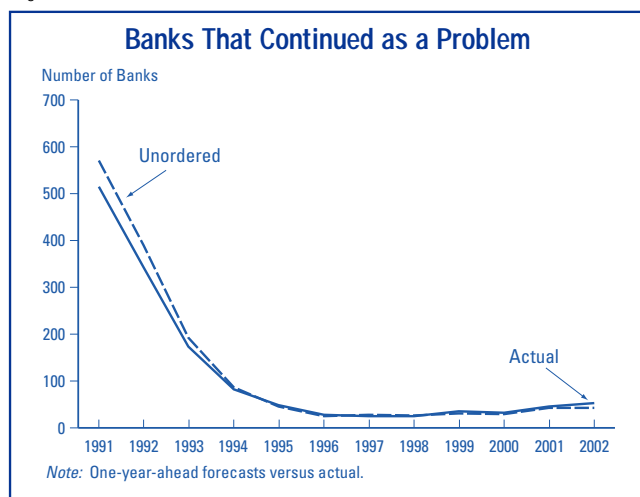**Banks That Continued as a Problem**

Note: One-year-ahead forecasts versus actual.

To determine whether banks with the highest probability of failure are the ones that actually fail, we rank banks that our model predicts to fail in each period by their probability of failure. We then divide the predicted failures into deciles to determine whether the highest decile contains the largest number of banks that actually failed. Of the 65 failed banks in our cohorts from 1991 through 2002, 38 were in the tenth decile.[24] An additional 8 banks were in the ninth decile.

The results for the remaining three states, however, were not quite as accurate. Of the 1,058 recovered banks in our cohorts from 1991 through 2002, 166 (16 percent) were in the tenth decile; adding the 159 banks in the ninth decile raises the percentage to 31. For banks that are predicted to merge, 14 percent are in the tenth decile (26 banks out of the 191 banks that merged in our cohorts from 1991 through 2002); and for banks that are predicted to remain a problem, 15 percent are in the tenth decile.

Despite the weaker results for the remaining three states, the accuracy in forecasting future bank states is noteworthy. Arguably, this model could be used to predict troubled banks' future state with decent reliability.

Economic Significance

To test the economic significance of the explanatory variables, we use a fairly standard approach: first we evaluate in-sample predicted state probabilities on the basis of the mean values of explanatory variables, and then we evaluate how these probabilities change with marginal changes in key explanatory variables. Because asset-quality variables—specifically, loans past due 90 days or more and nonaccrual loans and leases—were the variables most consistently significant across panels, we compared their economic significance in two periods: 1990 and the panel 1995–99.

[24] For the binary model, 39 of the 65 failed banks were in the tenth decile.

We use the predicted in-sample state probabilities for 1990 and the 1995–99 panel based on the mean values for explanatory variables in 1990 and in the 1995–99 panel. The means for the sample of banks used in model estimation for both periods are shown in table 8.

The predicted state probabilities evaluated at the mean for banks in the 1990 cohort are 16.41 percent for recover, 1.82 percent for merge, 80.82 percent for remain a problem, and 0.95 percent for fail. Both loans past due 90 days or more and nonaccrual loans and leases were statistically significant in 1990 and in the 1995–99 panel. Table 9 shows the effects on estimated state probabilities, ceteris paribus, should each
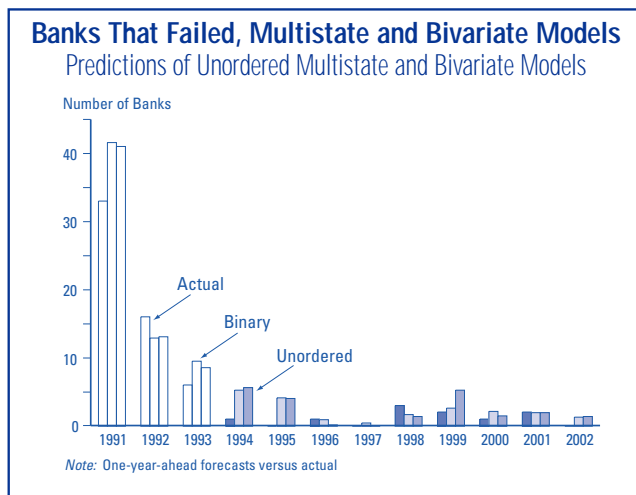
Figure 8

Banks That Failed, Multistate and Bivariate Models
Predictions of Unordered Multistate and Bivariate Models

Note: One-year-ahead forecasts versus actual

Figure 9

Banks That Failed, Multistate and LDM Models
Predictions of Unordered Multistate Model and LDM Models

Note: One-year-ahead forecasts versus actual
Total problem-bank list at year-end
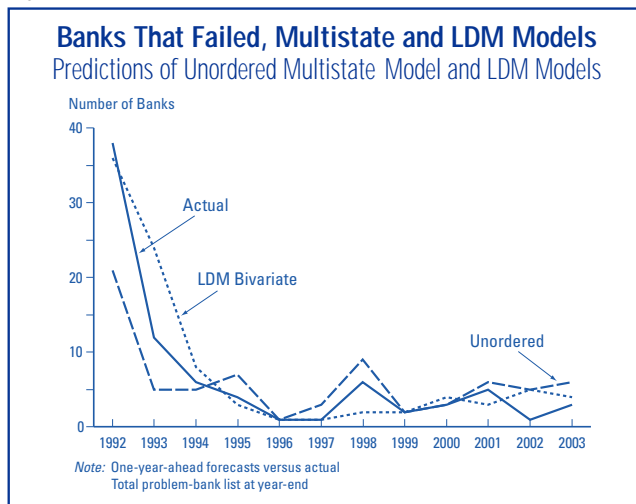
of these ratios experience a 1 percentage point increase in either of the periods examined. For example, in 1990 the mean for loans past due 90 days or more equaled 0.7964 percent of assets. If that is increased 1 percentage point to 1.7964 percent, the probability of recovery decreases from 16.41 percent to 12.52 percent, the probability of merger decreases from 1.82 percent to 1.59 percent, the probability of continuation as a problem increases from 80.82 percent to 84.74 percent, and the probability of failure increases from 0.95 percent to 1.15 percent.

Table 8

Means Ratio: 1990 and 1995–99 Panel Percentage of Assets		
Variable	Mean	Mean
	1990	**1995–99**
Capital		
Tangible Equity Capital	5.3409	7.297
Capital Injections:		
From BHC	0.1399	0.2176
Outside	0.1888	0.6267
Asset Quality		
Past-Due Loans (30–89 days)	2.2262	2.5514
Past-Due Loans (90+ days)	0.7964	1.1164
Nonaccruing Loans	2.6136	2.5111
Other Real Estate Owned	2.6808	1.4720
Loan Charge-offs	1.6613	1.7754
Allowance for Loan Loss	1.7465	1.9878
Management		
Efficiency Ratio	93.5429	93.5453
Earnings		
Interest Income	9.6398	8.2684
Noninterest Income	1.2205	2.1216
Interest Expense	5.8164	3.4738
Loss Provision	1.6035	1.7133
Salaries	1.9194	2.7150
Expenses on Premises	0.6952	0.8492
Other Noninterest Expense	2.0764	2.8551
Liquidity		
Volatile Liabilities	14.4676	14.2472
Loans and Sec. > 5 years	65.1021	68.6646

Table 9

Effects of One Percentage Point Change in Selected Variables on Predicted Probability			
1990	**At Mean**	**Increase in Loans Past-Due 90 Days to 1.7964%**	**Increase in Nonaccrual Loans to 3.6136%**
Recovery	**16.41%**	**12.52%**	**14.29%**
Merger	1.82	1.59	1.55
Remain a problem bank	80.82	84.74	83.13
Failure	0.95	1.15	1.02
1995–99	**At Mean**	**Increase in Loans Past-Due 90 Days to 2.1164%**	**Increase in Nonaccrual Loans to 3.5111%**
Recovery	**43.22%**	**36.45%**	**42.14%**
Merger	6.61	6.53	7.30
Remain a problem bank	49.93	56.65	50.12
Failure	0.25	0.37	0.45

Summary

We offer an approach that differs from that of previous failure-prediction models by focusing on troubled banks only. As a result, we can estimate a model that predicts failure as well as the three alternative outcomes to failure: recovery, merger, and continuation as a problem. Further, this model predicts failure as successfully as the standard binary failure-prediction model.

For the deposit insurer, this four-state model offers more information about the possible future states of problem banks than a two-state model can. This additional information can better assist the FDIC in long-term strategic planning regarding problem banks. This planning involves budgeting personnel, time, and funding. Moreover, our model shows that certain explanatory variables affect future bank state. This knowledge may help regulators choose policies that affect the likelihood that troubled banks can successfully resolve their own problems.

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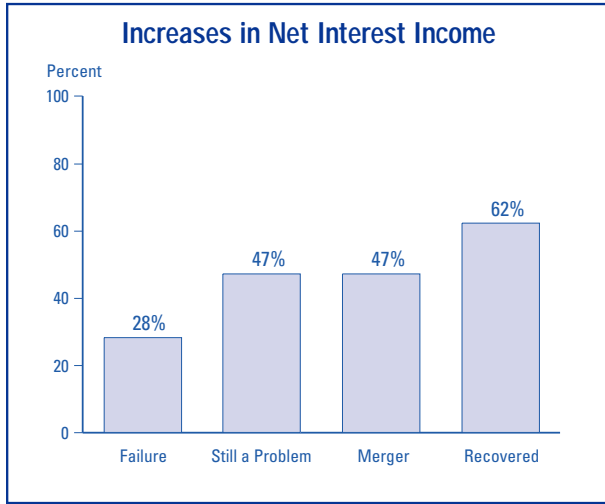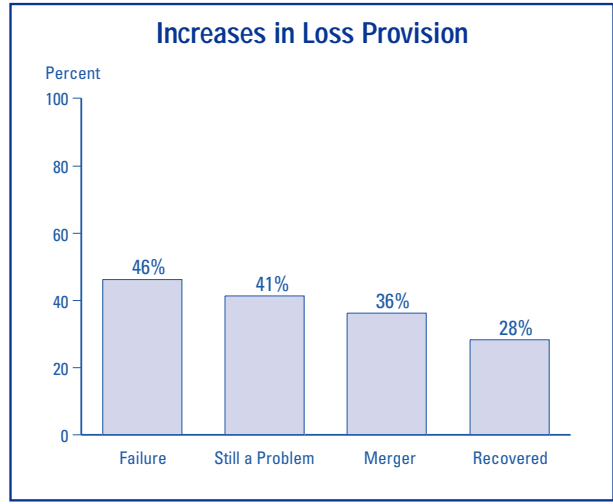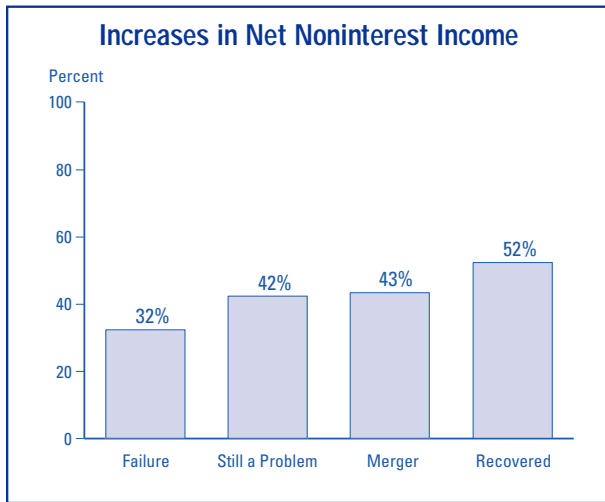
APPENDIX

Figure A1

Increases in Net Interest Income

Percent

- Failure: 28%
- Still a Problem: 47%
- Merger: 47%
- Recovered: 62%

Figure A3

Increases in Loss Provision

Percent

- Failure: 46%
- Still a Problem: 41%
- Merger: 36%
- Recovered: 28%

Figure A2

Increases in Net Noninterest Income

Percent

- Failure: 32%
- Still a Problem: 42%
- Merger: 43%
- Recovered: 52%

Figure A4

Increases in Loan-Loss Reserves

Percent

- Failure: 72%
- Still a Problem: 64%
- Merger: 67%
- Recovered: 50%

Figure A5

Increases in Loans 30–89 Days Past Due

Percent

56%	46%	50%	36%
Failure	Still a Problem	Merger	Recovered

Figure A8

Increases in Other Real Estate Owned

Percent

76%	63%	52%	44%
Failure	Still a Problem	Merger	Recovered

Figure A6

Increases in Loans 90 Days or More Past Due

Percent

56%	47%	46%	41%
Failure	Still a Problem	Merger	Recovered

Figure A9

Increases in Risk-Based Capital

Percent

14%	47%	46%	72%
Failure	Still a Problem	Merger	Recovered

Figure A7

Increases in Nonaccrual Loans

Percent

61%	59%	52%	38%
Failure	Still a Problem	Merger	Recovered

Figure A10

Increases in Tangible Capital

Percent

13%	41%	47%	70%
Failure	Still a Problem	Merger	Recovered

Figure A11

Increases in Volatile Liabilities

Percent

Failure	19%
Still a Problem	23%
Merger	29%
Recovered	26%

Figure A13

Improvement in the Efficiency Ratio

Percent

Failure	22%
Still a Problem	40%
Merger	40%
Recovered	59%

Figure A12

Increases in Loans and Securities with Maturities Greater than or Equal to Five Years

Percent

Failure	40%
Still a Problem	38%
Merger	32%
Recovered	37%