

- the market's Herfindahl-Hirschman Index,
- the number of banks and thrifts in the community where the bank is headquartered, and
- the percentage of deposits held by thrifts in the market.

We then used standard statistical procedures to test the importance of these variables, jointly and individually, in explaining earnings of the high- and low-profit banks. These variables together explained about one quarter of the variability in their earnings (table 4). As far as the relative contribution of individual variables is concerned, we found bank ownership, local competition, asset allocation and deposit composition to be key determinants of bank earnings. Banks that were not affiliated with bank holding companies earned higher profits. Some bankers believe this occurs because independent banks provide more personalized services and can react more rapidly to local changes than institutions belonging to larger organizations.

Local competition, as measured by the number of banks and thrifts in the community where the banks are headquartered, affected bank earnings. Banks operating in communities with fewer banking alternatives faced less vigorous

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

Address Correction Requested: Please send corrected mailing label to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101.

Table 4 — Regression Results for Bank Earnings

	Return on Assets
Deposit size	Positive
Bank ownership	Negative ¹
Deposit composition	Positive ²
Asset allocation	Negative ²
Household income growth in market	Negative
HHI in market	Negative
Number of banks and thrifts in head office community	Negative ²
Deposit held by thrifts in market	Negative
Adjusted R ²	0.26

1. Significant at 5 percent level.
2. Significant at 1 percent level.

competition and were able to earn higher profits. The high earners maintained a larger portion of demand deposits and savings deposits with interest rate ceilings that reduced interest expenses. In addition, these banks made fewer loans (or more investments), which lowered non-interest expenses and kept loan losses down.

When other variables were taken into account, some individual factors became insignificant in explaining high- and low-profit bank earnings. These factors included bank size, market growth, market concentration, and the share of deposits held by thrifts in the market.

Conclusion

Caution should be exercised in attempting to draw any general conclusions about the factors that determine bank earnings because our findings are based only upon the most- and least-profitable banks in four states and cover only one year. Nevertheless, many differences were found between the two groups of banks.

Such factors as bank size and market concentration are not significant in explaining the variability in earnings among the high- and low-profit banks when other factors are taken into account. What seemed to matter most was ownership, local competition, asset structure and deposit composition. The return on assets was higher at banks that were unaffiliated with bank holding companies, that operated in communities with fewer banks and thrifts, that held less expensive deposits and that extended fewer loans. These factors, along with superior management, helped banks in this category hold down operating expenses and generate higher revenues.

No evidence was found to support the notion that small independent banks cannot do well in a deregulated environment. Regardless of size, banks with good management are likely to continue to perform well.

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ECONOMIC COMMENTARY

Bank Earnings: Comparing the Extremes

by Paul R. Watro

Much concern has been expressed in financial circles about bank earnings, credit and interest-rate risks, and bank failures over the last few years. Since 1981, the number of bank failures has escalated because many institutions have been saddled with an increasing volume of bad loans and other problems.

Deregulation has played a role in these problems by intensifying competition, thereby increasing the difficulty for banks to enhance earnings. Adequate profits, of course, are necessary to allow banks to grow, particularly smaller institutions that have limited access to equity markets. Numerous studies have examined bank earnings to isolate factors that account for differences among banks in profits.¹ Findings generally reveal that the most important factor determining bank profitability is management's control over expenses, especially non-interest expenses. Other factors, such as bank size and market concentration, had little or no effect on bank earnings. All these studies, however, have been based on bank earnings prior to enactment of most rate deregulation.

The introduction of money market deposit accounts (MMDAs) in December 1982 and Super NOWs in January 1983 changed the method of competition and greatly altered the balance sheets of depository institutions. The absence of rate ceilings on MMDAs and Super NOWs enabled depository institutions to compete with each other and with money market mutual funds on the basis of rates. Competitive pressure caused banks and thrifts to pay higher rates; depositors reacted by shifting funds to those high-paying accounts. Institutions that traditionally held a high concentration of low-cost savings deposits were probably affected the most by deposit rate deregulation.

Paul R. Watro is an economist at the Federal Reserve Bank of Cleveland. The author would like to thank Larry Vozar and Steve Reutschi for their assistance.

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In this *Economic Commentary*, we examine bank profitability and identify institutional, operational and locational differences between the most- and least-profitable banks. We find significant differences in both expenses and revenues between high and low earners, and identify some of the contributing factors to earnings differences.

Sample Selection and Method Used

The sample of banks used in this study was selected from four states — Ohio, Pennsylvania, Kentucky and West Virginia — and included all those institutions that earned more than two cents per dollar of assets and all those institutions that failed to earn a profit in 1983.² There were 84 high earners and 79 low earners. The average high earner earned 2.44 cents per dollar of assets while the average low earner lost 1.48 cents per dollar of assets. Within the group of high earners, 34 were in Kentucky, 21 in West Virginia, 12 in Ohio, and 17 in Pennsylvania. Among the low earners, 34 were in Kentucky, 11 in West Virginia, 23 in Ohio, and 11 in Pennsylvania.

For each of the high- and low-earning banks, we gathered data on the size, ownership, competition, market conditions, operations, asset holdings, deposit composition, revenues, and expenses (see tables 1, 2 and 3). Some of these factors are under the direct control of bank management; others are not. Nevertheless, each of these factors could have an important influence on bank profits. For each of these variables, we calculated an average value for the high earners and an average value for the low earners.

1. Some of these studies include Donald R. Fraser, "The Determinants of Bank Profits: An Analysis of Extremes," *The Financial Review*, 1976, pp. 69-87; John A. Haslem, "A Statistical Analysis of The Relative Profitability of Commercial Banks," *Journal of Finance*, vol. 23, no. 1 (March 1968), pp. 167-76; Myron L. Kwast and John T. Rose, "Pricing, Operating Efficiency, and Profitability Among Large Commercial Banks," *Journal of*

Using standard statistical methods, we next tested to see if the averages were different between the two groups of banks. We have designated each result according to whether or not the averages are statistically different at various levels of significance. A 1 percent level of significance means that the probability that the difference is due to random chance is less than 1 percent.

Findings

The average values for the high- and low-profit banks and the statistical differences between them are given in tables 1 through 3.

The impact of institution size on bank earnings has important implications for public policy. With the current wave of technological change and deregulation in the financial service industry, much concern has been expressed about the survival of small independent banks. Yet, small independent institutions have not only survived, but many have continued to outperform larger institutions. In this study, high-earning banks were found to be much smaller than low-earning banks. Two-thirds of the high earners did not operate any branch offices and fewer of them belonged to a bank holding company (table 1). The average deposit size of the higher earners was only \$29.8 million, compared to \$141.6 million for the low earners. None of the high earners had deposits over \$200 million and two-thirds of them had deposits under \$25 million. In contrast, 10 percent of the low earners had deposits over \$200 million and half of them had deposits under \$25 million.

We found that the degree of competition is likely to alter bank earnings. Banks operating in areas where competition is

Banking and Finance, vol. 6, no. 2 (June 1982), pp. 233-54; Marvin M. Phaup, Jr., "Characteristics of High Performance Banks 1969-1975," *Economic Review*, Federal Reserve Bank of Cleveland, Fall 1976, pp. 12-22; and Larry D. Wall, "Why Are Some Banks More Profitable?" *Economic Review*, Federal Reserve Bank of Atlanta, vol. 68, no. 9 (September 1983), pp. 42-8.

Table 1—Size, Ownership, Competition, and Growth

	High Earners	Low Earners	Difference
Deposit size (\$ million)	29.8	141.6	-111.8 ²
Number of offices	1.7	5.7	-4.0 ³
Single office (percent)	34.2	69.0	-34.8 ³
Member of bank holding company (percent)	16.7	27.8	-11.1 ¹
Market structure			
Number of banks	11.1	13.7	-2.6
Number of banks and thrifts	18.9	25.6	-6.7
Four-bank concentration ratio (percent)	84.5	82.9	1.6
Four-bank & thrift concentration ratio (percent)	77.4	72.4	5.0
HHI (banks)	3257	2870	387
HHI (banks & thrifts)	2714	2175	539 ¹
Market deposits held by thrifts (percent)	17.9	25.0	-7.1 ³
Local structure			
Number of banks	1.5	2.5	-1.0 ³
Number of banks and thrifts	1.7	3.9	-2.2 ³
Bank's share of bank deposits (percent)	83.8	59.2	24.6 ³
Bank's share of bank & thrift deposits (percent)	78.9	50.7	28.2 ³
Community deposits held by thrifts (percent)	6.8	18.7	-11.9 ³
Market growth (percent change from 1978 to 1983)			
Population	4.7	5.1	-0.4
Household income	44.6	39.6	5.0 ¹
Per capita income	52.4	49.8	2.6

1. Significant at 10 percent level.

2. Significant at 5 percent level.

3. Significant at 1 percent level.

SOURCES: Federal Reserve System Board of Governors, and Survey of Buying Power.

less intense would be expected to earn higher profits. Researchers have typically used measures of market structure (the number and size distribution of competitors) to gauge the competitiveness of market areas.³

Since there is no unambiguous measure for market structure, several variables were examined: the number of competitors, the four-firm concentration ratio, the Herfindahl-Hirschman Index (HHI) and the percentage of deposits held by thrifts in the market.⁴ The four-firm concentration ratio indicates the market share held by the four largest competitors in the market. The HHI is a more comprehensive measure of market structure, since it takes into account both the number and size distribution of all the competitors in the market.⁵ When a market has only one institution, the HHI attains its maximum value of 10,000. The value of HHI declines with increases in the number of competitors and as the competitors become more equal in their share of market deposits. The percentage of deposits held by thrifts in the market is used as a measure for thrift competition.

All of the above market structure variables showed a tendency to influence bank earnings, but only the HHI and thrift competition had a significant impact on

profits. The high-earning banks operated in more concentrated markets and in areas where thrifts held a smaller share of the deposits.

In addition to the competitive condition in the overall banking markets, the competitive environment in local communities might also alter bank earnings, particularly for banks that do not operate offices throughout the entire market. Over one-half of the sample banks had only one office; many others had offices in only one community. The high-earning banks were headquartered in communities with fewer competitors, faced less thrift competition, and held a larger share of the local deposits than the low-earning banks.

Banks operating in expanding markets enjoy a larger supply of potential new deposit and loan customers. While economic growth generally leads to higher profits, it is unclear how growth would affect average earnings per dollar of assets. High earners operated in markets that experienced significantly faster increases in household incomes than markets where the low-earning banks were located. No material differences in other growth measures were detected between the markets of the two groups of banks.

Expenses and Revenues

As a percentage of assets, both expenses and revenues differed among the high- and low-earning banks (table 2). Expense differentials were the largest and most widespread. The average expenses per dollar of assets were less than nine cents for the higher earners, compared to over 12 cents for the low earners.

Given the level of interest rates, interest costs of banks are determined by the volume and mix of their liabilities. The share of liabilities paying market rates has risen substantially with deposit rate deregulation, particularly at smaller institutions. Banks that could maintain more demand and rate ceiling deposits would pay less interest than banks with fewer demand and regulated deposits. Although high-earning banks held about the same percentage of demand deposits as low-earning banks, they held a significantly smaller share of time deposits and large CDs, and a larger share of savings deposits with rate ceilings. As a result, interest expense was significantly lower at the most profitable banks.

The non-interest costs of banks are affected by the volume and composition of assets and liabilities and the effectiveness of controlling operating expenses. Some assets, such as loans, are risky and more expensive to make and to service compared to investing in government securities.

Lenders also incur higher administrative costs in extending certain types of credit, such as consumer loans, which are much smaller than business and real estate loans. Banks that have invested relatively more funds in branch offices and buildings and that are open longer are likely to incur higher non-interest expenses.

High-earning banks held a larger share of their assets in securities and smaller shares in loans and in offices and equipment than low-earning banks. The average highly profitable bank had 50.1 percent of total assets in securities compared to 39.2 percent for the low-earnings group. The high earners not only devoted a smaller percentage of funds to loans, but also made different kinds of loans than low earners. Specifically, higher earners had more real-estate loans and fewer commercial and industrial loans. Higher earners maintained shorter banking hours and were more cautious in extending credit. Only 0.2 percent of the loans outstanding at the high earners had to be written off, compared with 3.5 percent of the loans held by low earners.

Table 2—Expenses, Revenues and Operations

	High earners	Low earners	Difference
Expenses (percent of average assets)	8.2	12.3	-4.1 ¹
Interest	5.5	6.5	-1.0 ¹
Deposit composition (percent of deposits)			
Demand	20.9	18.8	2.1
Savings	33.8	29.2	4.6 ¹
NOWs and Automatic Transfer Savings Acct.	4.4	5.1	-0.7
Other with rate ceilings	19.8	11.8	8.0 ¹
Time	45.2	52.1	-6.9 ¹
Large CDs	5.0	8.8	-3.8 ¹
Non-interest (percent of average assets)	2.7	5.8	-3.1 ¹
Asset composition (percent of assets)			
U.S. Treasury & government agencies securities	29.0	21.4	7.6 ¹
State and local securities	17.3	6.6	10.7 ¹
Loans	39.2	50.1	-10.9 ¹
Bank premises	1.1	2.5	-1.4 ¹
Loan composition (percent of loans)			
Business	9.9	19.9	-10.0 ¹
Real estate	49.7	41.1	8.6 ¹
Consumer	30.4	27.9	2.5
Bad loan (percent of loans)	0.2	3.5	-3.3 ¹
Banking hours (weekly)	32.4	34.5	-2.1 ¹
Revenues (percent of average assets)	11.2	10.5	0.7 ¹
Interest	10.8	9.9	0.9 ¹
Loans	5.1	6.3	-1.2 ¹
Securities	4.9	2.6	2.3 ¹
Service fees	0.3	0.5	-0.2 ¹

1. Significant at 1 percent level.

SOURCE: Condition and income reports of banks and American Bank Directory.

Despite the appearance of conservative asset allocation, banks in the high-profit group earned more revenue per dollar of assets than the low-earning banks. High earners generated more income from securities, but less from loans and service charges. These banks earn more income from securities because they hold more of them, even though they hold a relatively larger share of state and local government securities that pay lower yields than U. S. government securities. They earn less loan income because they extend fewer and less risky loans.

Gap and Capital Position

Whether they make loans or invest in securities, banks take on interest rate risk, that is, the potential for loss due to rate swings. To control for this risk, banks use asset-liability management. The most widely employed technique is gap management.⁶ The difference between rate-sensitive assets and rate-sensitive liabilities for specific periods is known as the "gap." Interest-sensitive assets or liabilities are those that mature, or are repriced, within a designated time-frame.

assets than liabilities. Likewise, a negative gap would foster wider profit margins when rates were declining. To take size differences among the banks into account, we expressed the gap as a percentage of banks' total assets. Findings revealed that both groups of banks kept their gap position close to zero (table 3). Since no

Table 3—Gap and Capital Position

	High earners	Low earners	Difference
Gap ¹ (percent of assets)			
Three months or less	-1.0	2.3	-3.3
Six months or less	-4.5	-2.1	-2.4
One year or less	1.3	0.1	1.2
Capital (percent of)			
Assets	13.7	6.6	7.1 ²
Deposits	16.6	7.5	9.1 ²

$$1. \text{ Gap} = \frac{\text{Rate-sensitive assets} - \text{Rate-sensitive liabilities}}{\text{Total assets}} \times 100$$

2. Significant at 1 percent level.

SOURCE: Condition reports of banks.

statistical differences were found, it can be concluded that higher-earning banks did not have any more interest-rate exposure than the low-earning banks.

As expected, the high earners were well-capitalized with a capital-to-assets and capital-to-deposit ratios more than twice as great as the capital ratio for the low earners. The low earners were forced to use a portion of their capital to offset losses incurred during the year. In contrast, high earners were able to augment their capital base through retained earnings.

Most Important Factors

Because we found many differing factors between high and low earners, we wished to know which of these variables were most important in explaining the overall earnings performance of banks. We assumed that the level of bank earnings depended upon the following factors:

- the deposit size of the bank,
- whether the bank was a member of a bank holding company,
- the percentage of deposits held in demand deposits and savings deposits with rate ceilings,
- the percentage of assets allocated to loans,
- household income growth in the market,

2. Statistically, the banks whose return on average assets was more than one standard deviation above or below the mean profitability level were classified as either high or low profit banks.

3. For the purpose of this study, banking markets were approximated by metropolitan statistical areas and counties outside of urban areas.

4. Thrift institutions include all savings and loan associations and mutual savings banks that are federally insured.

5. The Herfindahl-Hirschman Index is calculated by adding the squared market share of each competing institution.

6. Another method used is duration gap management, which helps to insulate net worth from investment risk. For a discussion of asset-liability management, see Karlyn Mitchell, "Interest Rate Risk Management at Tenth District Banks," *Economic Review*, Federal Reserve Bank of Kansas City, vol. 70, no. 5 (May 1985), pp. 3-19.