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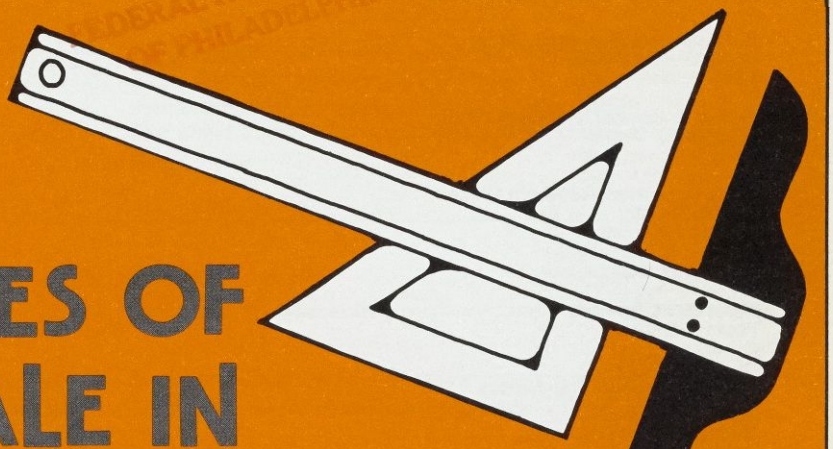

ECONOMIES OF SCALE IN BANKING

Economic Review

FEDERAL RESERVE BANK OF ATLANTA

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Economies of Scale in

Private institutions and public regulators alike have been erasing boundaries between financial institutions. Some 40,000 depository institutions are now able to offer a full range of consumer financial services where there were only 13,000 in March 1980. With the recent enactment of landmark banking legislation, another 4,000 new competitors (savings and loan associations) will be able to offer banking services to businesses. Besides these new competitors, nondepository institutions have entered consumer and business markets with an expanding variety of financial instruments and services.

How many of these new competitors will prosper? What will the survivors and the financial system look like? The answers to these rather broad questions depend, to a great extent, on the answer to a narrower question: do larger financial institutions enjoy lower costs than smaller institutions?

Evidence on this question will be vital to thinking through the implications of future financial deregulation. For instance, how would interstate deposit-taking operations by banks and S&Ls affect the structure and competitive health of the nation's financial system? Will large institutions "gobble up" smaller ones, or will smaller ones be able to remain competitive? Part of the answer depends on whether the large institutions can produce financial services more cheaply than smaller ones—in the language of economics, whether production of financial services is subject to "economies of scale."

This issue of the **Economic Review** concentrates on present and future competition between larger and smaller financial institutions. With remarkable consistency, the studies reported here suggest that large size does not seem to give a financial institution significant competitive advantages. This implies that, contrary to many predictions, large banks and S&Ls are not likely to drive smaller ones out of business as deregulation progresses.

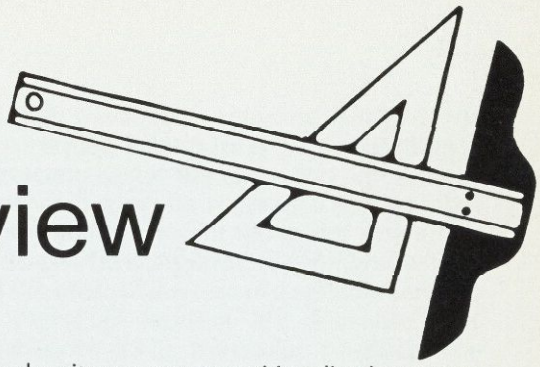
The first study, dealing with operating costs at banking organizations, is presented by **George J. Benston,** visiting scholar at the Federal Reserve Bank of Atlanta and professor of accounting, economics and finance at the University of Rochester's Graduate School of Management; **Gerald A. Hanweck,** economist, Board of Governors of the Federal Reserve System, and **David B. Humphrey**, chief of the Federal Reserve Board's Financial Studies Section. They estimated costs for branch and unit banks (unit banks are individual banks in states that prohibit bank branches) and tested for the impact of bank holding company affiliation on costs. They found that costs per account for banks larger than $50 million in deposits increased as bank size increased, while costs declined with size for banks with less than $25 million in deposits.

In the second article, **James E. McNulty,** assistant vice president and economist, Federal Home Loan Bank of Atlanta, reports on a new study of the cost structure of savings and loan associations. McNulty found decreasing costs for S&Ls with up to about $500 million in deposits but did not fully account for normal methods of expansion. Above the $500 million level, costs increased slightly.

Larger S&Ls, then, may capture some economies of scale if they can expand significantly without adding a proportionate number of branches. Since S&Ls specialize in low activity functions such as mortgages and savings accounts, McNulty suggests, these results are not likely to be carried over as S&L operations broaden to include transactions accounts and business and consumer loans.

Following McNulty's study, **David D. Whitehead,** senior financial economist, Federal Reserve Bank of Atlanta, and **Robert L. Schweitzer,** assistant

Banking: An Overview



professor of economics, University of Delaware, survey the evidence linking size and risk in banking. Operating cost studies fail to consider the relationship between risk costs and size in financial institutions. Greater risk requires greater compensating returns to shareholders and other providers of funds and thus may put riskier institutions at a competitive disadvantage. In their review of the sparse evidence found in studies of credit risk, interest rate risk, bank capital adequacy, and early warning systems for problem banks, Whitehead and Schweitzer found little evidence that small banks operate with greater risks that cannot be controlled.

Moving from studies of relationship between size and costs to the playing out of competition in the real world, **B. Frank King,** research officer at the Atlanta Fed, asks how well larger banks in local markets have performed versus the smaller ones over the past decade and a half. Citing evidence from several studies, including the Atlanta Fed's new study covering southeastern markets between 1974 and 1981, he concludes that larger banks generally have lost market share to smaller local competitors. The evidence supports that conclusion for any subperiod, any area of the country and any type of market studied over the past 15 years.

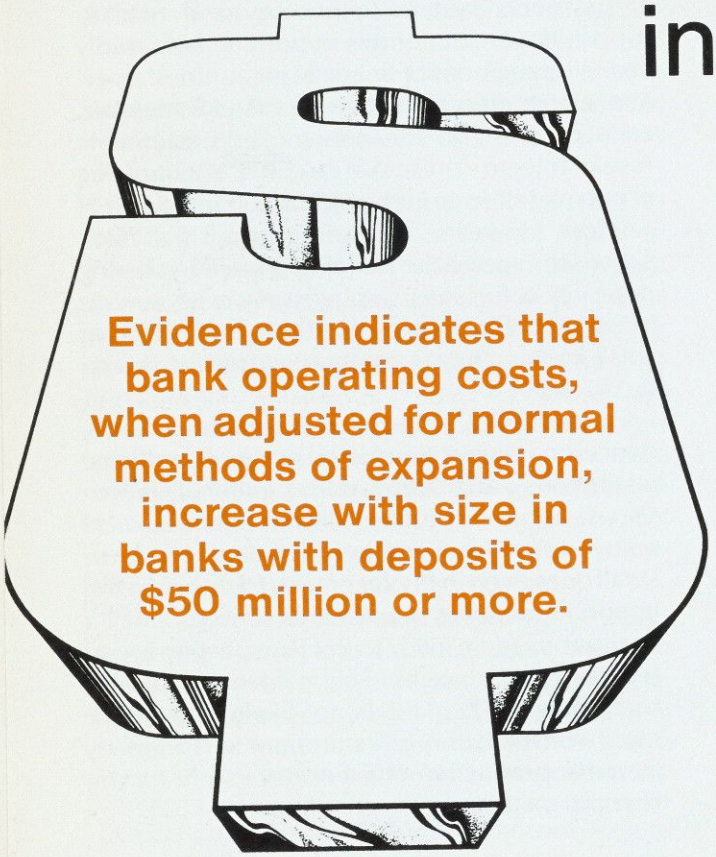
Carrying the consideration of one-on-one competition a step further, King then looks at the impact of large bank holding companies' acquisition of local banks in three southeastern states. King studied two types of banks—*de novo* (newly organized) banks and large banks acquired by large holding companies. He compared them with similar independent banks in the same markets. The evidence indicated that after several years the holding company subsidiaries did not generally differ from the independents in size, profitability or risk.

If smaller banks operate with different goals than larger ones, the smaller banks may be able to survive despite some competitive disadvantages, according to another study. It also found that small banks may contribute a competitive element that would be lost with their demise. **David D. Whitehead** tested indirectly the theory that small banks attempt to gain market share at the expense of profits, while large banks seek profits even if they must sacrifice market share. He found evidence consistent with his hypothesis that small banks emphasize market share. Smaller banks may survive even if they do not earn quite so much as larger ones. They may also create significant price competition.

The final study in this issue takes a forward look at payments system technology and tries to project the impact of this important and rapidly changing segment of financial institutions' operations on their competitiveness. **Paul F. Metzker,** an economist on the Atlanta Fed's payments research team, foresees substantial and growing economies of scale in the production of payments services. However, he also expects small institutions to capture the benefits of scale by sharing production facilities through networks, service bureaus and franchises. He finds evidence that small banks already are moving toward shared facilities.

These studies present considerable new evidence on competition between small and large institutions—and that evidence generally is consistent. Large institutions do not seem to have enjoyed significant competitive advantages over small ones even in the recent past. Further, in the important business of payments services, smaller institutions seem likely to keep up despite broad technological changes. This evidence indicates that interstate banking is not likely to produce rapid consolidation of institutions or to greatly increase productive efficiency or safety for the financial system.

Operating Costs in Commercial Banking



Evidence indicates that bank operating costs, when adjusted for normal methods of expansion, increase with size in banks with deposits of $50 million or more.

Reasons for Concern with Banks' Operating Costs

In most businesses, operating costs are a private matter. In banking, though, these costs receive wider attention. A bank's managers and owners clearly are concerned with costs since they profit if costs are controlled. A bank's customers also are concerned, since banking costs ultimately are passed on to users of the bank's services. In addition, legislators and those charged with bank regulation have a derivative concern; the more efficiently banks are operated, the larger the earnings flows that may improve safety by absorbing losses, the more efficiently the nation's payments system works and the more efficiently savings are channeled into investment.

Large versus Small Institutions

Legislators and regulators also have a direct concern with banks' operating efficiency, because efficency may influence the way specific regulations are enforced. In particular, if larger banks produce a given level and quality of services at a lower cost than smaller banks—that is, if banking is subject to economies of scale—then larger banks could offer lower prices or more service than smaller banks. In an unrestricted environment, larger banks might well displace the small banks, reducing competition. If these economies of scale are large enough, the savings of resources might offset anticipated reductions in competition. However, if economies of scale aren't significant, a policy of unrestricted chartering (free entry) would probably not result in failure of new banks due to their inherent inability to compete successfully with larger banks. Instead, failure would be associated more with management skill and specific economic events than with the scale of operation.

Form of Organization—Branching and Holding Companies

Financial institutions' operating costs also may be related to their form of organization. Information on this relationship is important for states trying to decide what type of bank branching and bank holding companies they will allow, and for the federal government as it considers various proposals for interstate banking. Branches, independent banks and bank holding company subsidiaries may all have different relationships between size and operating costs per unit of output. Branches, in particular, may be more or less costly to run than similar sized unit banks (banks without branches). Or very small branches may be more efficient than small unit banks, while large branches may be less efficient than similar sized unit banks. And, even if branches were more costly to operate, they might permit a bank to grow and take advantage of economies of scale, the savings from which could offset the presumed extra costs of branching. Considering the costs of holding companies' operations is important, since they are an alternative to branching.

Multiple Products

Banks produce multiple products. To answer some of the above questions, cost information on individual products is required; some other questions require information on the bank as a whole. In some cases, the costs and amounts of various services must be separated so that institutions producing different types and quantities of outputs can be compared meaningfully. Estimates of the production cost of a specific service, such as mortgage lending, are desirable in a market analysis for a particular product. For example, in considering competition between commercial banks and savings and loan associations, the possibilities for economies of scale in mortgage lending and time deposits are of primary concern; the costs of many other banking services may not be important.

". . . if banking is subject to economies of scale—then larger banks could offer lower prices or more service than smaller banks."

Aggregating the costs of multiple banking services is necessary to determine if a financial institution as a whole is subject to economies of scope. These economies occur when several products (such as time and demand deposits or demand deposits and business loans) are produced together at a lower total cost than when produced separately. If there were significant economies of scope in producing, say, business, consumer and mortgage loans in one operation, specialized institutions such as S&Ls would be less efficient than full-service commercial banks. The common production of transactions in corporate and government securities also could give rise to economies of scope. This has implications for public policy regarding the powers allowed thrift associations and commercial banks as well as for mergers between different types of institutions.

Results of a Current Bank Cost Study

This study reviews research on bank costs and reports on a recently published study by the

authors. Consecutive sections address the technical problems of defining and measuring operating costs and output, estimating operating efficiency, and obtaining appropriate data for cost analysis. The article then reports the finding of our latest study and discusses them in relation to other recent studies of bank operating costs. Results and implications of the analysis are summarized on page 21.

The important objectives of bank cost studies have been to determine: (1) the extent that the scale of bank operations affects bank costs; (2) the effects of branching and holding company organization on costs; (3) the cost effects of banks producing multiple services; and (4) the effects of different types of bank customers on bank costs. A number of fundamental problems are common to all bank cost studies as well as cost studies of other industries. Fortunately, measurement problems are not great using data from the Federal Reserve's Functional Cost Analysis (FCA) program.

The most recent research (using 1975-78 FCA data, a more flexible estimating functional form, and a theoretically supportable index number method of aggregating the various banking outputs) generally confirms many of the results of previous research. New results are summarized as follows:

(1) Banks with more than $50 million-$75 million in deposits in unit banking states experienced diseconomies of scale—that is, average costs increased as the banks increased in size.

(2) Banks of all sizes in states that allow branch banking experienced economies of scale with respect to the numbers of deposits and loan accounts.

(3) When the mode of expansion—increasing the number of accounts or the number of offices for branching banks but only expanding the number of accounts for unit banks was accounted for, banks in both branching and unit states above $50 million-$75 million in deposits experienced diseconomies of scale.

(4) Economies of scale appeared to be unchanged over the 1975-78 period.

(5) Larger account sizes for both types of banks increased costs less than proportionately.

(6) Average costs (unadjusted for certain differences in branch and unit banks) were similar for banks with up to $75 million in deposits in branch and unit states; larger banks in branching states had considerably lower average costs than similar banks in unit states.

(7) Taking into account the different ways that branch and unit state banks can expand—by increasing offices or average account size, respectively—average costs were similar among banks of similar size in unit and branching states.

(8) Bank holding company affiliation was found to have little effect on bank costs.

Definition and Measurement of Operating Costs and Output

Measuring Operating Costs

Public and private policy questions require numbers that meaningfully reflect economic values rather than accounting measurements. Regulators and bankers should be concerned with "opportunity costs," the value of resources given up because of a decision to do one thing rather than another. For example, the cost of making and servicing a mortgage loan is the dollar value of resources that, as a consequence, cannot be used for the next best opportunity. Where outlays are made in cash or in close equivalents (e.g., the present value of promises to pay cash in the future) for such expenses as salaries, supplies and computer services, the accounting numbers reflect economic values well, since the amount of cash used for the stated purpose is no longer available for another.

Other costs may not be so well reflected, however. For example, the economic cost of the space occupied by the mortgage loan department is not well measured in accounting statements. These statements include depreciation, an essentially arbitrary allocation of a portion of the original cost of the building and equipment to a given activity over a specific time period. These figures seldom provide valid estimates of the present economic cost of using the building. This cost is measured by the bank's next best opportunity. This would be the amount that it would receive if it rented out the space occupied by the mortgage department or the amount it could save by giving up space occupied by another function that could be moved into the mortgage department's space. Other costs that may be similarly misstated are inventories valued

at acquisition cost and salaries and other tax deductible compensation that are substituted for dividends. Clearly, opportunity costs involved in these situations are very difficult and often impossible to measure.

Even when costs are measured reasonably well, it often is very difficult to assign them to specific types of output with reasonable accuracy. For example, the cost of employing the bank president might be measured correctly if the present value of his pension and other fringe benefits were accounted for along with his salary. But how much of the president's compensation should be charged to demand deposits, business loans, mortgage loans, and the other banking functions? Even if one could keep track of the president's time, there is no reason to expect a direct relationship between the time spent with a department and the value of the president's services to the bank. Similar problems beset the allocation of other overhead costs.[1]

". . . it is often very difficult to assign [costs] to specific types of output with reasonable accuracy."

Fortunately, the divergence of the numbers that can be obtained (accounting data) from those that one wants (economic values) is relatively small for financial institutions. Salaries, which can be measured by accounting numbers, comprise about 52 percent of commercial banks' operating costs (excluding interest and loan and security losses). Occupancy expense, including building depreciation, represents only 9 percent of those costs.[2] The cost of supplies and goods sold, a large part of most other enterprises' costs, is negligible for financial institutions. Thus, except for a relatively small amount of depreciation and the inherent difficulty of assigning costs to specific outputs, the accounting numbers recorded on financial institutions' books provide reasonably good proxy measures of economic values.

Further problems arise because not all costs of producing financial services are recorded on the institutions' books; however, these problems are considerably less than those for cost studies of other firms. Two problems specific to financial institutions' costs arise from the possible trade-offs between revenues and expenses included in operating costs. With respect to lending operations, for instance, higher expenses for monitoring and collecting loans can substitute for higher loan losses. To the extent that this substitution is made, operating expenses will be higher, since actual loan losses are not considered operating costs, but are charged to reserves. As an alternative, higher loan losses could be compensated for with higher interest and fee income. In this event, not only must loan losses be excluded from operating expense, but higher losses need not even be associated with lower monitoring (operating) expenses.

Interest and other payments for deposits present the second problem. These payments are returns to depositors on their investments, as much as dividends and capital gains on mutual funds shares are returns to shareholders. The bank is merely an intermediary, as is a mutual fund. While interest is an important outlay to the bank, it is determined by market forces that reflect alternative investments available to depositors. Thus interest is not an operating expense for purposes of measuring banks' efficiency. However, the amount a bank can pay its depositors in the form of interest is constrained by law. For this and other reasons such as personal income taxes and administrative efficiency, banks may pay customers for their deposits in the form of "free" services, preferred lending arrangements (including lower interest charges) or more convenient banking facilities. "Free" services result in higher operating costs while preferred lending arrangements result in lower revenue. A similar problem may affect the recorded expenses of banks that get services from other banks in exchange for compensating balances.

Differences in incurring and recording operating costs may produce misleading conclusions about bank efficiency if the differences are related systematically to the size or organizational form of the institution. Fortunately, this seems not to be the case, at least with respect to the size of banks. For banks with deposits up to $50

[1] See Benston (1982) for a more complete description of the difference between economic values and accounting numbers.

[2] Federal Reserve, **Functional Cost Analysis: 1978 Average Banks**, p. 20. The percentages are almost the same for other years. 1978 figures are used here because data for this year are analyzed further below.

million, from $50 to $200 million and over $200 million, occupancy expenses average 9.0 percent, 9.7 and 9.7 percent of total operating expenses.[3] For these same bank size groupings, the five-year average amount of loan losses, expressed as percentages of loans outstanding, are .15 percent, .16 percent and .21 percent. The reported gross yields on loans for these banks average 9.8 percent, 9.8 percent and 10.2 percent.[4] Thus the relatively larger loan losses at banks with deposits over $200 million appear to be compensated for by higher yields.

Nor does the understatement of respondent banks' operating expenses (since they pay for some correspondent bank services with compensating balances rather than with fees) appear to distort the cost data with respect to bank size. In two previous studies, the opportunity cost of these balances was computed and added to the banks' operating expenses; this adjustment had no significant effect on the estimates of economies of scale.[5] Hence, we conclude that bank operating costs, as usually reported, measure economic values reasonably well and, to the extent they do not, appear not to bias economies of scale estimates. A major problem is the exclusion of the cost of customer inconvenience when there are too few banking offices available due to legal restrictions on banking.

Measurement of Output—What Do Banks Really Produce?

Measuring output is a more difficult problem. One's view of what banks produce depends on one's interests. Economists who are concerned with economy-wide (macro) issues tend to view the banks' output as dollars of deposits or loans. Monetary economists see banks as producers of money—demand deposits.[6] Others see banks as producing loans, with demand and time deposits being analogous to raw materials.[7] Thus banking statistics are reported and banks described in dollar terms, as a "million-dollar bank." Customers also often describe the output of a bank in dollar terms, since they hold so many dollars in deposits or want to borrow a given amount of money.

But banks do not incur operating costs directly as a function of the number of dollars of deposits or loans they process. The cost of accepting and collecting a deposited check is affected only slightly by the number of digits that appear around the decimal point. While a $10,000 check involves somewhat more risk to process than a $10 check, the extra cost is not 1,000 times greater. Similarly, a $100,000 loan may involve more careful administration than a $10,000 loan, but not by a factor of 10. Indeed, with respect to operating costs, a bank is best described as a recordkeeping and processing "factory." The key cost-causing output variable is the number and types of pieces of paper and electronic signals processed.

Though not proportionately so, the dollars written on the paper processed are also relevant. The risk, should a deposit be mishandled, a check not collected, a loan not repaid, or a security defaulted, is related positively to the amount of the check, loan or security. The amount of services a bank is willing to give to its depositors in lieu of direct interest payments (which are legally prohibited or restrained) also is a function of the value of the deposit. Therefore, to be complete, the dollar amount as well as the number of items and accounts processed should be considered operative cost-causing factors.

Which particular variables are taken to measure output? It depends on the question asked. For the regulatory and bank management questions posed above, the preferred measure is that which yields answers to such questions as, "what are the operating costs of large compared to small banks, of branches compared to unit banks, automated teller machines compared to bank offices, of banks compared to thrift associations, and of combinations of financial institutions?" To answer these questions, we must attempt to relate the costs incurred by various institutions to the same set of cost-causing activities. For these purposes, it is meaningless to report that a large bank enjoys lower costs per dollar of loans than a small bank if this "economy" is achieved because the large bank makes larger loans. Most operating costs are related to the loan, as such, rather than to its amount. Comparing the efficiency of a large and small bank in this manner is like comparing costs per dollar of

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[3]Ibid.
[4]Ibid., p. 5.
[5]Flannery (1981) and Benston, Hanweck and Humphrey (1982). Dunham (1982) also made this correction but did not estimate total bank cost output elasticities for the bank as a whole.
[6]For example, see Goldschmidt (1981).
[7]Studies that employ this definition (e.g., Greenbaum, 1967) are reviewed below.

sales of a wholesaler selling by the case and a retailer selling by the item.

Measurements of operating costs per dollar can be useful, however, since the lower cost per dollar loaned may explain why interest rates are lower on larger loans. But unless the size of loans or deposits is expected to change as a consequence of a regulatory or business decision, the variables used to measure output should refer to the ongoing factors that generate operating costs.

Any analysis of the output of financial institutions, then, should be multifaceted, and should include the numbers of deposit items processed and loans made and serviced. Collateral banking services, such as trust and safe deposit boxes, also should be accounted for. If different institutions are compared, differences in the levels and qualities of their outputs should be considered. And, because the costs incurred are functions of local economic conditions and the value of the dollar over time (when data for different time periods are used), the recorded costs should be adjusted for the effect of price-level factors.

Problems of Estimating Operating Efficiency

Two basic problems beset researchers who would analyze operating cost. One is accounting for differences among banks with respect to the amounts of costs recorded and the types of outputs produced. The second is accounting for differences in costs related to unique attributes of specific banks or markets rather than to general attributes, such as size and type of organization. For instance, a bank may have grown large because it was run efficiently, possibly because of the genius of particular individuals. Their compensation for superior abilities would not be included in current operating costs if it was paid for with stock options or if it occurred in the past. The cost of these factors may have been expensed in the past or may have been fortuitously acquired. That such banks currently achieve low operating costs and have grown large does not necessarily mean banking is characterized by economies of scale. Similarly, lower operating costs and, say, small size, could be associated jointly with characteristics of the markets in which banks operate. Thus small towns may have both lower wages and small banks. This relationship

"Operating cost is taken to be adequately measured by the amount reported in the bank's earnings statements."

is not an indication of economies of scale, since banks in small towns cannot effectively serve customers who live in distant large cities.

Fortunately, these problems are not serious for studies of financial institutions' costs. The technology and managerial methods used by banks are generally well-known and available. Furthermore, branching and chartering laws restrict banks to given geographic areas for deposit services. Except for large business loans, their markets are constrained by the cost to customers of dealing with banks far outside their communities and the cost to banks of acquiring information about and monitoring distant customers. Thus banks tend to be large or small because of the markets in which they operate. The operating cost and output data, therefore, are likely to trace out cost curves from intersections of supply and demand curves rather than tracing out demand curves.

The problem of accounting for factors that produce differences among banks in recorded costs and types of output is dealt with in two ways. With respect to cost, one way is to assume, usually implicitly, that these differences either are trivial or are not systematically related to bank output. Operating cost, then, is taken to be adequately measured by the amount reported in the banks' earnings statements. The bias in this simple "solution" is not likely to be serious, at least with respect to bank size. However, differences among individual banks should be kept in mind. In situations where differences may be important, the data should be adjusted and checked to see if perceived differences are systematically related to the variables at issue.

With respect to output, two approaches of measuring comparative bank efficiency have been followed. In one, differences among banks are assumed to be unimportant. Total costs of producing outputs such as deposits or loans

are divided by total outstanding amounts of these outputs. This gives costs per dollar of output, which are taken to be a valid measure of operating efficiency. The unit costs are presented in tables (tabular analysis) comparing banks grouped according to a variable of interest (for example, deposit size). The second approach uses the statistical method of multiple regression analysis to account for differences in output in order to isolate the scale effect from other cost-causing factors. The advantages, shortcomings, and findings of each type of analysis are presented in the next two sections.

Data for Cost Analyses

All Bank Aggregate Data

Since all chartered financial institutions regularly report income, expense and balance sheet data, measuring operating efficiency as total recorded costs divided by total deposits, loans and securities, or assets has considerable advantages. In studies using this method, costs per dollar typically are averaged for banks grouped by deposit size and compared in tables (hence, tabular analysis). This procedure was followed by Alhadeff (1954), who published the first study of bank operating costs, using California data from the years 1938-1950. But this comparison does not account for differences among banks, such as the composition of their earning assets, deposits, type of organization, and location. Horvitz (1963) replicated Alhadeff's study with data from all Federal Reserve member banks for 1949-1960. He subdivided the 1959 data into branch and unit banks and into three groupings according to the ratio of time to total deposits. Other variables were not accounted for. Assuming that these other variables are not important or are unrelated to size, Horvitz found (as did Alhadeff) that "once a bank reaches the relatively small size of $5 million in deposits, additional size does not result in reduced costs to any great extent until a bank reaches the giant size of over $500 million" (p. 37), and that branch banks have uniformly higher costs per dollar of loans and investments than unit banks. But, as the more complete statistical analyses reported below indicate, the assumptions necessary for this exercise are not likely to be valid.

FCA Data

One important shortcoming of the data used in these early studies is the lack of detail with respect to specific banking outputs. Fortunately, a rich source of data on the costs of major banking functions has been available since the late 1950s. The Federal Reserve provides banks with a Functional Cost Analysis (FCA) service in which the banks allocate costs and revenue to specific banking functions. These figures are then structured into a standard format that may be compared to other reporting banks. The FCA program is voluntary, with 780 banks responding nationwide in 1978.

Among the data allocated to the banking functions are itemized revenue, expense, dollars of deposits and assets (averages of 12 month end amounts), and the number of accounts opened and items processed. Thus, these data provide a wealth of detail that permits the analyst to improve upon potentially misleading tabular analyses.

However, even though FCA figures are aggregated by three bank deposit sizes, a comparison of the numbers must rest on several possibly untenable assumptions. One is that the banks' organizational structure is not relevant, since branch and holding company banks are not distinguished from unit banks in the published results. Another is that the location of a bank (e.g., urban or rural) does not affect its costs. Third, the analyst either must remove the allocated overhead expenses or accept the essentially arbitrary allocations made in the FCA data. Perhaps most important for a measure of efficiency is that output can be measured with only one variable for each type of product—number of accounts serviced, number of items

"We measured output using the average number of deposit and loan accounts serviced, augmented with information on the average balances of the accounts."

processed, or dollars of account balances outstanding. The joint effect of items processed, accounts serviced and dollars outstanding cannot be simply measured. In order to assess the joint effect of these variables, economists who have used these and other data employ multiple regression analysis.

Findings of a Recent Study[8]

The Model

We recently specified and estimated a bank cost function using multiple regression analysis. We used annual Federal Reserve FCA data for the years 1975 through 1978 involving from 747 to 852 banks, amounting to about 15 percent of the Federal Reserve members. Since this program is voluntary, the banks included are likely to be more conscious than most of the value of cost control. The banks range up to $1 billion in deposits, since the few banks in the FCA panel larger than this were excluded. Thus, the sample covers the range of U. S. banks except the giants, and it is perhaps overrepresentative of more efficient banks due to the voluntary nature of the FCA program.

Operating cost was defined to exclude interest and loan losses—since only the outputs of the banking deposit and loan functions were analyzed, the direct and allocated costs of the functions of safe deposit box, trust, customer computer services and investments were also excluded. The included outputs account for more than 72 percent of total operating costs.

We measured output using the average number of deposit and loan accounts serviced, augmented with information on the average balances of the accounts. Since we wanted to estimate the relationship between total operating cost and output (and other variables), we had to construct an index to represent the multiple products produced by banks. For this purpose we employed the technique suggested by aggregation theory (see Diewert, 1976 and Barnett, 1981) to construct a Divisia multilateral index number of bank output. In effect, we weighted the number of accounts of each of the five types of output (demand deposits, time and savings deposits, real estate loans, installment loans, and business loans) by their proportionate share in total operating costs using the FCA data.[9] The Divisia Index number of accounts provides a valid measure of the aggregate cost-causing transactions undertaken by banks for their customers. Including the average size of accounts serves as a control for activities that are related primarily to the dollar amounts of the accounts.

Differences among the banks in the prices of inputs were accounted for with variables that measured the average annual salaries plus fringe benefits paid per employee and an index of regional office floor space rental costs—the opportunity cost per square foot of bank building space.

Two types of organizational differences were recognized. The effect of multibank holding company (MBHC) affiliation on operating cost was captured with two variables, one of which measures its effect on total cost and the other its interaction between branching and MHBC affiliation. The costs of branching also were accounted for in two ways. First, the data were analyzed separately for banks in unit banking states and banks in states that permitted branch banking. This procedure avoids forcing the estimated parameters to be equal for branch and unit state banks, a common (but incorrect) assumption of other studies. Second, interactions between the number of offices and output were specified so that the effect of branching was not measured as merely a simple and constant percentage of total cost. We believe that absence of this more general branching specification seriously mars the findings of previous studies whose effect was to assume that the cost of adding a branch office was a constant percentage of total operating costs. Thus the cost to a larger bank of adding a branch of a given size would always be proportionately greater than the cost of adding the same size branch to a smaller bank.[10] Our specification allows the cost of an additional branch, as a percentage of operating costs, to vary across different sized banks.

Finally, the functional form fitted, the translog cost function, is designed to permit increasing

[8] Details of this study may be found in Benston, Hanweck and Humphrey, 1981 and 1982.

[9] See Benston, Hanweck and Humphrey, 1982, for details.

[10] For example, Longbrake and Haslem (1975, Table 2) estimate the demand deposit cost of an additional branch at a bank having from two to five branches as $1253 while the same sized additional branch at a bank having between twenty-five and fifty branches is $3,760.

Table 1. Scale Economy (Elasticity) Estimates, Unit and Branch States Banks, 1978 FCA Data

Deposit Size Group ($ millions)	Operating Cost Number of Accounts	Excluding Interest Dollars of Accounts	Operating Cost Number of Accounts	Including Interest Dollars of Accounts
A. Unit State Banks				
$0-10	.95	.73*	.95	.96[0]
10-25	1.01	.82*	.98	.95*
25-50	1.07	.88*	1.00	.96*
50-75	1.11*	.92[0]	1.01	.98*
75-100	1.13*	.96	1.03	1.00
100-200	1.19*	1.01	1.05	1.02
200-300	1.19*	1.06	1.08[0]	1.09*
300-400	1.24*	1.06	1.06	1.13*
400+	1.23*	1.12	1.09	1.13*
Total Sample	1.09*	.92[0]	1.01	.97*
B. Branch State Banks				
$0-10	.81*	.63*	.81	1.01
10-25	.89[0]	.74*	.95*	1.02
25-25	.93*	.81*	1.02	1.02*
50-75	.93*	.84*	1.04*	1.02*
75-100	.92*	.85*	1.05*	1.01*
100-200	.94	.89*	1.06*	1.01
200-300	.92	.90	1.06*	1.00
300-400	.93	.93	1.05	.99
400+	.92	.94	1.04	.99
Total Sample	.92*	.84	1.04*	1.02*

Notes: a. Source - Benston, Hanweck and Humphrey 1981 and 1982
*(0) Indicates elasticities different from 1.0 (constant costs) at the .05(.10) confidence level in a two tail t-test.

and/or decreasing costs to be measured as output increases, as well as to provide estimates of economies of scale, of branching, and of account size that are permitted to vary by size of bank. It is not constrained to meet the requirements of a particular production function, such as the Cobb-Douglas function which was almost exclusively used in earlier studies.

Three principal shortcomings of this study must be emphasized. One is that the data include only the fraction of U. S. banks that participate in the FCA program. The other shortcomings are that estimates of economies of scope have not been separated from estimates of economies of scale and that scale economies of individual banking functions are not separately estimated. These analyses are in progress.

Since economies of scale and average costs per account can and do differ for each bank, derived estimates of economies of scale and other parameters from the regression estimates were based on unit and branch banking state subsamples for nine deposit-size groups. The relevant measures were then calculated for the (geometric) average bank in each group. The following findings may be drawn from our analysis.[11]

Economies of Scale

- Banks in unit banking states above $50 million-$75 million in deposits experienced **diseconomies** of scale with respect to the Divisia number of accounts. The smaller banks in these states had scale economies or constant costs. The elasticities range

[11]The numbers presented are for the analysis of 1978 data. The analysis of the 1975, 1976 and 1977 data yield similar results. See Benston, Hanweck and Humphrey (1982) for details.

from .95 to 1.23.[12] (See Table 1, column 1.)

- Banks in branching states of all sizes experienced economies of scale with respect to the Divisia number of accounts. The elasticities range from .81 for the smallest deposit size group to .92 for the largest. These elasticities were calculated for each deposit size group, so the fact that larger branch banks have more branches was taken into account. (See Table 1, column 1.)

The economies of scale experienced by banks in branching states appear to result from the ability of branch banks to operate out of many smaller offices, avoiding the diseconomies associated with a large number of accounts per office.

To account for differences in the mode of branch bank expansion (by adding branches each with a given number of accounts) versus that for unit banks (by adding more accounts at a single office), we calculated augmented elasticities, where the effect on costs of changes in the number of offices as well as the number of accounts serviced is accounted for. These augmented elasticities (not shown in Table 1) show that:

- Banks in unit states with deposits below $25 million enjoyed economies of scale. The middle-sized banks ($75 million to $300 million in deposits) had significant diseconomies of scale and the others had insignificant scale diseconomies. (The numbers are almost the same as those given in Table 1 for the unaugmented measure.)
- Banks in branching states with more than $25 million in deposits experienced statistically significant diseconomies of scale (using the number of accounts as output). The elasticities range from 1.09 for banks with $25 million to $50 million in deposit size group to 1.16 for the largest. Smaller banks experienced approximately constant costs.

Thus, when the normal path of expansion is accounted for, branch and unit state banks experienced similar scale economy or diseconomy values. Other results indicate that:

- Economies of scale appear to be unchanged over the period 1975 through 1978, since the elasticities computed are either very similar or show unsystematic changes over the years.
- With respect to the average size of accounts, banks in both unit and branching states experienced considerable economies of scale. Elasticities averaged between .28 and .50 over the four years studied. The elasticities increase considerably for the larger deposit size groups of banks. In particular, the smallest banks had almost no additional cost associated with larger account sizes, but the cost of the largest deposit size banks (particularly the unit state banks) almost doubled when their average account sizes doubled. This finding indicates that the larger banks, which have larger loans and deposit accounts, incur proportionately larger costs, probably arising from monitoring the loans and attracting the deposits.

Average Cost per Account

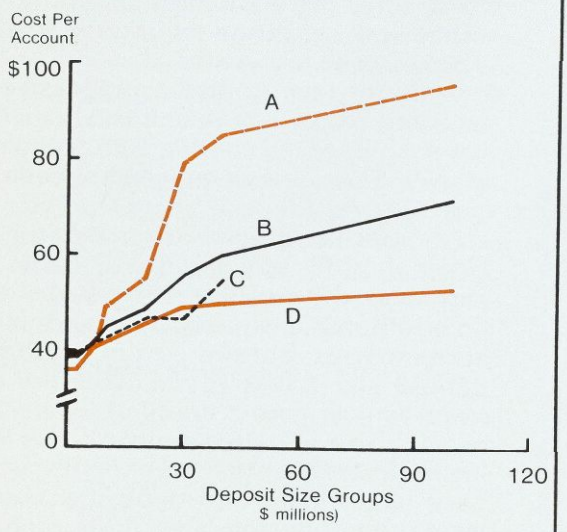
For many policy questions, average costs per account are more relevant than economies of scale. It may be that unit banks experience diseconomies of scale but their costs per account serviced might be lower than those for branch banks.

Average cost per account was calculated in several ways. First, the average (geometric mean) values of input prices, holding company affiliation, size of account, and number of offices of each of the nine deposit size groups were used for the calculation. Thus the calculated average cost per account is the average experienced for each size group. These are plotted in Chart 1 and show:

- Similar average costs for banks in unit and branch states up to $75 million in deposits.
- Greatly increasing average costs for larger banks in unit states. Costs incurred by the largest banks were more than double those for the middle size group.
- Higher average costs for larger banks in branching states that, nevertheless, are considerably below those for similarly sized banks in unit states.

[12] An elasticity is the proportional change in cost associated with a given proportional change in output. For example, an elasticity of .95 means that a 100 percent increase in output is associated with a 95 percent increase in cost. Since cost increases less than proportionately, the banks are said to experience economies of scale.

Chart 1. Average Cost per Account, 1978 FCA Data, At Unit and Branch State Banks



A - unit state banks, variables at means of deposit size group

B - branch state banks, variables at means of deposit size groups.

C - unit state banks, variables at branch state bank. Means for entire sample, except number of accounts and offices. *Deposit size group $400-1,000 is omitted since none of the unit state banks had numbers of accounts of the magnitude serviced by branch state banks.

D - branch state banks, variables at means for entire sample, except number of accounts and offices.

For most policy questions (for example, mergers and unit versus branch banking), the average size of accounts is not relevant. Presumably, bank customers would demand loans and hold deposits that met their convenience rather than the bank's. Consequently, we extended our analysis to abstract from this difference among banks, by holding the average size of account constant at the mean values for the entire branching state bank sample. Input prices and holding company affiliation also were held constant at the branching state sample means; however, the number of offices operated was not held constant. Branch banks tend to expand by opening more offices; therefore, it would be unrealistic to assume that higher output could be achieved without branch expansion. Unit banks, though, must expand at a single full-service office.

To compare average costs of banks in unit states with average costs of banks in branching states, we substituted branching state cost determinants in the unit states' cost equation. We entered averages of number of accounts, number of offices, account size and holding company affiliation. Average number of offices in branching states could not be entered in the unit state equation; thus, this cost determinant was ignored. We emerged from this exercise with an estimate of the average costs of unit banks with all of the characteristics of branch banks but multiple offices. These calculations (plotted in Chart 1) show:

- Somewhat higher average costs for larger banks.
- Very similar average costs for similar sizes of banks in unit and branching state banks.

These results indicate that when we take proper account of the current difference between unit and branch state banks, these two classes of banks would experience similar average costs. This reinforces the earlier reported similarities with the scale economy results when account is taken of the different expansion methods used by unit and branch banks (due to regulatory constraints).

Cost of Branching and Holding Company Affiliation

We can also compare estimated operating costs of a branch with those of a similar sized unit bank. Such comparisons are relevant to public choice of unit versus branch banking and of methods of interstate banking. The typical branch serves from 5,000 to 11,000 accounts. The operating costs of unit banks with the same output are $210,000 and $462,000.[13] Branches serving the same number of accounts at smaller branch banking organizations have estimated costs of $213,000 and $483,000, respectively. Similar sized branches

[13] 1978 data (as are the following numbers). The amounts for the other years studied (1975-1977) are similar, though lower due to the effects of inflation over the same period. See Benston, Hanweck and Humphrey, 1981, Table 6 for the individual year amounts.

at larger banking organizations are estimated to have increasingly higher operating costs (for example, an 11,000-account branch of a bank with $300 million to $400 million in total deposits costs $650,000 to operate.) Thus, small unit banks appear able to compete successfully with branches, particularly those operated by large banks.

We found the effect on operating costs of bank holding company affiliation to be insignificant. Not only were the coefficients of relevant variables generally statistically insignificant, but calculations of average costs that included or excluded consideration of these variables produced numbers that were almost identical.

(Cont. on p. 21)

Regression Studies of Bank Operating Costs

Before considering the implications of these findings for the policy questions delineated above, we review briefly the previously published regression studies of bank operations costs. These studies may be grouped according to the type of data used, which, in large measure, determined the researchers' definition and measurement of output. The first group used balance sheet and income statement data, with output defined as dollars of assets, while the other used FCA data, with output defined as number of accounts.

Output as Dollars of Earning Assets

Three of the six regression studies that use dollars of assets as output report economies of scale. (Two of these employed specifications that imparted a strong bias towards this result.) One study (Powers) found some evidence of diseconomies and two others (Schweitzer and Kalish-Gilbert) found strong evidence of U-shaped average cost curves, that is, decreasing costs at lower output levels and increasing costs at higher levels. The use of dollars of earning assets as the measure of output appears to have biased the findings of the studies away from showing higher costs for larger banks and deemphasizes the U-shape of the average cost curves. We reach this conclusion in part because when our present study is recast roughly in terms of these previous analyses, the findings are rather similar to theirs. All the studies found branch banking organizations as having higher costs than unit banks. The two studies that included measures of holding company affiliation report conflicting findings.

The first two studies that employed multiple regression analysis measured costs as total operating expenses (including interest) divided by year-end total assets (Schweiger and McGee (1961) and Gramley (1962)). This cost measure was regressed on bank size as measured by deposit size groups by Schweiger-McGee and total assets by Gramley. Other variables used to hold bank characteristics constant were the ratios of time to total deposits, various types of earning assets as a percent of total assets, and whether a bank was a unit or branch bank. Schweiger-McGee used all member bank data for 1959 and Gramley used a sample of Tenth (Kansas City) District member banks. Both studies found evidence of large economies of scale. Schweiger-McGee also reported higher costs per dollar of assets for branch banks (Gramley's sample included only unit banks). Unfortunately, the use of costs per dollar of assets to measure unit costs imparted strong bias toward the finding of economies of scale. The use of dollars of assets as the output measure requires the implicit and incorrect assumption that large and small loans are equally costly per dollar outstanding. Thus banks with larger average loan sizes appear more efficient. Equally important is the fact that neither study included variables that could identify U-shaped cost curves nor made a formal determination that a U-shaped curve was not necessary to properly describe the data they used.

Four studies defined output as loans and securities, with deposit services being considered an input. Greenbaum (1967), Powers (1969) and Schweitzer (1972), and Kalish and Gilbert (1973) reasoned that the "social" value of these earning assets is equal to the amount people are willing to pay to obtain them. Hence, except for Powers, they weighted each bank's dollars of loans and securities outstanding by the average gross yields on these assets over all banks in the sample to abstract from the effect of local market conditions. Powers used the rates charged at each bank rather than the average rate for all banks because he believed that a loan's social value is measured best by its actual local price. Thus output is equal to gross revenue or a variant thereof. Cost is defined as total operating cost, including interest, less fees for deposit services.[14]

Greenbaum (1967) analyzed 1961 data of 745 and 413 insured banks in the Tenth (Kansas City) and Fifth (Richmond) Federal Districts. He found U-shaped average costs in both districts; however, 98 percent of the banks are on the portion of the cost curve that showed economies of scale. The Fifth District sample was analyzed separately for branch and unit banks. When thus separated, both groups have downward sloping average costs. The unit banks have lower and more rapidly declining costs than the branch banks, but the unit banks are much smaller. Greenbaum concludes that banks grow larger by branching because large unit banks may be more costly to operate.

Powers (1969) analyzed 1962 data from all insured banks in the Seventh (Chicago) Reserve District. He

[14]Greenbaum did not deduct deposit service fees from costs.

stratified his sample of 2,411 banks into 24 sub-samples, according to asset size, current operating revenue to total output (which he defined as total revenue), lending output to total output, and branch versus unit. Of these sub-samples, five have some suggestion of a U-shaped cost curve within the range of the data. With respect to the branch versus unit dichotomy, Powers finds that the branch banking organizations generally (but far from uniformly) have higher average costs than do unit banks.

Schweitzer (1972) analyzed 1964 data from 1,325 Ninth (Minneapolis) District banks. Unlike Greenbaum and Powers, he included the following additional variables: time deposit rate paid, two dummy variables for city location to account for input price differences among banks, and dummy variables measuring the effect of Federal Reserve membership and bank holding company affiliation. The data were sub-categorized into four size of loans and securities groups. Schweitzer reports "scale economies for banks with total assets under $3.5 million, constant returns to scale for banks between $3.5 and $25.0 million, and decreasing returns for larger banks." (p. 265). He also found significant economies associated with large holding company affiliation, except for banks over $25.0 million in assets. Small bank holding company affiliation indicated economies that are not statistically significant.

Kalish and Gilbert (1973) analyzed 1968 data from 898 FCA banks, using a method that traced out costs with observations from the most efficient banks. The banks were separated into sub-samples of 86 holding company affiliates, 353 branch banks and 460 unit banks. They report U-shaped average cost curves for all three groups, with unit banks having the lowest costs (except for the very largest banks). Branch banks above $1 million in adjusted revenue (or $10 million in loans and investments) show lower costs than holding company subsidiaries and smaller branch banks had higher costs than similar sized holding company affiliates.

The four studies that allowed for finding of diseconomies of large scale found them.[15] However, the evidence of eventually upward sloping curves is slight in Greenbaum's study and mixed in Powers' study. The four studies that included measures of branch versus unit banking report higher costs for branch banks. Results on holding company affiliation are conflicting. Using 1964 data, Schweitzer found holding company affiliates to have lower costs (Schweitzer, 1964 data); using 1968 data Kalish and Gilbert found them to have higher costs (Kalish and Gilbert, 1968 data).

Before these results can be accepted as meaningful, at least with respect to the banks and time periods analyzed, we must consider the extent to which the more important misspecifications may bias these findings. The three principal problems are (1) exclusion of variables that account for differences in input prices and types of deposit services, (2) inclusion of interest in operating expenses, and, most important, (3) output defined as dollars of assets outstanding.

The exclusion of input price differences in the studies does not appear to be serious, at least with respect to the calculation of elasticities and average costs, where the banks are ordered by size and by type of organization (branch and unit). We calculated these numbers for our samples holding these factor prices constant over the entire sample; the changes in the scale economy estimates and average costs were slight and did not affect any of the conclusions. However, ignoring differences in types of deposits is likely to be serious, since about half of the total operating expenses (excluding interest) are due to deposits.[16] Furthermore, the proportion is higher at the small banks (those with deposits under $50 million): 53 percent compared to 49 percent for banks with $50 to $200 million in deposits and 46 percent for banks with over $200 million in deposits. The smaller banks also have relatively more demand deposit expense (39 percent versus 36 and 35 percent). This misspecification probably overstates the average costs of smaller banks.

Exclusion of interest from operating expenses might understate the costs of large banks, since they generally purchase a greater proportion of their funds in the market. We tested this hypothesis by including interest in operating expenses in our data and recalculating the cost functions. The recalculations showed greater economies of scale for all the banks (See Table 1, column 3). With interest included and the Divisia number of accounts as the measure of output, the larger banks (over $25 million in deposits) in unit states had nearly constant costs. The smaller (under $25 million in deposits) branch banks had statistically significant economies of scale, and the medium-sized ($50 million to $300 million in deposits) banks in branching states had small, but statistically significant, diseconomies of scale. Thus, inclusion of interest could account, in part, for the larger economies or lower diseconomies of scale for larger banks found in the other studies.

Finally, measuring output with assets (weighted by revenues in most of the studies) may impart a bias for banks that service larger accounts, showing them as being more efficient. We tested for this bias by recalculating the elasticities and average costs with dollars of deposits and loans as the output measure instead of the number of accounts and average size of account. These elasticities are considerably lower for all size groups of the unit banks and for all but the larger (up to $200 million to $300 million in deposits) branch banks (see Table 1, column 2). With interest included as part of operating expenses, the middle-sized banks in both unit and branch states show diseconomies of scale, a finding similar to those reported in the studies that

[15] Schweiger-McGee and Gramley employed different methods which, we feel, biased their measures of scale (as discussed above).

[16] 1978 Functional Cost Analysis data.

similarly measured cost and output (see Table 1, column 4). Thus using dollars of deposits is equivalent to measuring output by the number of accounts while assuming that the size of accounts is uniform among banks. This assumption biases the elasticity estimates towards greater economies of scale particularly at the large unit banks. This effect also is reflected in the average cost per dollar of deposits and loans (not shown): the cost curve is less U-shaped.

"Measuring output with assets may impart a bias for banks that service larger accounts, showing them as being more efficient."

Output as Numbers of Accounts and Average Size of Accounts in a Cobb-Douglas Production Function

Benston (1965A) is the first study to use the FCA data, which permitted him to specify output as the average number of accounts serviced and the average size of accounts, and to analyze costs of separate banking functions. He analyzed each of the five functions—demand deposits, time and savings deposits, real estate loans, installment loans, business loans, and securities—and overhead costs. Overhead was regressed on total assets rather than the number and average size of accounts. For most of the analyses, Benston used a functional form that can show only continously rising, falling, or flat average cost curves. But by including higher powers on the output measure he also tested for the presence of U-shaped cost curves. This study used data from some 80 banks in the Boston Federal Reserve District for 1959, 1960 and 1961 and found economies of scale for all except the business loan function and the overhead costs. Slight U-shaped curves were present for installment loans only. The estimated elasticities (averaged over the three years) ranged from .74 (securities) and .87 (demand deposits) to 1.0 (business development and overhead). However, the largest bank included had $55 million in assets (1961 price level), so the data did not cover the full range of bank output. Branch banks were found to have higher operating costs than unit banks that serviced the same number of accounts (Benston 1965B), but because the cost effect of branching was misspecified the validity of this finding is questionable.

Bell and Murphy (1968) extended Benston's work considerably. They analyzed data from 210 to 283 banks in the Boston, New York and Philadelphia Federal Reserve Districts that reported FCA data for 1963, 1964 and 1965. They did not explicitly test the data for the presence of U-shaped cost curves, since they explicitly based their analysis on the Cobb-Douglas production function. They estimated elasticities (averaged over the three years) ranging from .83 (securities) and .86 (real estate loans) to 1.0 (safe deposits and trust department). They constructed an overall measure of economies of scale by weighting the individual elasticities by the average cost of each function and type of overhead expense. This yielded a total elasticity of .93. Branch banks were found to have higher operating costs than unit banks, but Bell and Murphy calculated that expansion of branch banks did not generate greater average costs, since the higher cost of branching, in their calculations, was offset almost exactly by economies from a larger volume of output.

Murphy (1972) replicated and further extended this work with a larger sample (967 banks) of large banks (up to $5.5 billion in deposits) nationwide for 1968. The only important difference between the elasticities measured with these data compared to the earlier (1965) results is the change from significant economies of scale in demand deposits to approximately constant costs. Most of the other functions showed only small economies of scale, so that the estimated total elasticity for the 1968 sample is .95.

Longbrake and Haslem (1975) also used these data (1968 FCA banks, nationwide), but restricted the analysis to direct demand deposit costs, emphasizing the effect on these costs of organizations structure. They separated the sample of 767 banks into four sub-sets: unit banks and branch banks, each affiliated or not affiliated with holding companies. They found statistically significant economies of scale (elasticities of .93 for unit affiliates and branch non-affiliates and .82 for branch affiliates) for all except the unit bank non-affiliates, which had constant costs (elasticity of 1.03). In general, the branch banks (particularly the larger ones) had higher estimated costs per account or dollar of deposit than did the unit banks, the affiliated unit banks had higher costs than the unaffiliated unit banks, but the affiliated branch banks had lower costs than the unaffiliated branch banks.

Mullineaux (1975) also separated a 1970 sample of 196 FCA banks in the Boston, New York and Philadelphia Reserve Districts, into branch (167) and unit (29) banks, to test the hypothesis that the estimated coefficients differ by type of organization. Elasticities were estimated for each of the five principal banking functions and the hypothesis was accepted. For most functions, unit banks had economies of scale and branch banks had diseconomies. As the previous studies found, branch banks appeared to have higher operating expenses than similar unit banks.

Benston and Hanweck (1977) reported preliminary findings of a study of nationwide FCA banks for the years 1968 through 1974 (904 banks in 1974). The direct costs of the five principal banking functions were analyzed separately. Unlike the other studies which used the Cobb-Douglas cost function, a quadratic cost function was estimated which permitted estimation

of U-shaped cost curves.[17] They report finding scale economies for most years only for business loans. Little indication of systematic economies or diseconomies was found for the real estate, installment loan or time deposit functions. The demand deposits function, though, exhibited diseconomies of scale starting at low output levels.

The effect of holding company affiliation was tested by separating the sample into affiliated and independent banks. The affiliated banks exhibited somewhat lesser scale economies than the independents. But average costs per account at the affiliates were lower, particularly with respect to demand deposits. For 1974, demand deposits costs averaged 4 percent lower for banks affiliated with a small holding company and 17 percent lower for banks affiliated with a large holding company. Branch and unit banks were not separately identified and this misspecification may have confounded the results somewhat.

Finally, a recent study by Dunham (1982) used 1978 FCA data for three Federal Reserve Districts (Boston, New York and Chicago). The Cobb-Douglas form was used and separate estimation was performed for five banking functions—demand deposits, time deposits, commercial and agricultural loans, installment loans and mortgage loans. Operating costs were adjusted for correspondent services paid for with non-interest bearing balances by imputing a cost based on the three-month Treasury bill rate applied to net "due from" balances. Output was measured by the number of accounts for each function. When operating costs are not adjusted for the imputed cost of correspondent services, the demand deposit function exhibited constant costs while the other functions showed significant scale economies. After costs were adjusted, the demand deposit function also exhibited significant economies of scale. In addition, this study also found that branch banks had higher costs than unit banks with the same characteristics. Thus, the results are similar to those of Benston, Bell and Murphy.

These studies offer some important insights into costs of individual bank outputs and changes in banks cost structure over time. The analyses indicated economies of scale in the early 1960s for all banking functions and departments except safe deposit boxes and trust. The late 1960s and early 1970s data revealed a change to constant costs for the important demand deposit function, at least for unit banks not affiliated with holding companies. Affiliated unit banks and branch banks were found to have economies of scale in demand deposit operations similar to those computed with earlier data. Data for 1970 yielded approximately constant direct costs for branch banks but economies of scale for unit banks. However, one study that used data through 1974 found diseconomies of scale. This study (Benston-Hanweck) is the only one using data covering a broad range of bank sizes that specified a cost function to test for U-shaped cost curves. Thus, the earlier findings of continuous slight economies of scale might be due to this misspecification or to a change over time in the cost function faced by commercial banks.

It also is important to note that none of these studies tested for economies of scale for banks as entire entities. Where overhead costs were analyzed, these costs were regressed on output measured as total assets. Hence, the elasticities of banks that serviced larger average size accounts appear to be biased downward. This problem could have resulted in a finding of economies of scale or constant costs when, in fact, diseconomies of scale were experienced.

To test for the possible misspecification effect of not allowing for U-shaped cost curves and of not analyzing the banks as an entire entity, and as a means of separating the effects of sample and specification differences, we reestimated our 1978 findings using the Cobb-Douglas cost function. This functional form yields the following elasticities: branch state banks, .93*, unit state banks 1.07*, and for the entire sample, 1.01 (an asterisk indicates elasticities statistically significantly different from 1.0—constant costs—at the 95 percent confidence level). These are almost the same as the mean elasticities computed with our more complex translog cost function which allows for a U-shaped cost curve. But, as Table 1, column 1 shows, the mean elasticity value masks the finding of lower elasticities for smaller banks and higher elasticities for larger banks. Combining unit and branch banks in a single sample also masks important and statistically significant differences between them. Furthermore, as the augmented measure of branch bank elasticities presented above shows, ignoring the way in which branch banks actually expand understates the elasticities experienced by branch banks when one wishes to determine the scale economy of the entire organization rather than of a single office.

"The earlier findings of continuous slight economies of scale might be due to this misspecification or to a change over time in the cost function faced by commercial banks."

With respect to branch banking, most of the studies reported higher branching costs that appeared to be offset by measured economies of scale. Studies that calculated average costs found them to be higher for branch banks, with larger branching systems having even higher costs per account. Those findings are consistent with our more current study, with one exception. We found branch and unit banks to have very similar costs per account when differences between them, in terms of their mode of expansion, were accounted for properly.

[17] The variables were divided by output to correct for heteroscedasticity.

Implications of the Studies and Conclusion

At this point, only a few implications can be drawn concerning commercial banks' operating costs. To date, we are unable to weigh the possibilities and magnitudes of economies of scale or the cost savings from producing bank services jointly rather than separately. However, studies using data from 1959 through 1970 provide us with some evidence on banks' costs to produce individual services, such as demand deposits and installment loans. Unfortunately, the functional forms used appear to have understated the costs for larger banks. Also, their old data may not reflect present cost conditions. Thus we are unable at this time to go much beyond saying it is unlikely that there are large, if any, economies of scale in producing the most important banking services. (Business loans may be an exception.)

However, it does appear safe to conclude that branch and unit banks incur about the same costs per account, after we adjust for the higher cost of servicing customers with larger accounts. Small branch and unit banks, though, appear to be more efficient than larger banks.

We should emphasize that customer-borne costs, such as inconvenience, are not accounted for, nor is the benefit to customers of using collateral services offered by an individual bank. Presumably, the effect of these factors should be reflected in banks' revenues. Considering these caveats, our analysis of the presently available data leads us to conclude that smaller banks are, at the least, **not** at an operational disadvantage with respect to large banks. As a result, mergers appear unlikely to result in operating cost savings. Whether or not other benefits or costs flow from a policy of freer entry, or branching, or a more liberal merger policy is beyond the scope of this analysis.

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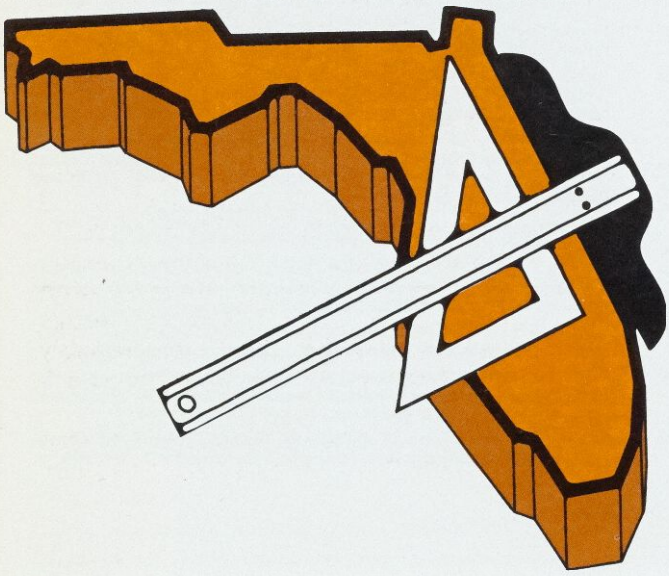
Economies of Scale: A Case Study of the Florida Savings and Loan Industry

A study of Florida S&Ls shows that operating costs decrease as S&Ls increase in size up to $500 million in deposits.



How does the structure of costs at savings and loan associations compare with that of commercial banks? In view of the trend toward deregulation, the large number of mergers of thrift institutions, proposals for new powers for thrift institutions, and prospects for increased competition and consolidation among all types of financial institutions, this is certainly not an academic question.

This article reviews recent studies regarding savings and loan scale economies, discusses the profit implications of S&L consolidation, and then presents some new results based on a study of the S&L industry in Florida. Since the Florida S&L industry ranks second to California nationally in terms of assets, these results should also be reasonably representative of S&L costs in other areas of the country.

S&L costs are both different from and similar to commercial bank costs. Operating costs are considerably lower at S&Ls, for instance, because these organizations have specialized in the low-cost functions of mortgage lending and servicing, and the collection and servicing of time deposits.

This study indicates that S&Ls experience economies of scale up to about $500 million in assets. Except at small sizes, however, costs savings are not very large as size increases. If S&Ls could expand assets significantly without adding offices, they could capture important economies of scale beyond the $500 million asset level; however, most are not able to do this without expanding their office networks.

Measuring Economies of Scale

Studies of operating costs typically have measured economies of scale by estimating the elasticity of cost with respect to output. For example, if assets are used as a measure of bank or S&L output, the elasticity would be calculated as the percent change in cost divided by the percent change in assets. Thus, if a typical bank or S&L with $100 million in assets had operating expenses of $1 million, and one with $200 million in assets had expenses of $1.9 million, the elasticity would be calculated as follows:

$$\frac{\text{percent change in costs}}{\text{percent change in assets}}$$

$$= \frac{(1.9/1.0) - 1}{(200/100) - 1} = \frac{90\%}{100\%} = 0.9.$$

If costs increase by less in percentage terms than the increase in asset size, the elasticity is less than one. In such a case average costs would decline as size increases, and economies of scale would exist in this industry. Elasticities that are greater than one indicate that average costs rise as size increases, in economic terms, "diseconomies of scale."

Until a few years ago it was generally accepted that economies of scale existed at all types of financial institutions and were significant in most asset size ranges. For example, in a survey of the major studies published in 1972, Benston (4) concluded that, on average, the overall elasticity of cost with respect to output was about 0.93 for commercial banks. Roughly similar results had been found for S&Ls. This led Benston to conclude that banks and S&Ls have approximately the same cost structure.

Recent studies, however, have called into question the conventional wisdom about economies of scale at financial institutions. For example, Gilligan, Smirlock and Marshall have concluded that, based on their investigation of the issue, "the empirical evidence does not indicate the existence of scale economies in banking, except for relatively low output levels...(therefore) a public policy that attempts to increase bank scale through controlling entry or encouraging merger cannot be justified on the basis of cost savings" (11, p. 27). In a recent paper, Benston, Hanweck and Humphrey have also found evidence of diseconomies of scale (increasing expense ratios) for commercial banks at bank office sizes in excess of $25 million of deposits (5). Similar controversy surrounds the existence of economies of scale at credit unions (15).

Profit Implications

To put into perspective the differences between S&L and bank costs, we should note that if economies of scale exist, the profit implications of changing size are somewhat different for S&Ls than for commercial banks. The typical S&L reported an operating cost ratio (operating costs divided by average assets) of 1.35 percent in 1980, while the typical commercial bank had a ratio approximately twice that amount.[1] This difference is a result of the much greater diversity of functions performed by banks.

Demand deposits, consumer lending, and corporate lending involve high turnover and thus require constant activity on the part of a bank's staff just to keep asset and deposit size at a certain level. In contrast, the bulk of S&L assets are long-term mortgage loans. These require servicing but involve little additional operating cost unless they become delinquent. In addition, savings deposits (the primary liability item for S&Ls) involve less operating costs per dollar than demand deposits.

Table 1 shows a hypothetical situation in which a typical S&L and a typical commercial bank experience growth and enjoy cost savings as a result of economies of scale. Both are assumed to have the same cost elasticity with respect to output. Because of its much larger initial operating cost ratio, the commercial bank experiences a pre-tax profit gain of 12 basis points; for the S&L the effect on profits is only half as great.

Previous Research Reviewed

Earlier studies seem to indicate quite clearly that economies of scale do exist at savings and loan associations. The most recent study to confirm this finding was the Brookings study of the thrift industry, conducted by Andrew Carron (8). As indicated in Table 2, Carron's results (which were based on 1980 data) are reasonably consistent with many earlier findings going back to the late 1960s.

These studies suggest, however, that the cost savings from growth will not be particularly large.

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[1]See the note to Table 1 for the precise figures and the sources of data.

Table 1. Hypothetical Effect of a Merger on Profitability

	Savings and Loan Association	Commercial Bank
Before Merger		
Operating Costs (millions)	$ 1.25	$ 2.50
Assets (millions)	$100.00	$100.00
Cost: Assets	1.25%	2.50%
Elasticity of Cost With Respect to Output (Assets)	0.9	0.9
After Merger		
Operating Cost (millions)[1]	$ 2.38	$ 4.75
Assets (millions)	$200.00	$200.00
Cost/Assets	1.19%	2.38%
Cost Savings (equals Pretax Profit Gain)	6 basis points	12 basis points

[1]A 90% increase in costs, which is the result of the asumed elasticity of 0.9 and the 100% increase in assets.
Note: The operating cost ratios are for illustrative purposes only. The actual ratio of operating expense to average assets in 1980 was 2.73% for commercial banks and 1.35% for S&L's on a national average basis.
Source: Calculated for commercial banks from FDIC, Bank Operating Statistics, 1980, and the Federal Reserve Bulletin, various issues; for S&L's from FHLBB, Combined Financial Statements, 1980 and miscellaneous news releases.

The last column of the table indicates that a doubling of asset size (or other measure of S&L output) is expected to cut the operating cost ratio by less than 25 basis points. The typical estimate, in fact, is substantially less than this—approximately seven to 12 basis points.

Cost savings from mergers actually may be even less. In most of these studies, when the relationship between asset size and operating cost was estimated, the number of branches was held constant. Mergers, of course, do not conform to such statistical niceties—in a merger, both asset size and the number of offices necessarily increase. The larger number of offices would increase operating cost, partially offsetting the estimated cost savings shown in Table 2.

In their 1969 study, Brigham and Pettit concluded that a merger would be expected to produce cost savings as a result of economies of scale. They calculated that the total operating cost for a single S&L with assets of $500 million and 9 branches would, in most cases, be about 15 to 35 percent less than the cost of operating ten $50 million unit S&Ls (associations without branches). However, in a study done at about the same time, Benston reported results suggesting that a merger would not produce any cost savings.

More recently, Henry Cassidy has shown that the equations developed in Atkinson's 1977 study produced results more consistent with Benston's conclusions. He estimated that costs would be about 10 percent higher at an association with five branches than the total for five unit associations, each of which is one-fifth as large. However, the results were mixed, providing some support for the Brigham and Pettit conclusions. Thus, as Cassidy has indicated, the issue of whether a merger will reduce costs has yet to be resolved.

In the two most recent studies shown in Table 2, a variable representing the number of offices was *not* held constant in the regression analysis. In other words, the number of branches was allowed to vary with asset size. Both of these studies found evidence of cost savings as size increases, lending support to the idea that a merger reduces cost.

Such cost savings should be small, however, for mergers among institutions of roughly equal size. The ratio of operating costs to average assets for the S&L industry was 1.35 percent in 1980 and 1.42 percent in 1981. The estimated cost savings of seven to 12 basis points from doubling asset size, the result suggested by most of the studies reviewed here, would not improve operating expense ratios significantly.

Merging a relatively small association into a large association, however, could offer an effective way of dealing with a profit squeeze at the smaller association. For example, estimated operating costs for associations in the $50 million asset range are about 1.4 percent of assets. This drops rapidly to a range of 1.0 percent to 1.1 percent as asset size reaches the $500 million to $1 billion range (12). This would imply a reduction of 30 percent to 40 percent in operating cost at the disappearing institution as a result of the merger.

Operating Costs of Florida S&Ls

Estimating the extent of economies of scale requires statistical analysis of data on operating cost and other variables at a cross section of associations. Operating cost includes all non-

Table 2. Summary of Previous Research Results on Economies of Scale at S&Ls

Author, year of publication, and reference number	Period studied and sample design	Measures of S&L output utilized	Elasticity estimate(s)	Estimated reduction in the operating expense to assets ratio from a doubling in output[1]
Atkinson, (1979) [1]	1975 (1,878 S&Ls-national sample)	Total assets	0.84 to 0.91	7 to 11 basis points
Atkinson, (1977) [2]	1974 (1,200 S&Ls-7 states[2])	Total assets	0.86	8 to 9 basis points
Benston (1969) [3]	1963-66 (3,159 S&Ls-national sample)	(1) Number of loans made; (2) Number of loans serviced; and (3) Number of savings accounts	0.91 to 0.94	5 to 7 basis points [3]
Brigham and Pettit (1969) [6]	1962-66 (approximately 450 S&Ls-Chicago, Cleveland, Detroit, Los Angeles SMSAs)	Total assets	N.A.	12 to 17 basis points
Carron (1981) [8]	1980 (approximately 4,000 S&Ls-national sample)	Total assets	N.A.	12 basis points[4,5]
McNulty (1981) [12]	1979 (approximately 360 S&Ls-six area samples)	Total assets	.82 to .98 (median = .92)	10 to 24 basis points[5]
Morris (1978) [13]	1976 (187 S&L-Arizona, California and Nevada)	(1) Total loans closed (dollar amount) and (2) Number of savings accounts	(1) 0.90 for loans closed (2) 0.98 for number of accounts	(1) 6 basis points[3] (2) Virtually no cost savings[3] for number of accounts
Verbrugge, Shick and Thygerson (1976) [14]	1971-72 (478 S&Ls-national sample)	Total assets	N.A.	7 basis points

[1]Estimated by the author from the equations and/or other information provided in each study.
[2]Arizona, California, Colorado, Illinois, Kansas, Ohio and Texas.
[3]Assuming that a doubling of lending activity, or other output measure used in the sudy, results in a doubling of assets.
[4]Based on unpublished results done in connection with this study, as supplied by the author.
[5]Based on an assumed increase in asset size from $250 million to $500 million.

interest costs, such as wages and salaries, office occupancy expenses, advertising, fees for professional services, and so forth. This study is based on 1980 data for 117 Florida savings and loan associations. All insured associations file detailed financial reports with the Federal Home Loan Bank Board twice a year, and these reports provided most of the required data. The sample excludes associations in existence less than two years.

Previous studies have often used national data. However, many factors affecting operating cost

vary from area to area. Associations operating in a similar market environment should provide a more appropriate basis of comparison. The industry is large and diverse in Florida and the range of operating cost ratios experienced by Florida S&Ls is similar to that for the country as a whole. Therefore, the Florida results can be generalized to apply to other areas of the country.

Elsewhere in this **Review**, Benston *et al* have criticized the use of assets as a measure of total output for commercial banks. Their argument has to do with a bias introduced by the large variation in average loan and deposit size among commercial banks in different asset size groups. There is also some variation in average loan and deposit size among individual S&Ls, but it is no doubt much less, particularly in a sample restricted to one state. Thus the bias introduced by using assets as the output measure is likely to be less important in S&L cost studies.

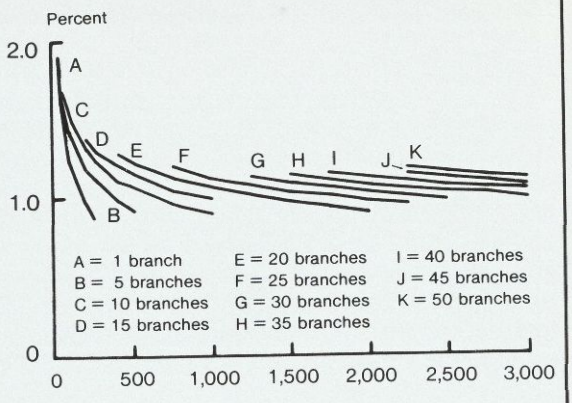
On the surface, a simple statistical analysis of data on operating costs and total assets would seem to provide the necessary information. However, many factors besides asset size affect operating cost. These include the number of branches, the extent to which the association is involved in mortgage banking activity, the mix of savings accounts, the percentage of liabilities representing borrowed money, and wage and salary levels in the local market(s) served by the association.

Through multiple regression analysis, a mathematical equation was fit to the data on operating cost, asset size, and 14 other variables likely to affect operating costs. This has the effect of holding these "other" factors constant, so that the relationship between size and operating cost can be measured.

This S&L cost study is the first to utilize a regression form known as a "translog cost function." Analysts who have used the translog form prefer it because of its flexibility, since it does not impose any particular shape on the cost function. This particular functional form has been used increasingly in economies of scale studies during the past six years.[2] The appendix contains a detailed description of the regression equation that was estimated, as well as a description of the "other" variables and estimates of their effect on operating cost.

[2]One of the first studies was by Christensen and Greene (10). Another important study is Brown, Caves and Christensen (7). This form was also used in the two recent commercial bank studies cited earlier (5, 11).

Chart 1. Estimated Operating Expense Ratios
Florida Savings and Loan Associations, 1980



Source: Table 3

Statistical Results

Table 3 and Chart 1 show how the estimated operating cost ratios change as asset size changes. We also calculated the normal number of offices for associations in various asset size groups. These results are shown in Table 4, which is based on an equation described in the appendix. Operating cost numbers are omitted from Table 3 for asset-branch combinations outside the normal range. For example, it is possible to estimate the operating cost ratio for an S&L with $2.5 billion in assets and one office. Since no such S&L exists, however, this calculation would not be meaningful, so is not shown in the table.

On the surface, the results suggest the existence of substantial economies of scale. For example, an association with assets of $50 million and five offices has an estimated ratio of operating cost to average assets of 1.63 percent (Table 3). The ratio for an association with the same number of offices (five) but an asset size of $500 million would be only 0.94 percent. Similarly, for an association with 20 offices, the ratio goes from 1.24 percent to 0.92 percent as assets increase from $500 million to $2 billion.

While these cost savings are substantial, they are not representative of what most associations can achieve. Few association managers can increase their asset size tenfold or even fourfold

Table 3. Estimated Operating Expense Ratios
Florida Savings and Loan Associations, 1980

Assets	Branches										
$ millions)	1	5	10	15	20	25	30	35	40	45	50
25	1.913										
50	1.552	1.633	1.670								
100	1.235	1.411	1.494								
200	.965	1.196	1.312	1.386							
250	.888	1.130	1.254	1.332							
400		.996	1.132	1.220	1.286						
500		.935	1.075	1.166	1.235						
750			.974	1.069	1.142	1.203					
800			.958	1.054	1.128	1.188					
1,000			.904	1.001	1.077	1.139					
1,250					1.026	1.089	1.144				
1,500					.985	1.049	1.104	1.153			
1,750					.951	1.015	1.070	1.120	1.164		
2,000					.921	.986	1.041	1.091	1.136		
2,250						.960	1.016	1.066	1.111	1.152	1.191
2,500							.993	1.043	1.088	1.130	1.169
2,750								1.023	1.068	1.110	1.149
3,000								1.004	1.050	1.091	1.130

Source: Estimated from the translog cost model described in the appendix. The "other" factors influencing oeprating cost were held constant at their average level in calculating the ratios.

while keeping their number of offices constant, except perhaps over a long period of time. Furthermore, as noted earlier, these cost savings cannot be realized in a merger, which normally involves simply combining two branch systems into one.

Table 5 provides a better perspective on the cost savings from mergers. The figures represent estimates of the change in the operating cost ratio from selected 50 percent and 100 percent increases in both asset size and the number of offices. For example, if an association with assets of $50 million and five offices were to merge with another association of the same size, the operating cost ratio is estimated to decline from 1.63 percent to 1.49 percent, a decline of 14 basis points.

It can be seen that the cost savings diminish rapidly once asset size reaches a certain level. For example, if two $500 million associations with identical branch systems are put together, average costs stay approximately the same. For a merger of two $1 billion institutions, costs actually increase slightly. Thus cost savings from a merger of two associations of similar size apparently disappear once the asset size of the resulting institution reaches $500 million. Thus, when branches are allowed to vary along with assets, the estimated average cost curve for S&Ls is the traditional U-shaped curve.

To check the reliability of these results, we performed an additional test by estimating a model which directly related the operating expense ratio to asset size and a number of other financial ratios. The results of this "ratio model" follow the general form of the results shown here, and clearly confirm the existence of economies of scale. The ratio model did show lower cost savings at small asset size levels, but costs continued to decline until asset size reached about $1 billion. At this point, both approaches predict little or no further cost savings when asset size and the number of offices are increased proportionately.

How to Control Cost

In a study several years ago for the U.S. League of Savings Associations, Verbrugge *et al* (14)

Table 4. Estimated Number of Offices for Associations of a Given Asset Size
Florida Savings and Loan Associations, 1980

Assets ($ millions)	Estimated Number of Offices	
	Average	Range
50	5	1 - 13
100	6	1 - 14
250	8	1 - 16
500	12	4 - 20
750	16	8 - 24
1,000	20	12 - 28
1,250	23	23 - 31
1,500	27	19 - 35
1,750	31	23 - 39
2,000	35	27 - 43
2,250	39	31 - 47
2,500	43	35 - 50

Source: Estimated from the Branch System Size equation described in the appendix. The range is two standard errors on each side of the regression line. This interval contains over 95% of the associations under consideration.

found the operating cost ratio to be one of the four key financial ratios influencing association profit performance. The data in Table 3 suggest something important about the influence of branch offices on cost: with a given asset size, associations with fewer offices tend to experience much more favorable operating cost ratios. This would indicate that associations (and financial institutions in general) will want to be cautious in expanding their branch systems.

Because of differences in their markets, and their aggressiveness in branching, the number of offices varies widely for associations of the same asset size. (Table 4 shows the ranges for the number of offices at which 95 percent of the associations in Florida were operating in 1980.) Associations operating at the lower end of these ranges can achieve operating cost ratios of 0.9 percent to 1.0 percent. However, associations operating at *larger* asset sizes, but in the middle or upper end of their ranges, experience much higher operating cost ratios. In addition, associations with a total number of offices in the lower end of these ranges can experience operating cost ratios as much as 25 percent lower than associations in the high end of the same range.

Table 5. Estimated Cost Savings from Selected 50 and 100 Percent Increases in Asset Size and the Number of Branches

Assets		No. of Offices		Operating Cost Ratio		
From	*To*	*From*	*To*	*From*	*To*	*Change*
50	100	5	10	1.63	1.49	−0.14
100	200	5	10	1.41	1.31	−0.10
100	200	10	20	1.49	1.44	−0.05
200	400	5	10	1.20	1.13	−0.07
200	400	10	20	1.31	1.29	−0.02
250	500	5	10	1.13	1.08	−0.05
250	500	10	20	1.25	1.24	−0.01
500	750	10	15	1.08	1.07	−0.01
500	1,000	5	10	0.94	0.90	−0.04
500	1,000	10	20	1.08	1.08	0.00
500	1,000	15	30	1.17	1.19	+0.02
750	1,500	10	20	0.97	0.99	+0.02
750	1,500	15	30	1.07	1.10	+0.03
750	1,500	20	40	1.14	1.20	+0.06
1,000	1,500	10	15	0.90	0.91	+0.01
1,000	1,500	20	30	1.08	1.10	+0.02
1,000	2,000	10	20	0.90	0.92	+0.02
1,000	2,000	20	40	1.08	1.14	+0.06
1,500	2,250	20	30	0.99	1.02	+0.03
1,500	2,250	30	45	1.10	1.15	+0.05
1,500	3,000	15	30	0.91	0.95	+0.04
1,500	3,000	20	40	0.99	1.05	+0.06
1,500	3,000	25	50	1.05	1.13	+0.08

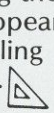
Source: Table 3

One way to control costs is to limit the number of offices relative to asset size. The data in Table 3 indicate that this may be an even more effective method of achieving low expense ratios than expanding assets.[3] Clearly, the results suggest quite strongly that economies of scale cannot be achieved by aggressive branching, since this would tend to push up the number of offices—more than in proportion to asset size.

Summary and Conclusion

Previous research indicates that economies of scale exist in the savings and loan industry, but

[3]Records maintained at the FHLB of Atlanta indicate that, despite the severe profit squeeze, only a few associations in the Southeast have closed any offices within the past year.

that the potential cost savings from most types of consolidation are small. This was confirmed in an analysis of 1980 data on 117 savings and loan associations in Florida. The estimated cost savings are substantial in moving from low asset sizes (for example, $50 million) to the $500 million level but are exhausted after asset size reaches $500 million. This conclusion applies to proportional increases in asset size and the number of offices. Limiting the number of offices relative to asset size appears to be a more effective way of controlling cost than does unrestrained asset growth. 

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APPENDIX

Translog Model. This is the first S&L scale economy study to employ the translog cost model. This model has been used in industrial sector studies by Christensen and Greene (10) and Brown, Caves and Christensen (7). It recently has been applied to commercial banking by Benston, Hanweck and Humphrey (5) and Gilligan, Smirlock and Marshall (11).

The form of the equation is:

$$\log C = a + b \log Q + c (\log Q)^2/2 + d \log B$$

$$+ e \log Q \bullet \log B + \Sigma fi \log X_i$$

Where C=operating cost, Q=output (represented by assets in this study), B=number of offices and X_i represents other factors affecting cost.

This functional form is considered by researchers in this area to be a substantial improvement over the simple logarithmic function which has a constant elasticity, and thus does *not* allow the average cost curve to turn upward at some point. The simple logarithmic function "forces" economies of scale to exist at all levels of output, if the data indicates that they exist on average. The distinguishing features of a translog function, in contrast, are the $(\log Q)^2$ term and the interaction term (log Q•log B). (The above form is slightly different from a pure translog function, which would require a separate squared term for each variable included in an interaction term. In this case this would require inclusion of a $(\log B)^2$ term in the equation. However, a regresion which included this variable produced results which were not realistic.)

Results of this translog function, estimated with data on 117 savings and loan associations in Florida for the year 1980, are shown in Table A-1. The "other factors" affecting operating cost are the variables found to be significant in an earlier study of operating cost and scale economies by Atkinson (1). All data, except for the local area wage rate, come from semi-annual reports each association files with the Federal Home Loan Bank Board. The best available proxy for inter-area wage differences is probably per-capita income, so county or (when applicable) SMSA per-capita income was used as the wage variable.

The performance of the equation is impressive, with eight of the variables statistically significant with the expected sign. Nonetheless, not too much importance should be placed on the high R^2 term. This merely reflects the fact that larger associations have a higher absolute level of total operating cost than smaller associations, which would be true regardless of the behavior of average cost. Nonetheless, it should be noted that the closely related F-statistic of 632.5 was the highest of any equation that was tested.

In the above model the elasticity of cost with respect to output can be calculated as follows:

$$\frac{\partial \log C}{\partial \log Q} = b + c \log Q + e \log B$$

Table A-1. Summary of Regression Results
Translog Cost Function

Variable	Coefficient	t-Statistic
Constant	−7.69645	1.294
Log (Assets)	1.36783	2.033
(Log (Assets))²/2[1]	−0.0385634	1.004
Log (Total Number of Offices)	−1.26834	2.335
(Log (Assets)) * (Log (Number of Offices))	0.0733443	2.531
Log (Wage Rate)	0.242230	2.423
Log (Scheduled Items)[2]	−0.00112127	0.2298
Log (Other Loans)[3]	-0.0286108	1.406
Log (Loans Serviced For Others)	0.00449619	2.128
Log (Loans Serviced By Others)	−0.00637744	2.765
Log (Borrowed Money)[4]	0.00235612	0.7661
Log (Passbook Savings)	0.0749267	1.191
Log (Investment in Service Corporations)	0.00841176	1.962
Stock Or Mutual[5]	0.106537	2.114

R^2: 0.9876
$\overline{R}^2$: 0.9861
Durbin-Watson: 1.7018
F-Statistic (13,103): 632.5

[1]Using one half of the squared term simplifies the calculation of the elasticity. This has no effect on the other results, since the percent change in the squared term is unaffected.
[2]Scheduled items include foreclosed real estate owned and loans that are delinquent or in default, as well as loans to facilitate the sale of foreclosed real estate.
[3]Other Loans include consumer loans, education loans, loans on savings accounts, home improvement loans and mobile home loans.
[4]Borrowed Money includes Federal Home Loan Bank Advances and other borrowings.
[5]Stock equals one, zero otherwise.
Note: The dependent variable is total operating expense. All variables except the number of offices and the dummy variable are in dollar amounts. The asset variable is average assets, computed over three semiannual periods.

Thus, the elasticity varies with the level of output and the number of offices, rather than remaining constant, as it would in a simple logarithmic function. Table A-2 shows the estimated elasticity for selected asset sizes and number of offices. It should be noted again that these calculations assume that it is possible to increase assets without increasing the number of offices.

It should be emphasized in this context that the negative coefficient of the B (number of offices) term has no meaning by itself. The elasticity of cost with respect to the number of offices is:

$$\frac{\partial \log C}{\partial \log B} = d + e \log Q$$

which is positive for all output (asset sizes) levels except for the very smallest.

Table A-2. Estimated Elasticity of Cost with Respect to Output

Assets ($ millions)	Number of Offices	Elasticity
50	1	0.684
50	10	0.853
100	1	0.657
100	10	0.826
250	5	0.740
250	15	0.821
500	5	0.713
500	20	0.815
1,000	10	0.738
1,000	25	0.805
1,500	20	0.773
1,500	35	0.814
2,000	20	0.762
2,000	40	0.812
2,500	30	0.783
2,500	50	0.820

Note: The elasticity has been calculated in the conventional way, which assumes that assets can be increased without an increase in the number of offices.

Ratio Model. The results of this model are shown in Table A-3. This model was estimated to serve as a check on the results of the translog model. The fit cannot be compared directly with that of the other equation because the dependent variable is a ratio. However, the fit does compare favorably with ratio models estimated in other studies (e.g. (6), (8), (11), (14)). Nonetheless, there are less statistically significant coefficients than in the translog equation. As noted in the text, the ratios estimated from the ratio equation shown in Table A-3 do confirm the existence of economies of scale; however, economies are less in the under $500 million asset range, but they extend out to $1 billion when the effects of proportional increases in assets and in the number of offices are calculated.

Branch System Size Equation. Table A-4 shows the results of a simple regression of the number of offices on asset size, for the same 117 associations. This equation was used to estimate the "average" number of offices for associations of a given asset size. From this we constructed a normal range for the number of offices at each asset size level (Table 4 in the text), so as to avoid reporting estimated cost ratios that would not be representative or meaningful. This normal range was set at two times the standard error of the estimate, on either side of the estimated value. With a standard error of estimate of 4, this led to a range of ± 8 offices on either side of the fitted value. The actual data were then evaluated, and over 95 percent of the observations fell within the confidence interval.

Table A-3. Summary of Regression Results
Ratio Model

Variable	Coefficient	t-Statistic
Constant	0.609988	2.832
Assets	−6.78547(E-10)	3.049
(Assets)²	1.27676(E-19)	0.9413
Number of Offices	0.00185660	0.1739
(Assets)*(Number of Offices	7.14398(E-12)	0.7927
Wage Rate	4.86297(E-5)	2.325
Ratio: Scheduled Items to Assets	−0.0108199	0.2026
Ratio: Loans Serviced For Others to Assets	0.00479122	1.462
Ratio: Loans Serviced By Others to Assets	−0.00290794	1.120
Ratio: Other Loans to Assets	0.00511514	0.2304
Ratio: Borrowed Money to Assets	0.00670078	1.018
Ratio: Passbook Savings to Total Savings	0.0173610	4.433
Ratio: Investment in Service Corporations to Assets	−0.0294030	0.3551
Stock Or Mutual	0.294797	3.597
R^2: 0.3557		
$\bar{R}^2$: 0.2744		
Durbin-Watson: 1.5851		
F-Statistic (13,103): 4.374		

Note: The dependent variable is the ratio of operating cost to average assets expressed in percentage terms. All other variables are as defined in Table A-I.

Table A-4. Summary of Regression Results
Branch System Size Equation

Variable	Coefficient	t-Statistic
Constant	4.23264	8.330
Assets	1.57135(E-81)	20.420
R^2: 0.7838		
Durbin-Watson: 1.6535		
F-Statistic: (1,115): 416.8		
Standard Error of the Regression: 4.275		

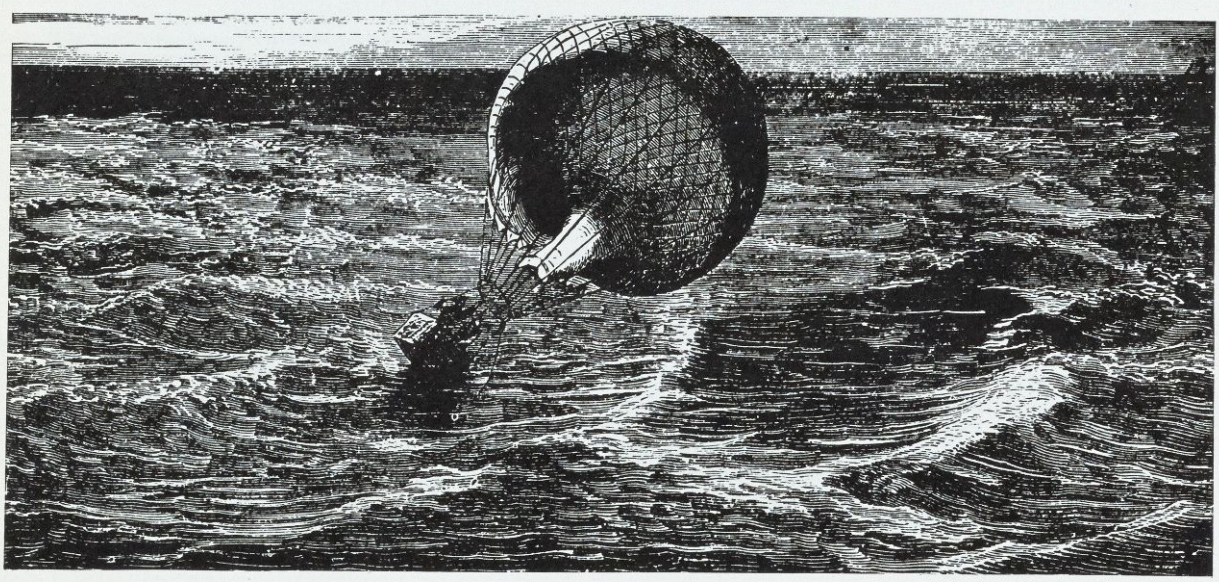
Note: The dependent variable is the number of offices.

Bank Size and Risk: A Note on the Evidence

A review of the literature finds little evidence that small banks operate with greater risks than large banks.

The relationship between risk and size of financial institutions may play a vital role in the evolution and stability of our financial system. Three possibilities exist: large banks are more risky than small banks, small banks are more risky than large banks, or large and small banks are equally risky. Everything else equal, the greater the risk of variation in income or of failure assumed by banks of various sizes, the greater the cost of capital and other liabilities that they need in order to grow. Therefore, the structure of our financial system (the number and size distribution of financial institutions) will ultimately depend in part upon the relationship between bank size and risk. This extremely important issue has received little or no direct empirical testing. Most of the evidence on risk and size must be gleaned from side results of empirical studies of other problems such as capital adequacy, interest rate risk, or identification of potential problem banks.

There are four main sources of risk for financial institutions. First, credit or default risk, the risk that borrowers will not repay or will not repay on schedule. Second, the risk associated with variability of interest rates, which stems from the fact that financial intermediaries must borrow or at least pay interest on a majority of the funds they lend and may not be able to match maturities of the funds they lend against the funds they acquire. Third, operating risk, a measure of how



well expenses and liquidity are managed. And fourth, the risk associated with fraud or insider abuse by management. Reviewing the empirical literature on each of these risks and their association with bank size indicates that we know far too little about bank size and risk.

Credit Risk

There is no direct empirical evidence or good indirect evidence showing a systematic relationship between a bank's size and its ability to control its credit risk position.

There has not been a string of either large or small bank failures due to credit risk, but there is evidence that large and small banks each face unique types of credit risk. Small banks may find themselves more geographically limited and hence more dependent on the health of a specific type of industry than do large banks. Therefore, small bank exposure to unforeseen regional or national economic events may be greater than for large banks, which tend to have greater geographic and industry loan diversity. The vulnerability of small rural banks to problems in the farming industry was highlighted in 1977. Rural banks had liquidity problems because their loan portfolios were heavily directed toward farmers who were experiencing hard times resulting in their inability to repay their loans. The dependence of small banks on their local economy is also demonstrated by the current recession (See 16). These risks, however, may be equalized by those faced by large banks which must keep current on large, diversified portfolios. Recently the problems of diversification have been graphically illustrated to banks with international loans, (some loans to Poland and/or Mexico are being restructured). (See 10, 12).

The only empirical study on the attitude of bank managers toward risk looked at the relative riskiness of bank holding company banks (which included almost all large banks) and independent banks (which are typically smaller banks). The study concluded that holding company bank managers take more credit risks (14).

Interest Rate Risk

Bank interest rate risk depends on the bank's vulnerability to changes in interest rates. Unless banks are able to perfectly match interest rates and maturities of their liabilities and assets, some interest rate risk will exist. Researchers have found little if any systematic relationship between large and small banks and their interest rate risk exposure (5, 6, 7).

Use of financial futures markets is one way to help control interest rate risk. Recent surveys of the use of financial futures markets by banks and savings and loan associations indicate that few small banks presently use these markets (3, 8). As banks increase in size, they are more likely to use the financial futures markets. This may be because small banks have less need to hedge their portfolios or because they have some inherent disadvantage in hedging (1). Presently, however little quantitative evidence exists that there are differences between large and small banks in interest rate risk exposure.

Operating Risk

Financial institutions face the risks of poor expense control, poor product design and poor liquidity management that afflict all firms. The extent of these risks depends primarily on how well the institution is managed and on the complexity of the problems it faces. Management problems are likely to be simpler in smaller organizations. Yet claims have often been made that smaller banks are less able to attract the best managers. In any event, there seems to be no strong tendency for problems associated with poor operating management to be associated with financial institutions of a particular size.

Management Risk

The inability to control expenses due to poor management is a serious problem, but a much more serious problem arises from management dishonesty and greed. These risks are manifest in fraud, forgery, insider transactions and dishonest acts by the bank's staff. Unfortunately, the bank failure and early warning system literature reveals that these risks are the primary cause of most bank failures. Joseph F. Sinkey, Jr. (18) writes, "For over 167 years, the major cause of bank failures, dishonest bank managers, basically has remained the same. The form has varied but the driving force has not changed." These problems are usually the most difficult to protect against.

The importance of managerial risk is seen in the record of bank failures since 1960. From 1960 to May 1976, 84 insured commercial banks failed. FDIC records indicate that the principal

causes of failure of 45 of these banks were insider loans and out-of-territory loans (often connected with brokered deposits). Twenty-five more failures were principally caused by embezzlement or other management manipulation. Only 14 failures (17 percent of the total) resulted from bad loans made in the bank's local area (18).

Overall Risk

Two sets of empirical literature assess overall bank risk. The first is the capital adequacy literature covering the problems of determining how much capital is necessary to buffer banks against potential losses. The second is the literature on early warning systems which would allow regulators to identify problem banks prior to the problem. Both sets of studies are extensive, yet the size-risk relationship is seldom addressed.

The capital adequacy literature shows that capital ratios are higher at small banks than at large banks. In addition it shows that regulators require higher capital ratios for smaller banks. Therefore, either banks abide by regulation or smaller banks in fact have more risk and compensate for this risk by holding more capital. Studies by Peltzman (15) and Mayne (11) indicate that regulations have little influence on bank capital ratios, while a study by Mingo (14) reaches the opposite conclusion. Wolkowitz (19) finds that small banks are inherently riskier but that they hold more capital to compensate for that risk. Therefore, when management decisions are made, actual risk appears to balance out for small and large banks. Dince and Fortson (2) also find that bank size and capital adequacy are not related.

The "early warning system" literature studies the characteristics of banks which have failed or which have appeared on a regulator problem list (See 4 for a summary). These studies generally controlled for bank size in the sampling process, which implicitly assumes that size is not important. One of the early warning studies that did consider size explicitly found no relationship between bank size and vulnerability (9). Another study which did not control for size in its sample selection found that the characteristics which best distinguished problem banks did not include size (17).

Conclusion

There has been little systematic study of the size-risk relationship for financial institutions. Much of the evidence that exists is in the form of incidental evidence from studies of other aspects of these institutions. Although little is known, our review of the literature leads to two general conclusions. First, no systematic evidence exists that small banks are at a competitive disadvantage in terms of risk. On this front, therefore, small banks appear to be on equal footing with large banks. And second, as banking competition becomes more intense, risk borne by banks will become increasingly important. The topic deserves much more attention than it has received.

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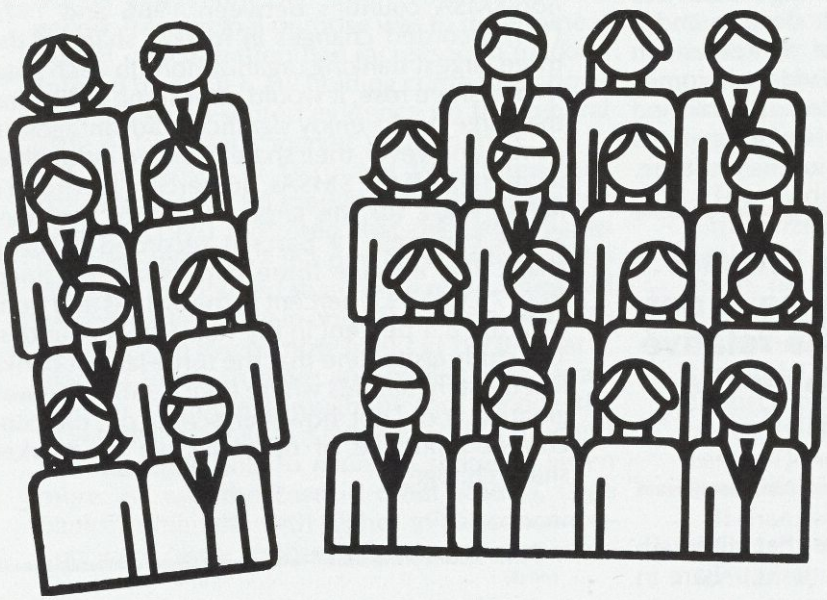
Changes in Large Banks' Market Shares

From 1974 through 1981, larger banks in the Southeast generally lost market share to smaller local competitors. Evidence strongly supports that conclusion for other areas of the country over the past 15 years.

Several factors help determine the competitive position of individual banks. Size, risk assumed, management strategies, and past behavior are thought to play important roles. Studies of these factors allow us to assemble evidence on their impact to project how a particular type of bank will perform. An alternative way to study the impact of these factors, particularly size, is to observe how a certain group of banks performs in a total environment without isolating individual factors.

Evidence on bank operating costs and risk indicates that, above a relatively small size, commercial banks do not gain operating efficiency or reduce risk to any significant degree. Other factors that might give large banks significant competitive advantages, such as economies of scope, the ability to invest in innovations, the ability to ride out errors, the concern of regulators to keep them from failing, have received less study. Students of banking find it difficult to put together all the evidence to project or explain banks' market performance.



Banks, on the other hand, put all of these factors together in their markets every day. Operating costs, risk, regulatory compliance costs, innovation, regulatory attitudes and other factors influence each day's

operations. One way to determine whether larger banks enjoy significant competitive advantages in local markets is to study their market performance.

If larger banks have (and use) advantages over smaller banks, we would expect them to gain market share at the expense of smaller banks. Lower costs of operations, risk taking, and the ability to handle the expense of developing new products or to ride out errors would allow larger banks to offer lower prices or higher quality service than smaller competitors. If they did so, then customers would gravitate to them from their smaller competitors.

But studies indicate that personal and business customers are loyal to their financial institutions. Nevertheless, turnover in both business and consumer markets would allow banks using price or service advantages to gain business relative to their competitors over an extended period of time.

Evidence on the actual market performance of large and small institutions comes from recent direct studies of the subject and from another group of studies by economists interested in competition in local banking markets. These latter economists have performed several studies of changes in the market shares of larger banks in these markets. While these studies were not conducted specifically to test the relative performance of larger and smaller banks, the evidence presented in them is relevant.

Studies indicate that smaller institutions generally have not been at a disadvantage relative to large competitors over the past decade and a half. This seems true in all sizes of markets and in each geographic area studied. Evidence comes from a variety of empirical work already published and is confirmed by new work on banking markets in the Southeast presented here for the first time.

"Studies indicate that smaller institutions generally have not been at a disadvantage relative to large competitors over the past decade and a half."

Our new evidence also indicates that, although large banks generally have lost market share in local markets, they have not been losing local market share because outside institutions are taking business away from them rather than from smaller banks. Nor do they seem to be losing share because they are refraining from using their competitive advantages so as to keep prices and profits high.

Studies of the Performance of Small Institutions

Two recent studies of the performance of small financial institutions (11) (12) during 1978-1980 found no evidence that smaller institutions are not viable competitors. Both studies deal with institutions in Standard Metropolitan Statistical Areas (SMSAs); one covers commercial banks, the other savings and loan associations. The authors of each compare performance of small firms with that of larger ones in the same economic environment. Although smaller banks and S&Ls report somewhat lower returns, they are also clearly less risky. The studies also find that, while there has been no difference in the growth rates of small and large S&Ls, smaller banks have grown faster than larger ones.[1]

Studies of Large Banks' Market Shares

Another set of relevant studies looks at changes in the market shares of larger banks relative to their smaller competitors. The most comprehensive of these, covering 213 SMSAs and 233 large non-SMSA counties between 1966 and 1975 (16), recorded changes in market share of the three largest banking organizations in each area. If their share rose, it would offer some indication that large banks enjoy significant advantages. In general, however, their share declined rather than increased. Of the SMSAs, 86 percent recorded a falling share for the largest firms; of the non-SMSA counties, 79 percent recorded a falling share. The average three bank share declined from 75.8 to 69.3 percent in the SMSAs and from 81.2 to 78.4 percent in the non-SMSA counties. The study also found that the three largest banks lost most in markets where their 1966 share was greatest. It did not, however, screen out the concurrent influence of other factors on market share change.

[1]For older studies of this issue — which reach similar conclusions see (1) and (8).

Another national study of market structure changes covering a smaller sample of markets produced similar results. The Rhoades (9) study covered the 1966-1976 period and included only 152 SMSAs that had not had their boundaries changed during the period and a sample of 129 non-SMSA counties. Over the period and two subperiods, more than 80 percent of the SMSA markets showed declining in market shares for the largest three banks. In 71 percent of the county markets, the largest three banks also lost share.

Two regional studies - one from the Midwest and one from the Southeast - confirm the findings of the national studies. The most recent of these covers 53 SMSAs and 233 non-SMSA counties with more than three banking organizations in Illinois, Indiana, Iowa, Michigan and Wisconsin (2). This study covers smaller areas and more recent experience (1965-1979) than the national studies summarized above, but its conclusions are quite similar. Of the SMSAs, 85 percent recorded declines in the combined market share of the three largest banks; of the non-SMSA counties, only 53 percent recorded declining concentration. As in the national studies, concentration declined to a greater extent in areas with higher initial concentration.

Another regional study was carried on at the Federal Reserve Bank of Atlanta in 1976 (18) and is the springboard for new empirical evidence presented in the next section of this article. That study covered 98 banking markets in Alabama, Florida and Tennessee during the 1970-1974 period. Its principal purpose was to determine if market concentration had increased in markets entered by multi-bank holding companies; however, it also presented evidence on the general issue of large bank market performance.

A comparison of 1970 and 1974 three-bank concentration in 98 markets with three or more banks in 1970 indicated that the larger banks had lost share in 62 (63 percent) of the markets and only maintained share in 26 more. They had gained market share in only 10 markets. In the 75 markets with five or more banks in 1970—that is, markets in which there are smaller banks available to compete throughout the period—the largest three banks lost share in 59 (79 percent) and managed only to maintain shares in seven more. As was the case in other studies, large banks in markets with higher initial concentration were likely to lose a greater market share (7).

Table 1. Concentration Change, Markets with Five Banks or More in June, 1981

		Number of Markets with Decrease		with Increase	
State	Total	Number	Percent	Number	Percent
Alabama	29	19	65.5	10	34.5
Florida	29	24	82.8	5	17.2
Georgia	13	9	69.2	4	30.8
Tennessee	14	12	85.7	2	14.3
Total	85	64	75.3	21	24.7

Recent Evidence from the Southeast

Our latest study adds both markets and time to evidence from Alabama, Florida and Tennessee. It covers the period from 1974 to 1981 and includes markets from Georgia as well as the three states covered previously. Eighty-four markets with five banking organizations or more are included. The market areas are those used by the Board of Governors of the Federal Reserve System in decisions on bank holding company acquisitions and bank mergers. They are defined on the basis of study of banking patterns in local areas and are updated on the basis of changing local conditions (15 and 17).

The study excludes eight markets for which the market definition was changed after 1974. Each of these markets was redefined during the study period to include an expanded geographic area. This in itself resulted in a decline in the market share held by the largest banks. The markets were excluded to avoid any bias toward a general conclusion that large bank market shares were declining.

The evidence from Sixth District markets is summarized in Table 1 and 2. The three largest banks lost market share in over three quarters of these markets, losing in each state and in markets of all sizes. The average share held by the three largest banks declined from 76.8 percent in 1974 to 72.2 percent in 1981—a drop of almost 6 percent. As Table 2 indicates, the three largest banks' share declined by almost 9 percent in Florida markets but by only 1.2 percent in Georgia markets.

If changes in bank operations and competition during the 1970s have changed large banks' performance, results of this most recent study

Table 2. Concentration Change, Markets with Five Banks or More

State	Average Concentration 1974	Average Concentration 1981	Change 1974–1981 In Average	Change 1974–1981 Percent in Average	Change 1974–1981 Average Percent Per Market
Alabama	.759	.727	−.032	−4.217	−3.758
Florida	.768	.699	−.069	−8.984	−8.686
Georgia	.804	.794	−.010	−1.244	−1.184
Tennessee	.757	.694	−.063	−8.322	−8.138
Total	.768	.722	−.046	−5.989	5.732

should be expected to differ from previous results. Yet results are quite similar to previous studies.

Explanations for Large Banks' Losses

Even if larger banks have lost market share, it does not show conclusively that they have suffered competitive disadvantages. At least two alternative explanations are possible. First, outside competitors may be taking more business from larger banks than from smaller ones. Nonlocal and non-bank competitors are not included in measures of local market size and share because data on their local business generally is not available. Consequently, large banks may appear to lose share to small ones when they are losing to non-local and non-bank competitors. Second, one may argue that large banks refrain from capitalizing on their advantages to charge lower prices, pay more for deposits or provide higher quality services in order to gain higher profits. If this were so, one might find these banks retaining or losing their market share rather than gaining.

We tested for these two alternative explanations and found that neither holds up well. If nonbank and nonlocal competitors have entered markets and taken business away from larger banks we would expect their entry to have its greatest impact in the most attractive markets. Multivariate tests of the determinants of changes in larger banks' shares indicate that neither market size nor market growth—two indicators of a market's attractiveness—was related to the decline in large bank shares in southeastern markets. (See the Appendix for an explanation of the tests.)

The consistency of the study results also implies that competitors from outside the banking industry and local markets have not differentially affected large bank shares. Markets of all sizes have shown a decline in large banks' share over all time periods since 1965. Yet rapid expansion of nonlocal and nonbank competition has been rather recent. Had this expansion caused large banks to lose more local market share, declining shares would have shown up in later studies. This has not been the case.

Evidence does not entirely rule out the possibility that large banks refrained from using their advantages in order to earn greater profits. However, no supporting evidence has been found in Southeast markets. In three of the other studies, tabular analysis indicated that the three largest banks lost the highest share in markets where they had held the highest initial share. This type of market performance supports one reason advanced for the ability of smaller banks to compete with larger ones. Large banks may refrain from exploiting some of their competitive advantages if they are able to earn long-run profits by doing so. Three previous studies of concentration change indicate that small banks gain more ground when large banks hold a greater market share—that is, when they have more incentive to charge higher prices and/or provide less quality. The other studies did not, however, account for other factors that also might have influenced large banks' share. Our study tested a more detailed multivariate model and found no relationship between changes in large banks' share and the level of their share (see Appendix.)

Our tests indicate that large banks probably have lost market share in local markets because they have been at a competitive disadvantage of

some sort. Neither differential effects of outside and nonbank competitors nor large banks' reluctance to use advantages seem to explain their loss of market share. A final element of the multivariate model gives a clue to the identity of the banks that gained from large bank losses and suggests at least one dimension of large bank disadvantages. Our tests found that the entry of new banks into local markets was closely related to large banks' loss of market share. The introduction of new banks was followed by greater market share loss for large banks. This finding is consistent with results of a studies of *de novo* entry by Rose and Savage (13 and 14). They found that new banks whether independent or started by bank holding companies made significant contributions to decreasing concentration of local market deposits in larger banks.

"Our tests found that the entry of new banks into local markets was closely related to large banks' loss of market share."

That new banks should gain market share seems reasonable for several reasons. Their organizers would not start them nor would regulators approve them without considerable confidence that they would attract profitable business, that is, gain market share. In addition, new banks are often organized by investors who do substantial banking themselves and who move their business to the new institution. Finally, most new banks in larger markets have opened in suburban areas that grow more quickly than the downtown areas that are headquarters of larger banks.

An interesting extension of this study would be an examination of the market shares of smaller banks that existed in local markets at the beginning of our study period. Did they also lose share to new banks or did they also gain share at the expense of larger banks?

Studies reported here consistently indicate that in the recent past smaller banks have performed at better than par with larger ones in local markets. The smaller banks have been about as profitable (when profits are adjusted for risk) and have generally gained market share. Attributing this phenomenon to mismeasurement of market share and noncompetitive behavior of large banks does not seem to fit. It seems more likely that larger banks have been at a competitive disadvantage in relation to smaller banks in some basic product lines.

—B. Frank King

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APPENDIX

To provide some evidence on the relationship of market power of the largest banks to changes in their shares, we developed and tested a model of concentration change. It follows the development in Working Papers previously published by the Federal Reserve Bank of Atlanta (6 and 7).

As explained in the text, large bank forebearance might be thought to result from use of market power even though large banks were more efficient. One would expect such forebearance to be more likely the larger the large banks' market share. Thus one feature of the model is market share of the market's three largest banks measured in the beginning year, 1974.

Market growth may also influence large banks' share in two ways. First, by providing new business opportunities and attracting migration, growth brings in bank customers not previously attached to a local bank. Second, growth may attract new bank competitors that apparently take market share from large banks. (See 6) Market growth has two dimensions in this case: the percentage change in market size and the absolute change in size. In order to capture both aspects, variables for percentage change in market deposits and for total market deposits were used.

We would also expect large banks' market share to be influenced over time by changes in the number of firms competing in the market. Additional firms would be expected to enter only if they could take market share from larger firms; exiting firms would give larger firms an opportunity to increase their share.

Bank holding company activity has also been discussed as an influence on concentration (See (5) and the next article in this **Review**, for summary of the evidence.) Evidence of holding company effects is mixed. A majority of studies find no bank holding company effect, but some studies find multi-bank holding companies both increasing and decreasing concentration of business in larger banks. A variable to measure the change in the number of multibank holding companies operating in each market was included in the model.

These variables were regressed against the percentage change in concentration in the local markets used in this study. The table below gives the results of this multiple linear regression.

Only one factor was closely related to changes in the market shares of the three largest banks. That was the change in the number of organizations competing in the market. Greater increases in the number of competitors—greater entry—were associated with greater declines in large bank shares. Market growth, size, concentration and bank holding company activity were not significantly related to concentration change.[1]

The equation explained almost 30 percent of concentration change, and the relationship was highly significant. This level of explanation is quite satisfactory in view of the slowness with which changing market conditions appear to be felt in market structure.

[1]We considered the possibility that change in the number of competitors and market growth might be closely related, causing problems related to multicollinearity. Percentage market growth and market size explained less than 7 percent of the change in the number of competitors in markets in this sample. In addition exclusion of the market growth variable from the model had only minor influence on other coefficients. Both facts indicate minimal multicollinearity. See (3).

Appendix Table Concentration Change Model: Regression Results

Variable	Regression Coefficient	Standard Error	t
Deposit growth 1974-81 (percent, annual average)	−.213	.182	−1.169
Deposits 1974 (billion $)	−1.435	1.039	−1.380
Three organization concentration, 1974	.184	6.661	.027
Change in number of competing organizations, 1974-1981 (percent)	−.184	.036	−5.009[a]
Change in number of multibank holding companies represented, 1974-1981	.245	1.039	.360
Constant	−.882	5.273	−.167

Dependent variable: Change in three-organization concentration, 1974-1981 (percent)

$\overline{R}^2 - .251$[a]

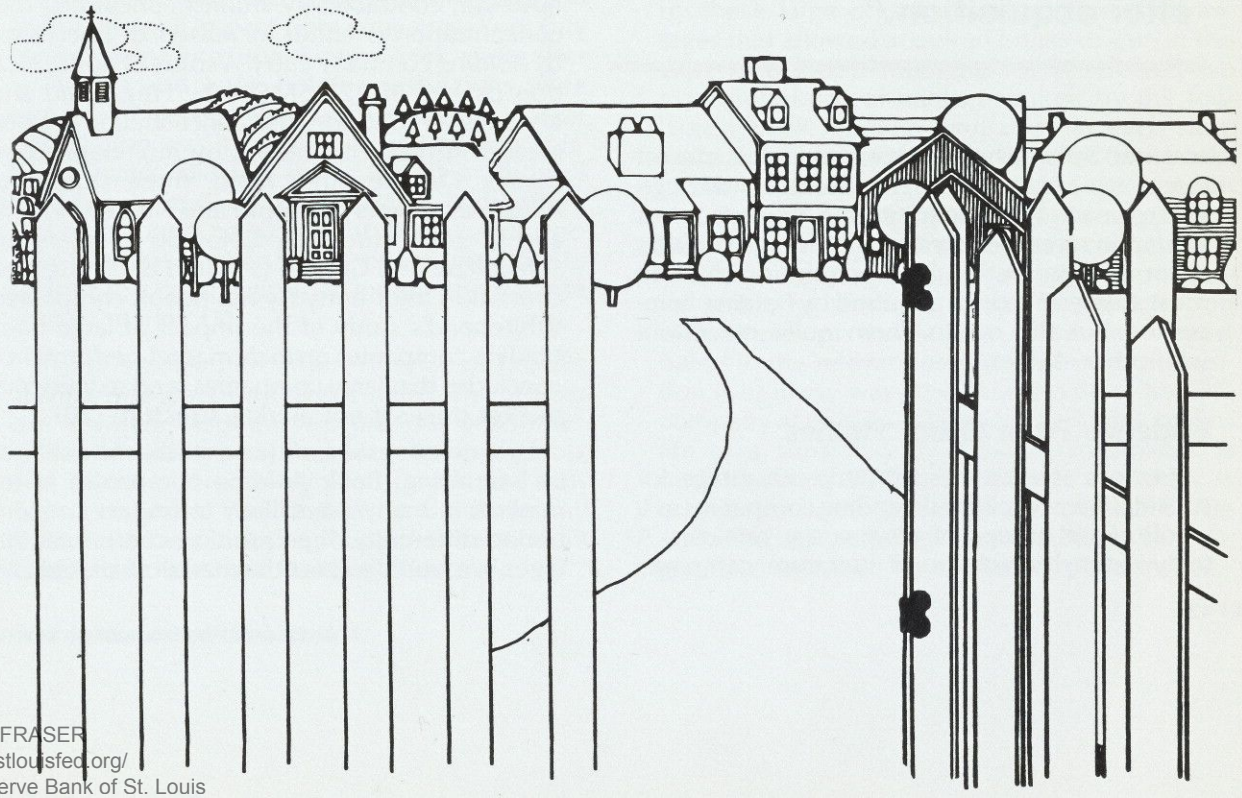
[a]Differs from 0 at .01 level.

The Impact of Local Market Entry by Large Bank Holding Companies

Five years after selected large bank holding companies entered new local markets, their subsidiaries showed no significant advantages over comparable independent banks. In fact, after seven years, the independents had gained market share on the larger holding company banks.

If there are advantages conferred by size in banking, they may not be limited to large individual institutions. Subsidiaries of larger multi-institution organizations may have competitive advantages over smaller independent organizations. Three states in the Sixth Federal Reserve District have large multibank holding companies that acquired banks during the 1970s. If membership in large organizations conferred cost or product advantages on an acquired bank, its market share would grow and/or its returns would increase relative to competitors. We would expect banks acquired by the largest organizations in District states to gain market share or have higher profits than similar independent banks.

This article reports on a study that compared the performance of two groups of Sixth District banks acquired by large bank holding companies with the performance of their independent counterparts. We looked at a group of banks started *de novo* (not acquired by merger or acquisition) by the four largest bank holding companies in Alabama, Florida and Tennessee



between 1972 and 1975 and a group of larger banks—the largest or second largest in their markets—acquired by the four largest bank holding companies in the same states during those years. We compared the *de novo* banks' market share and profit performance with that of a control group of independent *de novo* banks chartered in their markets during the same period. We compared the larger banks' performance with that of larger independent banks in their markets. Both groups of banks were followed for several years after holding company acquisition—the small banks for five years and the large ones for seven.

Our study indicates that large bank holding companies did not offer significant advantages to the banks they started or acquired, even several years after acquisition. *De novo* banks started by holding companies did enjoy higher assets, deposits and rates of returns than independents after five years of operation, but this seems to be the result of special circumstances in which the holding companies merged their smaller *de novo* banks into other subsidiaries. Larger banks acquired by large holding companies lost market share to independent competitors through seven years after acquisition. They also lost ground in rates of return and in risk. Our results cover a longer period after acquisition than do most studies of banks acquired by holding companies, but the results seem quite consistent with other studies.

". . . large bank holding companies did not offer significant advantages to the banks that they started or acquired, even several years after acquisition."

Evidence From Other Studies

Previous studies indicate little advantage for subsidiaries of multibank holding companies as a whole. Four groups of studies are relevant. A fairly extensive volume of literature compares the performance of banks acquired by multibank companies with independent banks of similar size in the same markets. (See Currey (2) for a detailed summary.) The studies are consistent in their major conclusions that bank holding company acquisition results in some changes in acquired banks' asset portfolios and increases in their operating expenses and income. The net effect is that these changes produced no significant changes in return on equity of acquired banks relative to independents. Acquired banks, however, have been leveraged to a greater extent. Studies that look at growth of acquired and independent banks find no difference between the two.

Another set of studies culminates in the survey of bank costs detailed in this **Review**. These studies generally conclude that subsidiaries of multibank holding companies enjoy no cost advantages over banks that are not holding company subsidiaries.

A third set of studies analyzes changes in concentration in markets entered by bank holding companies. (A highly concentrated market is one where a small number of firms hold a large share of the market.) These studies attempt to determine whether banking business in markets entered by multibank holding companies becomes more concentrated in a few firms after entry (4, 6, 7, 8, 10, 11, 17, 18, 21). A majority of these studies conclude that bank holding company entry has no impact on the concentration of deposits in the entered market. There are, however, contradictory studies concluding that concentration is either increased or decreased by holding company entry. A study of concentration change in 228 SMSAs by Heggestad and Rhoades (4) concludes that concentration became greater in markets entered by multibank companies. On the other hand, three studies of Alabama markets by Hooks and Martell (6, 7, 8) and a case study of Colorado markets by Schweitzer and Greene (17) find declining concentration after entry by multibank companies. Whitehead's study of the impact of large bank holding companies on local market performance concludes that large companies tend to influence market prices if not market structure (20).

The mixed results of these studies should not be surprising. Bank holding companies enter markets in many ways likely to impact concentration differently. If acquisition confers advantages, we would expect the market share held by

large banks to increase if a large bank is acquired but to shrink if a small or *de novo* bank is acquired. Thus the manner of entry would be crucial to the impact of bank holding company acquisition. Yet only two of the studies considered that determinant.

A more relevant set of studies looks at market performance of individual banks acquired by multibank holding companies. These studies follow the acquired banks for several years. In a study of 71 banks acquired between 1965 and 1970, Goldberg (3) found no significant change in market shares. His results were mirrored in Burke's broader study of 227 banks acquired between 1962 and 1970 (1). Burke reported some subtle tendency for larger banks to lose market share and smaller ones to gain share.

In a series of studies, Rose and Savage examined the performance of bank holding company subsidiaries after acquisition. These studies emphasize market share changes. Rose and Savage found that relatively large banks acquired by holding companies not otherwise represented in their market lost share and that small ones gained share (12). *De novo* banks acquired by bank holding companies performed no differently from independent *de novo* banks in aspects other than market share (15). Independents had a large edge in market share in less concentrated markets but holding company banks had a slight edge in highly concentrated markets (13 and 14).

One case study that addresses this question found minimal impact from large New York City banks' entry into upper New York state after branching and bank holding restrictions were removed. The large New York City banks' market penetration was modest and their competitors' performance did not suffer (9). In a study of banks acquired by two Florida companies, Hoffman found no significant increase (or decrease) in the market shares of acquired banks relative to a control group of independent banks in their market (5).

These studies find little evidence of holding company impact on market share. The studies are, however, inadequate in one way or another. Only Hoffman's study includes a control group, and it covers a relatively short period and only two companies. The studies by Goldberg and Burke use no control group of independent banks to isolate bank holding effects.

Despite their limitations, the studies reviewed here cast serious doubt on the proposition that multibank holding companies confer enough advantages on their subsidiaries to allow them to make substantial inroads on independent competitors. The studies are neither conclusive nor—with the exception of the studies by Rose and Savage—without fault; their weaknesses in today's world relate to their treatment of all multibank companies as the same, their lack of coverage of recent years and their lack of control groups. If holding company size is important, only large companies may confer advantages. Recent innovations may have increased large companies' ability to help their subsidiaries. Without a control group of independent banks, we do not know whether bank holding companies or some other factor accounts for acquired banks' performance.

Our study looks only at banks acquired by the largest multibank organizations in their states. It follows these banks over most of a decade to the present, and provides a control group of independent banks against which to test the holding company subsidiaries.

New Evidence From the Southeast

Large bank holding companies entered many markets in Alabama, Florida and Tennessee during the early 1970s and have competed in these markets since then. To test whether acquistion by these large organizations conferred advantages that allowed acquired banks to gain at the expense of independent banks, we selected two extreme groups of banks acquired by the four largest bank holding companies in each state and paired them with similar independent banks in their markets. We then traced three major elements of performance from the acquisition during the 1972-1975 period to recent dates.

To capture crucial aspects of holding company influence, we studied *de novo* acquisitions and acquisitions of the largest or second largest banks in the relevant markets. *De novo* acquisition is in many ways the purest type of holding company acquisition. The acquired bank begins life as a subsidiary. All future performance is under holding company influence and there is no past to boost or drag down the bank. The acquiring company has no one to blame (or congratulate) but itself for the bank's performance.

Acquisition of one of a market's largest banks may leave a holding company with a residue of past management's brilliance or mistakes, but it also gives the acquiring company the potential to exercise market power. Thus this type of acquisition would seem likely to confer advantages on organizations that already had operated successfully in a local market.

During 1972-1975, the four largest bank holding companies in each of the states of Alabama, Florida and Tennessee acquired 26 *de novo* banks for which we could find matches of independent *de novo* banks in the same local market.[1] All but two of these pairs were in Florida. During the same period, companies in Alabama, Florida and Tennessee acquired 13 banks that were the largest or second largest banks in their markets and could be matched with an independent in their market that was also of that rank.These two sets of pairs were studied.

We measured three aspects of performance. To get an overall indication of relative performance, we studied market share differences. If one type of institution possessed advantages over another, then we would expect it to widen the gap between its market share and that of the other type of institution. We tested differences between acquired and independent *de novo* banks. We followed each pair of banks up through 1981 or until one of the pair changed its status by being acquired, merged or divested. Since each *de novo* pair started from scratch, we tested for significant differences in assets, deposits, rates of return on assets and equity, capital to total assets and capital to risk assets one, three and five years after acquisition.

Each larger bank started with its own established market share and earnings and risk ratios from the time of acquisition through one, three, five and seven years. We tested for differences in market share after acquisition; that is, whether gaps in performance widened or narrowed.

Profits were analyzed because market share might be gained by a bank willing to sacrifice returns by pricing lower to attract customers. Models of this type of behavior have been developed to analyze the NOW account experience in New England and the behavior of southeastern banks (19). The situations tested in this study do not closely parallel the New England experience; however, systematic differences in profitability over time may well cast doubts upon the long-term viability of a group of institutions. We tested differences in both return on assets and return on equity.

Finally, profitability difference may be related to the risk taken by institutions. Consequently, we tested for risk differences among institutions by looking at capital to assets and capital to risk assets ratios.

Table 1. Pairs of Banks Remaining After Acquisition

Years After Acquisition	De novo Banks	Larger Banks
One	26	13
Three	25	13
Five	14	12
Seven	7	12

Our samples began with 26 pairs of *de novo* banks and 13 pairs of larger banks. Over time, mergers of sample banks removed pairs from the sample. Florida—a unit banking state before 1975—authorized countywide branching in 1975 and statewide branching by merger in 1980. Large bank holding companies in Florida chose to merge their unit banks into larger multi-office institutions after 1975, removing some of their *de novo* banks and one large bank from our samples. The number of remaining pairs is shown in Table 1. Our test followed *de novo* banks for five years after acquisition and larger banks for seven years.

New Banks

As the first two panels of Table 2 indicate, holding company and independent de novo banks performed much the same during the first three years after the holding company acquisition. Differences between the groups are small enough *in any case* that one cannot say they were not accounted for by chance. Holding company subsidiaries were somewhat larger after one year but somewhat smaller than independents after three years.

[1]In order to be a match, the independent must have begun operation no more than a year before or after the holding company bank and had to be located in the same local market.

Table 2. Performance of **De Novo** Banks

Performance Measure	BHC Mean	Independent Mean	Difference
End of Charter Year (n=26)			
Assets (millions $)	5.63	5.55	.08
Deposits (millions $)	4.60	4.32	.28
Return on Assets (percent)	−.58	−.63	.05
Return on Equity (percent)	−2.57	−2.24	−.33
Equity to Assets (percent)	29.36	30.95	−1.59
Equity to Risk Assets (percent)	132.57	129.43	3.14
End of Third Year After Charter Year (n=25)			
Assets (millions $)	11.92	12.97	−1.05
Deposits (millions $)	10.55	10.92	−.37
Return on Assets (percent)	−.37	−.25	−.12
Return on Equity (percent)	−3.00	−1.77	−1.23
Equity to Assets (percent)	11.06	16.75	−5.69
Equity to Risk Assets (percent)	16.33	22.90	−6.57
End of Fifth Year After Charter Year			
Assets (millions $)	21.78	13.9	7.88[c]
Deposits (millions $)	19.52	12.42	7.09[a]
Return on Assets (percent)	.142	−.221	.363
Return on Equity (percent)	1.434	−6.924	8.360[b]
Equity to Assets (percent)	8.37	9.98	−1.615
Equity to Risk Assets (percent)	12.77	15.18	−2.405

[a]Differs from 0 at .005 level (two tailed test)
[b]Differs from 0 at .025 level (two tailed test)
[c]Differs from 0 at .05 level (two tailed test)

Table 3. Large Bank Performance

Variable	BHC Mean	Independent Mean	Difference*
Year 0			
Assets (millions $)	41.80	46.56	−4.76
Market Share (%)	30.70	35.38	−4.68
Return on Assets	1.07	1.05	.02
Return on Equity	14.45	13.75	.70
Equity to Assets	7.43	7.67	−.24
Equity to Risk Assets	9.42	9.71	−.29
Year 7			
Assets (millions $)	62.32	82.85	−20.53
Market Share (%)	29.74	40.01	−10.27
Return on Assets	1.02	1.20	−.18
Return on Equity	11.64	13.24	−1.60
Equity to Assets	8.81	9.11	−.30
Equity to Risk Assets	10.14	10.92	−.78

*BHC mean minus independent mean.

The independent *de novo* banks had lower operating losses and took less risk through three years. The differences are not statistically significant, however.

By the fifth year after holding company acquisition, the subsidiaries appear to have established a considerable advantage over independent banks. Deposits and assets of the holding company *de novos* are significantly larger than those of independents. Holding company banks have become profitable while paired independents are still losing. These results however, are not indicative of bank holding company advantages. During the same period between the third and fifth year after acquisition, Florida's holding companies chose to merge nine of the sample's *de novo* banks into other subsidiaries. (Three of the independent banks were also merged into other banks. One was part of a pair with a merged holding company bank.) Banks that the holding company merged were significantly smaller and less profitable than those they did not merge. The fifth year results thus indicate a choice by the holding companies to eliminate smaller, less profitable banks rather than demonstrating competitive advantages by the remaining banks. In order to see if this selection by bank holding companies influenced results of our tests in the fifth year, we tested third year differences in only the pairs remaining after five years. These tests showed that third year results for the remaining pairs were quite similar to fifth year results.

Overall, there is little indication that *de novo* banks chartered by large bank holding companies possess significant advantages over independent *de novo* banks. In the three years before holding company mergers eliminated their smaller, less profitable subsidiaries from the sample, there was no difference in assets, deposits, profitability or risk that could not be accounted for by chance.

Large Banks

Large banks acquired by bank holding companies lost ground to their paired independent banks in the seven years covered in this study. The changing relative position of bank holding company subsidiaries is shown in Table 3. At year

Table 4. Relative Performance of Larger Bank Holding Company Acquisitions

Variable	Mean Difference*
End of Acquisition Year n=13	
Market Share	−.377
Return on Assets	.075
Return on Equity	.047
Equity to Assets	.530[c]
End of Third Year After Acqusition n=13	
Equity to Risk Assets	.340
Market Share	−2.248[d]
Return on Assets	−.124
Return on Equity	−2.614[d]
Equity to Assets	.920
Equity to Risk Assets	3.304[b]
End of Fifth Year After Acquisition n=12	
Market Share	−1.909[d]
Return on Assets	−.215
Return on Equity	−2.247
Equity to Assets	−.0255
Equity to Risk Assets	−.935
End of Seventh Year After Acquisition n=12	
Market Share	−4.970[a]
Return on Assets	−.222
Return on Equity	−2.291
Equity to Assets	−.0811
Equity to Risk Assets	−1.043

*Changes in bank holding company data minus changes in independents' data, stated in percentage points.

[a]Differs from 0 at .005 level (two-tailed test)

[b]Differs from 0 at .01 level (two-tailed test)

[c]Differs from 0 at .025 level (two-tailed test)

[d]Differs from 0 at .05 level (two-tailed test)

end before acquisition—when all banks in the sample were independent—banks that remained independents had a 4.68 percent market share advantage on the banks acquired by bank holding companies. The independents were less profitable and somewhat less risky.

By the seventh year after acquisition, the independent banks had gained market share while the holding company subsidiaries had lost share. The independents enjoyed a 10.27 percent market share advantage, reported greater returns on assets and equity and remained less risky.

Larger independents gained on the larger banks acquired by bank holding companies several years after acquisition. As Table 4 indicates, the independents and holding company subsidiaries had not, with one exception, changed in significantly different ways during the first year after acquisition. During the first year the holding company banks raised their equity-to-assets ratio significantly.

During the three years after acquisition the independents' relative increases in market share and return on assets were statistically significant. Bank holding company subsidiaries increased equity-to-risk assets significantly more than independents.

In the first five years after acquisition, the gap between independents' market share and that of holding company banks widened to a statistically significant extent. The gap also widened in the same direction in each of the other variables but not to a statistically significant extent.

After seven years the independents had established statistically significant gains in market share only. Their gains in return on assets and equity and equity-to-assets and risk assets were greater than those of the subsidiary banks but not significantly so.

On their face, these results indicate that independents gained market share to a significantly greater extent than bank holding company subsidiaries in the same markets without sacrificing either returns or safety. The position of the holding company as a resource for its subsidiaries makes statements about returns and risk somewhat ambiguous, however. Through various devices, holding companies may reduce profits in their subsidiaries by charging various flows to the parent company to tax deductible expenses rather than dividends. At the same time parent companies may bear risks for subsidiaries. Thus, relatively lower reported returns and risk for bank holding company subsidiaries may indicate a downward bias in the reporting of returns and risk. No such downward bias exists in reporting holding company banks' market shares.

Summary and Implications

This study indicates that acquisitions by large bank holding companies of *de novo* or larger banks have not helped these banks increase their market share relative to similar independent banks over a period of several years.[2]

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[2]Although this study concentrates on large holding companies, the evidence may apply to all companies. Rose and Savage (12) present evidence that holding company size has little impact on performance of large companies *de novo* banks.

"These larger (bank holding) organizations do not seem to be in a position to drive independent banks out of business."

Indeed, the larger banks that remained independent fared better than those acquired by holding companies, at least in market share. Results indicate also that large independents did not gain share at the expense of higher profits or lower risk.

These results are consistent with most other evidence on the advantages of multibank holding companies. This study improves on the others by observing acquired banks over a longer period—up to seven years—and by providing a specific control group, studying market share, and bringing the experience to the present all at the same time. Its samples, however, are relatively small and confined to three states. Additional work should be done.

If one accepts the findings of this study and most similar studies and projects them into the future, one finds implications on several fronts. On-site results seem consistent with cost study results, which indicate no bank holding company advantages. These larger organizations do not seem to be in a position to drive independent banks out of business. Their entry would seem unlikely to have the dire effects predicted by some opponents of bank holding company expansion at both state and national levels. In addition, their seeming inability to raise returns on assets and equity at acquired banks casts doubts on their capability to muster resources needed to acquire large numbers of smaller banks.

—B. Frank King

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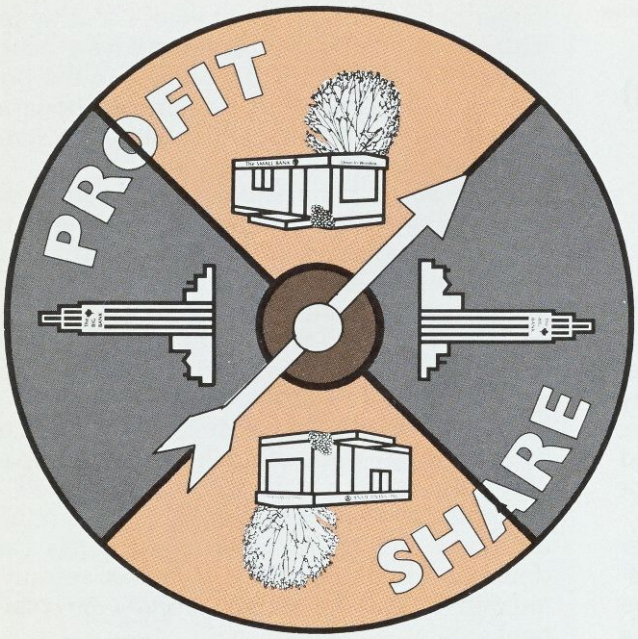

An Alternative View of Bank Competition: Profit or Share Maximization

A study of 590 banks over eight years finds consistent evidence that small banks seek to increase their market share even at the expense of profits. Large banks, on the other hand, apparently aim to maximize both profits and market share.

Market forces within the financial services industry are driving regulators and legislators to consider further deregulation. Both product and market restraints on financial institutions are being reconsidered seriously in light of new communication technology, product innovation, and cooperative competitive agreements among what traditionally were considered noncompeting financial institutions.

As deregulation removes the artificial restraints to product and market development, consolidations among financial institutions appear inevitable.[1] Although consolidations will occur, the degree of consolidation is questionable because there will always be a place for relatively small financial organizations which are specialized and highly efficient. On one hand, consolidations may offer certain benefits, such as those associated with economies of scale and the consumer's ability to obtain many financial services from a single institution. On the other hand, consolidations may involve certain costs to society such as the potential loss in competitive market performance from the removal of some small and potentially innovative competitors.

Given the likelihood of deregulation and the probability that many small competitors will be eliminated through consolidations, it is essential to learn whether competition would be decreased if the number of small competitors were reduced. This study addresses the question by analyzing the competitive performance of relatively large and relatively small banks in the Sixth Federal Reserve District.

Conventional antitrust analysis is based on a traditional theoretical model that assumes a

[1]To the extent that regulation has restrained the optimal size of financial institutions, deregulation will lead to mergers or consolidation among financial institutions. As deregulation occurs, a larger number of financial institutions will be able to offer similar financial services. This will tend to increase the number of competitors and reduce the level of market concentration, making it easier for similar institutions to merge.

firm's primary goal is to maximize profits. Given profit maximization as the firm's objective, it is then possible to depict the firm's conduct in various market settings. The firm's conduct or behavior then determines its performance (that is, prices, output, profit or rate of return). It follows that the interaction among firms in the same market, all attempting to maximize profits individually, will determine the market's competitive performance. Depicting all firms as profit maximizers then allows for a rather simple analysis of markets. Knowledge of the market's structure (number and size distribution of firms in the market) and the presumed conduct of firms in their efforts to maximize profits then allows us to project the market's competitive performance. Markets with high concentration (two or three firms controlling a relatively large portion of the market) are presumed to be less competitive (higher prices and lower levels of output) than those with low levels of concentration. This rather simple model forms the basis for the well-worn analytical tool that uses a market's structure to project its performance.

Casual Observation

Yet the competitive interaction among banks in market settings raises questions about the premise that all banks are profit maximizers. Commercial banks are department stores of financial services. The average consumer seems to develop a close relationship with his banker because access to future financial services may depend on it. This leads to customer loyalty perhaps unparalleled in other industries. Once people decide which bank to deal with, it is extremely difficult to persuade them to change. Consumer loyalty and mutuality of benefits appear to be at the root of this type of behavior. As a consequence bankers are less likely to compete for each others' current customers than for uncommitted customers. This is probably more the case for a small retail account than for large retail or commercial accounts. Competition for these latter types of accounts is probably more personal and individualized than competition for the small retail or small commercial account.

Two observations, then, seem worthwhile. First, most overt measures of competition within banking markets in fact measure the intensity of competition for relatively small retail and commercial accounts. Second, these competitive actions are almost certainly directed at new customers, those just moving into a new area or seeking to establish a banking relationship. It is then primarily the growth in banking consumers for which bankers are overtly competing—not the entire customer base of a market.

This leads to a third and perhaps more important observation: small banks may emphasize deposit growth to a greater extent than do their larger competitors. Both large and small banks overtly compete for the same set of customers, but small banks have more to gain by attracting new customers than do large banks. Numerous studies on economies of scale in banking show that significant reductions in average costs are experienced only up to approximately $50 to $75 million in deposits.[2] Past this point, as a bank expands its deposits it experiences relatively constant average costs. Therefore, by emphasizing deposit growth, the small bank may lower its average costs and thus increase its profit potentials. It follows that a small bank may undertake overt competitive actions (both price and nonprice) in order to attract proportionately more deposits than its larger competition. Only after the small bank has obtained a size sufficient to realize available economies of scale (lowest average costs) would it turn its attention to profits.

". . . if small banks are indeed the most likely to stimulate competition within a market, then the loss of small banks may weaken these markets' competitive performance."

Now if we follow this line of reasoning further, we may hypothesize that relatively large banks and smaller banks in the same markets may have different objectives. The

[2]See George J. Benston, Gerald A. Hanweck and David B. Humphrey, "Operating Costs in Commercial Banking," this **Review**.

large bank may find it less desirable to compete overtly for market share than to simply take advantage of its customer base and maximize profits subject to some minimum market share constraint. On the other hand, the smaller bank finds it advantageous to expand its customer base in order to achieve sufficient size to take advantage of scale economies. Therefore, the small bank finds it advantageous to undertake overt competitive action to increase its deposit base.

To the extent that profit maximization behavior and share maximization behavior are inconsistent we should be able to devise an empirical test of the hypothesis. This hypothesis is important. If large and small banks in fact have different objectives, and if the small bank is most likely to undertake overt price and nonprice stimuli seeking to expand its market share, then the loss of many small banks may adversely affect the competitive performance of banking markets. In other words, if small banks are indeed the most likely to stimulate competition within a market, then the loss of small banks from deregulation and consolidations may weaken these financial markets' competitive performance.

Theoretical Rationale

Thinking of a firm as something other than a profit maximizer is by no means pathbreaking.[3] In the late 1950s, W. J. Baumol asserted:

> "I am prepared to generalize from these observations and assert that the typical oligopolist's objective can usefully be characterized, approximately, as sales maximization subject to a minimum profit constraint. Doubtless this premise over-specifies a rather vague set of attitudes but I believe it is not too far from the truth. So long as profits are high enough to keep stockholders satisfied and contribute adequately to the financing of company growth, management will bend its efforts to the augmentation of sales revenues rather than to further increase profits."[4]

Baumol's generalization was based on his view of how large firms actually behaved. The management of business firms seems to be obsessed with sales growth. In attempts to impress directors, attract stockholders or simply impress market observers, management consistently emphasized sales growth. This led Baumol to hypothesize that the primary objective of the management of larger corporations is sales maximization subject to some minimum level of profits. This laid the foundation for a series of empirical studies attempting to verify what came to be known as the "sales maximization hypothesis." A number of these studies attempted to test the phpothesis, but most found little support for it.[5] One exception, a study by Robert J. Saunders that used a cross section of commercial banks from the Fourth Federal Reserve District, reported:

> "This observed profit-depressing, high growth-oriented behavior of some commercial banks would be expected in a situation where the sales maximization hypothesis is true . . ."[6]

More importantly, however, Saunders found that some commercial banks seemed to display profit maximizing behavior while others pursued policies consistent with sales maximization. Issues concerning the proper behaviorial model for the firm clearly are far from settled as a number of recent articles on expense - preference behavior reveal.[7]

The predictability of the relationship between a market's structure (number and size distribution of firms) and its competitive performance (i.e. level of prices, profits, and output) largely depends on the objectives of firms in that market. The structure—performance relationship in banking has proved statistically significant but quantatively weak. In other words, the level of market concentration (a structural measure of how much of the market is controlled by the largest firms) matters, but only very large changes in market concentration are associated with very small changes in price, profits or the other performance indicators. One probable reason for finding that this relationship quantitatively weak is that all firms in a market do not operate with the same objective. Numerous studies testing various explanations (for example, the expense preference hypothesis, or the

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[3]F. Machlup, "Theories of the Firm: Marginalist, Behavioral, Managerial," **American Economic Review**, March 1967, pp. 1-33.

[4]William J. Baumol, **Business Behavior, Value and Growth**, (New York: Macmillan, 1959), pp. 49-50.

[5]See for example, William C. Pardridge, "Sales or Profit Maximization in Management Capitialism," **Western Economic Journal**, Spring, 1964; Marshall Hall, "Sales Examiniation" **Journal of Industrial Economics**, April, 1977; and Bevars D. Mabry and David L. Siders, "An Empirical Test of the Sales Maximization Hypothesis," **Southern Economic Journal**, January, 1967.

[6]Robert J. Saunders, "The Sales Maximization Hypothesis and the Behavior of Commercial Banks," **Mississippi Valley Journal of Business and Economics**, Vol 6, Fall 1970.

[7]See Stephen A. Rhoades, "A Summary and Evaluation of Structure-Performance Studies in Banking: An Update," Working Paper, Staff of the Board of Governors of the Federal Reserve System, 1982.

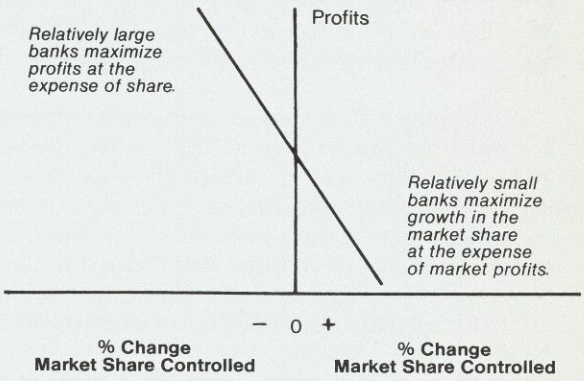
limit price hypothesis, or Hick's quiet life hypothesis or the linked oligopoly hypothesis) bear out the fact that the behaviorial element especially of the banking firms is a complex animal.[8] Attempting to understand a complex relationship often entails separating the components and analyzing them independently.

Since it is quite probable that not all firms operate with the same objective, a basic distinguishing characteristic should separate firms into groups sharing the same objective. Perhaps the simplest characteristic is the relative size of firms in their respective markets. For those markets chosen in the Sixth Federal Reserve District, banks with less than 3 percent market shares are consistantly smaller than the deposit size necessary to take advantage of scale economies. Banks with more than 15 percent of the market's deposits are consistently larger than the minimum size necessary to take advantage of scale economies. Therefore, this study attempts to gather empirical evidence on the possibility that relatively large banking firms' behavior (those with fifteen percent or more of market deposit) differs significantly from that of smaller firms (those with three percent or less of market deposits) with respect to their profit and market share maximizing behavior.

Hypothesis

Our basic hypothesis is that relatively large banks attempt to maximize profit subject to some minimal market share constraint while smaller banks attempt to maximize market share subject to some minimal profit constraint. This hypothesis asserts that, in general, large banks are willing to sacrifice market share to take advantage of pricing or nonprice policies allowing the bank to maximize profits. Therefore, we would expect that higher levels of market profit would be associated with declining market share for large banks. Conversely, small banks are in general attempting to acquire market share, since increased market share equates to increased market power. It is only after the small

Figure 1. Graphic Depiction of the Hypothesized Relationship



bank has acquired some level of market power, or relative size, that its objective would change to maximizing profits. Therefore, we would expect lower levels of profit to be associated with increasing market share for small banks.

This would be expected if small banks have the same or higher but declining average cost as their larger competitors. It would not be expected only in the case where the average cost of the larger firm is higher than that of the smaller firm, in other words, where diseconomies of scale are encountered. Graphically, Figure I describes the relationship expected if the two sets of banks, large and small, in fact perform as if they were attempting to maximize profits or market shares, respectively. Conceptually, the relationship between profits and growth or decay in market share need not be continuous, but the general relationship described by Figure I would need to be found to support the hypothesis.

Sample

To test the hypothesis we selected banking markets in the Sixth Federal Reserve District that contained five or more banks in 1969.[9] The criterion of five or more banks assures the inclusion of an ample number of both large and small banks. Because of the large number of

[8] See for example, Franklin R. Edwards, "Managerial Objectives in Regulated Industries: Expense-Preference Behavior in Banking," **Journal of Political Economy**, Vol. 85, February-December 1977 or Timothy H. Hannon, "Expense-Preference Behavior in Banking: A Reexamination," **Journal of Political Economy**, Vol. 87, February-December, 1979 or James A. Verbrugge and John S. Zahera, "Expense-Preference Behavior in the Savings and Loan Industry," **Journal of Money, Credit and Banking**, November, 1981.

[9] The geographic markets used were those defined by the Federal Reserve Bank of Atlanta and actually used in the analysis of holding company acquisitions or bank mergers.

banking markets in the Sixth District containing just two or three banks, inclusion of markets with less than five competitors would have artificially weighted the sample in the direction of relatively large banks. In total, 54 markets were selected which contained 590 banks in 1969.

Income and Call Report items were studied for each of these 590 banks for the period 1969 through 1977. Although this period includes a relatively severe recession, it also includes more normal periods of the business cycle. Overall we believe the period is fairly representative. Market shares and other market related calculations included new entrants in each of the markets; however, only banks existing in 1969 were used as observation points. These banks were segmented according to relative size, and the profit performance and share experience of each of these banks was tracked for the nine year period.

Model and Test

Given that this is an exploratory study, a direct test of the hypothesis proved too expensive to undertake. Statistical techniques to derive the appropriate share and profit constraints require tremendous amounts of computer time.[10] Therefore, as a first approximation of the hypothesized relationship a test for differences in the actual profit and share performance of relatively large and relatively small banks was devised. This test is simply intended to establish whether or not relatively large and relatively small banks display the hypothesized patterns with respect to their profits and market share growth.

Since the exact point at which a bank would opt to maximize profits instead of market share was of little interest in this exploratory study, we simply split our sample into two segments based on the relative size of the bank within its relevant market. One segment included all banks with beginning (1969) market shares of 15 percent or more, i.e. our large bank segment. The second segment included all banks with beginning market shares of 3 percent or less, i.e. our small bank segment. This gives us two groups of banks, one relatively large the other relatively small. The profit or share growth objectives of banks in the mid-range (those with more than 3 percent of the market but less than 15) are more likely to differ among organizations than are the objectives of either the banks in the large or small bank groups. Therefore, an analysis of the relationship between bank profits and market share growth for banks in the large group relative to those in the small group should provide some indication of whether or not the two groups of banks perform as if they have significantly different objectives in conformity with the hypothesis.

The model used to gather empirical evidence took the following form:

$$\pi_{ij} = f(Ms_{ij}, Ab_{ij}, (DD/TD)_{ij}, R_{ij}, (C+I/TL)_{ij}, E\ Hc_{ij}$$

where:

π_{ij} = Profits =(Net Income/Total Assets of the ith bank in the jth market.)

Ms_{ij} = Change in the market share between 1969 and 1977 (Market Share 977 - Market Share 1969)

Ab_{ij} = Absolute size (Total Deposits in millions of dollars)) of the ith bank in the jth market in 1969.

$(DD/TD)_{ij}$ = Average ratio of the ith bank's demand to total deposits from 1969 to 1977.

R_{ij} = a risk measure which is the bank's average loan-to-asset ratio over the period relative to the market's loan-to-asset ratio.[11]

$(C+I/TL)_{ij}$ = the proportion of commercial and industrial loans to total loans held by the ith bank in the jth market averaged for 9 years.[12]

E = the number of new banks entering the market during the 1969 to 1977 period.

H_j = The average of the jth market's Herfindahl concentration ratios over the 9 year period.

Hc = a dummy variable which indicates whether or not the ith bank is a subsidiary of a bank holding company.

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[10] Ideally, to test the hypothesis in the form in which it is presented we would need a model in which a bank's market share and its profits are determined simultaneously. In addition, determination of the market share growth would require a profit constraint and determination of market profits would require a profit constraint. Maximum likelihood estimation may be used to identify the proper profit and share constraints, however, this procedure proved too expensive for the purpose at hand. Therefore, given that this is an exploratory study, an indirect test was devised in order to explore the relevance of the hypothesis without the elaborate direct test.

[11] $$R_{ij} = \frac{\left(\sum_{T}^{9} \frac{Lij}{Aij}\right)/9}{\left(\sum_{T}^{9} \sum_{i}^{N} \frac{Lij}{Aij}/N\right) 9}$$

[12] $$(C+I/TL)_{ij} = \sum_{T}^{9} \left(\frac{C+Iij}{TLij}\right)/9$$

Table. 1 Empirical Results on Relationship Between Profits and Share Growth for Large and Small Banks (With Bank Profits the Dependent Variable)

Classification of Bank Size	A Intercept	Ms_{ij}	Ab_{ij}	$(DD/TD)_{ij}$	R_{ij}	$(C+I/TL)_{ij}$	H_j	Hc	R^2	F	Cases
≤.03 market share Small Bank	.008826	−.075266 (1.66) xx	.000483 (2.80) xxx	.001872 (1.59) x	.000413 (0.31)	−009956 (3.22) xxx	.009440 (1.41) x	.000001 (0.88)	.07270	2.9903 Δ	275
≥.15 market share Large Bank	.012025	.024150 (2.45) xxx	−.000013 (0.61)	.000280 (0.34)	.001700 (1.25) x	−.002370 (0.49)	−.004326 (0.50)	−.000017 (1.42) x	.19560	3.3348 Δ	104
≤.03 or ≥.15 market share Large and Small Subset	.010708	.014973 (1.39) x	.000008 (0.38)	.001043 (1.35) x	.001607 (2.06) xx	−.006579 (2.66) xxx	.000102 (0.00)	.000001 (0.63)	.04841	2.6962 Δ	379
All Banks	.011252	.008887 (1.08)	−.000002 (0.09)	.001314 (1.78) xx	.000848 (1.44) x	−.007490 (3.83) xxx	−.000521 (0.13)	−.000001 (1.11)	.04372	3.8012 Δ	590

x = Significant at the .10 level.
xx = Significant at the .05 level – one tail t
xxx = Significant at the .01 level
Δ = F significant at the .01 level for all equations.

Given the hypothesis, we are interested in the relationship between the relative size of a bank and its profit and market share performance during the period. Specifically the expected relationship is:

Firm	Change in Market Share	Change in Profits
Small	>	<
Large	<	>

Therefore, we would expect the relationship between both small and large bank profits and changes in their market shares to be negative. Small banks would show lower profits as they gained market share and large banks would show higher profits as they lost market share. Since the signs of both share coefficients will not indicate whether or not the banks actually lost market share as profits increased (as we would expect case for large banks) or gained market share at the expense of profit (as we would expect for small banks), a scatter diagram was used to differentiate the two events.

The expected signs on the remaining independent variables were as follows: profits are expected to expand with absolute size of the bank, (the larger the absolute size of the bank the more probable is profit maximizing behavior); profits are expected to be positively associated with the banks' demand to total deposit ratio, (this ratio proxies the bank's cost of funds; therefore, the higher the ratio the lower the cost of funds, thus increasing the potential for higher profits); profits and risk are assumed to have a positive association, (as risk increases we expect higher returns); the proportion of the bank's loans allocated to commercial and industrial borrowers in a portfolio proxy which should be negatively associated with profits (commercial and industrial borrowers normally obtained preferred rates); the entry variable is expected to be positively associated with bank profits, the higher the level of bank profits the more attractive the market for new entrants; and, Hc or the holding company dummy variable is expected to be positively associated with bank profits (either because of deep pocket assumptions or potential economies associated with holding company organizational structure). The empirical results of estimating the model appear in Table I. As the table indicates, the model was run three times, once including only banks with 1969 market shares 15 percent or greater, once including only those banks with 1969 market shares of 3 percent or less, once including banks with either 3 percent or less of the market or 15 percent or more in 1969 and once for all banks.

The empirical results were mixed with respect to the hypothesis tested. The F test on all three

equations was significant at the .01 level. Each of the independent variables with significant (t) tests showed the expected conclusion except in the large bank category where both the change in market share and holding company affiliation variables showed signs opposite those expected. The relationship between holding company affiliation and profits for large banks was negative and significant at the .10 level. This would indicate that, at least for banks which are large relative to their markets, holding company affiliation is negatively associated with profits. This is an interesting finding but outside the scope of this particular study. The magnitude of the coefficient (.000016), however, is so small that although it is statistically significant, it is quantitatively very weak (a little over 1/10 of a percent).

The major unexpected occurrence was the relationship between profits and change in market share in the large bank category. As hypothesized, the relationship was expected to be negative, indicating that the greater the loss in market share the higher the profits. Instead, this relationship proved positive for large banks and significant at the .01 level. This surprisingly positive relationship indicates that, within the large bank category, the larger the loss in market share the lower the profits. To restate, the smaller the loss in market share or the larger the increase in market share the higher the profits. This relationship suggests that, at least for large banks in our sample, profit maximization and share maximization are not inconsistent objectives.

In order to get a visual picture of the relationship between changes in market share and profits, we ran scatter diagrams for both large and small banks. With the large bank category, scatters were run on all banks with 10 percent or more of market deposits, banks with 15 percent or more and banks with 20 percent or more of market deposits. The three groups all showed a significant positive relationship between change in market share and profits. Interestingly, as the criterion of bank size for each group increased—from a 10 percent market share, to 15 percent and then to 20 percent—the R^2 increased from .08 to .19 and the (t) values increased from 7.2 to 9.5. Those findings indicate that the relationship between changes in market share and profits became more predictable as the bank's market share increased in size.

Most importantly, however, two-thirds of all banks holding market shares of .10 or more in 1969 lost market share during the observation period. Three-fourths of the banks in the other large bank categories actually lost market share—those with market shares of .15 percent and greater, and those with 20 percent and more. In the large bank category, then, those banks that gave up smaller market shares during the observation period actually performed better in terms of profits than those that gave up more. In addition, larger banks that increased market share tended to enjoy higher profits than those showing declining market share. Therefore, it appears from this data that share maximizing behavior is not inconsistent with profit maximization for large banks.

For relatively small banks—those holding .03 percent or less of market deposits in 1969—there appears to be a tradeoff between share growth and profit growth. The hypothesized relationship between profits and change in market share for small banks is negative, and, as expected, the regression analysis shows a statistically significant negative relationship between change in market share and profits for this group. In addition, the scatter diagram of this relationship indicated that 82 percent of the small banks increased market share, contrasting sharply with the 75 percent of large banks showing decreases. The small banks' actual profit and share performance is consistent with the hypothesis that relatively small banks tended to emphasize share growth, accepting relatively small profits as they gained larger market shares during the period. Figure 2 compares the hypothesized relationship between profits and changes in market shares with the empirical findings.

The empirical relationship shows that the profit and market share performance of relatively small banks conforms to the hypothesis that profits and change in market share are inversely related. This same relationship was hypothesized for relatively large banks, but the empirical results show a positive relationship between the relatively large banks' profits and change in market share. In other words, as market share increases, profits increase. Therefore, small banks face a trade off between growth in market share and growth in profits which the large banks don't face. The large banks appear to increase profits by minimizing the market share loss or gaining market share.

Figure 2. Hypothesis Compared to Empirical Relationship of Large and Small Bank Profit Versus Market Share Experience

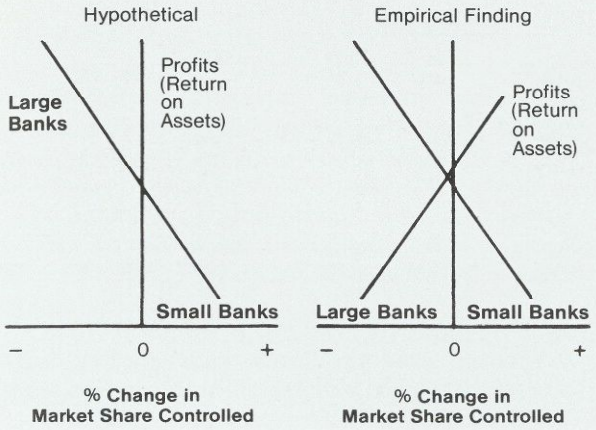

Table 2 shows the mean level of profits for small banks, large banks, and all banks represented in the sample as well as the standard deviation of profits within each of these groups.

Banks with relatively large market share tend to show higher profits than either small banks or the average of all banks. In addition, the large banks show less variation in profits than do small banks. It appears that large banks do in fact exercise their market power which results in slightly higher profit, approximately 7 percent greater return on assets than small banks. Although small banks tend to show lower profits than their larger counterparts, small banks tend to gain market share (82 showing positive growth in market share) while maintaining profits just slightly lower than the mean return on assets associated with the large banks. The mean levels of profits for large and small banks are not significantly different.

One conclusion we can draw is that small banks appear to be at no disadvantage in competing with their larger counterparts. The large banks appear to place more emphasis on profits than do small banks, but they also evidently attempt to minimize share loss or gain share in concert with their profit objectives. Thus the fact that small banks are capable of gaining market share given these circumstances without giving up much of their relative profitability indicates they can compete with their larger counterparts.

Table 2. Mean Level of Profits and Standard Deviation of Profits for Relatively Small Banks, Relatively Large Banks and All Banks.

	-1 Standard Deviation	Mean II	+Standard Deviation
Small Banks	.0046	.0103	.0160
Large Banks	.0066	.0110	.0154
All Banks	.0051	.0105	.0159

An analysis of the three equations presented in Table 1 indicates not only that the relationship between profits and changes in market share is significantly different for large and small banks but also that the model's ability to predict profit is reduced substantially when all banks are taken together (i.e. equation 3). Grouping the banks by relative share of the market increases our ability to predict market performance. This may be taken as another indication that the market behavior of large and small banks is significantly different. It also argues strongly for more research into the behavior of banks based on their relative market size.

In order to test the consistency of these findings with regard to market share performance we reorganized the variables in our model, allowing profits to become an independent variable and change in market share to become the dependent variable. Table III shows the results of rerunning the three equations.

The results of running the three equations a second time to evaluate market share are entirely consistent with the analysis of profit equation results. For relatively small banks profits were negatively associated with change in market share and statistically significant. Relatively large banks showed a statistically significant positive relationship between profits and change in market share. Relatively small banks tend to trade profits for increased market share and relatively large banks experience increased profits with increased market share. In addition the R^2 for both the relatively small bank sample and the large bank sample are higher than the R^2 for all banks taken together. This would again tend to indicate that small and large bank behavior is in fact different and that each group's behavior with respect to growth in market share is more predictable than all banks taken together.

Table 3. Empirical Results on Relationship Between Profits and Share Growth for Large and Small Banks (With Change in Market Share the Dependent Variable)

Classification of Bank Size	A Intercept	Profits	Ab_{ij}	$(DD/TD)_{ij}$	R_{ij}	$(C+I/TL)_{ij}$	E	Hc	R^2	F	Cases
Small Bank .03 market share or less	-.0004	-.1338 (1.66) xx	.0010 (4.22) xxx	-.0006 (.35)	.0071 (5.12) xxx	.0020 (.46)	.0002 (2.35) xxx	-.0000 (.17)	.149	6.7	275
Large Bank .15 market share or greater	-.0308	2.4554 (2.53) xxx	-.0000 (.08)	-.0099 (1.22)	.0042 (.37)	-.0531 (1.16)	-.0034 (2.11) xx	-.0002 (1.57)	-233	4.2	104
All Banks	.0050	.2156 (1.04)	-.0005 (5.48) xxx	-.0095 (2.58) xxx	.0025 (1.00)	-.0174 (1.70) xx	-.0004 (2.23) xx	-.0000 (.89)	1.06	9.8	590

x = Significant at the .10 level
xx = Significant at the .05 level - one tail t
xxx = Significant at the .01 level
F = Significant at the .01 level for all equations.

A final note of interest, the entry variable is statistically significant in each of the three equations. Entry, however, is positively associated with growth in small bank market share and negatively associated with larger bank growth in market share. This, again, indicates that small banks compete effectively against their larger counterparts.

Conclusion

In testing the hypothesis that large banks tend to be profit maximizers and that small banks tend to be share maximizers, we come to the following conclusions. First, the tests were structured as an indirect test of the hypothesis, but the results indicate a statistically significant difference in the profit and change in market share relationship between large and small banks. A statistical test of significance (Chow test) indicates the coefficients in the equation for large banks are significantly different from the coefficients in the small bank equation. This is true for both sets of equations, the set predicting profits as well as the set predicting change in market share. This gives further evidence that the profit performance relative to market share performance is in fact different for large and small banks.

Our major finding is that the profit and market share performance of large banks is significantly different from that of small banks. Small banks tend to experience a tradeoff between increases in their market share and profits, increasing market share at the expense of profits. Since the vast majority of small banks increased market share during the period, it appears they have a higher desire for share growth than do the larger banks, most of which gave up market share. On the other hand, our finding indicates that the relatively large banks do not experience a trade off between profits and growth in market share. To the contrary, it appears that relatively large banks may simultaneously maximize profits and market share. Given this difference and hence the probable difference in objectives of large and small banks, it is not hard to understand why the literature is full of studies that show such weak relationships between market structure and performance.

"Small banks tend to . . . increase market share at the expense of profits. . .[while] large banks may simultaneously maximize profits and market share."

Small banks show a higher propensity to acquire market share. Assuming that their actual performance represents an actual objective and not simply a mathematical necessity, small banks attempting to increase market share add to the competitiveness of the marketplace. But because large banks may undertake profit and share maximization behavior simultaneously and because the profit differential between large and small banks is so small, the competitive interaction of relatively small banks may retard the ability of large banks to acquire market share and hence profits. To this extent the consolidation of small banks into larger organizations may be detrimental to competition.

On the other hand, the fact that relatively large organizations may simultaneously maximize share and profits indicates that few organizations in a market may be necessary to provide adequate levels of competition. Along the same line, because the differential in return on assets to relatively large and small banks is so slight, relatively small banks appear to be at little competitive disadvantage in relation to large banks. It follows that small banks may then feel little pressure to consolidate with larger organizations to compete effectively. By simply reducing their aggressiveness and attempting to maintain share, they can improve their return on assets.[13]

[13]The finding that large relatively large banks appear to simultaneously maximize share and profits is consistent with either increasing returns to scale or constant returns to scale in banking. The relatively small profits differential between relatively large and relatively small banks would argue strongly for constant returns in banking. This seems to be consistent with most of the empirical work on economies of scale in banking.

—David D. Whitehead and Jan Lujytes

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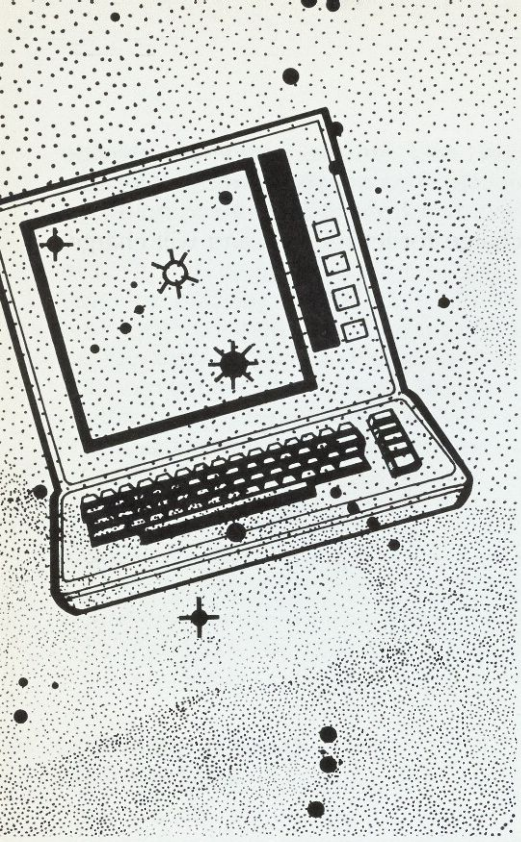


In payments system technology where there are significant economies of scale, small financial institutions may not necessarily suffer relative to large institutions. Shared networks and services promise to make sophisticated technology available to small institutions.

Future Payments System Technology: Can Small Financial Institutions Compete?

According to many of the studies cited elsewhere in this issue, the difference between unit operating costs at large and small financial institutions has been insignificant in the recent past. Even though small financial institutions appeared to have slightly lower unit costs for some payments system services, large institutions appeared to enjoy a slight unit cost advantage in others. Taken together, the respective "comparative advantages" seem to even out, making both large and small financial institutions formidable competitors.

Do these trends remain in effect? Will the historical trend of unit operating cost "parity" continue through the rest of the decade? This article addresses these questions and develops a model for the most-likely source of payments system services offered by small financial institutions.*

* This article's focus is not on large financial institutions versus small institutions in all facets of their operations; instead, it concentrates on payments system-related products and services offered by large and small financial institutions. It explores the impact of future technology on the traditional unit cost parity in payments systems among financial institutions of all sizes.

Generally speaking, this article refers to small financial institutions as commercial banks with less than $150 million in assets, savings, and loan institutions with less then $250 million in assets, and credit unions. Large financial institutions generally consist of commercial banks and savings and loan associations with assets in excess of the small financial institutions limits.

This article assumes that references to small banks in their payments system behavior are also generally applicable to the behavior of other small financial institutions. It assumes a similar relationship for large commercial banks and their large counterparts in other segments of the industry.

The term "technology" here refers to computer hardware and software, terminal devices, and electronic communication networks.

Finally, the article does not attempt to compare large and small financial institutions on a point and counterpoint basis. The emphasis is on whether payments system technology will be a friend or foe of small financial institutions in the 1980s.

The Situation Today

Other articles in this issue suggest that small banks enjoyed a slight edge in their payments system unit costs during the 1970s. What kinds of unit cost differences exist today?

Data in the Federal Reserve System's Functional Cost Analysis (FCA) show that similar trends continue. Recently released data for 1981, covering 614 commercial banks nationwide, show that:

> Interest-bearing checking accounts were most profitable at the smaller banks (deposits of $50 million or less), earning them $11.22 monthly per account....
> Medium-sized banks (deposits of $50 million to $200 million) earned $8.35 each month per account....
> The largest banks (more than $200 million in deposits) earned $5.77 per month on the accounts....
> The cost of administering a NOW account grew in all size groups over the previous year. Smaller banks again had the lowest administrative expenses. The accounts cost the smallest banks $6.06 monthly per account to handle. The medium banks had expenses of $6.69 per month per account. And it cost the largest banks $8.59 per account.[1]

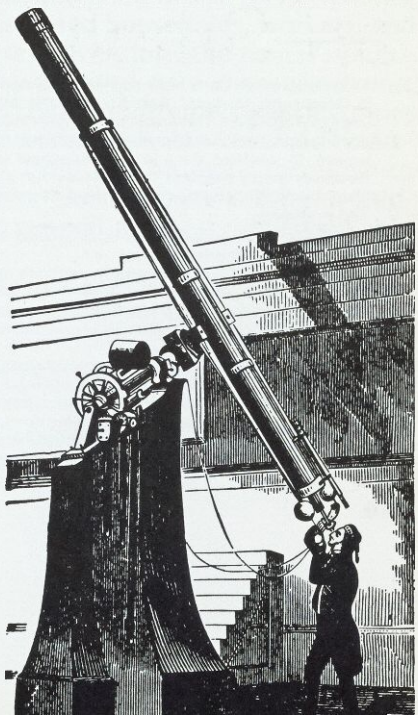
A review of other FCA data shows that the lowest-cost mantle varies between large and small financial institutions in the other payment systems. Time and savings deposits functions show variation too. Thus, when performance in all of these payments and deposit generating activities is netted out, the traditional overall parity remains generally intact.

The historical evidence implies that, so far anyway, payments system technology has not given either large or small financial institutions an insurmountable advantage in the delivery of such products as checking accounts, savings accounts, credit cards, and ATMs. Technological change during the 1970s and early 1980s did not appear to alter materially the unit cost parity between large and small financial institutions in payments system services.

The Status Quo Is Under Attack

During the rest of the 1980s, though, both the payments system (as now structured) and the traditional unit cost parity among financial institutions are expected to be altered in several respects. First, the Federal Reserve System has begun to charge for its services and will charge even more as attempts intensify to price all Fed float. Second, as Regulation Q is phased out, interest expenses on all kinds of deposits should escalate. Third, interstate banking is progressing on a de facto basis and is likely to become a legal activity before the decade is over. Fourth, savings and loan associations, mutual savings banks and credit unions are now providing such products as checking accounts, credit cards, ATMs and debit cards. Fifth, new players, offering payment services of one sort or another, are entering the arena—Sears, Merrill Lynch, and American Express to name a few. Sixth, backroom operations in the paper-based payment systems are labor and energy intensive. Costs in paper-based systems are expected to continue spiraling.

When itemized, these trends may sound foreboding to bankers. Yet such lists usually cite payments system technology as the salvation of financial institutions from these threatening trends. The general thrust of the technology argument is that computer and communications advances offer lower cost electronic alternatives to the paper-based payment systems and their gloomy future. Even more exciting, the argument contends that new, innovative alternatives to today's narrow, "me too" product lines can be designed and marketed electronically, at lower cost and with higher profit margins.



[1]Carson, Teresa. "Interest Bearing Accounts Gain, and So Does Their Profitability," **American Banker** (New York), August 19, 1982, p. 3

Explicit or implicit in many of these upbeat, technology-inspired forecasts is a suggestion that the future success of financial institutions will not only require use of this technology, but also use of large, networked payment systems. In other words, large financial institutions will be in the best position to reap the technological windfall and gain a unit cost superiority.

Many forecasts of this genre imply that electronic banking concepts are an important weapon in efforts to improve the nation's payments system. Such scenarios envision a necessary and desirable shakeout period as small, inefficient financial institutions are forced to merge or fold. The following prediction is typical of those anticipating much greater concentration in the industry:

> The financial services industry of the future is unlikely to consist of the same familiar types of institutions that we know today. It is not ordained that all or most commercial banks, savings and loans, mutual savings banks, credit unions, insurance companies, investment bankers and others of the old forms of financial institutions will survive. It is more likely that many of them will not.[2]

According to the shakeout theory, only large organizations have the capital and technical expertise to support large, complex electronic networks. One disagreement among proponents of this theory is the rate at which the transition will occur. In any case, the projected result for small financial institutions is an inevitable death—fast as with an electric chair or slow as with a Chinese water torture.

Such forecasts seem logical, tidy, neat and clean. But another scenario, just as plausible, is emerging to challenge the shakeout theory. The concepts embodied in the alternative theory are not new or unique. They have been evident in many other industries.[3] The alternative is based on the ease with which electronic products can be produced in large quantities for several smaller customers on a pooled or shared basis.

The divisibility theory, as it will be called here, suggests that the foreseeable technological trends are not the private preserve of an elite large few. Instead, the divisibility features of the new technology could offer even more unit cost competition between all sizes of financial institutions. More importantly, the new technology could lead to greater service differentiation and market segmentation than is now possible.

Likely Technological and Unit Cost Trends During the 1980s

To visualize fully the impact of payments system technology on financial institutions during the rest of this decade, let's review some of the general technological and cost trends expected during the 1980s. The review provides a preface for a more specific discussion of how technology can impact the payments system services of small financial institutions.

Inexpensive, powerful, computer hardware. Computing power will be less expensive and more accessible to households, small businesses, and small financial institutions. Whether we look at trends in the price-performance of large mainframe computers, minicomputers, or microcomputers, the cost of computing per calculation is declining. This article, for example, is being written with a microcomputer and word-processing

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[2]Kaufman, George, Larry Mote and Harvey Rosenblum, "Product Lines in Geographic Markets." **Bankers Monthly Magazine**. Volume 94 (May 15, 1982), p.22. This article, as do others that it is representative of does not suggest that all small financial institutions are expected to survive. By contrast, there is another school of thought, which the divisibility theory supports, that believes that a very large number of small financial institutions will survive—if they elect to do so and are well managed.

[3]A review of the history of the retail grocery industry provides another example of the divisibiity theory.

In the early years of this century, separate retail outlets typically sold separate lines of groceries, e.g., meat markets sold meat, dry goods grocers sold canned/packaged food products, and produce markets sold vegetables and fruits. Many of these outlets were proprietorships and often the owner lived on premise.

Then in the 1930s when the supermarket chain concepts began evolving, many industry forecasters predicted a shakeout of all proprietorships and specialized stores. The demise was expected to occur because small retailers were not expected to achieve the economies of scale available to the supermarket chains with their centralized buying, warehousing and distribution systems.

These forecasts ignored the easy divisibility of these centralized functions into lots usable by several smaller retailers on a cooperative basis. Wholesalers and cooperatives were established to support independent supermarkets as well as corner stores or "mom and pop" operativon. The divisibility theory enabled "independents" to achieve chain store economies of scale without the massive capital investment of a chain. The pooled resources of all the wholesaler's users/cooperatives's members were sufficient to compete with the large chain's economies of scale.

Granted the era did see the decline of the corner store concept in most areas of the country. Ironically another mutation, in the 1960s and 1970s, revived the corner store concept in a slightly different format and in a chain structure. The mutation is the convenience store where premium prices are charged for access to many supermarket items at locations or during hours when easy access to a supermarket is not possible.

Today, the retail grocery industry is a mixture of chain supermarkets, chain convenience stores, independent supermarkets, independent convenience stores, and specialty outlets such as meat martkets and produce markets. Their coexistence demonstrates how an easily divisible product, food, can be provided by organizations with many different organizational structures, with either similar shelf prices or with extra convenience at a premium price.

"The divisibility theory . . . suggests that the foreseeable technological trends are not the preserve of an elite few."

package that together cost less than $2,500. The memory capacity of this microcomputer equals the combined memory capacity of the IBM 1401 computers in four check reader-sorters, costing thousands of dollars per year in the early 1970s, at the Federal Reserve Bank of Atlanta.

Price-performance improvements are being accompanied by miniaturization. The four reader-sorters of 1970 required a large room with special electrical wiring, humidity control and temperature control. Today, memories of comparable size and power are available in desk-top and smaller computers requiring none of the special environmental support of earlier years.

These trends during the 1980s should produce an exponential growth in the sales of cheap memory and data storage devices. As a result, computing power will represent an exception to the resource scarcity now being faced with energy, strategic minerals, and even water. The surfeit of computing power will provide electronic payments with a significant price-performance advantage over more-labor intensive payment systems.

Inexpensive, user-friendly, computer programs. Canned, easy-to-use software for general management, as well as for payments products and services, will be readily available at reasonable prices. Much current literature on bank operations points out that programming costs are escalating rapidly and possibly threatening the economies that arise from automation and electronic payments.

These concerns are based on a traditional reliance on the in-house development of software. The rationale for in-house software development has been that a particular financial institution is unique and cannot possibly use software written for another financial institution. Unfortunately for those adhering to the in-house philosophy, some small financial institutions are living proof that several organizations can use the same software and even share a large computer system. Instead of owning the entire rock, so to speak, small financial institutions are finding ways to own just the pieces of a larger rock that they need in their organization.

Thus the idea that software development costs are rising and will continue to rise needs to be tempered with the realization that an individual financial institution may actually reduce software expenses during the 1980s by moving from proprietary, in-house software to canned or shared software concepts.

Inexpensive electronic communications. Advances in communications technology will lead to less expensive movement of information between locations. As energy and other air or surface transportation costs continue to rise, electronic transmission of information will become a greater bargain.

Wide-scale networking. Intelligent termials, costing under $200 a unit, should facilitate electronic access of households and small businesses to a wide array of products and services. Such terminals, linked to inexpensive computer hardware, user-friendly software, and inexpensive electronic communications networks, will create an electronic network with inestimable impact. Among the products and services readily adaptable to such a network are those often referred to as "home banking" services.

New concepts of "branch" banking. The cost advantages of electronic banking will lead to the demise of extensive networks of brick-and-mortar, full-service banking facilities. Many facilities will be replaced with a wider distribution of ATMs, home terminals, and point-of-sale (POS) systems.

More sophisticated households, workers, and small businesses. Over time, the nation's population is being exposed to a more electronic world. Today's children, are growing up in a more computerized world. The work force and household bases of 1990 will be more receptive to price-competitive electronic alternatives for existing services, in general, and payments services in particular.

Tomorrow's small businessman and consumer will be more knowledgeable and sophisticated in selecting and using credit, payment, and investment vehicles. Idle, non-earning balances left with financial institutions will continue their movement into easily accessible accounts/investment vehicles. Widespread use of such vehicles

should virtually eliminate demand deposits as a low-cost source of funds for financial institutions. Accordingly, financial institutions can be expected to rely less on spread income and more on fee income.

Finally, the trend throughout American industry and trade will continue to be away from blue collar jobs toward technical and white collar occupations. In the financial industry, the trend translates to less reliance on clerical work forces and more emphasis on technically skilled professional staffs that are comfortable working with a more computerized environment.

These technological trends will drastically change the unit cost structure for financial institutions. Donald G. Long, a finance industry consultant with IBM Corporation, recently summarized the anticipated impact of these technological trends on the unit cost of several payments system products. The following unit cost trends are excerpted from his recent article in the **Journal of Bank Retailing:**

> **Branch Automation.** In the traditional office, an average transaction accepted by a teller over the counter without on-line capability at the teller station cost 61 cents in 1981. At a conservative 6 percent compound rate of growth, the cost will be 82 cents in 1986. Providing full function on-line capability at the teller window could reduce that cost by approximately 21 percent to 48 cents....
>
> **Automated Teller Machines (ATMs).** While the figure is not directly comparable to the above because of differences in transaction mix, the cost per transaction of an ATM doing 6,000 transactions per month exclusive of inquiries is approximately 28 cents . . . .A major additional consideration is that the very high component of technology involved in this service delivery mechanism can significantly reduce the rate of cost growth. Based on this , I estimate that the same volume and transaction mix on the ATM in 1986 will average 30 cents per transaction . . . .
>
> **Point-of-Sale**. At the merchant point-of-sale, the current cost of a check accepted for goods or services is approximately 39 cents of merchant cost (57 cents general merchandise retailer and 33 cents supermarket skewed to reflect the majority of such checks in supermarkets) and 9 cents net bank cost (13 cents handling and processing less 4 cents deposit charges per item). This POS financial transaction cost could be reduced to about 31 cents (27 cents merchant cost and net 4 cents bank cost) through the use of an on-line debit card system providing both electronic authorization and data capture....
>
> **The Automated Clearinghouse....**A recent study sponsored by the Bank Administration Institute estimated the cost to the bank of an EFT deposit at 7 cents versus 24 cents for an over-the-counter teller deposit and 59 cents for a bank-by-mail deposit....
>
> **Home Banking....**The net cost to the payor, biller, and bank of a payment made by mail exceeds 65 cents. Providing a "Model T" capability, such as telephone bill payment, can reduce that net cost to less than 30 cents.[4]

Clearly, payments system technology is positioned to play a strong role in the unit costs of financial services and products as the decade unfolds. Yet as formidable as these technological trends and the unit cost projections may seem, they still skirt the original question: What does technology hold in store for unit costs at small financial institutions?

Impact of Payments Technology On Small Financial Institutions' Unit Costs

Small financial institutions probably will not generate sufficient volumes in electronic payment systems to develop proprietary, completely in-house hardware, software, and communications functions. But, just as obviously, the divisibility theory permits shared efforts that can achieve, collectively, the break-even volumes to be price-competitive with larger financial institutions.[5] Let's explore some of the implications of the divisibility theory further.

First, regulators have tended to require small banks to maintain higher capital ratios than large banks. One often-stated reason is that small

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[4]Long, Donald G. "The Business Case for Electronic Banking," **Journal of Retail Banking**, Volume 4 (June 1982), pp. 19-20.

[5]Please see Appendix A, Transaction Volumes and Unit Costs, for a more thorough description of the concepts involved in economies of scale for an electronic payment product/service and how the divisibility theory makes these economies available to small financial institutions.

Table 1. Primary Source of Computer Processing
Percent of banks by asset size in millions of dollars

Processing source	Under $100			$100–$500			$500 and above		
	1974	1977	1980	1974	1977	1980	1974	1977	1980
On-premise operations	9%	15%	24%	62%	58%	45%	77%	82%	75%
Holding co. arrangement	10	12	12	12	17	19	17	13	18
Correspondent bank	58	52	41	7	7	11	1	0	1
Joint venture	5	4	2	6	5	4	0	1	1
Facilities management	8	5	6	10	6	9	5	3	4
Servicing by non-bank	8	10	13	3	9	10	0	1	0
Other	0	0	2	0	0	2	0	0	1

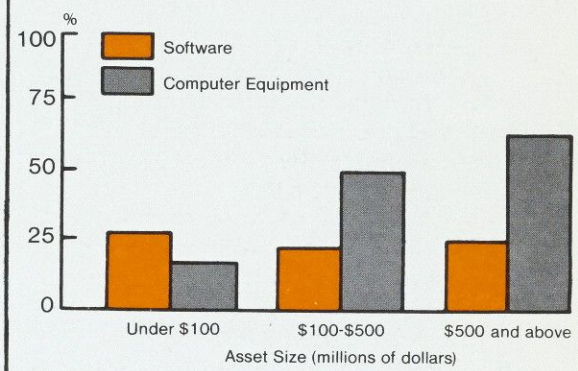
Source: "Operations/Automation Scoresheet: compare your bank with its peers," **ABA Banking Journal**, vol. 74 (Feb. 1982), p. 98.

financial institutions experience more risk because of their size. However, one risk not usually discussed is the relative automation investment of large versus small financial institutions.

Table 1 shows the primary sources of computer processing for small, medium and large banks as determined from responses to the American Bankers Association's Operations and Automation Surveys in 1974, 1977 and 1980. Large banks typically use in-house equipment and much in-house software. Small banks rely much more frequently on third-party sources. Conversations with vendor representatives indicate that, with few exceptions, small banks use canned software even if they have in-house processing capability.

Exhibit 1 (chart and table) shows the much larger percentage increase in expenditures for hardware and software that large banks anticipate in comparision with small banks. At a time when banks are experiencing new competitive pressures and squeezed profit margins, it appears that a significantly greater proportion of large bank expense and investment resources will be tied up in automation efforts. In contrast, small banks are buying what they need, in the quantity they need, when they need it. The latter approach would seem to carry less risk.

Exhibit 1. Projected Hardware/Software Expenditures per Bank - 1982



Average Hardware/Software Expenditures per Bank

	Asset Size (millions of dollars) Under $100	$100-$500	$500 and Above
Computer Equipment	($000s)	($000s)	($000s)
1980-actual	39	198	1,978
1981-budgeted	48	222	2,229
1982-anticipated	50	242	2,482
Software			
1980-actual	11	24	180
1981-budgeted	11	33	258
1982-anticipated	13	36	298

Source: Operations/Automation Scoresheet: Compare your bank with its peers," **ABA Banking Journal**, Vol. 74 (Feb. 1982), p. 96.

Why? A large bank is likely to be heavily committed and heavily invested in a software/hardware system that becomes prematurely obsolete from the rapid innovation spawned by a highly competitive marketplace. As a result, it will feel management pressure either to continue offering an obsolete product or service until the initial investment has been recouped or to drop the incompletely depreciated product, taking a heavy loss on the initial investment. On the other hand, a small bank, using third-party suppliers, can change products or services as the market dictates with much less internal financial impact. Divisibility, in a sense, decreases small bank automation risk and increases small bank ability to respond to a rapidly changing marketplace.

"A large bank is likely to be heavily committed and heavily invested in a software/hardware system that becomes prematurely obsolete. . . ."

Second, there are several indications that the economies of scale in payment systems now require volumes larger than are achievable even at large financial institutions. For example, during the past year several large financial institutions have turned their Visa and/or Mastercard back-room operations over to a third party. Almarin Phillips, Professor of Economics, Law and Public Policy at the University of Pennsylvania, recently predicted:

> Economies of scale in funds management, distribution, and in the electronic and mechanical aspects of clearing mean that many institutions will be unable independently to enter new markets with new products, or indeed, competitively to maintain their old services in their old markets....In many respects, the sharing of product offerings, with compatible hardware and software and general customer recognition is highly procompetitive. It keeps in the marketplace numbers of firms that would otherwise disappear; it also makes entry easier if procompetitive, non-exclusionary participations are allowed.[6]

Perhaps it is the large financial institutions that will become more like their small brethren with respect to automation resources. Perhaps it is the small institution's approach to harnessing automation resources that kept its unit costs so competitive during the last decade. If so, the small financial institution is really the automation model for the 1980s, not the large financial institution. If so, the divisibility theory actually has a broader application than once visualized.

Third, networking opens up markets for smaller financial institutions that were not profitably serviceable in the traditional payments system environment. William S. Anderson, chairman of NCR Corporation, observes that:

> A score of regional EFT networks in the United States—each capable of providing retail banking services over a broad geographic area—have now been organized. It is only a matter of time until full-scale national networks of this type, as well as international networks will be in operation. When that occurs, any bank regardless of location or size will at least theoretically have the entire world as its market.[7]

In this respect, technology opens new doors of opportunity for small financial institutions. Surely it would be naive to believe that small institutions can provide mass-market products nationally or internationally. But it does not seem naive at all to think that small financial institutions could use this technological windfall in certain well-defined market segments.

A good example of how new technology can be accessed by large and small institutions is the sweep and invest feature now being marketed by several large and small institutions in conjunction with their checking accounts for large balance customers. The size of the financial institution does not appear to be a deterrent to offering this feature. In fact, the sweep and invest feature offered by many large and small institutions is being obtained from the same third-party source.

Fourth, the literature in support of the shakeout theory seems to ignore a major question: Where

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[6]Phillips, Alamarin. "Financial Institutions in a Revolutionary Era," **Journal of Credit Union Management and Economics**, Volume 2 (Spring 1982), p. 17.

[7]Anderson, William S. "Electronic Funds Transfer is Reaching the Point-of-Sale," **American Banker** (New York), July 28, 1982, p. 58.

will large financial institutions obtain the financial wherewithal to go on a merger binge? Raoul D. Edwards, senior editor, **United States Banker**, suggests that a source is not available. Therefore, he observes:

> What has happened is a new and less certain economic pattern, marked increasingly by shrinking earnings margins, escalating labor costs, increasing pressures on the bottom line—and a consequent reluctance to make the kind of massive commitment implicit in major acquisitions. Some deals will still get made; the joining of a good sized pair of banks as equals, where no dilution of value occurs, for example. But no one in today's environment wants to go out and buy up a bunch of smaller institutions at book-and-a-half or two-time book, especially if their own stock is selling under book.[8]

According to Edwards, a major shakeout of small financial institutions is unlikely. What is likely is that technology will be the tool with which all financial institutions will attempt to offer products and services equal to or better than those in the past, but at a lower price and, hopefully, a better profit margin.

The same article that presented Edwards' scenario touched on a point that bears amplification here as a potential advantage for small financial institutions in the competition of the 1980s:

> This (trend) means that the vendor of products will increasingly find his market opening up at the bottom. Moreover, the range of services he can sell will broaden....
>
> The vendor who recognizes this and prepares for the new market is going to find it large and growing; the banker who understands this will find his options will be far greater, far more useful, than ever before.[9]

If vendors behave in this manner, small financial institutions will find more, not fewer, potential sources of supply for their hardware, software, technical, product, and service support in the 1980s than they can find now. If we assume that more vendors mean more price competition, then small financial institutions could find more of a "buyer's market" when shopping for suppliers than will large financial institutions deeply engrossed in more complex, longer lead time efforts to develop proprietary products and services. If so, intense price-performance competition among vendors will help cap potential cost increases for small institutions. If so, the divisibility theory provides them yet another benefit.

Fifth, minicomputers—and now microcomputers—constitute new technological weapons for small businesses and small financial institutions. Their full benefit has not been tapped yet by small institutions. Admittedly, their impact transcends the payments system functions of financial institutions.

Until the advent of microcomputers, only large businesses and financial institutions could afford automated planning and control. Robert H. Long, president of Long, Inc., and editor of Microbanker, recently wrote in **The Southern Banker** that:

> The microcomputer is one of the first pieces of technology that places a potent competitive weapon in the hands of community bankers—a piece of technology that can help them competitively serve the more profitable markets and reposition themselves for success in a deregulated environment. Large banks will use them the same way, but the effect will not be as dramatic.[10]

Stated another way, large financial institutions achieved the major planning and control software on their large computer systems during the last decade. Thus, for large banks, microcomputers will esentially serve as "fine tuning" devices. But microcomputers provide the first reasonable method for small financial institutions to achieve the management and operations improvement economies available from scientific planning and control processes. The "quantum leap," so to speak, could help small financial institutions improve their efforts to control expenses and to make better product/service decisions.

In the process, the comparative advantages of sophisticated management processes at large financial institutions will trickle down to small

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[8]Edwards, Raoul D. "The Vendor and Changing Worlds," **United States Banker**, Volume 93 (May 1982), p. 68

[9]**Ibid.**, pp. 68 and 71.

[10]Long, Robert H. "Welcome Micro Technology," **The Southern Banker**, Volume 158 (July 1982), p. 26.

"Small financial institutions could even enjoy a unit cost advantage over large institutions during the 1980s."

institutions. As a result, large financial institutions would lose one of their significant comparative advantages in unit cost control. The ability of small financial institutions to compete would be enhanced as this aspect of the divisibility theory materializes.

Will Unit Cost Parity Be Sustained in the 1980s?

Unfortunately, our research uncovered little quantitative data that address the question. Much qualitative information was found to structure a logical argument for or against continued unit cost parity. Technology, as represented in the divisibility theory, appears to provide small financial institutions with an enhanced ability to compete. The preceding discussion suggests that technology in the 1980s will trickle down to small financial institutions bringing many of the beneficial management control processes and systems once the province of large financial institutions with large computer installations.

The divisibility theory also suggests that the sourcing model for financial institutions during the 1980s will not be the in-house proprietary route so often favored by large financial institutions during the 1970s. Instead, the most cost-effective alternative appears to be the third-party, shared systems concepts practiced so effectively by small financial institutions during these years. The small financial institution's approach is also more flexible and more capital conservative, no small considerations in the volatile, unpredictable marketplace of the 1980s.

On the basis of the qualitative information we have reviewed, it appears that unit cost parity is possible for small financial institutions in the 1980s. More significantly, evidence suggests that small financial institutions could even enjoy a unit cost advantage over large institutions during the 1980s.

If the number of small financial institutions contracts during the 1980s, the contraction should not be caused by a lack of state-of-the-art technology at competitive prices for small institutions. Other causes will need to be sought if such a contraction occurs.

The Bottom Line

Future payments system technology appears unlikely to prevent small financial institutions from competing effectively during the 1980s. In fact, there are several indications that the benefits of the divisibility theory are so attractive that small institution sourcing arrangements will become the norm with many large financial institutions as well. The available quantitative evidence, albeit sparse, indicates that future payments system technology should not hinder the competitiveness of small institutions.

But any elation over this conclusion needs strong qualification. Technology will not save a financial institution—large or small—that is not well managed. Harnessing new technology is just one of the many responsibilities that management must oversee. Payments system technology is merely a tool by which an organization can achieve results in its payments activities. Without sound management, technological advances will not achieve the cost benefits potentially available to all financial institutions.

—**Paul F. Metzker**

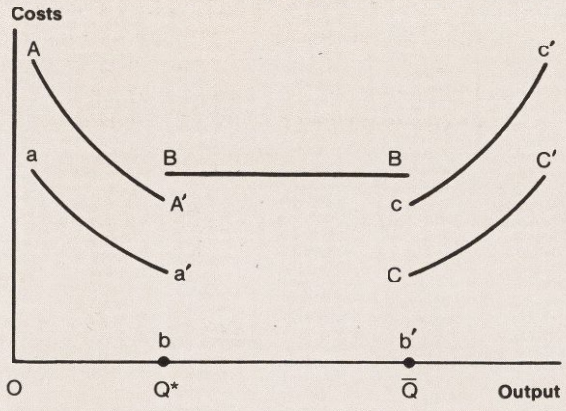
APPENDIX A

TRANSACTION VOLUMES AND UNIT COSTS

The following discussion is excerpted from an article by David A. Walker, associate professor, Georgetown University, titled "Electronic Funds Transfer Issues and Experience: What Credit Unions Should Consider," and published in the **Journal of Credit Union Management and Economics**, Volume 2 (Spring 1982), pp. 5-6.

> Besides the absolute costs of developing EFT systems, the per unit costs are a major concern. The average cost per transaction (total costs divided by total transactions) over the long run is used to judge whether or not there are economies of scale associated with an economic activity. If average costs decline as output (transactions) increase, economies of scale exist and the marginal cost per unit (additional cost for an additional transaction) is below the average cost in this transaction range.
>
> Two economic approaches have been applied to developing cost models for financial services. One approach assumes that average costs decline, or remain constant, or increase throughout the relevant output range; and curve is selected, from among ones shaped like AA', BB', or CC', respectively, in Figure 1. The relevant marginal cost relationships for these three cases are aa', bb', or cc', respectively. The second, broader approach is to assume that average costs decline at low output levels (0 to Q*) and then begin to rise beyond some higher output level (Q); in this approach, instead of selecting one of the three possibilities from Figure 1, all three are presumed to represent parts of the relationship as shown in Figure 2.

Figure 1

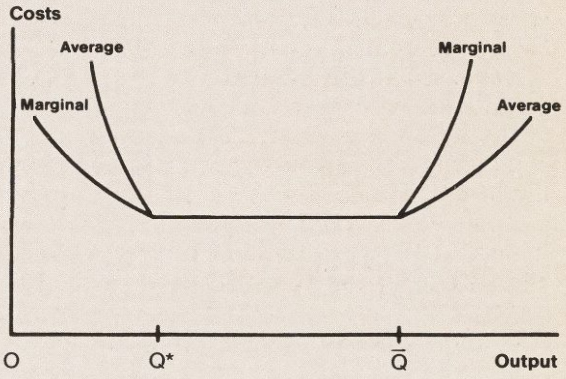


> The empirical evidence on the average and marginal costs per EFT transaction is very meager.... It appears that average costs per transactions decline as cash dispenser and automated teller transactions increase (as shown in Figure 2). Lower average costs are expected to be observed until approximately 45,000 transactions per month (Q* in Figure 2) occur at a particular retail terminal.

The preceding discussion shows how economies of scale can be measured in an EFT system. Walker's example pertains to a single cash dispenser or ATM. The same basic rationale applies to a payment product, overall, offered by a financial institution. More importantly, using Figure 2 in Walker's discussion, it is possible to show how the divisibility theory benefits small financial institutions.

A small financial institution quite possibly can only generate a volume of transactions in the range of 0 to less than Q*. If so, the small institution is not operating in the portion of the cost curves that allows its unit costs to be most competitive with larger competitors. But, if several small financial institutions use a third-party source, their combined transaction volume will more than likely allow them to operate in the Q* to 0 range of the cost curves. In this range, each of the small financial institutions will achieve unit costs that are competitive with larger institutions.

Figure 2



O to Q*	average costs may decrease as ouptut increases *(economies of scale);*
Q* to Q̄	average costs may remain constant as output increases *(constant returns to scale);*
above Q̄	average costs may increase as output increases *(diseconomies of scale).*

FINANCE

STATISTICAL SUPPLEMENT

$ millions	SEPT 1982	AUG 1982	SEPT 1981	ANN. % CHG.		SEPT 1982	AUG 1982	SEPT 1981	ANN. % CHG.
UNITED STATES									
Commercial Bank Deposits	1,170,291	1,163,103	1,051,230	+ 11	Savings & Loans				
Demand	282,892	286,095	287,174	- 1	Total Deposits	534,675	534,363	511,245	+ 5
NOW	59,257	58,171	45,362	+ 31	NOW	10,649	10,519	6,713	+ 59
Savings	149,974	150,116	150,193	- 0	Savings	91,577	91,963	94,014	- 3
Time	704,138	695,861	594,949	+ 18	Time	433,178	432,781	410,260	+ 6
Credit Union Deposits	48,930	49,479	37,581	+ 30		JUL	JUN	JUL	
Share Drafts	3,153	3,324	2,268	+ 39	Mortgages Outstanding	501,678	503,964	507,767	- 1
Savings & Time	41,962	42,093	33,090	+ 27	Mortgage Commitments	15,865	16,753	17,135	- 7
SOUTHEAST									
Commercial Bank Deposits	124,831	124,861	112,286	+ 11	Savings & Loans				
Demand	32,456	33,180	33,025	- 2	Total Deposits	78,877	78,882	74,933	+ 5
NOW	7,649	7,536	5,746	+ 33	NOW	1,704	1,696	1,025	+ 66
Savings	14,656	14,673	14,762	- 1	Savings	11,536	11,558	11,765	- 2
Time	72,434	72,160	61,659	+ 17	Time	65,809	65,727	62,031	+ 6
Credit Union Deposits	4,617	4,634	3,534	+ 31		JUL	JUN	JUL	
Share Drafts	302	330	244	+ 24	Mortgages Outstanding	69,736	69,968	74,120	- 6
Savings & Time	3,896	3,880	3,061	+ 27	Mortgage Commitments	2,981	3,117	3,608	- 17
ALABAMA									
Commercial Bank Deposits	13,886	13,953	12,903	+ 8	Savings & Loans				
Demand	3,300	3,439	3,279	+ 1	Total Deposits	4,530	4,517	4,339	+ 4
NOW	672	653	509	+ 32	NOW	91	89	53	+ 72
Savings	1,557	1,557	1,564	- 0	Savings	544	546	595	- 9
Time	8,767	8,715	7,844	+ 12	Time	3,926	3,908	3,710	+ 6
Credit Union Deposits	837	815	551	+ 52		JUL	JUN	JUL	
Share Drafts	59	64	48	+ 23	Mortgages Outstanding	3,957	3,946	4,010	- 1
Savings & Time	677	654	494	+ 37	Mortgage Commitments	47	78	94	- 50
FLORIDA									
Commercial Bank Deposits	40,620	40,642	37,034	+ 10	Savings & Loans				
Demand	11,298	11,605	11,875	- 5	Total Deposits	47,661	47,681	45,369	+ 5
NOW	3,313	3,268	2,504	+ 32	NOW	1,158	1,155	718	+ 61
Savings	6,176	6,180	6,332	- 2	Savings	7,689	7,693	7,821	- 2
Time	20,349	20,293	17,142	+ 19	Time	38,810	38,783	36,648	+ 6
Credit Union Deposits	2,083	2,116	1,602	+ 30		JUL	JUN	JUL	
Share Drafts	165	183	139	+ 19	Mortgages Outstanding	41,191	41,364	45,173	- 9
Savings & Time	1,640	1,647	1,253	+ 31	Mortgage Commitments	2,345	2,519	3,041	- 23
GEORGIA									
Commercial Bank Deposits	17,375	17,400	15,150	+ 15	Savings & Loans				
Demand	5,772	5,911	5,757	+ 0	Total Deposits	9,869	9,898	9,559	+ 3
NOW	1,101	1,089	835	+ 32	NOW	193	190	107	+ 80
Savings	1,637	1,635	1,584	+ 3	Savings	1,176	1,190	1,221	- 4
Time	9,656	9,623	7,912	+ 22	Time	8,598	8,599	8,251	+ 4
Credit Union Deposits	855	853	689	+ 24		JUL	JUN	JUL	
Share Drafts	29	32	19	+ 53	Mortgages Outstanding	8,996	9,062	9,476	- 5
Savings & Time	775	773	659	+ 18	Mortgage Commitments	167	171	140	+ 19
LOUISIANA									
Commercial Bank Deposits	22,859	22,758	20,299	+ 13	Savings & Loans				
Demand	5,758	5,876	5,855	- 2	Total Deposits	7,898	7,893	7,215	+ 9
NOW	1,071	1,036	776	+ 38	NOW	110	111	62	+ 77
Savings	2,428	2,448	2,395	+ 1	Savings	1,215	1,223	1,193	+ 2
Time	13,989	13,888	11,754	+ 19	Time	6,591	6,585	5,973	+ 10
Credit Union Deposits	123	126	95	+ 29		JUL	JUN	JUL	
Share Drafts	9	10	6	+ 50	Mortgages Outstanding	7,332	7,331	7,047	+ 4
Savings & Time	116	116	88	+ 32	Mortgage Commitments	281	229	222	+ 27
MISSISSIPPI									
Commercial Bank Deposits	10,375	10,372	9,330	+ 11	Savings & Loans				
Demand	2,296	2,205	2,239	+ 3	Total Deposits	2,466	2,436	2,387	+ 3
NOW	555	571	426	+ 30	NOW	52	53	26	+100
Savings	736	733	733	+ 0	Savings	232	228	236	- 2
Time	6,999	6,993	6,142	+ 14	Time	2,197	2,168	2,132	+ 3
Credit Union Deposits	N.A.	N.A.	N.A.			JUL	JUN	JUL	
Share Drafts	N.A.	N.A.	N.A.		Mortgages Outstanding	2,177	2,180	2,206	- 1
Savings & Time	N.A.	N.A.	N.A.		Mortgage Commitments	20	20	34	- 41
TENNESSEE									
Commercial Bank Deposits	19,716	19,736	17,570	+ 12	Savings & Loans				
Demand	4,032	4,144	4,020	+ 0	Total Deposits	6,453	6,457	6,064	+ 6
NOW	937	919	696	+ 35	NOW	100	98	59	+ 69
Savings	2,122	2,120	2,154	- 1	Savings	680	678	699	- 3
Time	12,674	12,648	10,865	+ 17	Time	5,687	5,684	5,317	+ 7
Credit Union Deposits	719	724	597	+ 20		JUL	JUN	JUL	
Share Drafts	40	41	32	+ 25	Mortgages Outstanding	6,083	6,085	6,209	- 2
Savings & Time	688	690	567	+ 21	Mortgage Commitments	121	100	77	+ 57

Notes: All deposit data are extracted from the Federal Reserve Report of Transaction Accounts, other Deposits and Vault Cash (FR2900), and are reported for the average of the week ending the 1st Wednesday of the month. This data, reported by institutions with over $15 million in deposits as of December 31, 1979, represents 95% of deposits in the six state area. The major differences between this report and the "call report" are size, the treatment of interbank deposits, and the treatment of float. The data generated from the Report of Transaction Accounts is for banks over $15 million in deposits as of December 31, 1979. The total deposit data generated from the Report of Transaction Accounts eliminates interbank deposits by reporting the net of deposits "due to" and "due from" other depository institutions. The Report of Transaction Accounts subtracts cash in process of collection from demand deposits, while the call report does not. Savings and loan mortgage data are from the Federal Home Loan Bank Board Selected Balance Sheet Data. The Southeast data represent the total of the six states. Subcategories were chosen on a selective basis and do not add to total. N.A. = fewer than four institutions reporting.

EMPLOYMENT

	AUG 1982	JUL 1982	AUG 1981	ANN. % CHG.		AUG 1982	JUL 1982	AUG 1981	ANN. % CHG.
UNITED STATES									
Civilian Labor Force - thous.	111,887	112,526	110,099	+ 2	Nonfarm Employment- thous.	89,195	89,362	91,087	- 2
Total Employed - thous.	101,177	99,732	102,152	- 1	Manufacturing	18,793	18,725	20,370	- 8
Total Unemployed - thous.	10,710	11,036	7,947	+35	Construction	4,167	4,149	4,431	- 6
Unemployment Rate - % SA	9.8	9.8	7.3		Trade	20,547	20,598	20,664	- 1
Insured Unemployment - thous.	-	-	-		Government	14,902	15,082	15,097	- 1
Insured Unempl. Rate - %	-	-	-		Services	19,191	19,209	18,771	+ 2
Mfg. Avg. Wkly. Hours	39.0	39.0	39.9	- 2	Fin., Ins., & Real Est.	5,429	5,422	5,374	+ 1
Mfg. Avg. Wkly. Earn. - $	332	333	320	+ 4	Trans. Com. & Pub. Util.	5,048	5,051	5,180	- 3
SOUTHEAST									
Civilian Labor Force - thous.	14,329	14,329	13,901	+ 3	Nonfarm Employment- thous.	11,264	11,300	11,386	- 1
Total Employed - thous.	12,936	12,902	12,844	+ 1	Manufacturing	2,154	2,144	2,313	- 7
Total Unemployed - thous.	1,392	1,428	1,056	+32	Construction	674	678	746	-10
Unemployment Rate - % SA	9.7	9.4	7.6		Trade	2,669	2,679	2,651	+ 1
Insured Unemployment - thous.	-	-	-		Government	2,039	2,063	2,045	- 0
Insured Unempl. Rate - %	-	-	-		Services	2,234	2,241	2,142	+ 4
Mfg. Avg. Wkly. Hours	39.1	38.8	40.4	- 3	Fin., Ins., & Real Est.	641	643	635	+ 1
Mfg. Avg. Wkly. Earn. - $	288	285	278	+ 4	Trans. Com. & Pub. Util.	697	698	700	- 0
ALABAMA									
Civilian Labor Force - thous.	1,690	1,704	1,658	+ 2	Nonfarm Employment- thous.	1,319	1,323	1,347	- 2
Total Employed - thous.	1,450	1,454	1,483	- 2	Manufacturing	334	333	366	- 9
Total Unemployed - thous.	240	250	175	+37	Construction	63	63	67	- 6
Unemployment Rate - % SA	14.1	13.6	10.5		Trade	272	272	273	- 0
Insured Unemployment - thous.	-	-	-		Government	291	295	281	+ 4
Insured Unempl. Rate - %	-	-	-		Services	213	214	211	+ 1
Mfg. Avg. Wkly. Hours	39.3	38.8	40.1	- 2	Fin., Ins., & Real Est.	60	60	60	0
Mfg. Avg. Wkly. Earn. - $	284	282	282	+ 1	Trans. Com. & Pub. Util.	71	71	72	- 1
FLORIDA									
Civilian Labor Force - thous.	4,865	4,854	4,603	+ 6	Nonfarm Employment- thous.	3,699	3,721	3,660	+ 1
Total Employed - thous.	4,486	4,489	4,294	+ 4	Manufacturing	443	440	466	- 5
Total Unemployed - thous.	379	365	308	+23	Construction	255	258	290	-12
Unemployment Rate - % SA	7.7	7.3	6.4		Trade	1,004	1,011	973	+ 3
Insured Unemployment - thous.	-	-	-		Government	572	586	568	+ 1
Insured Unempl. Rate - %	-	-	-		Services	906	908	853	+ 6
Mfg. Avg. Wkly. Hours	38.6	38.3	40.4	- 4	Fin., Ins., & Real Est.	278	279	272	+ 2
Mfg. Avg. Wkly. Earn. - $	274	271	267	+ 3	Trans. Com. & Pub. Util.	231	230	227	+ 2
GEORGIA									
Civilian Labor Force - thous.	2,694	2,692	2,610	+ 3	Nonfarm Employment- thous.	2,150	2,149	2,180	- 1
Total Employed - thous.	2,494	2,473	2,452	+ 2	Manufacturing	495	492	523	- 5
Total Unemployed - thous.	200	219	158	+27	Construction	100	100	104	- 4
Unemployment Rate - % SA	7.2	7.6	5.7		Trade	497	497	503	- 1
Insured Unemployment - thous.	-	-	-		Government	424	425	421	+ 1
Insured Unempl. Rate - %	-	-	-		Services	368	368	362	+ 2
Mfg. Avg. Wkly. Hours	39.2	38.6	40.4	- 3	Fin., Ins., & Real Est.	117	117	115	+ 2
Mfg. Avg. Wkly. Earn. - $	265	262	257	+ 3	Trans. Com. & Pub. Util.	142	143	145	- 2
LOUISIANA									
Civilian Labor Force - thous.	1,907	1,901	1,872	+ 2	Nonfarm Employment- thous.	1,609	1,613	1,635	- 2
Total Employed - thous.	1,700	1,685	1,719	- 1	Manufacturing	197	198	216	- 9
Total Unemployed - thous.	207	216	152	+36	Construction	133	134	159	-16
Unemployment Rate - % SA	11.0	11.1	8.5		Trade	370	369	365	+ 1
Insured Unemployment - thous.	-	-	-		Government	305	307	310	- 2
Insured Unempl. Rate - %	-	-	-		Services	297	296	284	+ 5
Mfg. Avg. Wkly. Hours	39.4	39.6	41.8	- 6	Fin., Ins., & Real Est.	76	77	76	0
Mfg. Avg. Wkly. Earn. - $	374	375	358	+ 4	Trans. Com. & Pub. Util.	131	132	129	+ 2
MISSISSIPPI									
Civilian Labor Force - thous.	1,052	1,064	1,048	+ 0	Nonfarm Employment- thous.	783	790	813	- 4
Total Employed - thous.	920	933	963	- 4	Manufacturing	206	207	224	- 8
Total Unemployed - thous.	132	131	85	+55	Construction	40	40	44	- 9
Unemployment Rate - % SA	12.7	11.2	8.2		Trade	163	163	165	- 1
Insured Unemployment - thous.	-	-	-		Government	170	173	175	- 3
Insured Unempl. Rate - %	-	-	-		Services	118	121	118	0
Mfg. Avg. Wkly. Hours	39.0	38.3	39.5	- 1	Fin., Ins., & Real Est.	33	33	33	0
Mfg. Avg. Wkly. Earn. - $	251	244	237	+ 6	Trans. Com. & Pub. Util.	40	40	41	- 2
TENNESSEE									
Civilian Labor Force - thous.	2,120	2,115	2,111	+ 0	Nonfarm Employment- thous.	1,704	1,704	1,751	- 3
Total Employed - thous.	1,886	1,868	1,933	- 2	Manufacturing	479	474	518	- 8
Total Unemployed - thous.	234	247	178	+31	Construction	83	83	82	+ 1
Unemployment Rate - % SA	11.4	11.2	8.4		Trade	363	367	372	- 2
Insured Unemployment - thous.	-	-	-		Government	277	277	290	- 4
Insured Unempl. Rate - %	-	-	-		Services	332	334	314	+ 6
Mfg. Avg. Wkly. Hours	39.3	39.2	39.9	- 2	Fin., Ins., & Real Est.	77	77	79	- 3
Mfg. Avg. Wkly. Earn. - $	283	278	269	+ 5	Trans. Com. & Pub. Util.	82	82	86	- 5

Notes: All labor force data are from Bureau of Labor Statistics reports supplied by state agencies.
Only the unemployment rate data are seasonally adjusted.
The Southeast data represent the total of the six states.
The annual percent change calculation is based on the most recent data over prior year.

CONSTRUCTION

	AUG 1982	JUL 1982	AUG 1981	ANN % CHG		AUG 1982	JUL 1982	AUG 1981	ANN % CHG
12-month Cumulative Rate									
UNITED STATES									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	47,160	48,090	52,478	- 10	Value - $ Mil.	35,018	34,772	47,399	- 26
Industrial Bldgs.	5,498	5,780	8,394	- 35	Residential Permits - Thous.				
Offices	13,392	13,884	13,464	- 1	Single-family units	463.5	461.5	681.1	- 32
Stores	5,458	5,602	6,693	- 18	Multi-family units	395.1	392.6	482.4	- 18
Hospitals	1,694	1,701	1,425	+ 19	Total Building Permits				
Schools	861	849	706	+ 22	Value - $ Mil.	82,178	82,862	99,877	- 18
SOUTHEAST									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	6,275	6,489	7,359	- 15	Value - $ Mil.	6,432	6,467	9,890	- 35
Industrial Bldgs.	737	763	897	- 18	Residential Permits - Thous.				
Offices	1,334	1,378	1,342	- 1	Single-family units	93.9	92.7	148.5	- 37
Stores	1,035	1,054	1,054	- 2	Multi-family units	81.3	83.9	126.6	- 36
Hospitals	212	272	260	- 18	Total Building Permits				
Schools	94	95	75	+ 25	Value - $ Mil.	12,707	12,956	17,259	- 26
ALABAMA									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	387	398	434	- 11	Value - $ Mil.	221	239	394	- 44
Industrial Bldgs.	78	78	46	+ 70	Residential Permits - Thous.				
Offices	55	54	62	- 11	Single-family units	3.9	4.0	7.6	- 49
Stores	66	67	71	- 7	Multi-family units	4.0	5.2	8.0	- 50
Hospitals	21	21	24	- 13	Total Building Permits				
Schools	8	8	5	+ 60	Value - $ Mil.	607	637	827	- 27
FLORIDA									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	3,154	3,269	4,189	- 25	Value - $ Mil.	3,993	4,062	6,841	- 42
Industrial Bldgs.	362	381	481	- 25	Residential Permits - Thous.				
Offices	624	639	582	+ 7	Single-family units	50.0	49.6	89.8	- 44
Stores	555	563	593	- 6	Multi-family units	50.5	52.6	89.4	- 44
Hospitals	97	157	125	- 22	Total Building Permits				
Schools	18	20	26	- 31	Value - $ Mil.	7,147	7,332	11,030	- 35
GEORGIA									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	1,020	1,045	1,015	+ 0	Value - $ Mil.	1,118	1,077	1,202	- 7
Industrial Bldgs.	160	156	177	- 10	Residential Permits - Thous.				
Offices	240	247	250	- 4	Single-family units	21.4	20.9	25.2	- 15
Stores	103	104	116	- 11	Multi-family units	10.7	10.0	9.8	+ 9
Hospitals	26	27	21	+ 24	Total Building Permits				
Schools	35	34	14	+150	Value - $ Mil.	2,137	2,123	2,217	- 4
LOUISIANA									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	884	905	937	- 6	Value - $ Mil.	580	579	681	- 15
Industrial Bldgs.	88	91	108	- 19	Residential Permits - Thous.				
Offices	265	263	305	- 13	Single-family units	9.2	9.2	11.4	- 19
Stores	162	168	116	+ 40	Multi-family units	8.5	8.5	9.1	- 7
Hospitals	15	21	73	- 79	Total Building Permits				
Schools	25	25	21	+ 19	Value - $ Mil.	1,463	1,483	1,618	- 10
MISSISSIPPI									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	170	174	177	- 4	Value - $ Mil.	150	142	232	- 35
Industrial Bldgs.	13	15	20	- 35	Residential Permits - Thous.				
Offices	42	42	37	+ 14	Single-family units	3.1	2.8	4.5	- 31
Stores	38	39	37	+ 3	Multi-family units	2.0	1.9	3.7	- 46
Hospitals	4	4	8	- 50	Total Building Permits				
Schools	1	2	1	0	Value - $ Mil.	321	315	409	- 22
TENNESSEE									
Nonresidential Building Permits -	$ Mil.				Residential Building Permits				
Total Nonresidential	660	698	607	+ 9	Value - $ Mil.	371	368	541	- 31
Industrial Bldgs.	35	41	65	- 46	Residential Permits - Thous.				
Offices	107	133	105	+ 2	Single-family units	6.3	6.2	10.0	- 37
Stores	110	114	120	- 8	Multi-family units	5.6	5.7	6.6	- 15
Hospitals	40	33	9	+344	Total Building Permits				
Schools	7	6	8	- 13	Value - $ Mil.	1,031	1,066	1,158	- 11

NOTES:

Data supplied by the U. S. Bureau of the Census, Housing Units Authorized By Building Permits and Public Contracts, C-40. Nonresidential data excludes the cost of construction for publicly owned buildings. The southeast data represent the total of the six states. The annual percent change calculation is based on the most recent month over prior year. Publication of F. W. Dodge construction contracts has been discontinued.

GENERAL

	SEP 1982	AUG 1982	SEP 1981	ANN. % CHG.		SEP 1982	AUG (R) 1982	SEP 1981	ANN. % CHG.
UNITED STATES									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	2,541.5	2,518.6	2,370.9	+ 7	Prices Rec'd by Farmers				
Taxable Sales - $ bil.	N.A.	N.A.	N.A.		Index (1977=100)	136	133	133	+ 2
Plane Pass. Arrivals (thous.) JUL	N.A.	N.A.	N.A.		Broiler Placements (thous.)	78,072	80,612	77,721	+ 0
Petroleum Prod. (thous. bls.)	8,684.3	8,669.1	8,640.2	+ 1	Calf Prices ($ per cwt.)	60.00	61.90	61.40	- 2
Consumer Price Index					Broiler Prices (¢ per lb.)	27.1	26.3	26.3	+ 3
1967=100	293.2	292.2	279.3	+ 5	Soybean Prices ($ per bu.)	5.28	5.59	6.21	-15
Kilowatt Hours - mils. (MAY)	158.6	167.4	160.6	- 1	Broiler Feed Cost ($ per ton)	209	215	222	- 6
SOUTHEAST									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	301.8	297.0	280.5	+ 8	Prices Rec'd by Farmers				
Taxable Sales - $ bil.	N.A.	N.A.	N.A.		Index (1977=100)	120	120	125	- 4
Plane Pass. Arrivals (thous.) JUL	4,353.0	4,192.5	4,292.5	+ 1	Broiler Placements (thous.)	30,677	31,843	30,723	- 0
Petroleum Prod. (thous. bls.)	1,386.5	1,387.5	1,421.3	- 2	Calf Prices ($ per cwt.)	55.58	57.84	56.77	- 2
Consumer Price Index					Broiler Prices (¢ per lb.)	26.6	25.6	24.9	+ 7
1967=100	N.A.	N.A.	N.A.		Soybean Prices ($ per bu.)	5.43	5.83	6.34	-14
Kilowatt Hours - mils. (MAY)	24.9	25.4	26.0	- 4	Broiler Feed Cost ($ per ton)	204	213	219	- 7
ALABAMA									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	33.6	33.0	31.7	+ 6	Farm Cash Receipts - $ mil.				
Taxable Sales - $ bil. (JUN)	20.9	20.9	20.2	+ 3	(Dates: JUN, JUN)	903	-	904	- 0
Plane Pass. Arrivals (thous.) JUL	107.8	112.9	127.1	-15	Broiler Placements (thous.)	9,478	9,938	9,770	- 3
Petroleum Prod. (thous. bls.)	57.0	56.5	60.5	- 6	Calf Prices ($ per cwt.)	56.50	57.20	55.70	+ 1
Consumer Price Index					Broiler Prices (¢ per lb.)	25.0	24.5	24.0	+ 4
1967=100	N.A.	N.A.	N.A.		Soybean Prices ($ per bu.)	5.54	5.73	6.09	- 9
Kilowatt Hours - mils. (MAY)	3.4	3.5	3.7	- 8	Broiler Feed Cost ($ per ton)	205	210	235	-13
FLORIDA									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	111.3	108.7	102.1	+ 9	Farm Cash Receipts - $ mil.				
Taxable Sales - $ bil.	66.7	66.6	65.3	+ 2	(Dates: JUN, JUN)	2,905	-	2,588	+12
Plane Pass. Arrivals (thous.) JUL	2,277.5	2,056.9	1,961.3	+16	Broiler Placements (thous.)	1,795	1,839	1,800	- 0
Petroleum Prod. (thous. bls.)	73.0	75.0	97.4	-25	Calf Prices ($ per cwt.)	59.70	61.10	59.90	- 0
Consumer Price Index - Miami	**SEP**	**JUL**	**SEP**		Broiler Prices (¢ per lb.)	27.0	25.0	25.0	+ 8
Nov. 1977 = 100	156.1	155.1	150.2	+ 4	Soybean Prices ($ per bu.)	5.54	5.73	6.09	- 9
Kilowatt Hours - mils. (MAY)	7.0	6.9	7.0	0	Broiler Feed Cost ($ per ton)	210	220	230	- 9
GEORGIA									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	52.5	51.8	49.2	+ 7	Farm Cash Receipts - $ mil.				
Taxable Sales-$ bil. (1Q-4Q-1Q)	34.5	34.3	32.1	+ 8	(Dates: JUN, JUN)	1,270	-	1,265	+ 0
Plane Pass. Arrivals (thous.) JUL	1,504.1	1,564.1	1,750.8	-14	Broiler Placements (thous.)	12,281	12,423	12,312	- 0
Petroleum Prod. (thous. bls.)	N.A.	N.A.	N.A.		Calf Prices ($ per cwt.)	49.10	54.20	52.50	- 6
Consumer Price Index - Atlanta	**AUG**	**JUN**	**AUG**		Broiler Prices (¢ per lb.)	26.5	25.0	24.5	+ 8
1967 = 100	295.6	291.1	276.1	+ 7	Soybean Prices ($ per bu.)	5.50	6.25	6.46	-15
Kilowatt Hours - mils. (MAY)	3.7	3.9	3.8	- 3	Broiler Feed Cost ($ per ton)	200	215	210	- 5
LOUISIANA									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	43.7	43.0	40.4	+ 8	Farm Cash Receipts - $ mil.				
Taxable Sales - $ bil.	N.A.	N.A.	N.A.		(Dates: JUN, JUN)	561	-	595	- 6
Plane Pass. Arrivals (thous.) JUL	273.5	259.4	258.0	+ 6	Broiler Placements (thous.)	N.A.	N.A.	N.A.	
Petroleum Prod. (thous. bls.)	1,164.0	1,164.0	1,168.0	- 0	Calf Prices ($ per cwt.)	58.50	60.70	58.60	- 0
Consumer Price Index					Broiler Prices (¢ per lb.)	27.5	27.5	26.5	+ 4
1967 = 100	N.A.	N.A.	N.A.		Soybean Prices ($ per bu.)	5.51	5.84	6.57	-16
Kilowatt Hours - mils. (MAY)	4.3	4.3	4.4	- 2	Broiler Feed Cost ($ per ton)	250	250	245	+ 2
MISSISSIPPI									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	19.7	18.9	18.5	+ 6	Farm Cash Receipts - $ mil.				
Taxable Sales - $ bil.	N.A.	N.A.	N.A.		(Dates: JUN, JUN)	839	-	805	+ 4
Plane Pass. Arrivals (thous.) JUL	32.8	33.0	39.1	-16	Broiler Placements (thous.)	5,927	5,973	5,574	+ 6
Petroleum Prod. (thous. bls.)	92.5	92.0	95.4	- 3	Calf Prices ($ per cwt.)	57.50	58.10	58.70	- 2
Consumer Price Index					Broiler Prices (¢ per lb.)	29.0	28.0	26.5	+ 9
1967 = 100	N.A.	N.A.	N.A.		Soybean Prices ($ per bu.)	5.31	5.83	6.30	-16
Kilowatt Hours - mils. (MAY)	1.6	1.6	1.6	0	Broiler Feed Cost ($ per ton)	200	205	205	- 2
TENNESSEE									
Personal Income-$ bil. SAAR					Agriculture				
(Dates: 2Q, 1Q, 2Q)	41.0	41.5	38.6	+ 6	Farm Cash Receipts - $ mil.				
Taxable Sales - $ bil.	25.5	25.4	23.5	+ 9	(Dates: JUN, JUN)	713	-	647	+10
Plane Pass. Arrivals (thous.) JUL	157.3	166.2	156.2	+ 1	Broiler Placements (thous.)	1,217	1,326	1,266	- 4
Petroleum Prod. (thous. bls.)	N.A.	N.A.	N.A.		Calf Prices ($ per cwt.)	51.90	55.90	54.80	- 5
Consumer Price Index					Broiler Prices (¢ per lb.)	25.5	25.5	25.0	+ 2
1967 = 100	N.A.	N.A.	N.A.		Soybean Prices ($ per bu.)	5.36	5.63	6.28	-15
Kilowatt Hours - mils. (MAY)	4.9	5.2	5.5	-11	Broiler Feed Cost ($ per ton)	176	181	195	-10

Notes:
Personal Income data supplied by U. S. Department of Commerce. Taxable Sales are reported as a 12-month cumulative total. Plane Passenger Arrivals are collected from 26 airports. Petroleum Production data supplied by U. S. Bureau of Mines. Consumer Price Index data supplied by Bureau of Labor Statistics. Agriculture data supplied by U. S. Department of Agriculture. Farm Cash Receipts data are reported as cumulative for the calendar year through the month shown. Broiler placements are an average weekly rate. The Southeast data represent the total of the six states. N.A. = not available. The annual percent change calculation is based on most recent data over prior year.
R = revised.

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