

Profits of Commercial Banks In Tenth District States

By William R. Keeton and Lyle Matsunaga

These are turbulent times for banking. The rate of bank failures, though low in absolute terms, is the highest since the 1930s. Large money center banks have had difficulty collecting loans they made to less developed countries in the 1970s. And even though the current recovery is over two years old, banks of all sizes are still plagued with shaky farm, energy, and real estate loans. All of these problems have received wide publicity, creating concern about the health of banking in the United States.

In light of this concern, now is an especially appropriate time to examine the performance of commercial banks in states of the Tenth Federal Reserve District. Although banks in this region have escaped some of the problems of banks in other parts of the country, they have been particularly affected by the changing fortunes of agriculture and energy. Partly because of these changing conditions, their profitability has varied sharply in recent

years, increasing dramatically in the late 1970s and falling even more dramatically in the 1980s.

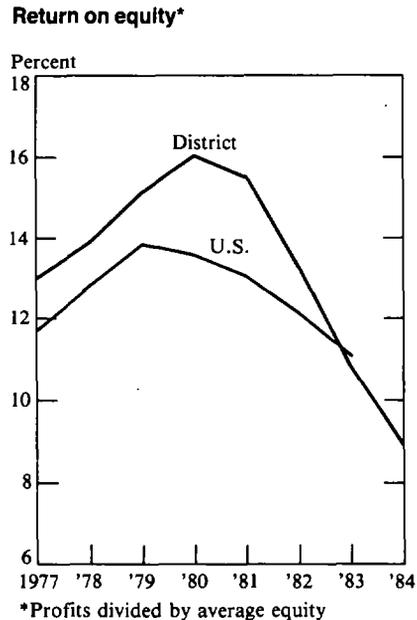
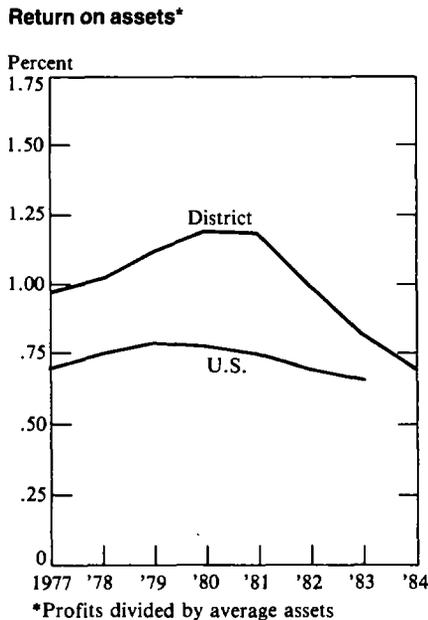
This article examines changes in district bank profitability from 1977 to 1984. The article first explains how profitability is measured, and then shows how profitability has changed in Tenth District states—in the aggregate, by size of bank, and by degree of specialization in agricultural lending. Next, the article looks at the two factors most responsible for recent changes in profitability: net interest income and loan losses. Following a brief analysis of profitability in each of the Tenth District states, the article concludes by examining the impact of the recent earnings decline on bank capital.

Measuring and explaining profitability

Bank profitability can be measured several ways. The bigger the bank, the greater total profits are likely to be. Thus, to compare performance across time or across banks, total profits must be deflated by some measure of

William R. Keeton is a senior economist at the Federal Reserve Bank of Kansas City. Lyle Matsunaga is a former research associate at the bank.

CHART 1
Profitability of commercial banks



size. Different measures of profitability deflate by different measures of size.

One measure of profitability is return on equity (ROE). ROE deflates a bank's profits by its equity, the amount owners have invested in the bank through the purchase of stock or retention of earnings. ROE provides a good indication of the return that a bank is yielding to its owners.

Another measure of profitability is return on assets (ROA). ROA deflates total profits by total assets, including both financial assets and physical assets such as building and equipment. ROA is especially useful for measuring changes in a bank's performance over time. Because most components of a bank's income and expense are closely related to the volume of its assets, changes in ROA can be conveniently explained by determining which compo-

nents of income and expense have changed relative to assets. For this reason, ROA is used here as the primary measure of profitability.

Overall profitability

Measured by either ROE or ROA, the profitability of commercial banks in Tenth District states has fluctuated widely since 1977. Profitability rose sharply until 1980 and fell even more sharply after 1981 (Chart 1).¹ Because

¹ All data in this article were taken from the Reports of Condition and Income filed by insured commercial banks. Balance sheet data for 1977 to 1983 were adjusted for mergers at the Board of Governors of the Federal Reserve System to ensure that the assets and liabilities of merging banks were combined as close as possible to the date at which they began reporting their income jointly. Data for 1984 were adjusted the same way by the authors.

the deterioration since 1981 has been so sharp, profitability was substantially lower in 1984 than in 1977. ROA was only 0.7 percent in 1984, compared with 1.0 percent in 1977. And ROE was only 9.0 percent in 1984, compared with 13.1 percent in 1977.

Changes in profitability in Tenth District states have been both larger than in the United States as a whole and, on balance, less favorable. For example, in 1977, ROA was about 25 basis points higher in Tenth District states than in the nation as a whole. The gap increased to 40 points in 1980 but shrunk to 15 basis points in 1983. Although data for the entire United States are not yet available for 1984, indications are that the gap narrowed further during the year. In terms of ROE, the decline in the region's relative performance looks even sharper, with the gap in profitability disappearing by 1983.²

Although average profitability has fallen sharply the last several years, some banks in Tenth District states have continued to do well. Of the region's 2,900 banks, almost 500 suffered net losses in 1984. But 1,340 earned more than 1 percent on their assets, and 150 earned more than 2 percent.

Profitability by size and type

Performance has differed not only among individual banks but also among different sizes and types of bank. On balance, small banks in the district states have done considerably worse than large banks, and agricultural

banks significantly worse than nonagricultural banks.

For every year covered by this study, commercial banks have been divided into three size groups, with each group holding about a third of the total assets in the seven-state region. This implied an upper threshold for the small group of \$55 million in assets in 1984 and an upper limit for the medium-size group of \$226 million.³ As shown in Table 1, small banks are much more important in Tenth District states than in the United States as a whole, partly because the region is more rural and partly because it has more restrictions against branching. Nationwide, banks that fell under the lower threshold accounted for only 10 percent of total assets in 1983. They also represented a smaller proportion of total banks, 69 percent compared with 80 percent in Tenth District states.

The left panel of Chart 2 shows how profitability has changed at the three size groups, as measured by ROA. At all three groups, ROA increased through 1980, leveled off in 1981, and then declined. During both halves of the cycle, however, ROA changed more at small banks than at medium-size and large banks. Also, in 1984, ROA continued to deteriorate sharply at small banks but fell more slowly at medium-size banks and leveled off at large banks. Because of this divergence in performance, the ROA of small banks fell twice as much as that of other banks over the period, starting out at the top and ending up near the bottom.

² The gap in ROE disappeared before the gap in ROA because it was proportionately smaller to begin with. The reason it was smaller is that in Tenth District states banks are less leveraged—more of their assets are financed by equity rather than by deposits and other liabilities. The less leveraged a bank, the greater its ROA tends to be (interest expense is lower, increasing the numerator of ROA) but the smaller its ROE tends to be (equity is higher, increasing the denominator of ROE more than the numerator).

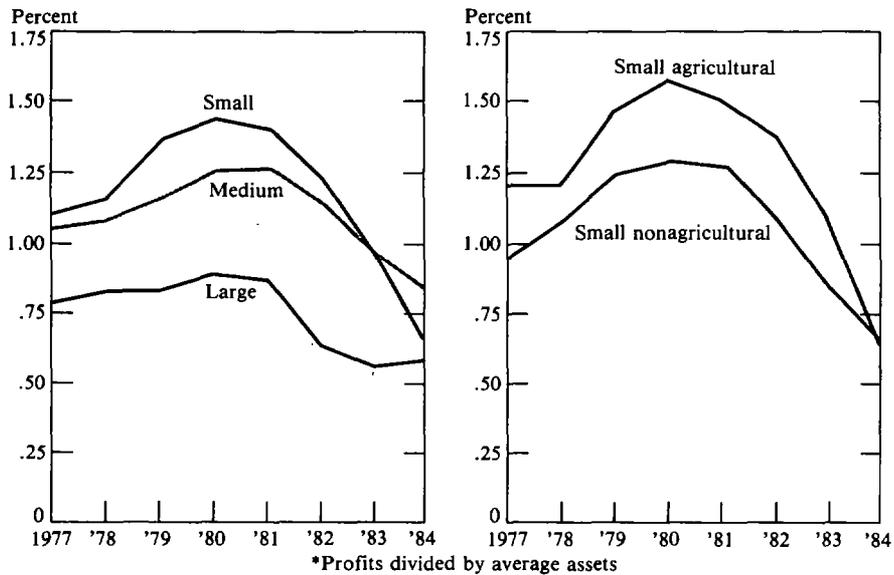
³ Because inflation and economic growth tend to increase the assets of all banks, the two size thresholds have risen significantly over time. Back in 1977, for example, the upper limit for the small group was only \$31 million and the upper limit for the medium group was only \$134 million. In defining size groups, many studies of bank performance use the same dollar thresholds in early years as in later years. That approach can produce severe distortions over long periods of time, because the tendency for all banks to grow in dollar terms causes the small size group to shrink relative to the larger groups.

TABLE 1
Distribution of commercial banks by size and type, 1983*

	Percent of assets		Percent of banks	
	District	U.S.	District	U.S.
Small banks	33	10	80	69
Agricultural	16	3	44	27
Nonagricultural	17	7	36	42
Medium banks	33	15	18	25
Agricultural	5	1	3	3
Nonagricultural	28	13	15	22
Large banks†	33	75	2	6
	100	100	100	100

* Includes only banks in existence the entire year.
† There were only eight large agricultural banks in the United States and only one in the district, accounting for 0.2 percent of total assets in both cases.

CHART 2
Return on assets, banks in Tenth District states*



Measured by ROE, the relative decline in profitability at small banks was even greater. In 1977, their ROE was 13.2 percent, less than that of medium-size banks but more than that of large banks. By 1984, it had fallen to 7.4 percent, less than that of either of the other groups.

Besides having a disproportionate number of small banks, Tenth District states have an unusually high proportion of agricultural banks. Since most agricultural banks are small, it is natural to ask whether the sharp deterioration in profitability in the small size group has been due to the performance of agricultural banks.

As in most other studies, agricultural banks are defined here as those with at least 25 percent of their outstanding loans in farm real estate or farm operating loans. As shown in Table 1, such banks account for about 21 percent of total assets in Tenth District states, five times as much as in the United States as a whole. Among the region's small banks, agricultural banks account for an ever larger share of total assets, about a half.

In both the small and medium-size groups, profitability has declined more at agricultural banks than nonagricultural banks over the past two years. The right panel of Chart 2 illustrates this for small banks. Agricultural banks in the group experienced about the same increase in ROA as nonagricultural banks in the late 1970s and about the same decrease in ROA through 1983. In 1984, however, they suffered a much bigger drop in earnings that left their ROA slightly below that of nonagricultural banks for the first time since the period began. The story has been much the same for medium-size banks, except that agricultural banks in that group suffered their big drop in earnings a year earlier, in 1983 instead of 1984.

The especially sharp deterioration in earn-

ings at agricultural banks and the disproportionately large number of agricultural banks in the small size group help explain why that group has suffered such a large decline in profitability. However, the magnitude of the decline cannot be entirely explained by the fact that so many small banks specialize in agricultural loans. Even when the sample is limited to nonagricultural lenders, small banks show the biggest drop in profitability, both from the 1980-81 peak and from earlier levels. Over the period as a whole, ROA dropped almost 30 basis points at small nonagricultural banks but only 15 basis points at medium-size nonagricultural banks and 20 basis points at large banks.

Determinants of ROA

What caused the change in bank profitability in Tenth District states? Since ROA equals total profits deflated by assets, changes in ROA can be explained by deflating the different components of total profits by assets and observing how they have changed over time. In the calculations performed here, profits are defined as net interest income minus loan loss provisions, net noninterest expense, net losses from security sales, and taxes. Table 2 shows the results for all banks in the region.

Most of the recent variation in profitability at district banks can be attributed to two sources. One is changes in net interest income, the excess of interest income over interest expense. The other is changes in loan loss provisions, the amount banks set aside to cover their loan losses. As shown in Table 2, the increase in ROA from 1977 to 1980 was due to a steep rise in net interest margin (NIM), the ratio of net interest income to assets. The subsequent fall in ROA from 1981 to 1984 was due to a sharp decrease in NIM and an even sharper increase in the ratio of

TABLE 2
Income and expense of commercial banks,
Tenth District states*
 (Percent)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Net Interest								
Income (NIM)†	4.11	4.26	4.41	4.64	4.70	4.67	4.41	4.29
- Loan loss provisions	0.24	0.24	0.25	0.29	0.30	0.56	0.65	0.81
- Net noninterest expense	2.13	2.13	2.16	2.21	2.24	2.36	2.34	2.27
- Net security losses‡	-0.04	0.02	0.05	0.05	0.13	0.04	-0.01	-0.03
- Total taxes	0.80	0.84	0.84	0.91	0.86	0.70	0.60	0.55
Profits (ROA)	0.98	1.02	1.12	1.19	1.18	1.00	0.83	0.69

*All variables are expressed as a percentage of average annual assets net of loan loss reserves. Average annual assets are computed from beginning-of-year, middle-of-year, and end-of-year figures, with weights of one-quarter, one-half, and one-quarter, respectively.

†Interest income is calculated on a taxable-equivalent basis. That is, each bank's tax-exempt income from state and local securities is grossed up by its marginal tax rate.

‡Includes net losses on extraordinary items.

loan loss provisions to assets. Compared with net interest income and loan loss provisions, net noninterest expense and net security losses have remained fairly constant. Since 1980, however, taxes have declined sharply relative to assets, dampening the fall in ROA.

The next two sections take a closer look at net interest margin and loan loss provisions in Tenth District states.

Net interest margin

The greater volatility of bank profits in Tenth District states is explained partly by greater changes in NIM. The NIM of district states rose sharply in the late 1970s and fell sharply in the early 1980s. Despite the recent decline, however, NIM ended up almost 20 basis points higher in this region than in 1977.

NIM by size and type

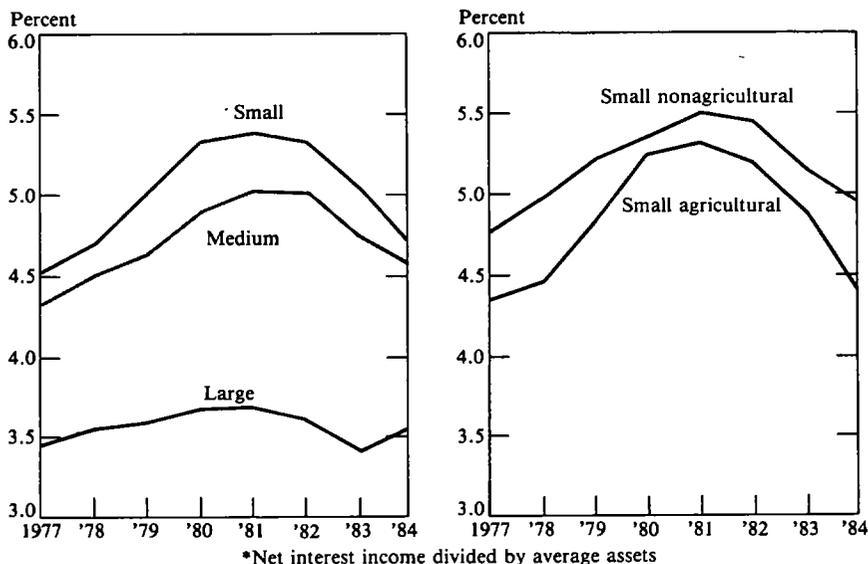
Until 1984, NIM moved in the same direction in all three size groups, increasing from

1977 to 1981 and falling from 1981 to 1983. As shown in the left panel of Chart 3, the NIM of small and medium-size banks rose much more than the NIM of large banks during the upswing and fell about the same amount during the downswing. There was a reversal in 1984, however. The NIM of small and medium-size banks continued to fall while the NIM of large banks turned around and increased. Despite this reversal, small and medium-size banks did better than large banks over the period as a whole, widening the gap between them.⁴

Within the small and medium-size groups, agricultural banks ended up with less net improvement in NIM than nonagricultural

⁴ The main reason the gap in NIM is so large is that small and medium-size banks have fewer noninterest-bearing assets. This tends to raise their interest income ratio above that of large banks. Noninterest-bearing assets accounted for 10 percent of the total assets of small and medium-size banks in 1984 but 18 percent of the total assets of large banks. The difference is due partly to large banks facing higher reserve requirements and partly to their having more demand deposits, which are subject to higher reserve requirements than time and savings deposits.

CHART 3
Net interest margin, banks in Tenth District states*



banks, due to a sharper deterioration in NIM after 1982. The right panel of Chart 3 illustrates this point for the small size group. At agricultural banks, NIM rose somewhat more from 1977 to 1981, fell about the same amount from 1981 to 1983, and then dropped much more in 1984. Because the 1984 decline was so severe, NIM ended up increasing only half as much as at small nonagricultural banks over the period as a whole. In the medium-size group, agricultural banks fared even worse. Because they experienced very large declines in NIM in both 1983 and 1984, their NIM ended up significantly lower than in 1977.

Determinants of NIM

Two factors affecting NIM are movements in market interest rates and shifts in the com-

position of banks' portfolios. If banks' assets and liabilities are not equally sensitive to market interest rates, changes in rates will have a different effect on interest income than on interest expense, altering the gap between them. And if the composition of banks' assets or liabilities shifts between categories with low rates of return and categories with high rates of return, interest income and interest expense will be affected even without any change in market interest rates.

To what extent can the sharp variation in NIM in district states be attributed to movements in market interest rates? Until 1984, NIM changed in the same direction as market interest rates, rising from 1977 to 1981 and falling from 1981 to 1983. From this coincidence it is tempting to conclude that banks in the district were "asset-sensitive" throughout the period—that their assets were more sensi-

tive to changes in market rates than their liabilities. If this were true, the rise in rates in the late 1970s would have pushed up interest income more than interest expense, raising NIM. Conversely, the fall in rates in the early 1980s would have pulled down interest income more than interest expense, reducing NIM.

Although appealing on the surface, this explanation is apparently only half correct. The steep rise in market interest rates in the late 1970s does seem to have been responsible for the sharp improvement in NIM at all three size groups. However, when the impact of portfolio shifts is netted out, the fall in market rates in the early 1980s appears to have contributed only marginally to the deterioration in NIM at large banks and not at all to the decline in NIM at small and medium-size banks.

What were these portfolio shifts? Throughout the period, banks in Tenth District states suffered a large adverse shift in the composition of their funds—a shift out of demand deposits and passbook savings accounts into deregulated retail deposits and managed liabilities, both of which paid higher rates of interest. This adverse shift in the composition of funds occurred at all three size groups. From 1979 to 1981, however, the shift in funds was significantly less at large banks. Also, from 1981 to 1984, the shift in funds was mostly offset at large banks by a favorable shift in the composition of assets, first from cash to loans and then from money market assets to loans.

Table 3 shows how these portfolio shifts affected each group's interest income ratio, interest expense ratio, and NIM over consecutive intervals from 1977 to 1984. To obtain these estimates, banks' assets and liabilities were first split into broad categories. Two numbers were then computed for each category—the share of the category in average

annual assets and the average rate of return earned or paid on the category during the year. Next, for each interval shown in Table 3, the effects of portfolio shifts on interest income and interest expense were calculated. This was done by multiplying the change in the share of each category by the average rate of return on that category and then summing over all categories. The rest of the change in the interest income and interest expense ratios is the "rate effect," the part due to changes in the average rates of return on different categories. Finally, the effects of portfolio shifts and rate changes on NIM were calculated by subtracting the estimates for the interest expense ratio from the estimates for the interest income ratio.⁵

The figures in Table 3 suggest the following explanation for the behavior of NIM in the three size groups.

1977-81. During the late 1970s, banks in all three size groups were asset sensitive. The increase in market interest rates tended to raise their interest income much more than their interest expense. This favorable rate effect outweighed the adverse impact of portfolio shifts, causing NIM to improve.⁶

⁵ The decomposition is described in greater detail in the appendix. For other applications of the technique, see Joseph F. Sinkey, Jr., *Commercial Bank Financial Management* (New York, Macmillan, 1983), pp. 485-492, and Ronald L. Olson and Harold M. Sollenberger, "Interest Margin Variance Analysis: A Tool of Current Times," *The Magazine of Bank Administration*, May 1978, pp. 45-51.

⁶ This interpretation of the data is subject to the criticism that shifts in the composition of funds may affect interest income as well as interest expense. In other words, some banks might have responded to the increase in their average cost of funds by raising their loan rates. To the extent this happened, the "rate effect" in Table 3 overstates the impact of rising market rates on interest income and understates the impact of falling market rates.

The argument that banks set loan rates as a markup over average cost is advanced by Emanuel Melichar, "A Financial Perspective on Agriculture," *Federal Reserve Bulletin*, January 1984, p. 7. However, many economists dispute this view of bank behavior. See, for example, R. Alton Gilbert and A. Steve Hol-

TABLE 3
Changes in interest income and expense by size of bank,
Tenth District states
(Percentage-point change in ratio to average assets)

	<u>1977-79</u>	<u>1979-81</u>	<u>1981-83</u>	<u>1983-84</u>
Small banks				
Change in interest income ratio	+ 1.22	+ 3.50	- 1.16	+ 0.11
Portfolio shift	+ 0.05	+ 0.02	+ 0.04	+ 0.02
Rate effect	+ 1.17	+ 3.48	- 1.20	+ 0.09
Change in interest expense ratio	+ 0.77	+ 3.10	- 0.80	+ 0.42
Portfolio shift	+ 0.23	+ 1.36	+ 0.84	+ 0.25
Rate effect	+ 0.54	+ 1.73	- 1.64	+ 0.18
Change in NIM	+ 0.46	+ 0.40	- 0.36	- 0.31
Portfolio shift	- 0.17	- 1.35	- 0.80	- 0.23
Rate effect	+ 0.63	+ 1.75	+ 0.44	- 0.08
Medium banks				
Change in interest income ratio	+ 1.49	+ 3.23	- 1.47	+ 0.33
Portfolio shift	+ 0.07	+ 0.05	+ 0.20	+ 0.06
Rate effect	+ 1.43	+ 3.18	- 1.68	+ 0.27
Change in interest expense ratio	+ 1.21	+ 2.83	- 1.20	+ 0.47
Portfolio shift	+ 0.25	+ 0.94	+ 0.89	+ 0.20
Rate effect	+ 0.95	+ 1.89	- 2.10	+ 0.27
Change in NIM	+ 0.30	+ 0.39	- 0.27	- 0.14
Portfolio shift	- 0.18	- 0.89	- 0.69	- 0.14
Rate effect	+ 0.47	+ 1.28	+ 0.42	0.00
Large banks				
Change in interest income ratio	+ 2.36	+ 3.04	- 2.73	+ 0.76
Portfolio shift	- 0.10	- 0.04	+ 0.57	+ 0.17
Rate effect	+ 2.47	+ 3.08	- 3.30	+ 0.60
Change in interest expense ratio	+ 2.22	+ 2.94	- 2.46	+ 0.60
Portfolio shift	+ 0.35	+ 0.70	+ 0.72	+ 0.03
Rate effect	+ 1.86	+ 2.24	- 3.18	+ 0.57
Change in NIM	+ 0.15	+ 0.09	- 0.27	+ 0.17
Portfolio shift	- 0.46	- 0.74	- 0.16	+ 0.14
Rate effect	+ 0.60	+ 0.83	- 0.12	+ 0.03
Memo:				
Change in 6-month T-bill rate	+ 4.51	+ 3.76	- 5.03	+ 1.05

The improvement in NIM was especially great at small and medium-size banks. From 1977 to 1979, they benefited no more than large banks from rising rates. According to the estimates in Table 3, for example, small banks enjoyed a favorable rate effect of 63 basis points between 1977 and 1979, only three points more than large banks. During these years, however, small and medium-size banks suffered somewhat less than large banks from adverse portfolio shifts. As a result, their NIM improved more.

After 1979, as deregulation gathered momentum, small and medium-size banks suffered more than large banks from adverse portfolio shifts. These shifts raised the interest expense ratio of small banks an estimated 136 basis points from 1979 to 1981, compared with 70 points at large banks. By this time, however, small and medium-size banks were also benefiting much more than large banks from the continued rise in market rates. At small banks, for example, the rise in rates boosted NIM by 175 basis points, more than twice as much as at large banks. Because of this highly favorable rate effect, NIM again increased more at small and medium-size banks than at large banks.

1981-83. By the early 1980s, the behavior of interest income and expense had shifted at all three groups. Small and medium-size banks had become liability sensitive while large banks had become less asset sensitive.

The assets of small and medium-size banks were no more sensitive to rates in 1981-83 than in the comparable period 1977-79. But because of the substantial shift in funds toward deregulated deposits, their liabilities had become much more sensitive to rates. As

lander, "Has the Deregulation of Deposit Interest Rates Raised Mortgage Rates?" *Review*, Federal Reserve Bank of St. Louis, May 1984, and Michael C. Keeley, "Interest-Rate Deregulation," *Weekly Letter*, Federal Reserve Bank of San Francisco, January 13, 1984.

a result, the fall in market rates from 1981 to 1983 reduced their interest expense ratio significantly more than their interest income ratio—44 points more at small banks and 42 points more at medium-size banks. This favorable rate effect was not great enough to overcome the continued adverse shift in the composition of funds and prevent NIM from falling. But it did significantly dampen the fall in NIM.

In contrast to small and medium-size banks, large banks remained marginally asset sensitive in the early 1980s. Their liabilities were significantly more rate sensitive in 1981-83 than in 1977-79. However, their assets had become more rate sensitive too. As a result, the fall in market rates from 1981 to 1983 reduced their interest income ratio 12 basis points more than their interest expense ratio. This unfavorable rate effect made up for the less adverse portfolio shift at large banks, causing their NIM to fall just as much as at medium-size banks and almost as much as at small banks.

1983-84. Market interest rates quit declining in 1984 and edged upward, increasing a percentage point over 1983. Did banks' interest income and expense respond to the 1983-84 increase in rates the same way they responded to the 1981-83 decrease? Although the two periods are not exactly comparable, the decomposition in Table 3 provides some tentative answers.

In the small and medium-size groups, interest expense rose significantly more than interest income, as would be expected if these groups continued to be liability sensitive. In both groups, however, much of the increase in interest expense was caused by adverse portfolio shifts. When the impact of these shifts is netted out, medium-size banks show no change in NIM and small banks show a decline of eight basis points instead of 31.

Furthermore, the unfavorable rate effect at small banks is due entirely to the experience of small agricultural banks, where interest income continued falling despite the rise in market rates.⁷ At small nonagricultural banks, the increase in market rates raised interest income just as much as interest expense, with no effect on NIM.

Large banks were also relatively unaffected by the increase in market interest rates, experiencing a favorable rate effect of only three basis points. During the year, however, these banks enjoyed a favorable shift in the composition of assets that was not offset by an adverse shift in the composition of funds. As a result, their NIM improved.

Although it is difficult to say whether district banks' liabilities are now more sensitive to rates than their assets, one fact seems clear. Because of deposit deregulation, banks in all three groups derive less benefit from rising rates than they once did, and some banks—particularly agricultural banks—may be severely hurt.

Loan loss provisions

Net interest margins fell sharply at district banks after 1981, but remained higher than in 1977. Thus, even though the deterioration in NIM accounts for much of the drop in profitability over the last three years, it accounts for none of the decline in performance over the period as a whole. Almost all of that decline has resulted from a sharp increase in loan loss provisions.

⁷ Farm financial stress may have contributed to the fall in interest income in 1984, both by discouraging lenders from raising rates on new loans and by preventing borrowers from meeting the interest payments on their old loans. However, the interest income of small agricultural banks behaved much the same in 1982, the last time interest rates turned around. Interest income continued rising that year even though market rates had begun to fall.

Relative to assets, loan loss provisions in Tenth District states remained virtually unchanged through 1981, almost doubled in 1982, and then increased further in 1983 and 1984 (Table 2). Loss provisions have increased 50 basis points since 1981, reaching 0.81 percent of assets in 1984. Although loan loss provisions have also risen in the rest of the country, they have not risen nearly as much. That is why profitability has declined more in Tenth District states over the period as a whole.

Most of the increase in loan loss provisions since 1981 has been to cover writeoffs of bad loans. But banks have also been setting aside enough to build up their loan loss reserves.⁸ As a result, loan loss reserves in district states have grown from 1.1 percent of loans at the end of 1981 to 1.4 percent at the end of 1984.

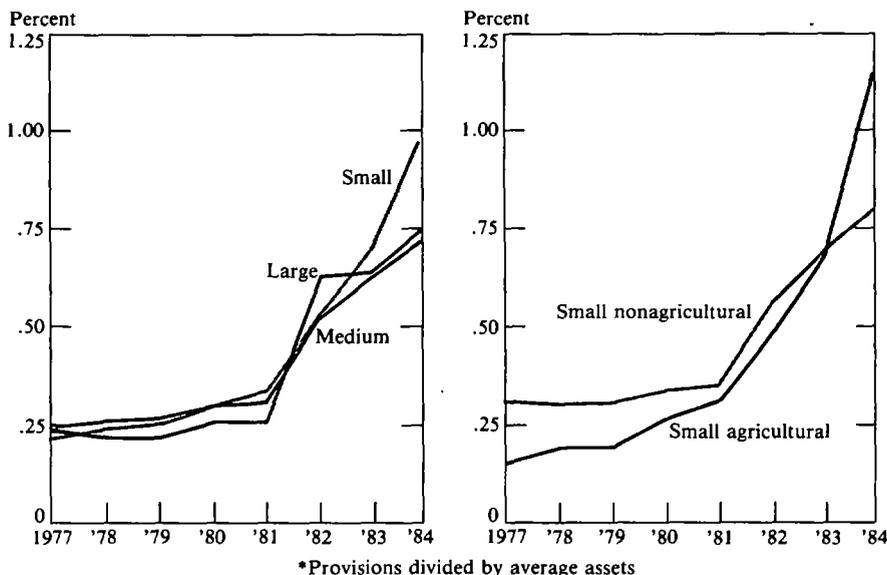
Provisions by size and type

As shown in the left panel of Chart 4, small banks have experienced the largest increase in loan loss provisions of the three size groups. Their poor performance can be attributed entirely to the disproportionately large number of agricultural banks in the group.

Although agricultural banks and nonagricultural banks experienced similar increases in loan losses at first, losses have accelerated at agricultural banks over the past two years while decelerating at nonagricultural banks. As the right panel of Chart 4 shows, provisions increased the same at small agricultural banks as at small nonagricultural banks from 1981 to 1983, about 35 basis points. In 1984, by contrast, provisions jumped almost 50 basis points at small agricultural banks while

⁸ When banks write off bad loans, they charge their loan loss reserves, not their earnings. Writeoffs affect earnings only to the extent that banks provide enough funds for their reserves to make up for the chargeoffs.

CHART 4
Loan loss provisions, banks in Tenth District states*



increasing only 10 basis points at small nonagricultural banks. The relative performance of medium-size agricultural banks has been similar, except that the big increase in their loan loss provisions came a year earlier, in 1983 instead of 1984.

Nonperforming loans

An important indicator of future loan losses is the amount of nonperforming loans. These are loans that have not been written off but are 90 days or more overdue, nonaccruing, or renegotiated.⁹ Data on such loans have been available to the public only since 1983.

⁹ Banks are allowed to count as income any interest that is due but not received, provided the interest and principal are less than 90 days overdue or the loan is well secured and in process of collection. Nonaccruing loans are overdue loans that do not meet either of these conditions. Renegotiated loans are troubled loans with terms that have been eased to facilitate repayment by the borrower.

Table 4 shows that the behavior of nonperforming loans in 1984 was much less favorable for agricultural banks in the region than

TABLE 4
Nonperforming loans by size and type of bank, Tenth District states
 (Percent of total loans, end of year)

	<u>1983</u>	<u>1984</u>
All banks	3.2	3.5
Small banks	2.9	3.5
Agricultural	2.8	4.0
Nonagricultural	2.9	3.1
Medium banks	2.9	3.2
Agricultural	3.4	4.0
Nonagricultural	2.8	3.0
Large banks	3.9	3.7

for nonagricultural banks. The percent of nonperforming loans increased sharply at agricultural banks but remained relatively flat at all three sizes of nonagricultural banks. By the end of the year, 4 percent of the total loans of agricultural banks were nonperforming, significantly more than at small and medium-size nonagricultural banks and slightly more than at large banks.

Over the course of 1984, agricultural banks did manage to provide more for loan losses than they charged off. Small agricultural banks, for example, built up their reserves from 1.2 percent of loans at the end of 1983 to 1.6 percent at the end of 1984. But the growth in loan loss reserves has been far outstripped by the growth in nonperforming loans. This makes it unlikely that agricultural banks can cover future writeoffs of bad loans without adversely affecting earnings.

Causes of increased loan losses

The severe business recession of 1981-82 has been partly to blame for the sharp increase in loan losses the past three years. Loan loss provisions of nonagricultural banks in the district rose after the 1974-75 business recession too. However, the recent recession cannot account for all the loan problems at district banks. For one thing, the increase in loan loss provisions at nonagricultural banks has been much sharper and more protracted than after the 1974-75 recession. For another, loan loss provisions have also risen sharply at the region's agricultural banks, after remaining virtually unchanged throughout the 1970s.

Why, then, have loan losses of district banks increased so much over the last several years? One factor has been the unusually high level of real interest rates. Although nominal interest rates have fallen significantly, they have not fallen nearly as much as inflation. As

a result, the real burden of debt payments has increased, making it more difficult for borrowers to repay their loans. High real interest rates help explain why loan losses of nonagricultural banks increased much more after the 1981-82 recession than after the 1974-75 recession. They also help explain why loan losses of agricultural banks have accelerated so much.

Another factor has been the unevenness of the current recovery. Although some sectors of the district economy have enjoyed rapid growth, the energy and agriculture sectors have suffered severe slowdowns. The combination of high real interest rates and declining real incomes has made it particularly difficult for borrowers in these sectors to meet their debt payments. And because energy and agriculture are more important in Tenth District states than the nation as a whole, the downturn in these two sectors has had an especially severe impact on district loan losses.

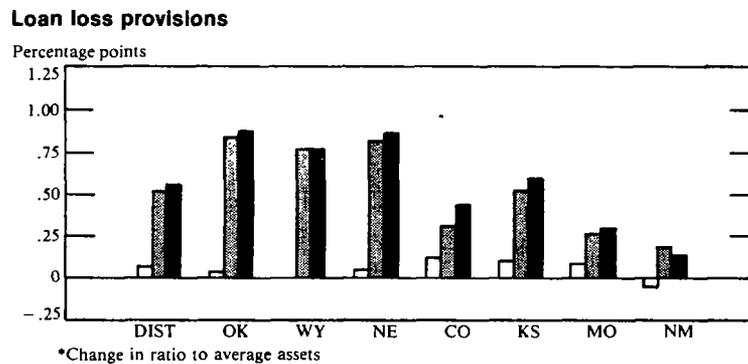
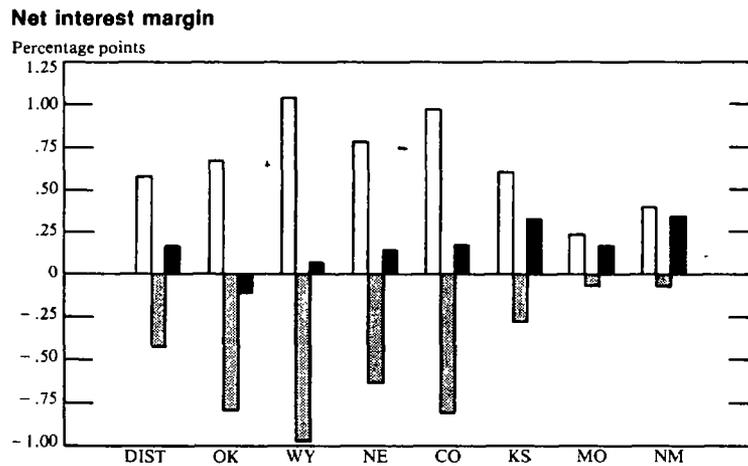
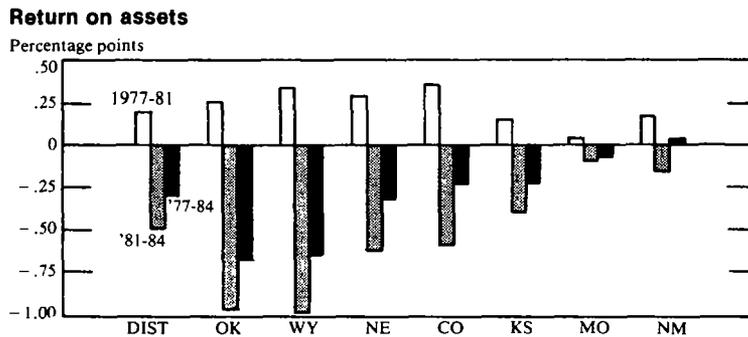
Profitability by state

Falling net interest margins and rising loan losses have squeezed profit margins throughout the district. However, performance has not been uniform among the seven states in the region. Some states have experienced much larger swings in profits, and some have experienced a much greater decline in profits over the period as a whole (Chart 5). This section briefly analyzes the earnings performance of each state, in order of its net decline in ROA.

Oklahoma

Profits in Oklahoma rose only slightly more than average for the district in the late 1970s but fell significantly more than average in the early 1980s (Chart 5). Because the latter decline was so severe, ROA decreased almost

CHART 5
Changes in profitability in Tenth District states*



70 basis points over the period as a whole, much more than in the rest of the region.

The volatility of profits in Oklahoma has resulted partly from the volatility of NIM. NIM rose more than average because of an unusually sharp increase in average loan yields, and then fell more than average because of an unusually steep drop in average loan yields. The vicissitudes of the state's energy industry were partly responsible for these fluctuations. The energy boom of the late 1970s tended to raise loan yields by boosting local demands for credit. On the other hand, the energy bust of the 1980s tended to reduce loan yields by making borrowers less willing or less able to pay high interest rates. Because NIM has deteriorated so much over the last three years, Oklahoma is the only Tenth District state to have suffered a net decline since 1977.

Besides suffering a steep decline in NIM, Oklahoma banks have experienced an extremely large increase in loan loss provisions—a development that can also be attributed to the slowdown in the energy sector. The increase in loan losses has been especially great at large banks. Their provisions jumped to 1.5 percent of assets last year, while those of small and medium-size banks remained in the neighborhood of 1 percent.

Wyoming

Because energy and mining are also important in the Wyoming economy, it comes as no surprise that Wyoming's earnings performance has been similar to that of Oklahoma (Chart 5). Wyoming enjoyed a comparatively large increase in profits in the late 1970s but suffered an extremely severe decline in profits in the early 1980s. For the period as a whole, ROA dropped a little more than 60 basis points, only slightly less than in Oklahoma.

NIM has varied more in Wyoming than any other Tenth District state, contributing to the volatility of profits. Some of the variation in NIM has been due to greater-than-average changes in loan yields at the state's small banks. Differences in portfolio shifts have also been a factor. In the late 1970s, Wyoming banks experienced a smaller adverse shift in the composition of funds than the rest of the region, preventing their interest expense from rising as much. And, in the 1980s, Wyoming banks suffered a larger adverse shift in the composition of funds, preventing their interest expense from falling as much as in other states.

Although NIM ended up slightly higher in Wyoming in 1984 than in 1977, loan loss provisions rose much more. This, together with a sharp increase in net noninterest expense, explains why profits have fallen so much in the state over the period as a whole. The increase in loan losses has been widespread, but has been particularly severe at the state's large banks.

Nebraska

Profits have varied much more in Nebraska than in the district as a whole (Chart 5). Over the entire period, however, ROA declined only 30 basis points, the average for the region.

Because Nebraska has a disproportionately large number of small agricultural banks, its NIM has been highly volatile.¹⁰ As noted previously, the NIM of the region's small agricultural banks increased by a relatively large

¹⁰ In 1983, 44 percent of total assets in Nebraska were held by small agricultural banks and another 19 percent were held by medium-size agricultural banks. For the district as a whole, the corresponding percentages were only 16 and 5 (Table 1).

amount in the late 1970s and then decreased by a relatively large amount in the early 1980s. NIM has fluctuated even more sharply at small agricultural banks in Nebraska, making up for the relative stability in NIM at the state's large banks.

The large number of agricultural banks in Nebraska also accounts for a sharp increase in loan loss provisions in the state. Although provisions have also risen at Nebraska's non-agricultural banks, the increase at these banks has not been any greater than at nonagricultural banks in the rest of the region.

Despite the large increase in loan losses, profits have declined only slightly more in Nebraska than the rest of the region. That is because Nebraska banks have maintained somewhat better control over their net noninterest expense.

Colorado

Profits rose significantly more than average in Colorado in the late 1970s and then fell slightly more than average in the early 1980s (Chart 5). Over the period as a whole, ROA fell 20 basis points, a little less than the regional average.

In both the late 1970s and early 1980s, NIM changed almost as much in Colorado as in Wyoming. As in Wyoming, the volatility of NIM in Colorado can be partly explained by differences in portfolio shifts. Colorado banks suffered a relatively small adverse shift in funds in the late 1970s but a relatively large adverse shift in funds in the early 1980s. In addition, the interest income of Colorado's small and medium-size banks responded fairly quickly to changes in market rates, increasing more than average in the late 1970s and falling more than average in the early 1980s. This was due partly to a tendency for Colorado banks to hold more short-term loans and fewer

long-term securities than banks of the same size in other states.

Although NIM did not improve more in Colorado than the rest of the region over the seven-year period, loan loss provisions rose somewhat less, limiting the decline in profits. The more moderate increase in loan loss provisions in Colorado has been due to a sharp turnaround in loan losses at the state's large banks. After a very large increase in 1982, their provisions have fallen, while provisions of small and medium-size banks have continued to climb. The slowdown in energy and mining helps explain the 1982 jump in loan losses at large banks and the continued increase in loan losses at smaller banks. Although these sectors are not nearly as important in Colorado as in Oklahoma and Wyoming, they are more important than in other Tenth District states.

Kansas

Banks in Kansas experienced an average increase in profits from 1977 to 1981 and a slightly below-average decrease in profits from 1981 to 1984 (Chart 5). Over the period as a whole, ROA declined 20 basis points, the same as in Colorado.

Although Kansas is second only to Nebraska in the share of assets held by small agricultural banks, its NIM has not been especially volatile.¹¹ That is because the NIM of the state's medium-size banks and small non-agricultural banks has been relatively stable. In the late 1970s, their interest expense responded more quickly to market rates than in other states, holding NIM down. And in the early 1980s, their interest income responded

¹¹ In 1983, 32 percent of total assets in the state were held by small agricultural banks and another 8 percent were held by medium-size agricultural banks.

more slowly, holding NIM up. The NIM of the state's large banks grew steadily over both phases, increasing by a full percentage point. Because of this, NIM ended up increasing twice as much in Kansas as in the region as a whole.

Although NIM has performed well in Kansas, provisions for loan losses have increased just as much as in the rest of the region. The high proportion of agricultural banks has tended to raise the state's average loan losses, making up for the relatively small increase in loan losses at large banks.

Missouri

Missouri experienced a modest increase in profits in the late 1970s and a modest decrease in profits in the early 1980s (Chart 5). Over the period as a whole, ROA declined only 10 basis points, significantly less than in the rest of the region.

Profits have been stable in Missouri mainly because NIM has changed very little. One reason NIM has fluctuated so little is that the interest expense of large banks has responded quickly to changes in market rates, rising rapidly in the late 1970s and falling rapidly in the early 1980s. Another factor that has tended to dampen the fluctuation in NIM in Missouri is the pattern of portfolio shifts. Compared with other district states, banks in Missouri suffered a larger adverse shift in the composition of funds from 1977 to 1981 and a smaller adverse shift from 1981 to 1984.

Because Missouri has a highly diversified economy, its loan loss provisions have increased only moderately. That is why profits have fallen so little over the period as a whole. At nonagricultural banks, provisions rose significantly less than average in 1982 and 1983 and no more than average in 1984. Agricultural banks have been less fortunate.

But because they account for a smaller share of total assets than in Nebraska and Kansas, the sharp increase in their loan losses since 1981 has not been enough to offset the more favorable performance of the state's nonagricultural banks.¹²

New Mexico

Like Missouri, New Mexico has experienced relatively little variation in profits over the period. And because earnings have deteriorated so little the last several years, New Mexico is the only state in the region that has not suffered a net decline in ROA.

NIM has improved substantially in New Mexico since 1977, about the same as in Kansas. NIM increased somewhat less than average in the late 1970s but then fell much less than average in the early 1980s. The performance of NIM has been especially strong at small and large banks. Both size groups suffered a highly adverse shift in funds after 1981. However, their interest expense responded much more quickly to the fall in market rates than their interest income, protecting their NIM.

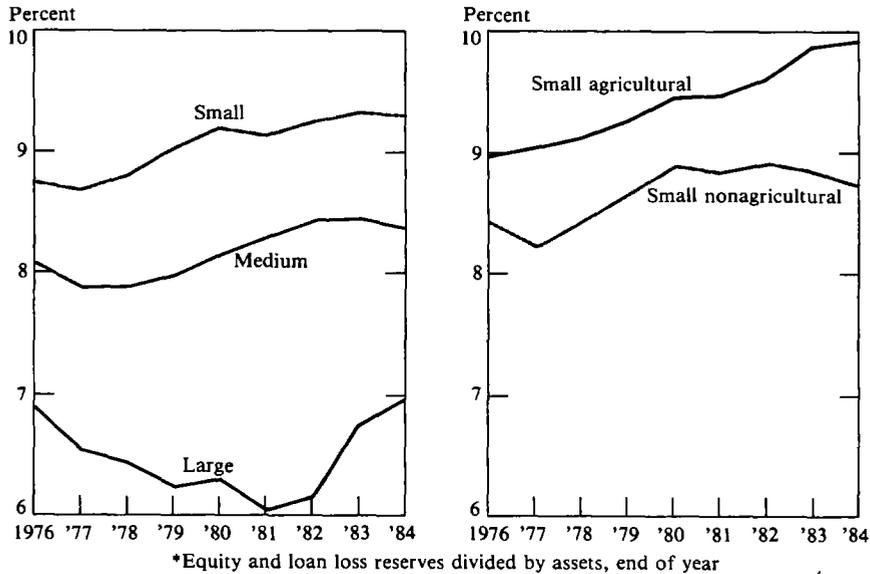
Another reason profits have held up so well in New Mexico is that loan loss provisions have increased only moderately. Provisions have risen only 20 basis points since 1981, the smallest increase in the district.

Capital

Bank profits are down sharply in most of the Tenth District, compared not only with the peak of 1980-81 but also with earlier levels. How well banks in the region weather this

¹² In 1983, 13 percent of total assets in the state were held by small agricultural banks and 3 percent were held by medium-size agricultural banks.

CHART 6
Primary capital, banks in Tenth District states*



decline in earnings will depend on two factors—how much capital they have on hand to absorb losses and how much longer the decline in earnings lasts.

Banks in Tenth District states are still well capitalized, despite lower earnings. One measure of capital is primary capital, the sum of equity and loan loss reserves. For district banks in the aggregate, primary capital equaled 8.2 percent of assets at the end of 1984, compared with 7.9 percent at the end of 1976. Over the period as a whole, equity remained unchanged at about 7.5 percent. Thus, the increase in primary capital has been due entirely to the growth in loan loss reserves.

All three size groups have managed to preserve their primary capital, as the left panel of Chart 6 shows. However, small and medium-size banks have been more successful than large banks. Although large banks have

increased their equity and loan loss reserves significantly since 1981, the increase has just made up for the sharp decline in capital they suffered in the late 1970s.

Among small and medium-size banks, agricultural banks have increased their capital-asset ratios even more than nonagricultural banks, widening the gap between them. As shown in the right panel of Chart 6, the capital-asset ratio of small nonagricultural banks has risen about 30 basis points since 1976. At small agricultural banks, the ratio has risen almost 100 basis points, falling just short of 10 percent at the end of 1984. The superior performance of agricultural banks is due to two factors. First, they have not accumulated assets as rapidly as nonagricultural banks. And second, until last year they earned significantly higher profits than nonagricultural banks, enabling them to build up their equity at a faster rate through retained earnings.

The volume of nonperforming loans suggests that increased loan losses will be the most important factor tending to depress banks' earnings and use up their capital in the short run. At the end of 1984, 89 percent of the region's banks still had more than twice as much primary capital as nonperforming loans. Only a year earlier, however, 93 percent of all banks were in that position. Furthermore, more than 70 banks in the region ended 1984 with less primary capital than nonperforming loans, compared with only 35 banks at the end of 1983. Thus, while the vast majority of banks in the region have more than enough capital to protect themselves against additional loan losses, the number of banks that do not enjoy such a cushion has been growing.

Conclusions

The profitability of Tenth District banks has fluctuated widely since 1977, first increasing sharply and then decreasing sharply. Because the recent deterioration has been so severe, banks throughout the region have suffered a net decline in earnings. The decline has been greatest at small banks, banks that specialize in agricultural lending, and banks in energy-producing states. Because all three groups are disproportionately represented in the Tenth District, bank profits have fallen more in the region than in the nation as a whole.

The volatility of profits at district banks has had several causes. During the late 1970s, ris-

ing market interest rates and strong growth in the agricultural and energy sectors boosted banks' net interest margins despite a large adverse shift in the composition of their funds toward more expensive deregulated deposits. During the early 1980s, falling market rates did not have the same tendency to reduce banks' net interest margins, because the massive shift to deregulated deposits had made their cost of funds much more sensitive to rates. But banks continued to suffer a large adverse shift in funds, causing net interest margins to drop anyway. Even more important, the failure of interest rates to decline as much as inflation, the severe 1981-82 business recession, and the sharp slowdown in the energy and agricultural sectors combined to produce a large increase in loan losses. Thus, even though net interest margins remained slightly higher at most banks than when the period began, profits ended up substantially lower.

Despite the recent decline in earnings, district banks have managed to maintain high levels of capital relative to assets. These high capital-asset ratios should provide the vast majority of banks with an adequate cushion against future losses. Resuming the rapid earnings growth of the late 1970s will be more difficult. At the very least, such a turnaround will require lower real interest rates, greater balance among the various sectors of the regional economy, and strong growth in the national economy.

Appendix

This appendix explains the decomposition of interest income, interest expense, and NIM in Table 3.

The choice of asset and liability categories was constrained by the degree of disaggregation in the Reports of Condition and Income. Assets were split into four categories – money market assets, loans, securities, and all other assets. Liabilities were divided into five categories – passbook savings accounts, regular NOW accounts, other interest-bearing retail deposits, managed liabilities, and all other liabilities. For the years from 1978 to 1981 only, other interest-bearing retail deposits were also broken down into six-month money market certificates and other deposits. Finally, for passbook savings, regular NOW's, and six-month money market certificates, it was assumed that the average rate of return equaled the prevailing ceiling rate.

Between each pair of years, t and T, the portfolio-shift effect was calculated as

$$\Sigma(s_{iT} - s_{it})(r_{it} + r_{iT})/2],$$

where s_{it} is the fraction of total assets or total funds in category i in year t and r_{it} is the average rate of return paid or earned on category i in year t. The rate effect was then calculated as

$$\Sigma(r_{iT} - r_{it})(s_{it} + s_{iT})/2].$$

Adding the two effects together gives the total change in the interest income or interest expense ratio from year t to year T.

The decomposition could be done in other ways. For example, in calculating the portfolio-shift effect, either r_{it} or r_{iT} could be substituted for the term $(r_{it} + r_{iT})/2$. This would change the numbers in Table 3, but not enough to alter any of the qualitative results.