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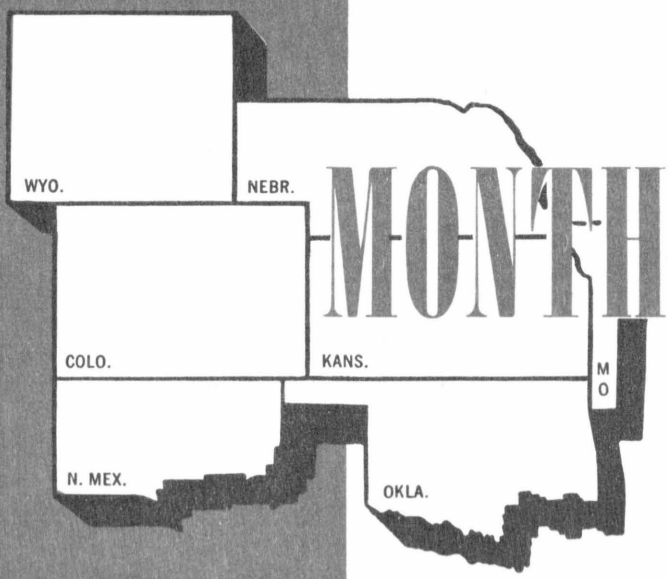

MONTHLY REVIEW

In This Issue

FEDERAL RESERVE BANK
OF KANSAS CITY

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Relationship of Bank Size and Bank Costs

An article in the July 1960 issue of the *Monthly Review* entitled, "Growth and Earnings at Individual Commercial Banks," offered evidence suggesting that rapid growth does not automatically assure a bank of a high net income position. Banks with high postwar growth rates, it was found, had relatively high rates of gross earnings, but their cost ratios also tended to be higher than average. The result was that the advantages of larger gross earnings were not carried through to net earnings.

While high growth rates need not lead to an immediate expansion of profits, growth may still be profitable from a longer-run point of view if there are distinct advantages to be gained from operations on a larger scale. A major question involves the relationship between bank size and bank costs—that is, the possibility that large banks enjoy significantly lower average costs than small banks.

How are bank costs related to bank size, and how significant is the size factor as a determinant of bank costs? Questions of this kind cannot be answered abstractly. Reductions in costs with increasing size often are thought to be present in almost every industry, since some of the sources of these cost savings—such as the increased specialization of labor that is possible with large-scale operations—are applicable to virtually every form of economic enterprise. But there are other sources of cost advantage to large firms that are more important in some industries than in others. For example, large-scale operations may result in lower average costs if modern production techniques require the use of substantial quantities of machinery and equipment that cannot be employed efficiently on a small scale. This source of cost reduction may be critical in certain lines of manufacturing or in the public utilities, but it is of considerably less significance in other industries such as banking. Furthermore, in any given industry there may also be factors tending to produce higher average costs for the larger size firms. It is often contended that as a firm expands, a point ultimately is reached at which the increasing complexity of managerial organization tends to raise costs. Thus, if the sources of decreasing costs with increasing size were relatively unimportant, they might be offset by forces operating to increase costs before a very large scale of operations was attained.

Whether size has a significant bearing upon costs in banking must be determined, therefore, by looking at empirical evidence. In the present article, the relationship of bank costs to bank size is explored through the use of statistical analysis applied to cost data for member banks in the Tenth Federal Reserve District.

Evidence from Operating Ratio Data

A useful point of departure for the discussion may be found in a review of the evidence on size-cost relationships that may be deduced from regularly published statements on operating ratios of member banks—showing cost, earnings, and other ratios for banks in different size classes. In these statements, costs are expressed as a percentage of total earnings, which obscures somewhat the relationship between costs and size, but a reasonable ap-

proximation to the ratios of costs to assets for each size class of banks is readily obtainable. Table 1 presents estimates of cost-asset ratios for all member banks in the Tenth District, classified according to size, during 1959. The footnote to the table explains the procedure by which these ratios are derived.

The data in that table show an inverse relation between cost ratios and size of bank—the ratio of total costs to assets for banks with less than $1 million in deposits is about one fourth higher than that for banks with more than $50 million in deposits. The decline in costs with increasing size appears to be steeper when interest on deposits is removed from total costs. Thus, the ratio in column 5 is about one third higher for the smallest than for the largest bank size class, reflecting mainly the fall in wages and salaries relative to assets as the size of bank increases. Comparable data for all member banks in the U.S. also indicate an irregular decline in wages and salaries as a per cent of assets with increasing bank size, but the fall is more pronounced among District members.

Table 1

Cost-Asset Ratios of All Tenth District Member Banks, 1959

Bank Size (Deposits in millions of dollars)	Ratio to Total Assets				
	Total Costs	Wages and Salaries	Interest on Deposits	Other Expenses	Total Costs Minus Interest on Deposits
	(1)	(2)	(3)	(4)	(5)
			(in Per Cent)		
Less than 1	2.78	1.59	.26	.94	2.52
1-2	2.82	1.51	.40	.89	2.42
2-5	2.62	1.30	.46	.84	2.16
5-10	2.65	1.25	.50	.88	2.15
10-50	2.70	1.18	.58	.94	2.12
Over 50	2.23	.97	.33	.91	1.90
All banks	2.67	1.33	.46	.88	2.21

NOTE: Column 1 represents the difference between average ratios of gross and net earnings to total assets for each size class. Columns 2, 3, and 4 are approximate ratios obtained by taking the product, for each size class, of the average ratio of gross earnings to assets and the average ratio of the relevant expense item to gross earnings. A rough test of the reasonableness of this procedure may be made by comparing the sum of columns 2, 3, and 4 with column 1. For each bank class, the sum of columns 2, 3, and 4 deviates from column 1 by 1 per cent or less. Column 5 represents the difference between columns 1 and 3. Data on gross earnings to asset ratios and ratios of costs to gross earnings were obtained from published operating ratio statements for District member banks.

Table 2

Time Deposit Ratios of All Tenth District Member Banks, 1959

Bank Size (Deposits in millions of dollars)	Ratios of:	
	Time to Total Deposits	Interest on Deposits to Time Deposits
	(in Per Cent)	
Less than 1	13.3	1.69
1-2	19.2	2.13
2-5	21.4	2.11
5-10	23.8	2.19
10-50	26.1	2.33
Over 50	15.5	2.37
All banks	21.2	2.13

At District banks, the three identifiable subcomponents of the total cost ratio—ratios of wages and salaries, interest on deposits, and other expenses to total assets—each display a different relationship to size of bank. The wage and salary ratio declines continuously as the size of bank increases, while the "other expenses" ratio appears to demonstrate no systematic association with bank size. The ratio of interest on deposits to total assets, on the other hand, rises with increasing bank size up to $50 million in deposits, but declines thereafter. The behavior of this latter variable can be explained in terms of the distribution of deposits between demand and time accounts in the various size classes, and the average rate of interest paid on time deposits. As indicated in Table 2, both the ratio of time to total deposits and the ratio of interest payments on deposits to time accounts increase with size of bank up to $50 million in deposits, but the percentage of deposits in the time and savings account category decreases sharply thereafter.

It is evident that when allowance is made for differences in the relative volume of time accounts and the rates paid on time deposits, the relationship between bank costs and bank size is altered considerably. There are, of course, other structural characteristics of banks that also have an important bearing on costs—such as the proportion of assets held in

the form of loans and the type of loans made. How would the association between size and costs appear if allowances were made for differences in these structural characteristics?

Clearly, that question cannot be answered from operating ratio data, nor is there available any information which would show directly the proportion of a bank's costs attributable to each of the bank's activities. But the statistical method of multiple regression and correlation analysis can be applied to data for a group of individual banks to reveal the relation between size and costs when the effects on costs of other structural characteristics of the banks have been accounted for.

For this purpose, ratios of costs to total assets were gathered for a sample of approximately 270 District member banks for the period 1956-59. With unimportant exceptions, all of these banks are unit banks. Measures representing structural characteristics of each bank—such as the percentage of assets in the form of loans, the proportion of a bank's loans made to consumers, the relative volume of time deposits, and others—believed to be important cost-determining factors, also were assembled. The technique of multiple regression and correlation analysis then was applied to the data in an attempt to separate from the effects of bank size on costs the influence of a number of these structural characteristics.[1] The results of this study will be presented in the following pages with relatively little attention given to technical questions except in footnotes. The reader interested in these aspects of the study may wish to refer also to the technical notes at the end of the article.

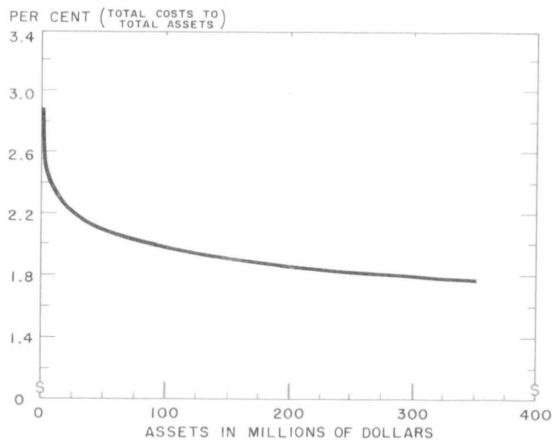
Bank Size and Costs—1956-59 Averages

Statistical analysis was applied to data obtained by averaging the individual sample bank figures for the years 1956-59. The averaging process was undertaken to reduce unusual influences that may affect data for a single year. Through considerable experimentation, it was found that differences in ratios of total costs to total assets among the sample banks could best be accounted for in terms of six characteristics of the banks: (1) bank size (measured by assets), (2) the ratio of time to total deposits, (3) the ratio of total loans to total assets, (4) the ratio of securities other than U. S. Government issues to total assets, (5) the ratio of consumer loans to total loans, and (6) the percentage growth of assets between 1956 and 1959. The association between these variables and total cost ratios may be expressed in the form of a regression equation which indicates the average relationship between costs and bank size when the effects on costs of the other five

Chart 1

Relationship Between Total Cost Ratios and Bank Size

Sample of Tenth District Member Banks, 1956-59



NOTE: The equation on which the chart is based is: $X_1 = 1.377 - .394 \log X_2 + .0162X_3 + .0221X_4 - .0126X_5 + .0156X_6 + .0078X_7$, where X_1 is the ratio of total costs to total assets, X_2 is assets in millions, X_3 is the ratio of time to total deposits, X_4 is the ratio of total loans to total assets, X_5 is the ratio of securities other than Government issues to total assets, X_6 is the ratio of consumer to total loans, and X_7 is the percentage growth of assets from 1956 to 1959. All ratios are expressed in percentage terms. The multiple correlation coefficient for this equation is .78. All independent variables are statistically significant at the 5 per cent level. The chart is obtained by setting variables X_3, X_4, . . . X_7 at their mean values and then graphically portraying the resulting relation between X_1 and X_2.

[1] The analysis is of the cross-section type—regression equations were fitted to data for each of the years 1956-59 and to averages of the data for the 4 years.

characteristics have been eliminated. The average relationship between total costs (as a per cent of total assets) and bank size found among the sample banks over the period 1956-59 is shown in Chart 1.

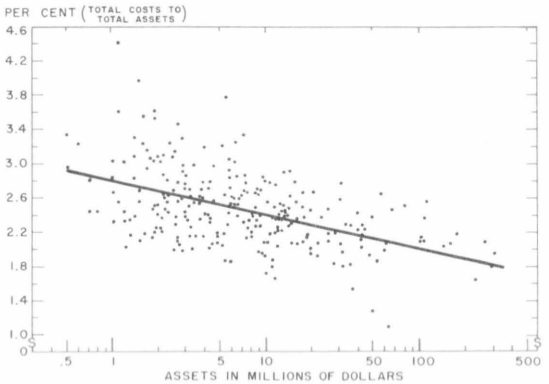
The downward movement of the curve in Chart 1 indicates that the ratio of total costs to assets declines as the size of bank increases, after the effects on costs of the five other structural characteristics have been removed. The amount of decline in costs, however, becomes less as the size of bank increases. This is not surprising. A $1 million increase in assets represents a 10 per cent increase in size for a bank with $10 million in assets, but only a 1 per cent increase for a bank with $100 million in assets. Therefore, one would expect the effect on costs of a given dollar increase in assets to be larger in the former case. The size-cost line in Chart 1 is drawn on the assumption that equal *percentage* changes in size have equal effects on costs, an assumption that appears justified on the basis of statistical tests.[2]

This association between cost ratios and percentage changes in size is more readily appreciated when the size-cost line of Chart 1 is plotted on a chart measuring bank size on a logarithmic scale, where equal percentage increases in size are represented by equal distances along the scale. This converts the curved line of Chart 1 into a straight line, as indicated in Chart 2. The ratio of total costs to assets falls, on the average, by .39 percentage points for each tenfold increase in size of bank. Thus, the solid line of Chart 2 shows an average ratio of total costs to assets of 2.78 per cent for banks with $1 million in assets, 2.39 per cent for banks with $10 million in assets, and 2.00 per cent for banks with $100 million in assets. The dots plotted around the size-cost line in Chart 2 indicate cost differences among the sample banks that are not explained by bank size or by the five other characteristics of the banks included in the analysis. Bank size and these five characteristics account for 62 per cent of the differences in total cost ratios among the sample banks; other unidentified forces account for the remaining 38 per cent.

Chart 2

Relationship Between Total Cost Ratios and Bank Size

Sample of Tenth District Member Banks, 1956-59



NOTE: The dots in the chart are not actual cost ratios but residuals measured from the size-cost line.

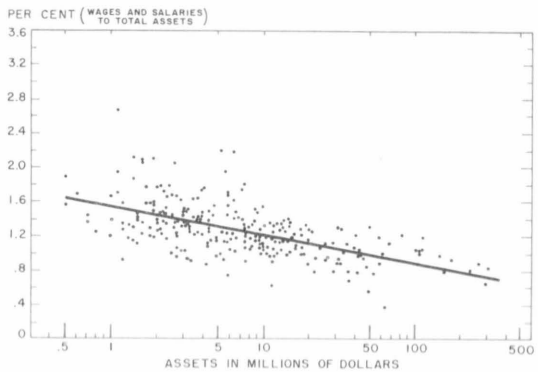
Wage and Salary Expenses

The procedure used to obtain Chart 2 took account of cost differences among the sample banks that were due to different ratios of time to total deposits. The downward slope of

[2] A test for linearity of fit was made for the function described in the note to Chart 1 with the size variable expressed first in absolute amounts and then in logarithmic terms. The residuals were arrayed according to increasing size of bank and the Durbin-Watson ratio was calculated. With the size variable expressed in logs, the ratio was 1.95, which suggests an absence of nonlinearity of fit. Using size in absolute amounts, the ratio is 1.72. This use of the Durbin-Watson test statistic is described in S. J. Prais and H. S. Houthakker, *The Analysis of Family Budgets* (Cambridge, 1955), pp. 50-52. The multiple correlation coefficient also is somewhat higher with the size variable expressed in logs.

A similar conclusion was obtained by dividing the banks into two groups—over and under $25 million in assets—and fitting the function indicated in the note to Chart 1, with size measured in absolute amounts, to each of the two groups. The regression coefficient of the size variable was −.0303 for banks with assets of less than $25 million and −.0018 for the group of larger banks.

Chart 3
Relationship Between Wage and Salary Ratios and Bank Size
Sample of Tenth District Member Banks, 1956-59



NOTE: The equation on which this chart is based is: $X_1 = 1.108 - .327 \log X_2 + .0087X_4 - .0115X_5 + .0083X_6 + .0030X_7$, where X_1 is the ratio of wages and salaries to total assets, and $X_2, X_4, \ldots X_7$ are defined as in the note to Chart 1. The multiple correlation coefficient is .70. All independent variables are statistically significant at the 5 per cent level. As in Chart 2, the dots in Chart 3 represent residuals plotted around the size-cost line. Tests for linearity of fit, described in footnote 2, were made for this function also, with generally similar results to those obtained when the total cost ratio is used as the dependent variable.

the size-cost line, therefore, mainly reflects a decline in costs other than interest on deposits —that is, in wages and salaries or in the "other expenses" category of Table 1.[3] It is perhaps to be expected that if there are cost economies associated with larger scale operations in banking, they would be found mainly in wage and salary expenses. But this does not preclude the existence of economies in other cost categories, and it is therefore useful to isolate the types of costs (other than interest on deposits) which tend to decline in relation to assets when the size of bank increases.

Chart 3 shows the average relationship between wages and salaries, as a per cent of total assets, and bank size (measured in logarithmic terms) for the sample banks over the period 1956-59. As in Chart 2, the size-cost relationship depicted in Chart 3 is that which is found when effects on costs of the five other characteristics mentioned above are removed.[4] The size-cost line again is tilted downward to the right, with the ratio of wages and salaries to total assets (in per cent) falling, on the average, by .33 percentage points with each tenfold increase in size of bank.

Attempts to discover a relationship between bank size and the ratio of miscellaneous other expenses to total assets were generally unsuccessful. This category of expenses seemed to show a weak negative association with bank size, but the ability to explain differences in ratios of "other expenses" to assets among the sample banks in terms of bank size and other structural characteristics of the banks was quite limited. The principal factors giving rise to bank-to-bank differences in these expense ratios thus were not discovered—apparently bank size is not among them.

Parallel evidence for this conclusion is found in a comparison of the slopes of the size-cost lines in Charts 2 and 3. It was noted above that the downward slope of the size-cost line in Chart 2 is accounted for primarily by the decline in costs other than interest on deposits. As a per cent of assets, these other costs fall .39 percentage points, on the average, for each tenfold increase in size of bank. The ratio of wages and salaries to total assets, meanwhile, drops .33 percentage points for each tenfold increase in bank size, and thus comprises more than 80 per cent of the decline in the total cost ratio.

[3] A variable measuring average interest rates on time deposits could not be included in the estimating equation without introducing problems of multicollinearity, since the simple correlation between average rates paid on time accounts and the relative volume of time deposits is too high—the correlation coefficient is .549. However, the ratio of time to total deposits is strongly correlated with the ratio of interest paid on deposits to total assets. The simple correlation coefficient between these two variables is .940.

[4] In this case, however, the time to total deposit ratio was not included in the regression equation, since experimentation indicated that this variable did not bear a statistically significant relationship to wage and salary costs.

Do Costs Ultimately Rise with Increasing Bank Size?

In studies of this kind, it is important to determine whether, even though average costs may tend at first to decline as size increases, there is some point beyond which further increases in size lead to higher costs. Is there, in other words, a bank size for which ratios of costs to assets are a minimum in the sense that both larger and smaller banks tend to experience higher costs? The logical possibility that this type of size-cost relationship might exist was noted earlier.

The key to the question is found in the dots which are plotted around the size-cost lines in Charts 2 and 3—representing variations in costs of the sample banks that are not explained by forces included in the analysis. If there were a size among the sample banks at which cost ratios reached a minimum, or if cost ratios stopped declining after a certain size was reached, these dots would tend to form a U-shaped pattern around the size-cost lines. This does not seem to be the case—the dots are rather evenly distributed on both sides of the size-cost lines all the way along the size range. Thus, no critical turning point in the size-cost relation can be found among Tenth District member banks, nor is there evidence of a leveling out of the size-cost line.[5] Cost ratios appear to fall with rising bank size over the full range of bank sizes present within the District banking community. However, there are relatively few banks in the District with more than $200 million in assets, and whether a minimum point in the size-cost relation would be found to exist among banks larger than those in the District cannot be determined with the data employed in this study.

[5] As noted earlier, tests for a nonlinear distribution of residuals around the size-cost lines in Charts 2 and 3 do not indicate the presence of any significant departure from linearity.

Summary Remarks

These measurements suggest that there are substantial cost economies associated with large-scale operations in banking—cost savings that result mainly from the reduction of wage and salary expenses in relation to total assets as the size of bank increases. But there remain other interesting questions that might be asked concerning the association between bank size and bank costs. For example, do the lower ratios of wages and salaries to total assets found among the large banks result from differences in wage and salary payments per employee or from other sources? More importantly, consideration may be given to other structural characteristics of banks that may affect costs but which were not included in the regression-correlation analysis. In this way, the source of differences in costs among the sample banks can be isolated further, and the interpretation of size-cost relationships in banking improved. These and other aspects of size-cost relationships in banking will be discussed in a subsequent issue of the *Review*.

TECHNICAL NOTES

1. The sample of banks drawn for this study included all 31 Tenth District member banks which had assets of over $50 million on December 31, 1959, about two thirds (81 banks) of those with assets of $10-$50 million, one third (49 banks) of those with assets of $5-$10 million, one fourth (72 banks) of those with assets of $2-$5 million, and one fifth (35 banks) of those with assets of less than $2 million. In the size strata for which the sampling fraction was less than 100 per cent, the sampling procedure was not strictly random, since the sample was selected partly for reasons other than the measurement of size-cost relationships. This deliberate departure from randomness is believed not to have influenced the results of the regression-correlation analysis to any significant degree.

2. Preliminary investigation suggested that banks involved in a merger or absorption tended to experience unusually high costs in the next year or two. Consequently, data for such banks in the 2 years following the merger date were not employed. In calculating averages of the data for the period 1956-59, therefore, any bank involved in a merger between January 1, 1954, and January 1, 1960, was dropped from the sample.

3. Data for the individual years 1956-59 were computed on the basis of earnings reports for the full year and averages of three condition reports, following the procedure used to calculate operating ratio data. Average ratios for the period 1956-59 were computed by averaging the ratios of each bank for each of the 4 years, rather than by aggregating original data for each bank for the 4 years and then computing an average ratio.

4. The years 1956-59 were selected for the purpose of including figures covering a full short cycle in economic activity, and thereby avoiding any bias that might be introduced by data for a single year of the cycle. District banking data, however, have been affected more by longer-term trends over the postwar period than by short cycles in economic activity, suggesting caution in generalizing from the results of the years 1956-59 to other periods. It may be noted, however, that the dominant shifts in the asset and liability structure of District member banks during the postwar period have been the growth in loans relative to assets, the increase of consumer loans as a proportion of total loans, and the substantial expansion of time deposits, and variables representing these structural characteristics are among the independent variables employed in the regression equations.

5. The five independent variables other than bank size included in the regression equations were selected from a list of about 15 variables thought to be possibly important factors influencing bank cost ratios. Some variables on the original list were dropped from the regression equations because no significant relationship to costs of the sample banks could be found—the ratio of real-estate to total loans is a case in point. The majority, however, were eliminated by reason of intercorrelation with another independent variable. Omission of such variables has a particularly important bearing on the measured relationship between bank size and bank costs when the variable is omitted because of intercorrelation with bank size. In a subsequent article, an attempt will be made to arrive at qualitative judgments as to the influence on the size-cost relation that such variables may have had.

6. The reader of the notes to Charts 1 and 3 may have noted with surprise the negative sign attached to the coefficient of the ratio of securities other than U. S. Government to total assets. Logic would suggest that, given the ratio of total loans to total assets, costs would tend to be positively associated with the ratio of other securities to total assets. The partial association between cost ratios and the ratio of other securities to total assets is, in fact, positive when both the ratio of loans to assets and the ratio of U. S. Government securities to assets are held constant. But when only the ratio of loans to assets is held constant, the partial association is negative. This results from the high degree of intercorrelation between the ratios to total assets of loans, Government securities, and other securities, which forces the variable representing other securities to take on the opposite sign of the loan variable. (Because of this intercorrelation, not more than two of the three could be included in the equation without encountering the characteristic evidences of multicollinearity.) It is clear, therefore, that the coefficient of the other securities ratio can be assigned no analytical significance. It was included in the model, nevertheless, because it proved to be statistically significant, it improved the fit of the regression equation, and, more importantly, it expressed an influence on costs that might otherwise have been partly absorbed by the bank size variable.

What's Happening

on Tenth District Farms?

RESOURCES USED on farms in the Tenth Federal Reserve District have changed substantially since 1954, according to the 1959 Census of Agriculture. Generally, capital inputs have continued to be substituted for land and labor inputs. Although the total amount of farm land used is practically unchanged from 1954 levels, inputs of power and machinery, fertilizer, biological supplies, petroleum products, and many other capital items have increased to record levels. Farm labor inputs, on the other hand, have decreased considerably in all District states.

The changing combination of land, labor, and capital, along with the use of new production techniques in farming, has influenced both the social and economic structure of the economy. Firms selling goods and services to farmers find themselves supplying a greater volume of business to a decreasing number of operators. Competition between firms tends to be intensified by such trends. Financial institutions are discovering that previously accepted methods of extending credit to farmers may no longer be adequate to meet present needs. In many cases, marketing agencies find plant expansion necessary in order to handle an increasing volume of farm output. Consumers, related farm organizations, and farmers themselves all are being influenced by the changes occurring in agriculture.

The agricultural census, made available each 5 years by the Federal Government, provides data that are useful in examining changes that have taken place in farming. Although the data may not always be comparable from one census to the next, they afford a useful and valuable guide for measuring trends in modern farming. The census is revised as changing conditions dictate, to improve the accuracy and usefulness of the data. One of the most relevant revisions in the 1959 census was in the definition of a farm. The 1954 definition was, " . . . each place operated as a unit of 3 or more acres on which the value of farm products produced totaled $150 or more, as well as each place of less than 3 acres from which the value of all agricultural products sold totaled $150 or more." In 1959, however, a farm was defined as, " . . . each place operated as a unit of 10 or more acres from which the sale of agricultural products totaled $50 or more, as well as each place operated as a unit of less than 10 acres from which the sale of agricultural products totaled $250 or more."

In this article, an effort will be made to examine the changing combination of resources and structure of farms in the Tenth District since 1954. The analysis will include data for all of the seven District states, including those sections of Missouri, New Mexico, and Oklahoma not included in the District.

Changing Resource Structure

In addition to being familiar with the total physical quantities of resources used in farming, it is important to be acquainted with their changing composition. Although the total quantity of agricultural inputs used has changed little in recent years, the amount of labor used has decreased and that of purchased capital inputs has increased. Labor

accounted for nearly half of the total agricultural inputs in 1947-49, but dropped to less than one third by 1959. This sharp reduction in the farm labor force caused land and capital inputs per farm worker to increase substantially. The changing combination of resources and other influences of technological innovation has resulted in increased productivity for agricultural resources generally. The census data verify that these trends, which have prevailed for a number of years, continued unabated during the 1954-59 period.

Labor

One evidence of the changing pattern of farming in the District is the decreasing number of family and hired farm workers. The decrease in farm family workers, which makes up more than three fourths of the total farm labor supply, has been substantial. Farm operators working on farms fell from 554,000 in 1954 to 444,000 in 1959—a 20 per cent decline. Numbers of unpaid family workers declined 25 per cent in the same period – from 326,000 to 246,000. Although changes in the definition of a farm account for part of the reduction in family workers, a large proportion was caused by movement of families from the farm. The greatest loss in family labor apparently occurred among the younger operators, as the average age of operators increased from 49 in 1954 to 50 in 1959. The proportion of farm operators over 65 increased from 18 per cent in 1954 to 19 per cent in 1959.

Although several forces have been influential in causing farm families to leave the farm, the relatively unfavorable level of farm income received by many farmers undoubtedly has been a significant factor in recent years. This has been especially true of farmers on small farms with inadequate capital capacities for plant expansion. Although many of these operators have quit farming, others have stayed on the farm and attempted to supplement their farm incomes by off-farm employment. In 1959, 50 per cent of the farm operators in District states reported working at off-farm jobs, compared with 48 per cent in 1954. The proportion of these operators working 100 or more days off the farm also increased from 26 per cent in 1954 to 31 per cent in 1959. The proportion of farm operators working off farm in 1959 ranged from 64 per cent in Oklahoma to 31 per cent in Nebraska. New Mexico reported 61 per cent; Colorado, Kansas, and Missouri, 51 per cent; and Wyoming, 43 per cent.

Regular hired workers (workers employed 150 or more days on the farm during the year) declined 7 per cent—from 60,000 in 1954 to 56,000 in 1959. Purchased inputs tended to be substituted for labor as costs of these inputs became cheap in relation to hired labor costs. In recent years, wage rates to farm workers increased substantially more than did prices of most other goods and services used on the farm.

It is interesting to note in connection with labor used on farms that, despite a lower number of regular hired workers since the previous census, the purchase of many labor services from off-farm sources increased. A large proportion of the increase came in the form of machine hire for such tasks as applying commercial fertilizers and insecticides. Expenditures for machine hire increased 17 per cent from 1954 to 1959.

Land

The movement of operators from District farms has released farm units for consolidation into other units. With the land in farms practically unchanged since 1954, farms in the seven District states have become larger and fewer in number as these consolidations occurred. Reduction in number of farms for individual states varied from a high of 24 per cent in New Mexico to a low of 10 per cent in Nebraska. For District states as a whole, the number of farms declined 16 per cent. Part of this decline in numbers, however, must be attributed to the difference in the definition of a farm. It has been esti-

Number and Average Acreage of Farms

Tenth District States

State	Number of Farms 1954	Number of Farms 1959	Percentage Decrease	Average Acreage 1954	Average Acreage 1959	Percentage Increase
Colorado	40,749	33,390	18	942	1,162	19
Kansas	120,167	104,345	13	416	481	14
Missouri	201,614	168,673	16	170	197	14
Nebraska	100,846	90,475	10	471	528	11
New Mexico	21,070	15,919	24	2,347	2,905	19
Oklahoma	118,979	94,675	20	300	378	21
Wyoming	11,402	9,743	15	3,069	3,712	17
Seven States	614,827	517,220	16	472	557	15

SOURCE: **U. S. Census of Agriculture: 1959.**

mated that the new definition, adopted for the 1959 census, accounted for approximately 3.6 per cent of the loss in number of farms for the District as a whole.

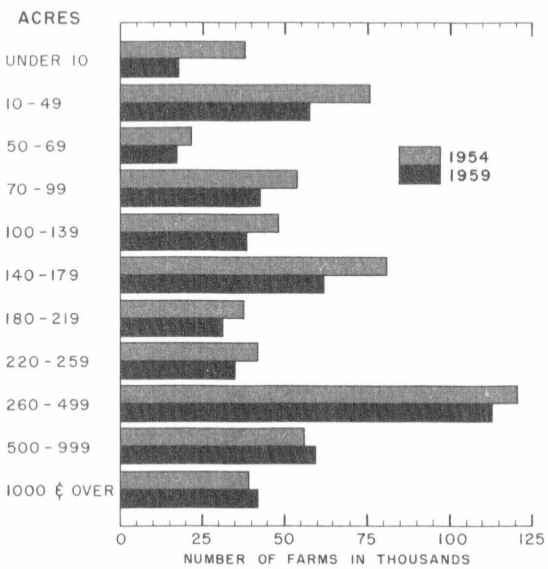
Technological innovations that have occurred since 1954 have provided a strong incentive for individual farmers to increase the acreage of land in their farms. In many cases, once certain techniques are introduced, costs on a per-acre-farmed basis decline sharply as farm size is increased. The incentive to expand farm size, along with land made available for consolidation, has caused the average acreage per farm between the two census years to increase from 472 to 557 for District states as a whole. As would be expected, the largest percentage increases in average acreage operated per farm occurred in those states in which number of farms declined most sharply. Average acreage operated per farm increased 21 per cent in Oklahoma from 1954 to 1959, but by only 11 per cent in Nebraska.

A wide variation in the average acreage per farm existed among the District states and ranged from 197 in Missouri to 3,712 in Wyoming in 1959. Farms with 1,000 or more acres predominated in Colorado, New Mexico, and Wyoming, and accounted for the large average size of farms in these states. The average acreage was 1,162 in Colorado and 2,905 in New Mexico, while the average acreage was 481 in Kansas, 528 in Nebraska, and 378 in Oklahoma. Although the acreage per farm varied widely within each state, over 50 per cent of the farms in Colorado, Kansas, Nebraska, and Wyoming exceeded 260 acres in 1959. In New Mexico, 47 per cent of the farms exceeded this acreage in 1959, while the proportion was 41 per cent in Oklahoma and only 24 per cent in Missouri.

For the District as a whole, farms of less than 500 acres in size generally declined in number, while those with 500 or more acres increased. Biggest decreases were recorded in

Number of Farms by Acreage Size Groups

Tenth District States



SOURCE: **U. S. Census of Agriculture: 1959.**

the "less than 10 acres" group, where there were over one half fewer farms than in 1954. A part of the sharp decline in this size group was caused by the change in definition of a farm. In the next larger size groups used by the census (including 10-49, 50-69, 70-99, 100-139, and 140-179 acre classifications) decreases also were quite significant, varying from 20-24 per cent. In the three remaining groups of less than 500 acres, the decline in number of farms was approximately 17 per cent in the 180-219 and 220-259 acre groups and 6 per cent in the 260-499 acre group. Farms in the 260-499 acre group predominate in Kansas, Missouri, Nebraska, and Oklahoma, and account for approximately 22 per cent of all farms in the District.

In the two size groups greater than 500 acres, a 5 per cent increase in farms was recorded in the 500-999 acre group and a 7 per cent increase in the group with 1,000 or more acres. Thus, farms with 500 or more acres became relatively more important in the District in 1959—accounting for 20 per cent of all farms, as compared with 16 per cent in 1954.

There is some indication that farms have been enlarged by farm operators incorporating into existing units land formerly farmed by tenants. The proportion of farms operated by tenants dropped as much as 20 per cent in Oklahoma, with variations in other states ranging from no change in New Mexico to a 16 per cent decrease in Missouri. Thus, the number of farms operated by tenants in District states declined in relative importance from 25 per cent of all farms in 1954 to 22 per cent in 1959.

Capital

The substitution of machines and other capital items for both labor and land in farming is reflected in the increased quantities of these goods used on District farms. There were 9 per cent more tractors, 1 per cent more grain combines, 9 per cent more motor trucks, 32 per cent more pick-up balers, and 25 per cent more field forage harvesters used on District farms in 1959 as compared with 1954. The relatively greater increase in pick-up balers and field forage harvesters probably can be attributed largely to more recent major technological innovations for these items of equipment as compared with some of the other items. However, a shifting pattern of farming within the District and increasing size of farms has contributed to the increase also. Other types of relatively new technological equipment such as power-operated elevators, grain driers, and electric milk coolers have also become more numerous on District farms.

Since 1954, the use of purchased production items such as livestock feed, electricity, petroleum products, insecticides, and fertilizer also have increased substantially. Expenditures for purchasing feed for livestock and poultry increased 9 per cent, while those for purchasing petroleum products increased 12

Farm Equipment

Tenth District States
(In nearest thousands)

State	Tractors		Grain Combines		Trucks		Pick-up Balers		Field Forage Harvesters	
	1954	1959	1954	1959	1954	1959	1954	1959	1954	1959
Colorado	62	66	14	12	49	52	4	8	4	5
Kansas	176	184	76	72	112	122	18	25	13	18
Missouri	183	218	45	52	96	110	21	32	8	10
Nebraska	163	180	51	53	72	84	13	19	8	11
New Mexico	17	18	3	2	21	20	2	2	1	1
Oklahoma	106	109	28	27	86	93	9	11	3	4
Wyoming	19	22	4	4	15	16	2	4	1	1
Seven States	726	797	221	222	451	497	69	101	38	50

SOURCE: **U. S. Census of Agriculture: 1959.**

per cent. The higher expenditures for feed represent a substantial increase in the quantity of feed purchased as prices paid for feed declined 12 per cent during this period. The increased expenditures for petroleum products, however, were apparently partly accounted for by higher prices, since they increased somewhat from 1954 to 1959. Expenditures for commercial fertilizer also were higher in 1959 and represented an increased volume of fertilizer purchases, since fertilizer prices were slightly lower in 1959 than in 1954. Farmers in District states applied 1.5 million tons of commercial fertilizer to 19 million acres in 1959, as compared with 1.3 million tons to 16 million acres in 1954. The quantity of lime used in District states increased but it was used more intensively on a smaller number of acres. Approximately 2.5 million tons of lime were applied to 1.0 million acres in 1959, as compared with 2.2 million tons to 1.1 million acres in 1954. Missouri accounted for 74 per cent of the total quantity of lime used in 1959, while Kansas accounted for 18 per cent; Oklahoma, 4 per cent; and Nebraska, 3 per cent.

The increased use of capital items, technological innovations, and larger-size farms has had a pronounced influence on agricultural output in recent years. Many of the labor resources released in agriculture also have been employed in agriculturally related industries and have helped foster the rapid rate of growth achieved in output per man-hour in farming. These developments have stimulated agricultural production and efficiency.

Economic Classification

The economic classification of farms made by the census was based upon three factors: (1) total value of all farm products sold, (2) number of days the farm operator worked off the farm, (3) the relationship of the income received from off-farm sources by the operator and members of his family to the value of all farm products sold. On the basis of these three factors, farms were classified into two general groups – "Commercial Farms" and "Other Farms." Each of these general groups was then broken into subclassifications.

Generally, farms were classified as commercial farms if the sales from farm products were $2,500 or more. Farms with product sales from $50-$2,499 also were classified as commercial farms, if the operator had less than 100 days off-farm employment during the year and if his income and that of his family from off-farm sources was less than the value of all products sold. As would be expected on the basis of the changing resource structure of District farms, the number of commercial farms with a relatively large dollar volume of sales increased, while those with a small volume of sales decreased. For the District as a whole, the changes ranged from a 36 per cent increase for commercial farms with product sales of $10,000 or more to a 75 per cent decline for those with sales from $50-$2,499. Commercial farms with sales from $5,000-$9,999 declined 7 per cent, while those with sales from $2,500-$4,999 declined 21 per cent. Generally speaking, the changes in the number of commercial farms in each of the subgroups in each of the District states were similar to those for the District as a whole.

Number of Farms By Economic Class
Tenth District States

Economic Class	Number of Farms 1954	Number of Farms 1959	Percentage Change
Commercial Farms:	464,233	371,594	—20
Farms with sales of $10,000 or over	85,521	133,494	+36
Farms with sales of $5,000-$9,999	118,089	109,359	—7
Farms with sales of $2,500-$4,999	118,097	93,764	—21
Farms with sales of $50-$2,499	142,526	34,977	—75
Other Farms: (Part-time, part-retirement, abnormal)	150,745	144,900	—4
Total All Farms*	614,978	516,494	—16

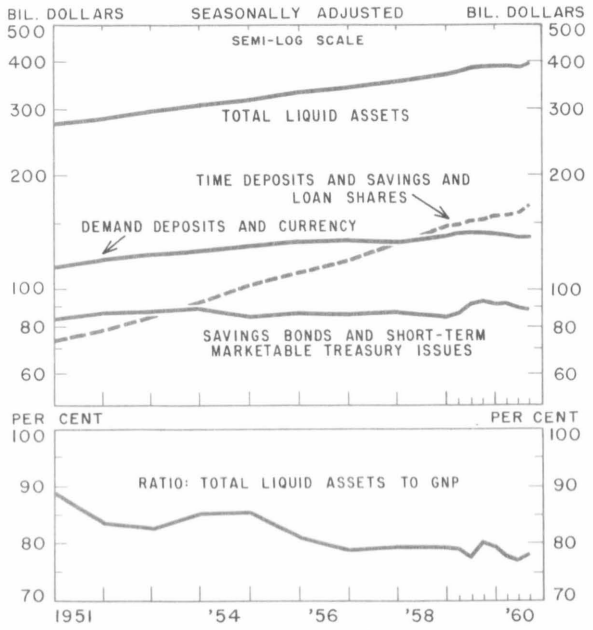
* The number of farms by economic class is not exactly equal to the number by size groups.
SOURCE: **U. S. Census of Agriculture: 1954** and **1959.**

One of the most significant changes from the standpoint of income available for spending and investment has been the increase in the number of farms with farm product sales of $10,000 or more. Farms in this economic class accounted for 36 per cent of all commercial farms in the District in 1959, as compared with only 18 per cent in 1954. The significant decrease of commercial farms with sales from $50-$2,499 caused this group to become relatively less important in 1959. This group made up only 6 per cent of commercial farms in 1959, as compared with 31 per cent in 1954.

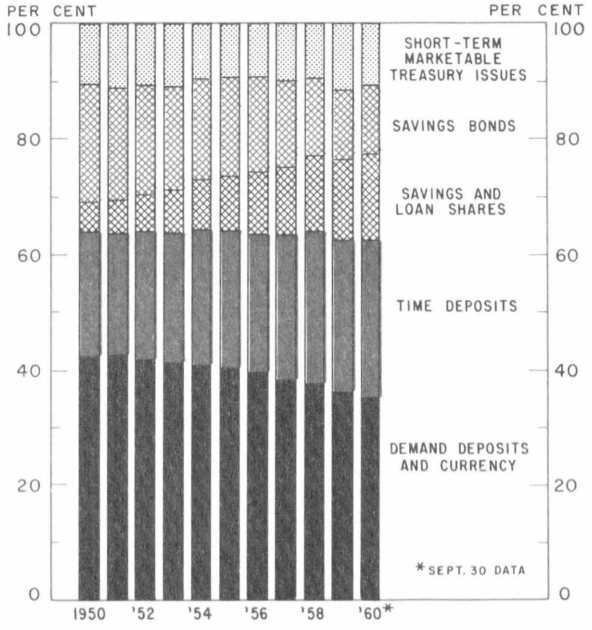
The general group, "Other Farms," was subclassified into part-time, part-retirement, and abnormal farms. Part-time farms were units where the operator was under 65 years of age, worked off the farm 100 or more days with the income from off-farm sources being greater than the value of farm products sold, and from which sales of farm products were less than $2,500. Part-retirement included units where the operator was 65 years old or over and had farm product sales of less than $2,500. Abnormal farms included public and private institutional farms, community enterprises, experiment station farms, grazing associations, and similar units. This general group of farms declined 4 per cent from 1954 to 1959. Although the change in the number of farms in these economic classifications was slight for the District as a whole, there was considerable variation from state to state. Variations ranged from a 30 per cent increase in Nebraska to a 32 per cent decline in New Mexico. Changes in other states included increases of 18 per cent in Kansas and 1 per cent in Missouri; and declines of 24 per cent in Colorado, 17 per cent in Oklahoma, and 6 per cent in Wyoming.

In conclusion, census data verify that the trends toward fewer and larger farms continued from 1954 to 1959. The resource "mix" of land, labor, and capital continued to be altered, with purchased inputs becoming increasingly more important.

LIQUID ASSETS HELD BY THE PUBLIC



RELATIVE SHARES OF LIQUID ASSETS HELD BY THE PUBLIC



BANKING IN THE TENTH DISTRICT

District and States	Loans				Deposits			
	Reserve City Member Banks		Country Member Banks		Reserve City Member Banks		Country Member Banks	
	December 1960 Percentage Change From							
	Nov. 1960	Dec. 1959	Nov. 1960	Dec. 1959	Nov. 1960	Dec. 1959	Nov. 1960	Dec. 1959
Tenth F. R. Dist.	+5	+5	+4	+15	+2	†	+3	+4
Colorado	+2	+1	+2	+5	+1	+3	−1	+5
Kansas	+6	+4	+3	+20	+3	−1	+5	+6
Missouri*	+7	+14	+1	+7	+5	+1	+4	−1
Nebraska	+2	+4	+4	+15	+2	+4	+1	+3
New Mexico*	**	**	+5	+9	**	**	†	−1
Oklahoma*	+6	+2	+8	+19	+1	−4	+6	+5
Wyoming	**	**	+1	+7	**	**	†	+1

*Tenth District portion only. **No reserve cities in this state.
†Less than 0.5 per cent.

PRICE INDEXES, UNITED STATES

Index		Dec. 1960	Nov. 1960	Dec. 1959
Consumer Price Index	(1947-49=100)	127.5	127.4	125.5
Wholesale Price Index	(1947-49=100)	119.5	119.6	118.9
Prices Rec'd by Farmers	(1910-14=100)	242	241	230r
Prices Paid by Farmers	(1910-14=100)	298	297	296r

r Revised.

TENTH DISTRICT BUSINESS INDICATORS

District and Principal Metropolitan Areas	Value of Check Payments		Value of Department Store Sales	
	Percentage change—1960 from 1959			
	Dec.	Year	Dec.	Year
Tenth F. R. District	+2	+3	+4	+1
Denver	+3	+8	+3	+3
Wichita	−3	−4	−9	−13
Kansas City	+1	+3	+3	+2
Omaha	+4	+3	+27	+13
Oklahoma City	+6	+1	−6	−1
Tulsa	−1	+1	0	−3