FEDERAL RESERVE BANK OF DALLLAS
DECEMBER 1995

FINANCIAL INDUSTRY

Studies

Does Geographic Liberalization Really Hurt Small Banks?

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Contents

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Small bank market share did tend to decline around the time a state reduced its geographic banking restrictions. But the losses in market share were occurring before the removal of the restrictions, and liberalization did not accelerate the declines.

The U.S. banking industry has long featured the presence of many small banks. To the extent that small banks have operated in markets off-limits to larger competitors because of geographic banking restrictions, those restrictions may have contributed to the large number of small banks. While geographic restrictions were being relaxed, small banks lost market share, reinforcing concerns about small banks' ability to compete in a less geographically restricted banking market. These issues have taken on increased prominence in light of the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994, which will allow interstate branching in 1997 unless a state opts out. If geographic liberalization at the state level hurts small banks, then it might be expected that the Riegle–Neal Act would pummel small banks. But the Riegle–Neal Act is only the latest in a series of changes in banking law that have reduced the geographic restrictions on banking.

While the erosion of geographic banking restrictions has been occurring for decades, many of the banking laws that reduced geographic banking restrictions were passed during the 1980s and early 1990s. In twenty-one states, the relaxation of geographic restrictions resulted in banks' being allowed to branch freely within state borders; this freedom to branch could reduce small banks' market share by allowing larger in-state competitors to enter small banking markets through branching. In addition, forty-seven states relaxed geographic restrictions to allow entry by out-of-state bank holding companies; this change could reduce small banks' market share by allowing larger out-of-state competitors to enter small banking markets.

As geographic restrictions on banking were being removed, the number of small banks in the United States declined significantly, and their share of banking industry assets also declined. At the end of 1982, there were 11,825 banks in the United States with total assets of $1.8 billion or less, and these banks held 33 percent of U.S. banking assets.[1] By the end of first-quarter 1995, there were 7,762 banks in the United States with total inflation-adjusted assets of $1.8 billion or less. And these banks held 28 percent of U.S. banking assets. Thus, at the national level since 1982, the number of banks below the $1.8 billion cutoff declined by 34 percent, and their share of the banking market declined by 15 percent.[2]

In this study, I seek to determine whether the removal of legal restrictions on the geographic expansion of banks had a significant impact on the market share of small banks.[3]

[1] In this study, I use the term "bank" to indicate either a single insured commercial bank that does not belong to a holding company or the group of all insured commercial bank subsidiaries within a given holding company. I analyze banking organizations rather than individual banks because, within a bank holding company, sister banks are not viewed as competitors in this study and, to some extent, may act as branches of the lead bank.

[2] Moore and Couch (1994) find that small banks' market share slips to an even greater degree when off-balance-sheet activities are included in the measure of banking activity than when only balance sheet assets are included in the measure of banking activity.

[3] Several studies have examined the influence of the relaxation of changes in geographic restrictions on the banking market. Rose and Wolken (1990) find that affiliation with a geographically diversified bank holding company does not generally improve individual small banks' ability to gain market share relative to their independent rivals. Amel and Liang (1992) find that entry increased following the relaxation of geographic restrictions on banking. Benston (1985), Fant (1985), and Fraser and Kolari (1985) examine the competitive position of small banks in a deregulated environment; the consensus is that, while increased competition would pose challenges for small banks, small banks would be able to maintain an important place in the banking market. Calem (1994) studies the impact of easing branching restrictions and allowing entry by out-of-state bank holding companies on small bank market share. Calem concludes that allowing entry by out-of-state bank holding companies has little effect on small bank market share, while relaxing branching restrictions hurts small bank market share.

Consistent with popular notions and previous research (Calem 1994), I find that small bank market share in a state did tend to decline around the time the state reduced its geographic banking restrictions. However, a closer examination reveals that the losses in market share were occurring before the removal of geographic restrictions became effective and that liberalization did not accelerate those declines. Thus, if the recently enacted interstate branching law has an impact similar to that of earlier state laws that reduced geographic banking restrictions, then the new law is not likely to have a significant impact on small bank market share.

While not the focus of this study, the question remains as to why small banks were losing market share during the 1980s, given that the decline in small bank market share was not explained by the removal of geographic banking restrictions. One possible explanation is that technical and financial innovations had reduced the effects of geographic restrictions before they were lifted, allowing competition and integration to reshape the banking industry. Kaufman (1991) argues that improvements in information and communication technology reduced banks' ability to compete with nonbanks; this argument could be extended to small banks' ability to compete with distant large banks, insofar as improved technology reduced the importance of a bank's physical location and allowed competition to span greater distances than it had historically. Jackson (1992) finds evidence suggesting that competition and integration had made at least part of the market for banking services national by the mid-1980s, despite the presence of numerous geographic restrictions at that time. Thus, the evidence suggests that geographic restrictions did not isolate small banks from competition, which helps explain both the downward trend in small bank market share and the lack of an effect from the removal of geographic banking restrictions.

Losses in small bank market share. I begin my analysis by documenting the decline in the number of small banks and their market share that tended to occur in each of the fifty states and the District of Columbia (hereafter considered a "state") from the end of 1982 to the first quarter of 1995.[4]

While there are many possible ways to define "small banks," this study defines small banks in a state by finding a cutoff for asset size such that the banks below the cutoff controlled one-third of the assets in the state at the end of 1982.[5] I then apply that cutoff to the state's banking market in subsequent years, after adjusting for inflation, and examine the behavior of the share of bank assets held by banks below the cutoff.

This method for defining small banks results in substantial differences in the cutoffs defining small banks across states. The differences in cutoffs across states allow for a consistency that would be absent when using a fixed dollar cutoff across states. Using, say, a fixed $100 million cutoff to define "small" banks for all states would result in the banks' labeled "small" being large relative to their competitors in states like Kansas, where banks of that size controlled 72 percent of bank assets at the end of 1982, and banks' labeled "small" being minuscule relative to their competitors in states like New York, where banks of that size controlled less than 1 percent of bank assets at the end of 1982.

Table 1 shows the cutoffs for small banks and their market position as of the end of 1982 and the first quarter of 1995. As the table shows, there are substantial differences in the size cutoffs for small banks across states, with the higher cutoff points tending to occur in states with a large volume of bank assets. Nevertheless, all states tended to experience substantial declines in small bank market share and numbers of small banks, irrespective of the size of their banking market or the cutoff point used to define small banks; the share of banking assets controlled by small banks and the number of small banks fell in all but three states. Moreover, in thirty-seven states, small bank market share fell more than 10 percentage points.

Legal changes affecting geographic banking restrictions

Numerous changes in the laws imposing geographic banking restrictions occurred between the end of 1982 and the second quarter of 1993. Table 2 summarizes the status of laws affecting the geographic expansion of banks during my sample period.[6,7] These laws can be broken into two categories, intrastate branching laws and interstate holding company laws.

Intrastate branching. As of the end of 1982, there were significant differences in the amount of branching allowed among different states. At the most restrictive end, ten states did not allow any branching; in these states, a small bank would be fully protected from a large bank entering its market through the establishment of a branch near the small bank's location. In twenty-six states, some branching was allowed but was subject to various restrictions that could offer small banks some protection from competition

[4] The period chosen for analysis reflects the substantial number of changes in legislation affecting geographic restrictions on banking and the availability of data on banks' troubled asset ratio that begins at the end of 1982.

[5] For the purposes of this study, a banking organization's size is defined as the sum of its banking assets in the state under consideration. This definition facilitates a focus on structural changes that entail the combination of banking assets in a given state. Generally, it is not possible to find cutoffs such that exactly one-third of a state's banking assets are controlled by the small banks as a group. I select cutoffs that bring the share of a state's banking assets controlled by the small banks as close to one-third as possible.

[6] Information on state laws affecting the geographic expansion of commercial banks comes from Amel (1993).

[7] The dates in the table refer to the date on which general entry was allowed for out-of-state holding companies. In some cases, special provisions were made before the dates shown that allowed out-of-state holding companies to acquire failed institutions.

Table 1

Selected Banking Structure Variables, 1982:4–95:1

State	Bank assets, as of 1982:4 (Thousands of dollars)	Cut off at 1982:4 (Thousands of dollars)	Number of small banking organizations, 1982:4	Number of small banking organizations, 1995:1	Percentage change in number of small banking organizations	Share of small banks, as of 1982:4 (Percent)	Share of small banks, as of 1995:1 (Percent)	Change in share, 1982:4–95:1 (Percentage points)
Alabama	20,424,278	176,049	215	152	−29.30	33.45	20.81	−12.64
Alaska	3,373,736	269,227	9	5	−44.44	32.53	13.43	−19.10
Arizona	16,660,181	2,337,055	28	26	−7.14	30.02	10.12	−19.90
Arkansas	13,618,218	51,466	190	90	−52.63	33.37	13.51	−19.86
California	275,430,674	22,254,929	345	379	9.86	35.77	40.88	5.11
Colorado	20,274,882	396,029	225	171	−24.00	32.16	35.62	3.47
Connecticut	16,477,636	934,740	46	40	−13.04	35.33	15.16	−20.17
Delaware	7,759,857	721,146	23	20	−13.04	35.03	5.60	−29.43
District of Columbia	10,577,192	1,082,355	15	12	−20.00	32.82	20.25	−12.56
Florida	59,832,953	899,464	274	273	−.36	33.98	22.27	−11.71
Georgia	30,359,352	193,316	343	263	−23.32	33.12	19.70	−13.42
Hawaii	6,701,568	461,913	8	10	25.00	24.78	4.60	−20.18
Idaho	5,883,914	684,350	24	15	−37.50	35.83	20.10	−15.74
Illinois	158,130,160	290,352	1,152	604	−47.57	33.33	21.12	−12.20
Indiana	3,654,617	96,557	319	105	−67.08	33.29	9.63	−23.66
Iowa	25,485,354	43,357	441	283	−35.83	33.43	22.31	−10.95
Kansas	19,617,615	33,737	457	278	−39.17	33.36	21.22	−12.14
Kentucky	23,562,937	65,994	274	143	−47.81	33.28	14.94	−18.34
Louisiana	30,886,965	111,581	228	155	−32.02	33.49	22.50	−10.98
Maine	3,890,100	544,675	19	18	−5.26	37.50	24.34	−13.16
Maryland	20,178,545	1,628,980	67	67	0	31.87	24.35	−7.52
Massachusetts	44,688,974	3,814,990	76	44	−42.11	37.00	8.81	−28.19
Michigan	58,947,991	1,047,609	202	123	−39.11	32.91	16.15	−16.77
Minnesota	38,820,939	134,022	609	397	−34.81	33.46	27.25	−6.20
Mississippi	13,694,026	82,391	135	75	−44.44	33.12	17.45	−15.68
Missouri	41,482,463	410,867	459	321	−30.07	33.18	29.53	−3.65
Montana	6,153,144	58,532	96	75	−21.88	33.29	32.49	−.81
Nebraska	13,964,218	30,871	359	203	−43.45	33.27	17.48	−15.79
Nevada	4,585,244	551,298	11	16	45.45	27.99	8.54	−19.44
New Hampshire	3,635,021	63,991	39	9	−76.92	33.34	5.50	−27.84
New Jersey	42,223,829	809,777	99	72	−27.27	32.75	13.22	−19.53
New Mexico	7,765,532	137,898	54	43	−20.37	32.93	24.66	−8.27
New York	519,857,598	40,403,593	157	152	−3.18	31.38	23.16	−8.23
North Carolina	32,452,041	2,105,948	65	55	−15.38	34.83	8.62	−26.20
North Dakota	5,784,493	35,188	112	77	−31.25	33.48	27.59	−5.89
Ohio	63,379,659	1,709,994	257	200	−22.18	33.14	19.02	−14.12
Oklahoma	29,628,280	61,857	414	250	−39.61	33.36	29.47	−3.89
Oregon	14,214,241	992,759	74	34	−54.05	28.46	16.49	−11.98
Pennsylvania	105,812,086	890,609	319	191	−40.13	33.09	20.26	−12.83
Rhode Island	8,415,905	1,832,684	12	7	−41.67	29.89	13.85	−16.04
South Carolina	10,264,911	426,408	72	61	−15.28	30.38	24.48	−5.90
South Dakota	8,782,831	104,123	128	76	−40.63	32.79	11.80	−20.99
Tennessee	28,305,928	127,631	272	158	−41.91	33.13	19.00	−14.13
Texas	162,945,253	1,538,872	1,124	840	−25.27	32.94	43.02	10.08
Utah	8,230,643	578,944	51	40	−21.57	35.47	27.18	−8.29
Vermont	2,869,622	142,927	21	11	−47.62	34.30	17.41	−16.90
Virginia	30,211,867	1,988,201	149	123	−17.45	33.04	19.74	−13.29
Washington	26,334,117	1,966,123	95	79	−16.84	32.25	23.58	−8.66
West Virginia	11,950,156	47,922	167	36	−78.44	33.37	7.99	−25.38
Wisconsin	30,447,923	61,241	424	212	−50.00	33.37	16.00	−17.37
Wyoming	4,107,705	61,372	57	30	−47.37	33.22	17.51	−15.71

Table 2

Status of Geographic Banking Restrictions

State	Branching status, 1982:4	Date limited branching allowed (if during 1982:4–93:2)	Date free branching allowed (if during 1982:4–93:2)	Interstate status, 1982:4	Date regional entry allowed (if during 1982:4–93:2)	Date national entry allowed (if during 1982:4–93:2)
Alabama	limited		May 1990	none	July 1987	
Alaska	free			national		
Arizona	free			none		October 1986
Arkansas	limited			none	January 1989	
California	free			none	July 1987	January 1991
Colorado	unit	August 1991		none	July 1988	January 1991
Connecticut	limited		October 1988	none	June 1983	March 1990
Delaware	free			none	January 1988	June 1990
District of Columbia	free			none	November 1985	April 1986
Florida	limited		November 1988	none	July 1985	
Georgia	limited			none	July 1985	
Hawaii	limited		January 1986	none		
Idaho	free			none	July 1985	January 1988
Illinois	limited		June 1993	none	July 1986	December 1990
Indiana	limited		May 1991	none	January 1986	July 1992
Iowa	unit			none	January 1991	
Kansas	unit	April 1987	February 1990	none	July 1992	
Kentucky	limited			none	July 1984	July 1986
Louisiana	limited		June 1988	none	July 1987	January 1989
Maine	free			national		
Maryland	free			none	July 1985	
Massachusetts	limited			none	July 1983	September 1990
Michigan	limited		August 1988	none	January 1986	October 1988
Minnesota	unit	August 1987		none	July 1986	
Mississippi	limited			none	July 1988	
Missouri	unit		November 1990	none	August 1986	
Montana	unit	January 1990		none	October 1993	
Nebraska	unit	March 1983		none	January 1990	January 1991
Nevada	free			none	July 1985	January 1989
New Hampshire	limited		July 1987	none	September 1987	April 1990
New Jersey	limited			none	August 1986	January 1988
New Mexico	limited		June 1991	none		June 1989
New York	limited			national		
North Carolina	free			none	January 1985	
North Dakota	unit	July 1987		none		June 1991
Ohio	limited		January 1989	none	October 1985	October 1988
Oklahoma	unit	October 1983		none	July 1987	
Oregon	limited		March 1985	none	July 1986	July 1989
Pennsylvania	limited		March 1990	none	August 1986	March 1990
Rhode Island	free			none	July 1984	January 1988
South Carolina	free			none	January 1986	
South Dakota	limited			none		February 1988
Tennessee	limited		March 1990	none	July 1985	January 1991
Texas	unit	January 1987	October 1988	none		January 1987
Utah	free			none	April 1984	December 1987
Vermont	free			none	January 1988	February 1990
Virginia	limited		January 1987	none	July 1985	
Washington	limited		July 1985	none		July 1987
West Virginia	limited		January 1987	none		January 1988
Wisconsin	limited		August 1989	none	January 1987	
Wyoming	no statute	March 1986		none		May 1987

NOTES: Unit = no branching. Limited = limited branching. Free = unrestricted branching. None = entry by out-of-state holding companies generally prohibited. National = entry by holding companies headquartered anywhere in the United States generally allowed. Regional = entry by holding companies headquartered in selected states generally allowed.

SOURCE: Amel (1993).

with large banks' branches. Finally, in fourteen states, banks were allowed to branch freely, implying that large banks were free to enter the small bank's geographic area.

But between the end of 1982 and the second quarter of 1993, many states eased their geographic branching restrictions. Among the ten states that allowed no branching at the end of 1982, all but Iowa (which did allow banks some ability to expand geographically through the use of nonbranch "facilities") moved to allow at least limited branching as of the second quarter of 1993, and three of the ten states moved to allow free branching by the second quarter of 1993. Also, more than two-thirds of the states that allowed only limited branching at the end of 1982 moved to allow banks to branch freely by the second quarter of 1993.

Interstate holding companies. While differences in intrastate branching laws across states at the end of 1982 were significant, the differences in laws affecting interstate bank holding companies were more limited. At the end of 1982, all but three states generally prohibited out-of-state bank holding companies from operating banks within their state. But by the second quarter of 1993, every state except Hawaii allowed bank holding companies headquartered in other states to operate banks within its borders. And Hawaii allowed such entry in the first quarter of 1995.

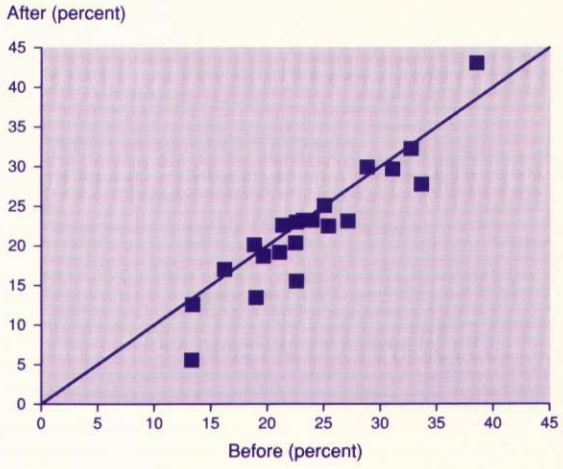
The type of out-of-state entry allowed differed across states, however. Between the end of 1982 and the second quarter of 1993, thirty-nine states moved to allow entry only by holding companies headquartered in states within a selected region, with twenty-three of these states later moving to allow entry by holding companies headquartered anywhere in the nation. In addition, eight states went directly to allowing entry by holding companies headquartered anywhere in the nation, without first allowing entry on a regional basis.

The impact of legal changes on small bank market share: Graphical analysis

Was there a connection between changes in state laws affecting the geographic expansion of commercial banks and small bank market share? This section provides some evidence to address this question by comparing small bank market share before and after geographic restrictions were eased.

Free intrastate branching and small bank market share. Small bank market share did fall in the wake of the movement to free branching. Chart 1 shows the market share that small banks had on average two years prior to free branching (measured on the horizontal axis) and the market share that small banks had on average two years after free branching was adopted (measured on the vertical axis). Each point on the chart represents one of the twenty-one states that changed its laws to allow free branching between the end of 1982 and the second quarter of 1993. The solid line on the chart represents points consistent with no change in market share; squares above the line represent states where small banks had a larger market share after the adoption of free branching than they had before the adoption of free branching. Squares below the line represent states where small banks had a smaller market share after the adoption of free branching than they had before the adoption of free branching. As can be seen in the chart, most squares lie below the line, indicating that small banks tended to lose market share after the adoption of free branching.

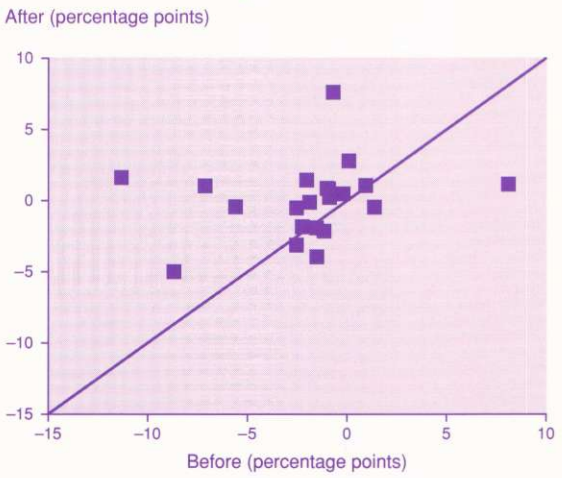
Chart 1
Average Market Share of Small Banks
Two Years Before and Two Years After Free Branching



It would be premature, however, to conclude that the decline in market share was necessarily connected to the adoption of free branching. If there were a general downward trend in small bank market share over the period analyzed, then a comparison of small banks' market share before and after any arbitrary time point would likely show a decline in market share.

To avoid incorrectly attributing the reduction in the market share of small banks caused by a general downward trend in small bank market share to the adoption of free branching, I compare the change in small bank market share over the two years before the adoption of

Chart 2
Change in Small Bank Market Share
Two Years Before and Two Years After Free Branching



free branching with the change in small bank market share over the two years after the adoption of free branching. If this change had a negative impact on small bank market share, then most of the squares in the chart would lie below the solid line, indicating that the decline in small bank market share was greater after the adoption of free branching than before. Chart 2 shows, however, in most states the change in small bank market share was similar before and after the adoption of free branching. Most of the squares lie near the solid line, indicating little difference in changes in market share before and after liberalization. Moreover, more squares are above the line than below it, indicating that small banks actually did somewhat better in terms of changes in market share after the adoption of free branching.[8] Thus, the graphical analysis does not support the notion that liberalizing branching restrictions harms small banks' market share. And these results show that it is important to consider movements *before* and after legal changes when attempting to assess the impact of those changes on small banks.[9]

Calem (1994) also examines the impact of easing branching restrictions on small bank market share. Calem identifies seventeen states that had significant barriers to branching as of January 1985 and that reduced those barriers by January 1991. He finds that small banks in these states were more likely to have had a loss of market share of 5 percent or more between December 1986 and December 1992 than small banks in other states. Use of Calem's methodology, but with the cutoffs defining small banks that are used elsewhere in the present study, produces results similar to Calem's; more than three-quarters of the seventeen states that Calem identifies as easing branching restrictions suffered declines in small bank market share of 5 percent or more between the end of 1986 and the end of 1982, while among the other thirty-four states, fewer than two-fifths suffered such declines. Based on such results, Calem concludes that the easing of branching restrictions resulted in a decline in the market share of small banks.

These results could be interpreted differently, however, if the easing of branching restrictions tended to occur in states where small banks were losing market share prior to the easing of branching restrictions. Examining the change in market share before and after branching restrictions were eased can control for the possibility that the states that eased branching restrictions tended to do so after small banks had already lost market share. An examination of changes over either two or five years before and after the easing of branching restrictions shows that the loss in small bank market share was greater after branching restrictions were eased than before in fewer than half of the states that eased. Moreover, using a two-year window, the average loss in market share of 1 percentage point after liberalization was slightly smaller than the average loss in market share of 2.7 percentage points before liberalization. Similarly, based on a five-year window, the average loss after liberalization was 3.3 percentage points, compared with an average loss of 5.7 percentage points before liberalization. The results suggest that the easing of branching restrictions did not cause the loss of small bank market share in the states that eased.[10]

It is possible, however, that the changes in small bank market share that occurred before the easing of branching restrictions were caused by anticipation of the restrictions' being eased. Such anticipation could occur between the time that a law that eased branching restrictions was passed and the time that the law became effective. While data on passage dates are not readily available for all of the states that eased, Gunther (1995) provides passage dates for eight of Calem's seventeen states. In all but one of these eight cases, the passage date fell within one year of the effective date. To control for changes in small bank market share that occurred between the passage date and effective date of the branching law, I compute changes in market share using the two- and five-year windows as above, but with the "before" window ending one year

[8] The data used in Chart 2 are shown in Table A1 in the appendix.

[9] To check the robustness of these results, I also compute market share for five years before and after free branching was allowed. The results using the five-year window are qualitatively similar to those obtained with the two-year window. The choice of five versus two years also does not qualitatively change the results in Chart 1.

[10] Moreover, it is possible that the loss of small bank market share that occurred before the easing of branching restrictions increased the likelihood that a state would ease its branching restrictions.

before the effective date. For the two-year window, small banks had larger losses in market share in thirteen of the seventeen states before the change in law than after the change in law; for the five-year window, small banks had larger losses in market share in eight of the seventeen states before the change in law than after the change in law. Thus, this evidence does not support the idea that the relatively large declines in small bank market share that I found before the branching laws became effective occurred between the passage date and effective date of the branching laws.

The possibility remains, however, that anticipation of the changes in laws still played a role in the market share changes, but bankers were acting even before the laws were passed. It would be likely to be difficult, however, to form firm expectations of the change in law too far in advance. Thus, I compute market share changes using two- and five-year windows as before, but with the "before" window now ending two years before the effective date of the law. For the two-year window, small banks had larger losses in market share in eleven of the seventeen states before the change in law than after the change in law; for the five-year window, small banks had larger losses in market share in seven of the seventeen states before the change in law than after the change in law. All in all, the evidence casts doubt on the view that banks' behavior in anticipation of the passage of branching laws caused the relatively large losses in small bank market share before the effective date of the laws.

Chart 3
Average Market Share of Small Banks
Two Years Before and Two Years After Interstate Entry

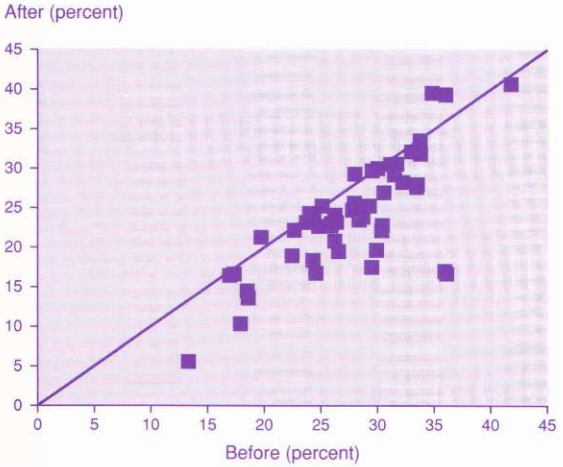
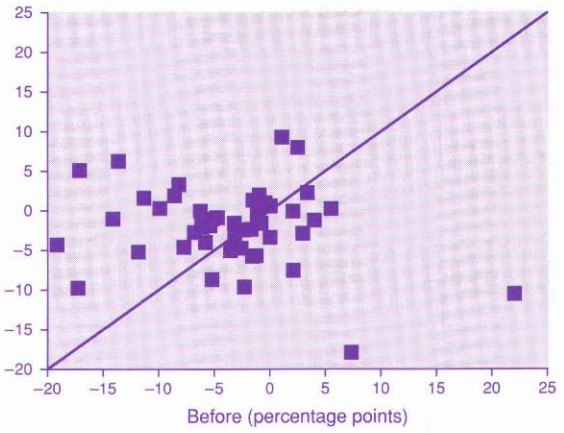


Chart 4
Change in Small Bank Market Share
Two Years Before and Two Years After Interstate Entry



Interstate entry and small bank market share. The movement to allow entry by out-of-state holding companies is another liberalization of geographic banking restrictions that could have had an impact on small bank market share. Chart 3 shows the average market share held by a state's small banks for the two years before (on the horizontal axis) and two years after (on the vertical axis) the state adopted measures allowing entry by out-of-state bank holding companies. Each square on the chart represents one of the states that changed its laws to allow entry by out-of-state holding companies between the end of 1982 and the first quarter of 1993. Most of the squares lie below the line, indicating that small bank market share tended to be lower after interstate entry was allowed than before such entry was allowed.

As was the case in the intrastate branching analysis, however, it is necessary to control for the general downward trend in market share over the sample period. Toward that end, Chart 4 shows the change in market share for the two years before and two years after the adoption of interstate entry.[11] If the adoption of provisions allowing entry by out-of-state holding companies had a negative impact on small bank market share, then most of the points would lie below the solid line. As can be seen in the chart, however, there were slightly more points above the line than below the line, providing little evidence to support the idea that allowing entry by out-of-state holding companies causes small banks to lose market share.[12]

[11] The data used in Chart 4 are shown in Table A2 in the appendix.

[12] To check the robustness of these results, I also examined market share for five years before and after interstate entry was allowed. The results using the five-year window were qualitatively similar to those obtained with the two-year window. The choice of five versus two years also did not qualitatively change the results in Chart 3.

Table 3

Effect of Changes in State Law and Troubled Asset Ratio On Small Bank Market Share

State	*TAR*	*BRANCH*	*INTER*
Alabama	positive	none	positive
Arizona	none	none	none
Arkansas	none		none
California	none		none
Colorado	positive		none
Delaware	none		none
District of Columbia	none		none
Florida	negative	none	none
Georgia	negative		positive
Hawaii	none	none	
Idaho	none		none
Illinois	none	none	none
Indiana	positive	positive	negative
Iowa	positive		none
Kansas	positive	positive	none
Kentucky	none		none
Louisiana	positive	none	none
Maryland	none		none
Michigan	none	none	none
Minnesota	none		none
Mississippi	none		none
Missouri	positive	negative	none
Montana	none		none
Nebraska	positive		negative
Nevada	positive		none
New Hampshire	none	none	none
New Jersey	negative		positive
New Mexico	none	none	negative
North Carolina	positive		none
North Dakota	positive		none
Ohio	none	none	none
Oklahoma	negative		none
Oregon	positive	none	none
Pennsylvania	none	none	positive
Rhode Island	none		negative
South Carolina	none		none
South Dakota	positive		none
Tennessee	negative	positive	none
Texas	none	none	none
Utah	none		none
Vermont	none		positive
Virginia	none	none	none
Washington	positive	none	none
West Virginia	none	none	none
Wisconsin	positive	none	positive
Wyoming	none		none

NOTES: Column 2 is based on a likelihood ratio test for the troubled asset ratio (*TAR*) and the sign of the sum of the coefficients on *TAR*. Where the likelihood ratio statistic implies that *TAR* is not statistically significant at the 5-percent level, "none" is shown; otherwise, the sign of the sum of the coefficients on *TAR* is shown. Columns 3 and 4 are based on *t*-statistics for the effect of allowing free branching and interstate entry on small bank market share. "None" implies that the *t*-statistic was not statistically significantly at the 5-percent level. "Positive" implies that the *t*-statistic is statistically significant and positive; "negative" implies that the *t*-statistic is statistically significant and negative. Additional details on the ARIMA models used and quantitative results are available from the author on request.

Links between small bank market share and legal changes: ARIMA analysis

In addition to the graphical analysis presented above, statistical methods can also be used to help identify and measure any effects on banking structure emanating from the removal of geographic restrictions. In particular, autoregressive integrated moving average (ARIMA) models can control for both complex dynamics in the time series process governing small bank market share and the potential effects of other variables.[13]

To the extent that banking-sector difficulties have differing impacts on small and large banks because of differences in small and large bank portfolios, it would be important to control for the impact of banking-sector difficulties on small bank market share. In Moore (1995), I find a positive relationship between the severity of regional banking-sector difficulties and regional changes in small bank market share. To account for such effects, in this study, I include the troubled asset ratio (*TAR*) as a proxy for banking-sector difficulties, where the troubled asset ratio is defined as the ratio of nonaccrual loans, loans past due ninety days or more, and other real estate owned to gross assets.

The variables that measure the impact of the liberalization of geographic branching restrictions are modeled as follows. *BRANCH* measures the impact of adopting free branching and enters as an intervention variable modeled as a step function, in which *BRANCH* = 0 before free branching was allowed and *BRANCH* = 1 after free branching was allowed. Similarly, *INTER* measures the impact of allowing entry by out-of-state holding companies and equals 0 before out-of-state holding company entry was allowed and equals 1 after such entry was allowed.

Table 3 shows the results from the ARIMA analysis. As shown in the table, *TAR* had a statistically significant effect on small bank market share in twenty of the forty-five states for which I computed estimates. To provide an indication of whether *TAR* has a positive or negative relationship with small bank market share, I report the sign of the sum of the coefficients on *TAR* for each state where *TAR* is statistically significant; this sum is positive for fifteen states and negative for five states. Thus, these results confirm those presented in Moore (1995); regional banking difficulties tend to help small banks hold on to market share.

Table 3 also shows that the effect of free branching on market share is not statistically significant for seventeen of the twenty-one states for which I compute estimates.[14] For three of the twenty-one states, the estimated effect of *BRANCH* on small bank market share is positive, and for one state, the estimated effect of *BRANCH* on small bank market share is negative. Taken as a whole, these results show that the adoption of free branching in a state did not result in any strong pattern of effect on the market share of small banks in that state.[15] This conclusion is in agreement with the graphical results in Chart 2.

Table 3 also includes estimates of the effects of the adoption of provisions allowing entry by out-of-state holding companies on small bank market share.[16] As the table shows, the estimated effect of *INTER* on small bank market share is not statistically significant in thirty-five of the forty-five states for which I compute estimates. In six of the forty-five states, the estimated effect of *INTER* on small bank market share is positive, and in four of the states, the estimated effect of *INTER* on small bank market share is negative. Thus, similar to the results for *BRANCH*, the results, taken as a whole, show that the adoption of interstate entry agreements by a state did not result in any strong pattern of effect on the market share of small banks in that state.[17] This conclusion is also in agreement with the graphical results in Chart 4.

Conclusion

This study shows that the relaxation of geographic restrictions on bank expansion in the 1980s did not generally have a negative impact on small bank market share. To the extent that past evidence from state-by-state relaxation of geographic banking restrictions can be used to evaluate the likely impact of the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994 on small bank market share, it would appear that the recent legislation is not likely to have a dramatic effect on small banks' market share as a whole.

This is not to say that individual small banks will not be challenged by the potential entry of new competitors; the results in this study apply only to small banks taken as a group. Moreover, my results show that the relaxation of geographic restrictions did not cause small banks to lose more market share than would have been predicted based on historical patterns. The historical patterns, however, show that small bank market share was drifting downward through much of the 1980s in most states. Reversing this trend will remain a challenge for small banks.

[13] Vandaele (1983) describes ARIMA models, including the transfer function intervention ARIMA method that I employ. Additional material on intervention models can be found in Box and Tiao (1975). The general methodology used in the ARIMA modeling is as follows. The dependent variable is the first difference of ln (S / (100 – S)), where S denotes a state's small bank market share. This dependent variable is then modeled as a function of its own past values, current and past values of the statewide troubled asset ratio, and changes in legal structure.

[14] New Hampshire adopted free branching and allowed entry by out-of-state holding companies during the third quarter of 1987. Thus, the results for New Hampshire reported in Table 3 could be due to branching, out-of-state entry effects, or a combination of both.

[15] Table 3 reports the effects of removing branching restrictions when their removal is modeled as having permanent effects on the market share variable. I also estimate models in which the removal of branching restrictions is only allowed to have an effect on the market share variable for two years and for five years. These models produced qualitatively similar results to those shown in Table 3; removing branching restrictions has an insignificant effect on market share in eighteen of the twenty-one states examined in the five-year impact model and had an insignificant effect on market share in twenty of the twenty-one states examined in the two-year model.

[16] Connecticut and Massachusetts allowed interstate entry in the second and third quarters of 1983, respectively. They are dropped from my sample, however, because of insufficient data on lagged values of their troubled asset ratios.

[17] Table 3 reports the effects of adopting interstate entry agreements when their adoption is modeled as having permanent effects on the market share variable. I also estimate models in which adopting interstate entry agreements is only allowed to have an effect on the market share variable for two years and for five years. These models produce qualitatively similar results to those shown in Table 3; the adoption of interstate entry agreements has an insignificant effect on market share in thirty-seven of the forty-five states examined in the five-year impact model and is insignificant in thirty-six of the forty-five states examined in the two-year model.

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Appendix: Supplementary Tables

Table A1

Impact of Adopting Free Branching on Small Bank Market Share

State	Change in share, two years before branching	Change in share, two years after branching	Branching impact
Alabama	−.1987	.4804	.6791
Connecticut	.0882	2.79644	2.70824
Florida	−.927	.83352	1.76052
Hawaii	−5.6022	−.42979	5.17241
Illinois	−1.516	−3.8769	−2.3609
Indiana	−1.881	−.11424	1.76676
Kansas	−2.5384	−3.12027	−.58187
Louisiana	−1.1584	−2.13865	−.98025
Michigan	−1.5355	−1.91047	−.37497
Missouri	−2.0272	1.44531	3.47251
New Hampshire	−11.3345	1.62372	12.95822
New Mexico	1.3715	−.45812	−1.82962
Ohio	−.8836	.23168	1.11528
Oregon	−2.5336	−.51057	2.02303
Pennsylvania	.9321	1.0709	.1388
Tennessee	−1.0082	.87199	1.88019
Texas	8.1038	1.1483	−6.9555
Virginia	−7.1305	1.04229	8.17279
Washington	−.7026	7.61475	8.31735
West Virginia	−8.6905	−4.98345	3.70705
Wisconsin	−2.2502	−1.83302	.41718

NOTES: Market share changes are measured in percentage points; branching impact = column 2 – column 1.

Table A2

Impact of Adopting Interstate Banking Agreements on Small Bank Market Share

State	Change in share two years before interstate banking	Change in share two years after interstate banking	Interstate impact	Type of regional entry adopted
Alabama	−4.793	−.8628	3.9302	R
Arizona	4.0126	−1.2033	−5.2159	N
Arkansas	.0154	−3.3648	−3.3802	R
California	−8.5734	1.9157	10.4891	R
Colorado	.0373	.6271	.5898	R
Connecticut	−17.2857	−9.7468	7.5389	R
Delaware	−7.742	−4.5928	3.1492	R
District of Columbia	−4.7152	−.8681	3.8471	R
Florida	−5.7932	−3.9936	1.7996	R
Georgia	−6.0879	−2.0595	4.0284	R
Idaho	−.4316	1.008	1.4396	R
Illinois	−1.586	−5.758	−4.172	R
Indiana	−5.2185	−8.6725	−3.454	R
Iowa	−3.1961	−1.5548	1.6413	R
Kansas	−1.1493	−1.297	−.1477	R
Kentucky	−2.3093	−9.6171	−7.3078	R
Louisiana	−1.688	−2.3465	−.6585	R
Maryland	−8.1878	3.3329	11.5207	R
Massachusetts	−17.1287	5.113	22.2417	R
Michigan	−3.5607	−5.0486	−1.4879	R
Minnesota	−.0757	.5783	.654	R
Mississippi	−.7932	−1.5865	−.7933	R
Missouri	−1.1407	−.0586	1.0821	R
Montana	1.0816	9.2861	8.2045	R
Nebraska	−3.1622	−3.17	−.0078	R
Nevada	−13.6325	6.2729	19.9054	R
New Hampshire	−11.3345	1.6237	12.9582	R
New Jersey	−9.8971	.3157	10.2128	R
New Mexico	2.9738	−2.8647	−5.8385	R
North Carolina	−11.8368	−5.1946	6.6422	R
North Dakota	1.879	1.3566	−.5224	N
Ohio	−6.2576	−.0151	6.2425	R
Oklahoma	4.4686	1.1451	−3.3235	R
Oregon	−1.2372	−5.6888	−4.4516	R
Pennsylvania	−5.2028	−1.0475	4.1553	R
Rhode Island	22.0287	−10.5137	−32.5424	R
South Carolina	2.0833	−.0563	−2.1396	R
South Dakota	−.9623	1.989	2.9513	N
Tennessee	−2.5882	−4.7313	−2.1431	R
Texas	2.5256	7.9807	5.4551	N
Utah	−14.1304	−1.0196	13.1108	R
Vermont	−1.5264	1.3586	2.885	R
Virginia	−6.1287	−1.4579	4.6708	R
Washington	7.3464	−17.8798	−25.2262	R
West Virginia	−6.8036	−2.7277	4.0759	N
Wisconsin	−5.3944	−1.8964	3.498	R
Wyoming	3.3841	2.2691	−1.115	N
Median for all states	−2.59	−1.20	1.64	.
Median for R states	−3.56	−1.30	1.80	R
Median for N states	2.75	.08	−.82	N

NOTES: R = first type of interstate agreement was regional. N = first type of interstate agreement was national. Market share changes are measured in percentage points. Alaska, Maine, and New York are not shown because they had adopted interstate entry agreements before the end of 1982. Hawaii is not shown because it did not adopt interstate entry until 1995.

A CAMEL Rating's Shelf Life

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The pattern of CAMEL ratings and bank failures during the recent period of banking difficulties points to the value of off-site monitoring systems as a complement to the supervisory ratings generated from periodic on-site examinations.

How long does a supervisory rating derived from an on-site bank examination adequately reflect a bank's current financial viability? Insofar as financial conditions can, and often do, change rapidly, we would not expect individual exam ratings always to remain applicable for long periods of time. For this reason, the Federal Reserve generally began examining the state-chartered banks it regulates at least once per year, even before the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) mandated annual exams.[1]

The Fed also has recognized that, during periods of financial turbulence, even annual on-site examinations may not be sufficient to detect rapid changes in a bank's financial condition. As a result, "problem banks," those with composite CAMEL ratings of 4 or 5, generally are subject to an on-site exam twice per year. Moreover, because of the speed with which financial conditions can change, the Fed has long relied on extensive off-site monitoring systems to supplement the ratings derived from periodic on-site exams and to provide up-to-date assessments of the financial status of individual banks. A recent example of this type of off-site monitoring system is the Fed's comprehensive Financial Institutions Monitoring System (FIMS), which was instituted in 1993.[2]

In this study, we attempt to measure the speed with which changing financial conditions can reduce the applicable information content of previously assigned CAMEL ratings. If we find that changing financial conditions cause the information content of CAMEL ratings to decay fairly rapidly, that would reinforce the Fed's policy of employing extensive off-site monitoring systems to help track the financial status of individual banks during the period between on-site exams.

To carry out our study, an appropriate metric must be found for assessing the speed with which changing financial conditions affect the information content of previously assigned CAMEL ratings. In this regard, we would like to note from the outset that the on-site examination process and the CAMEL ratings it generates have numerous important uses, the full treatment of which is beyond the scope of this study. Generally speaking, CAMEL ratings are designed to reflect a bank's financial condition, its compliance with laws and regulatory policies, and the quality of its management and systems of internal control. Only through comprehensive, on-site exams can regulators determine whether a bank's management is operating the institution in accordance with the laws and regulations

[1] While generally requiring annual on-site exams, FDICIA permits banks that are small, well-capitalized, and highly rated to be examined only once every eighteen months.

[2] The Fed uses FIMS not only to track the financial condition of individual banks and banking organizations between on-site exams but also to direct examination resources. An overview of FIMS is provided by Cole, Cornyn, and Gunther (1995). Putnam (1983) describes the bank surveillance systems used by regulators during the 1970s and early 1980s.

designed to promote safety and soundness. Moreover, the complex financial reviews that accompany an exam, together with the associated dialog between examiners and bank management, are necessary to assess accurately a bank's credit quality and overall financial posture. Given the multiple dimensions and uses of CAMEL ratings, it would be exceedingly difficult to construct a single comprehensive metric of their information content.

We use accuracy in discriminating between failing and surviving banks as a convenient yardstick for assessing the speed with which changing financial conditions reduce the association between previously assigned CAMEL ratings and the current financial status of individual banks. It should be emphasized that regulators do not expect all poorly rated banks to fail but, rather, focus attention on early intervention and take actions designed to return troubled banks to financial health. As such, the primary purpose of CAMEL ratings is not to identify future bank failures. Nevertheless, accuracy in discriminating between failing and surviving banks provides a convenient avenue for examining the association between previously assigned CAMEL ratings and current financial conditions.

To gauge the accuracy of examination ratings in discriminating between failing and surviving banks, we use as a benchmark an off-site monitoring system based on a statistical model that processes publicly available accounting data. Our analysis takes into account the length of time between on-site examinations and subsequent failures, as we expect the results of relatively recent exams to be more accurate in identifying failures than the results of exams conducted in the more distant past.

Our findings suggest that the information content of examination ratings begins to decay after two quarters. Specifically, the ability of examination ratings to discriminate between failing and surviving banks matches or exceeds that of our off-site monitoring system only when the ratings are no more than six months old. If a bank has not been examined for more than two quarters, our findings suggest that off-site monitoring systems can provide a more accurate indication of survivability. We conclude that our results support the Fed's use of extensive off-site monitoring systems as a complement to on-site examinations. In addition, our results indicate that an off-site monitoring model, such as the one used to produce our benchmark ratings, would be a valuable tool for private investors interested in tracking the financial condition of individual banks.

While our results highlight the usefulness of off-site monitoring systems as a complement to on-site examinations, the findings of this study should not be construed as detracting from the critical dependence of a successful banking supervision program on the examination process. The applicable information content of previously assigned CAMEL ratings can change only when financial conditions change appreciably, as was the case during the particularly volatile time period we examine. Under more stable financial conditions, CAMEL ratings typically remain accurate for relatively long periods. Also, off-site monitoring systems, such as the one used here, depend on the integrity of accounting data, which can be enhanced through regular periodic exams. Moreover, as alluded to earlier, the examination process and the CAMEL ratings it generates have numerous important uses, many of which are quite distinct from the relatively narrow application of off-site monitoring systems for the identification of bank failures.

On-site monitoring

The Uniform Financial Institutions Rating System, adopted in 1979, provides federal bank regulatory agencies with a framework for rating the financial condition and performance of individual banks. Regulators periodically visit banks to evaluate their financial soundness, to monitor their compliance with laws and regulatory policies, and to assess the quality of their management and systems of internal control.[3]

Based on the results of these on-site evaluations, regulators then rate the performance of individual banks along five key dimensions—capital adequacy, asset quality, management, earnings, and liquidity—yielding the rating system's acronym, CAMEL. Each of the five areas of performance is rated on a scale of 1 to 5 as follows: 1—strong performance, 2—satisfactory performance, 3—performance that is flawed to some degree, 4—marginal performance that is significantly below average, and 5—unsatisfactory performance that is critically deficient and in need of immediate remedial action.

Once each of the five areas of performance has been assigned a rating, a composite, or overall, rating is derived, again on a scale from 1 to 5. The five composite rating levels are described as follows in the Commercial Bank Examination Manual produced by the Board of Governors of the Federal Reserve System: 1—an institution that is basically sound in every respect, 2—an institution that is fundamentally sound but has modest weaknesses, 3—an institution with financial, operational, or compliance

[3] According to the American Institute of Certified Public Accountants Committee on Working Procedures, "Internal control comprises the plan of organization and all of the coordinate methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency, and encourage adherence to subscribed managerial policies."

weaknesses that give cause for supervisory concern, 4—an institution with serious financial weaknesses that could impair future viability, and 5—an institution with critical financial weaknesses that render the probability of failure extremely high in the near term. While a composite 5-rated bank is characterized as "extremely" likely to fail "in the near term," many such institutions are turned around by prompt corrective action taken by regulators working together with management.

The frequency of on-site examinations has varied considerably over recent years. Before FDICIA's adoption, banks often were not subject to annual examinations.[4] Because a bank's financial condition can change appreciably from one quarter to the next, more frequent on-site examinations provide a more accurate assessment of a bank's current financial condition. And the earlier regulators can identify a troubled bank, the more quickly they can intervene with supervisory actions intended to return the bank to financial health or, if necessary, close the bank so as to minimize losses to the Bank Insurance Fund.[5]

The benefits of more frequent on-site examinations, however, must be weighed against the substantial costs of such exams to both regulators and banks. The perceived trade-off between the costs and benefits of more frequent exams presumably has precluded Congress from requiring more than an annual frequency for on-site examinations.[6] When banks are only subject to annual on-site exams, the task of monitoring individual banks on a more frequent basis devolves to off-site monitoring systems such as FIMS.

Off-site monitoring

Various off-site monitoring systems have been developed to complement the CAMEL rating system. While these systems have employed a wide variety of analytical tools, most have relied on a common source of data—the Report of Condition and Income, or *call report*—which each bank submits quarterly to its primary regulatory agency. The financial data in this report provide timely information on the performance of individual banks and a strong foundation for off-site monitoring systems. One of the primary functions of on-site examinations is to ensure that banks have internal control systems designed to maintain the accuracy and reliability of their accounting data. Without the accurate reporting of call report data between on-site exams, off-site monitoring systems could not detect deterioration in the financial condition of individual banks.

Table 1
Financial Indicators Used in the Off-Site Monitoring System

Financial indicator*	Expected effect on the likelihood of bank failure
Capital Adequacy	
Equity capital	Reduce
Asset Quality	
Loans past due ninety days or more and still accruing interest	Increase
Nonaccrual loans	Increase
Other real estate owned	Increase
Earnings	
Net income	Reduce
Liquidity	
Investment securities	Reduce
Large certificates of deposit ($100,000 or more)	Increase

* Each indicator is measured relative to gross assets.

DATA SOURCE: Report of Condition and Income.

To illustrate the nature and function of off-site monitoring systems, we develop a system based on key financial ratios derived from the bank call report data. In this system, we use standard statistical methods to estimate the relationship between the financial ratios measured at year-end 1985 for all U.S. insured commercial banks and the likelihood of bank failure during the two-year period from the second quarter of 1986 through the first quarter of 1988.[7]

We use seven financial indicators, each measured as a percentage of gross assets, to characterize the financial posture of individual banks. As shown in Table 1, these indicators are measures of capital adequacy, asset quality, earnings, and liquidity—four of the five components of the CAMEL rating. Equity capital, which serves as a buffer protecting a bank's solvency against financial losses, is our measure of capital adequacy; more capital is expected to reduce the chance of failure. We use three indicators of asset quality—loans past due ninety days or more and still accruing interest, nonaccrual loans, and other real estate owned (which, for the most part, consists of foreclosed real estate). Higher values of each indicator should increase the probability of failure in subsequent years. To measure earnings, we use net income as our indicator. Higher income generally reflects a lack of financial difficulties and so would be expected to reduce the likelihood of failure. Finally, we use two indicators of liquidity—investment securities and large certificates of deposit ($100,000 or more). Liquid assets, such

[4] State-chartered banks regulated by the Federal Reserve generally were subject to annual exams even before the FDICIA mandate.

[5] Gilbert (1993) provides evidence that failing banks examined in their last twelve months of operation imposed lower losses on the Bank Insurance Fund, as a percentage of their assets, than banks that were not examined near the time of failure. Also, Jones and King (1995) show that the information gained from on-site exams can improve the ability of risk adjusted capital ratios to reflect the underlying financial condition of individual banks.

[6] It is important to note that "problem banks," those with composite CAMEL ratings of 4 or 5, generally are subject to an on-site exam twice per year.

[7] Failures are identified starting in the second quarter of 1986, rather than the first quarter, to impose a one-quarter lag in the estimated relationship. This is done to approximate real-world conditions, under which edited call report data generally are not available until forty-five to seventy days after the end of each quarter. Consequently, failures occurring during that first quarter are excluded from the analysis. When the estimated relationship is used to predict future bank failures, lags in the reporting of call report data imply a short lag between the call report date and the period over which failures are predicted.

as investment securities, enable a bank to respond quickly to unexpected demands for cash and typically reflect relatively conservative financial strategies, whereas volatile liabilities, such as large certificates of deposit, often reflect relatively aggressive financial strategies, impose high interest expenses, and are subject to quick withdrawal. As a result, we expect higher values of investment securities to reduce the chance of failure, whereas higher values of large certificates of deposit should increase the probability of failure.

The historical relationship between these financial indicators and failure is estimated using statistical methods.[8] The estimation results indicate that the variables included in the system are important indicators of bank survivability and that each affects the probability of failure in the expected fashion. With the estimated relationship in hand, we can now insert into the system values of the seven financial indicators reported for year-end 1987 to generate forecasts of the probability of failure for individual banks over the two-year period from the second quarter of 1988 through the first quarter of 1990. This exercise illustrates the manner in which regulators use off-site monitoring systems in practice. A historical relationship is estimated between a set of financial indicators and the likelihood of bank failure, which then provides the basis for generating predictions of future failures. Here, we compare the predicted probabilities of failure for the period from the second quarter of 1988 through the first quarter of 1990 with actual failures, thereby establishing a sense of the system's predictive accuracy. We can then use the off-site surveillance system to benchmark the ability of CAMEL ratings to distinguish failing from surviving banks.

The information content of CAMEL ratings

To measure the information content of CAMEL ratings, we test their ability to discriminate between banks that will fail and banks that will survive.[9] Accuracy in identifying banks that are likely to fail is an important ingredient of a successful banking supervision program, but it is important to remember that CAMEL ratings are not intended to measure the probability of bank failure. Instead, CAMEL ratings serve as a categorical measure of a bank's financial condition, its compliance with laws and regulatory policies, and the quality of its management and systems of internal control. Because a CAMEL rating has only five discrete levels, it is difficult to discriminate among banks within each rating class. In addition, regulators do not expect all poorly rated banks to fail. Instead, regulators intervene and take actions designed to return troubled banks to financial health. Despite the multiple dimensions that exist in the design and usage of CAMEL ratings, their accuracy in discriminating between failing and surviving banks provides a convenient metric for assessing the speed with which changing financial conditions can reduce the applicable information content of previously assigned CAMEL ratings.

To provide a benchmark for gauging the accuracy of CAMEL ratings in discriminating between surviving and failing banks, we use results from the off-site monitoring system presented in the previous section. We expect both CAMEL ratings and off-site ratings to be significantly more accurate in identifying bank failures than a simple system that randomly selects a sample of banks as likely to fail.

Are timely CAMEL ratings informative? In assessing the accuracy of CAMEL ratings, we take into account the length of time between on-site examinations and the beginning of our evaluation period. Because CAMEL ratings are assigned on a flow basis as exams are completed, many of the ratings available on a given date are based on exams conducted much earlier. We expect the accuracy of CAMEL ratings in identifying failures to be a decreasing function of the length of time between the assignment of the rating and the beginning of the evaluation period.

To test this hypothesis, we assess the accuracy of the CAMEL ratings for individual banks at year-end 1987 in identifying failures during the two-year period from the second quarter of 1988 through the first quarter of 1990. Because all bank examinations are not conducted at the same time, the CAMEL ratings available at year-end 1987 were assigned during a wide span of time. While many of the ratings were based on exams conducted during the fourth quarter of 1987, many others were assigned much earlier and were based on exams conducted during the previous year and even earlier. Because the financial condition of individual banks can change appreciably from quarter to quarter, the CAMEL ratings based on exams conducted near the end of 1987 should provide a better indication of future survivability than those based on exams conducted a year or more earlier.

To provide an indication of how well recent CAMEL ratings identify failing banks, we first limit our sample to ratings assigned "as of" the fourth quarter of 1987.[10] Of the 9,880 insured commercial banks used in this analysis, 2,254 had CAMEL ratings based on financial data from

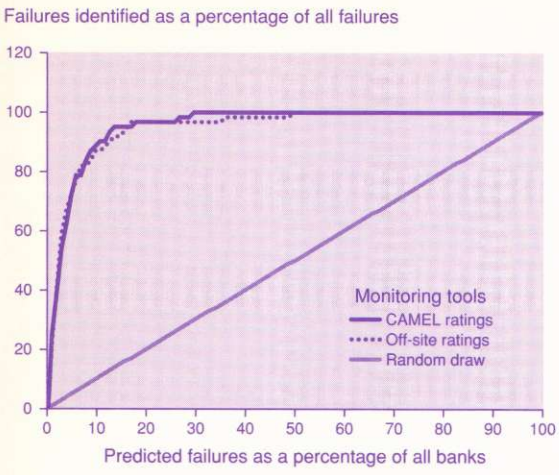
[8] Specifically, our off-site monitoring system uses the probit methodology to estimate the historical relationship between the financial indicators and the likelihood of failure. The statistical underpinnings of this methodology are described by Maddala (1983).

[9] Berger and Davies (1994) provide a detailed review of the academic literature on the value of the information generated by federal bank exams. Based on their results, Berger and Davies conclude that CAMEL downgrades reveal previously private unfavorable information about bank condition.

[10] There are three primary dates typically associated with an examination—the start date, the end date, and the "as of" date. The "as of" date is the date of the financial data on which the CAMEL rating is based. We use the "as of" date to match CAMEL ratings with the ratings from our off-site monitoring system, which also are dated according to the date of the financial data used.

Chart 1

Success Rate in Identifying Bank Failures, 1988:2–90:1, for Banks Examined 1987:4



the fourth quarter.[11] We sort the 2,254 banks from worst to best based on their composite CAMEL ratings. Then, we sort the banks within each of the five possible composite ratings from worst to best based on the arithmetic average of their five CAMEL component ratings.[12] While bank examiners do not intend for the component ratings to be used as a means of ranking banks within each composite rating class, some such ranking procedure is necessary to compare CAMEL ratings with the results of our off-site monitoring system. Using the resulting ranking as our guide, we expect the banks with the worst ratings to be the most likely to fail during the two-year period from second-quarter 1988 through first-quarter 1990.

Chart 1 shows the accuracy of the CAMEL ratings based on fourth-quarter 1987 financial data in identifying failures during the subsequent two-year period of interest (April 1988–March 1990).[13] The horizontal axis measures the proportion of banks identified as likely to fail. For example, the value of 10 on the horizontal axis indicates that the top 10 percent of the sample of banks, as sorted from the worst to best CAMEL ratings, are identified as likely to fail. The vertical axis gives, as a percentage of the total number of banks that actually failed, the number of failed banks correctly identified as likely to fail. So, for example, when the 10 percent of banks with the worst CAMEL ratings are identified as likely to fail, Chart 1 indicates that 89 percent of the failures that actually occurred are identified successfully. In comparison, the 10 percent of the same sample of banks with the highest likelihood of failure, as generated by the off-site monitoring system, includes 87 percent of the failures that actually occurred. Hence, when each system considers the 10 percent of banks most likely to fail, recently assigned CAMEL ratings are slightly more accurate in identifying failures than are the ratings generated by our off-site monitoring system.

Overall, the on-site and off-site systems' degrees of accuracy are comparable, as indicated by the tendency for the two curves in Chart 1 to remain fairly close together. For banks recently examined, we would expect the call report data to be highly reliable, as examiners typically require a bank's accounting data to reflect accurately any existing financial difficulties. The success of the examination process in promoting accurate call report data is reflected in the ability of our off-site monitoring system to match the accuracy of recently assigned CAMEL ratings in discriminating between surviving and failing banks.[14]

In this regard, it is important to note that these results for recently examined banks may attribute a higher degree of accuracy to the off-site monitoring system than could be achieved in actual practice. The source of this potential bias is the fact that banks that are discovered to have underreported credit difficulties often are required to refile their most recent call report to make it reflect those difficulties. As a result, the call data for some of the banks we analyze may have been revised, and it may not reflect the information actually available to analysts during the historical period we study. These considerations suggest that, in practice, the accuracy of recently assigned CAMEL ratings in identifying failures may substantially exceed the accuracy of off-site monitoring systems.

Both systems perform much better than the expected results of the simple system that randomly selects potential failures. For example, if 10 percent of the banks are selected at random as likely to fail, only 10 percent of the failures would be successfully identified, on average. Both recent CAMEL ratings and off-site ratings are highly accurate in identifying bank failures.

How quickly do financial conditions change?

While recently assigned CAMEL ratings provide a good indication of the survival prospects for individual banks, the speed with which financial conditions can change suggests that CAMEL ratings assigned in the relatively distant past may not identify future failures as well as "fresh" CAMEL ratings. To provide an indication of how well relatively dated CAMEL ratings identify failing banks, we augment our initial sample of banks rated as of fourth-quarter 1987 with banks rated as of the third quarter of that year. Of the

[11] The number of banks included in our analysis is limited by our access to historical CAMEL rating data. Of the 13,365 U.S. insured commercial banks that meet the other requirements of our study, we are able to obtain year-end 1987 CAMEL ratings for 9,880, or 74 percent. Of these 9,880 banks, 244 failed during the two-year period examined. Also, of the 9,880 banks, 9,740 were rated based on a "full scope" exam, another 134 had ratings associated with "limited scope" exams, and the remaining six were the subject of "targeted" exams. The results reported here are qualitatively identical when the analysis is limited to "full scope" exams.

[12] While the equal treatment of the five component ratings is somewhat arbitrary, we also used several alternative schemes to weight the five component ratings for determining ranks within composite CAMEL rating groups. The results are not qualitatively different when alternative schemes are used.

[13] We exclude the first quarter of 1988 because examinations based on December 1987 financial statements would not be finalized until at least some point during the first quarter of 1988.

[14] Call report information often depends on examination results, rather than the other way around, as on-site exams frequently result in substantial changes to reported financial information. Berger and Davies (1994) provide evidence that the call report acts as a conduit to transmit exam results to the public.

9,880 insured commercial banks used in this analysis, 4,529 had CAMEL ratings based on financial data from the third or fourth quarter. Once again, we sort these individual banks from worst to best based on their composite CAMEL and average CAMEL component ratings, with the expectation that those with the worst ratings would be the most likely to fail during the two-year period from second-quarter 1988 through first-quarter 1990.

Chart 2 shows the accuracy of the CAMEL ratings based on data from the third or fourth quarter of 1987 in identifying bank failures during the two-year period. Overall, the on-site and off-site systems' levels of accuracy are again comparable, as indicated by the closeness of the two curves. When the 10 percent of the banks with the worst ratings are identified as likely to fail, the CAMEL ratings capture 88 percent of the failures that actually occurred, while the off-site monitoring system identifies 87 percent. These findings suggest that, for the time period examined, no appreciable reduction occurs in the relative ability of CAMEL ratings to identify bank failures when examinations conducted one quarter earlier are augmented with exams conducted two quarters earlier.

A different picture emerges, however, when banks with a most recent examination of three quarters ago are also included in the analysis. Chart 3 shows the accuracy of the CAMEL ratings as of the second, third, or fourth quarter of 1987 in identifying bank failures during the two-year period from second-quarter 1988 through first-quarter 1990. Of the 9,880 insured commercial banks used in this analysis, 6,358 had CAMEL ratings based on financial data from the second, third, or fourth quarter. When the banks with three-quarter-old CAMEL ratings are included in the analysis, the accuracy of the CAMEL ratings in identifying bank failures is appreciably less than that of the ratings generated by the off-site monitoring system. When the 10 percent of the banks with the worst ratings are identified as likely to fail, the CAMEL ratings capture 78 percent of the failures that actually occurred, whereas the off-site ratings identify 85 percent of the failures.[15] Based on these findings, it appears that there is a substantial reduction in the relative ability of CAMEL ratings to identify bank failures when examinations conducted one and two quarters earlier are augmented with exams conducted three quarters earlier.

The deterioration in the accuracy of CAMEL ratings continues when banks with four-quarter-old CAMEL ratings are included in the analysis. Of the 9,880 insured commercial banks used in this analysis, 7,872 had CAMEL ratings based on financial data from the first through fourth quarters of 1987. As shown in Chart 4, for this broader sample of banks, the ratings from the off-site monitoring system are substantially more accurate in identifying bank failures than the CAMEL ratings. When the 10 percent of the banks with the worst ratings are identified as likely to fail, the CAMEL ratings capture 73 percent of the failures that actually occurred, whereas the ratings from the off-site monitoring system capture 86 percent of the failures.

Finally, we consider all banks for which CAMEL ratings would have been available at year-end 1987. Interestingly, of the 9,880 insured commercial banks analyzed, 2,008 had

Chart 2

Success Rate in Identifying Bank Failures, 1988:2–90:1, for Banks Examined 1987:3–4

Failures identified as a percentage of all failures

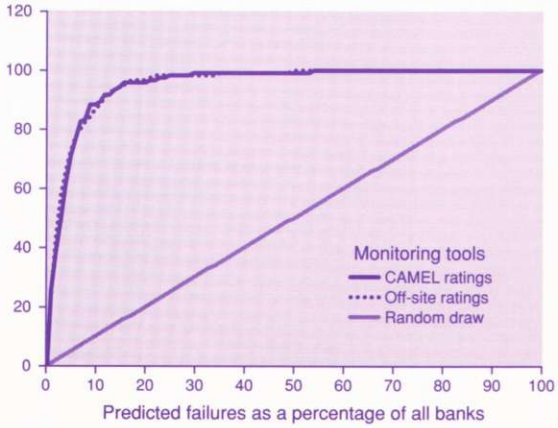
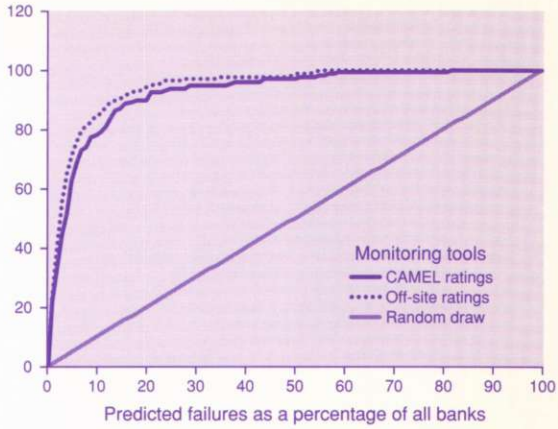


Chart 3

Success Rate in Identifying Bank Failures, 1988:2–90:1, for Banks Examined 1987:2–4

Failures identified as a percentage of all failures



[15] The lower success rate of the CAMEL ratings in identifying failures implies that the CAMEL ratings also mistakenly identify a greater number of surviving banks as failing.

CAMEL ratings at year-end 1987 based on financial data from 1986 or earlier. When these 2,008 banks are included and the entire sample of 9,880 banks is analyzed, the accuracy of CAMEL ratings relative to the off-site monitoring system is even lower. When the 10 percent of the banks with the worst ratings are identified as likely to fail, the CAMEL ratings capture only 74 percent of the failures that actually occurred, whereas the ratings from the off-site monitoring system capture 88 percent, as shown in Chart 5. The reduction in accuracy attributable to relatively old CAMEL ratings causes the overall accuracy of CAMEL ratings to fall substantially below that of the off-site monitoring system.[16]

These results indicate that the applicable information content of CAMEL ratings can deteriorate rather quickly, pointing to the conclusion that off-site monitoring systems provide regulators with valuable information on bank survivability over and above the information generated by the examination process.

Conclusion

The findings reported here suggest that the applicable information content of CAMEL ratings decays fairly rapidly. During the period examined, the ability of CAMEL ratings to identify bank failures matches or exceeds that of off-site monitoring systems only when the CAMEL ratings are based on on-site examinations conducted no more than two quarters before the forecast period. If a bank has not been examined for more than two quarters, then off-site monitoring systems more accurately indicate survivability. The higher accuracy of off-site ratings is derived from their timeliness; an updated off-site rating is available for every bank in every quarter.

Chart 4

Success Rate in Identifying Bank Failures, 1988:2–90:1, for Banks Examined 1987:1–4

Failures identified as a percentage of all failures

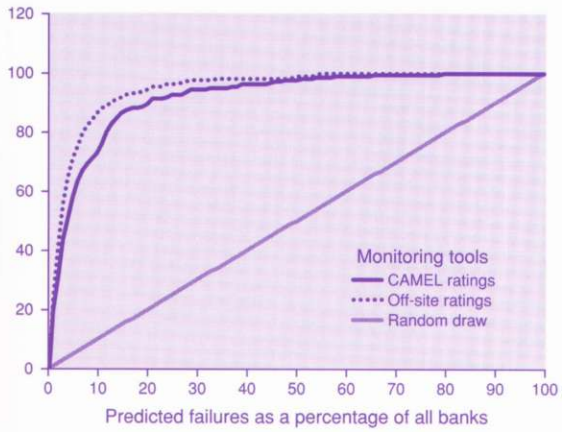
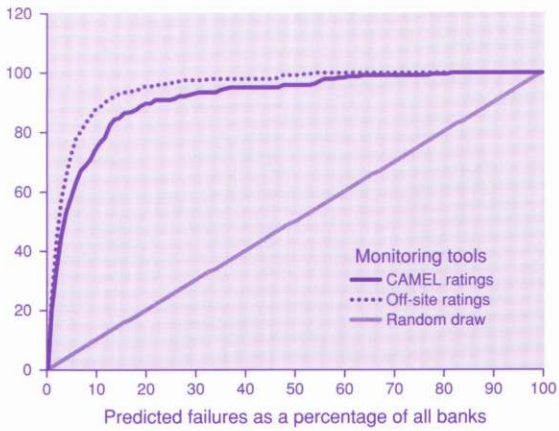


Chart 5

Success Rate in Identifying Bank Failures, 1988:2–90:1, for All Banks

Failures identified as a percentage of all failures



These conclusions are based on the particular period analyzed and may not generalize to all other periods.[17] And it should be noted that, by limiting our focus to a relatively compact period of severe banking difficulties, the analysis here documents the performance of off-site monitoring systems under conditions conducive to forecasting accuracy. Because the type of off-site monitoring system we use is based on estimates of the relationship between financial variables and bank failures, it requires that we observe relatively frequent failures. However, from the mid-1940s until the early 1980s, no more than twenty bank failures occurred in any one year. Similarly, in 1993 and 1994, there were only forty-two and thirteen bank failures, respectively. Whether off-site monitoring systems based on the failure experience of the 1980s and early 1990s are capable of accurately identifying any relatively far removed failures that might emerge in the future is an open question.

Nevertheless, the pattern of CAMEL ratings and bank failures during the recent period of banking difficulties points to the value of off-site monitoring systems as a complement to the supervisory ratings generated from periodic on-site examinations. In practice, output from regulatory off-site monitoring systems is reviewed by supervisory personnel in conjunction with information obtained from previous on-site exams and other sources, including the Uniform Bank Performance Report and the Bank Holding Company Performance Report. These latter reports are analytical tools created on a quarterly basis by supervisory personnel showing the effect of

[16] For example, looking separately at the 2,008 banks with CAMEL ratings based on financial data from 1986 or earlier, the 10 percent with the worst CAMEL ratings includes only 59 percent of the subsequent failures, while the 10 percent with the worst off-site ratings includes 95 percent of the subsequent failures. Similarly large differences in accuracy occur for banks examined in the first and second quarters of 1987.

[17] However, we obtain similar results when analyzing bank failures occurring during the period from the second quarter of 1990 through the first quarter of 1992.

management decisions and economic conditions on a bank's financial performance and balance sheet composition. The results of this comprehensive off-site analysis are then used to accelerate the on-site examination of institutions showing financial deterioration, to identify the areas of most supervisory concern in those institutions already scheduled for examination, and to allocate the most experienced examiners to troubled institutions. Our results support the continuation of the prominent role of off-site monitoring systems in the supervisory process as a complement to comprehensive, on-site examinations.

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