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PRODUCTIVITY OF RESOURCES USED ON COMMERCIAL FARMS

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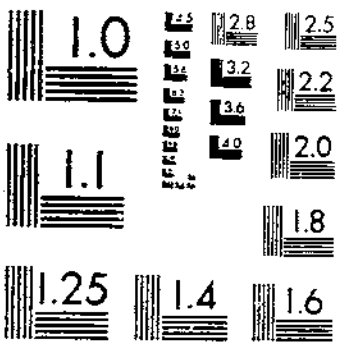

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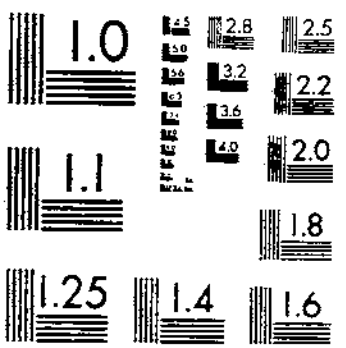

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Productivity of Resources

USED ON COMMERCIAL FARMS

by
Edwin G. Strand, Agricultural Economist
Agricultural Research Service
United States Department of Agriculture

and
Earl O. Heady, Professor, and
James A. Seagraves, Graduate Assistant
Department of Economics and Sociology
Iowa State College

UNITED STATES DEPARTMENT OF AGRICULTURE
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Productivity of Resources

USED ON COMMERCIAL FARMS[1]

By EDWIN G. STRAND, *agricultural economist, Agricultural Research Service,* and EARL O. HEADY, *professor,* and JAMES A. SEAGRAVES, *graduate assistant, Department of Economics and Sociology, Iowa State College*

SUMMARY

Striking differentials exist in returns to the production resources that are used on commercial farms in this country. Analysis of the 68 productivity regions delineated in this report provides a basis for appraising the magnitude of these differences as they existed in the relatively prosperous year of 1949.

Along with data on the characteristics and interrelationships of the resources used, three principal measures of the productivity of specific resources or groups of resources were developed. These are residual returns per man-equivalent worker, residual returns per dollar of investment, and the ratio of the value of total output to the value of all inputs.

From the standpoint of both analytical and welfare considerations, differences in returns per man-equivalent operator and family worker for labor and management are significant. Among the regions here delineated, this return ranged from less than $300 to almost $16,000. The average for the United States was $1,156.

Regions characterized by low average returns to operator and family workers are highly concentrated in the Southern States. But this characteristic is not confined to the South.

In the Great Lakes region, in the regions that encompass New York, Pennsylvania, West Virginia, and much of Maryland, and in eastern Ohio, southeastern Indiana, and the Ozark region of Missouri, returns per operator and family worker are substantially below the national average. This is true also for four scattered regions in the West, which are located in northwestern New Mexico, western Oregon and Washington, northeastern Washington, and northwestern Montana. In all, 15 regions showed average returns in 1949 of less than $600, and 29 of less than $1,000.

In 10 regions returns of more than $3,000 per operator and family worker are indicated. Four of these are located in California, 2 in Texas, 1 in Arizona, and 1 in Washington-Oregon-Idaho. The final two regions are at the northern and southern extremities of the eastern coast—Aroostook County, Maine, and the Florida Peninsula.

The picture of average residual return per dollar of investment in the various regions has much in common with the situation which exists with respect to average returns per operator and family worker.

[1] Submitted for publication April 1955.

In 1949 the range among areas in the instance of residual to investment was from minus 4 percent to plus 24 percent; the national average was 4.9 percent.

Twenty-five regions indicate returns of less than 3 percent per dollar of investment (7 of them show negative returns). Twenty-four of these are among the 29 regions having less than a $1,000 return per operator and family worker.

On the high-return side are 12 regions which showed residuals of 8 percent or more per dollar of investment; 8 of these are among the 10 regions in which the residual per operator and family worker was $3,000 or more. The 2 high-labor-return regions that are not among the 12 with highest returns to investment had investment residuals of more than 7 percent.

An indication of possible opportunity for adjustment in the combinations of resources used on commercial farms in many regions is to be found in the fact that in 40 of the 68 regions the average annual wage per hired farm worker exceeded the residual return per operator and family worker. The 25 regions in which return to investment was less than 3 percent, and 28 of 29 regions having less than $1,000 residuals per operator and family worker, are found among these 40 regions.

Value of farm production expressed as a percentage of all cash and imputed costs is a significant measure of relative efficiency among regions. In computing these ratios, prices of products and input factors that prevailed in each region were used. Operator and family labor were evaluated at existing regional rates for hired farm labor.

A ratio of 1.0 or better indicates generally efficient farm operation. Ratios below 1.0 would suggest that many farms in the region would profit from adjustments in patterns of resource use or combination, assuming continuation of 1949 cost-price relationships. It should be remembered that the data on which these ratios are based are estimates and are for 1 year only. The degree to which ratios of less than 1.0 suggest inefficient utilization of resources is, therefore, dependent on the extent to which the ratio falls below this figure.

For 28 regions, ratios of 1.0 or better are indicated. Included among these are all of the 14 regions that accounted for the 10 highest regional returns per operator and family worker, and the 12 regional residuals to investment which exceeded 8 percent. With 4 exceptions, these 28 regions showed returns per operator and family worker which were substantially above the national average. Exceptions were the Virginia-Carolina tobacco areas, the peanut-tobacco area of Alabama and Georgia, and the delta cotton area of Arkansas, Mississippi, and Louisiana.

In 22 regions, values of total output were less than 90 percent of the values of all inputs. These 22 are among both the 29 regions having lowest returns per operator and family worker, and the 25 regions showing residuals to investment of less than 3 percent.

THE PROBLEM

Efficiency of agriculture in our country varies in different areas and with different segments of the agricultural economy. In some areas and with some farming systems, efficiency is high; in others it is low.

How can we increase the efficiency of our agriculture? One way is to emphasize, more than has been done in the past, opportunities for production and to encourage shifts in resources in areas where efficiency of production is currently low. The consequent improvement of incomes of people in these areas will make for a healthier farm economy.

Workers in the field of research, extension, and credit, and others who direct State and Federal agricultural activities, can greatly improve present conditions. To be well formulated, such a program must be based on rather extensive knowledge of the relative magnitude of differences that exist and the economics of the problem.

Average incomes of farm families in the United States differ greatly in various parts of the country. Most persons who are familiar with our agriculture can point to areas in which farm incomes usually are rather low and to others in which they usually are relatively high. Reasons for these variations in level of income are understood in a general way by those who work with farm people and farm problems. It is known that soil, climate, and other geographic characteristics affect agricultural production. It is generally understood that these factors limit types of production in particular areas and that they affect returns to labor and other resources. The influence of social institutions in bringing about existing patterns of farming in some areas is also appreciated by many who are concerned with farm incomes and rural [illegible]e. Less widely understood are the economic aspects of these d[illegible]erences. Technical combinations or proportions of land, machinery, and other factors of production with which labor is used are of paramount importance.

For an individual farm, efficient production is expressed in the relative level of income, and hence in standard of living, for the farm family. Its achievement is determined by the way the farmer organizes his capital, labor, and land. Any shift in use of *given* resources between different crop and livestock enterprises, or between different techniques of production, which increases the value of sales, must increase the net income of the farm. It also increases the quantity of goods and services the family can buy and thus boosts the potential living standard. Farm planning and organization to further these individual goals represents a step toward more efficient use of the Nation's resources.

Other aspects of resource organization are important also. Capital, labor, and land must be used efficiently in all farming areas of the country; they must be distributed efficiently between opportunities in farming and those in nonfarming industries. With individual preferences for particular living locations considered, efficient use of resources is attained when each additional unit of labor and capital produces approximately the same returns in different locations or in different industries. Under these conditions individual families can attain maximum incomes; production also is organized to permit a maximum national income.

Variations between farming regions in productivity of labor and efficiency of resources used closely parallel regional differences in income per farm. Hence, analysis of resource productivity can help to build an efficient agriculture with a favorable level of income for farm families. This complex is the major problem in our agricul-

tural economy. In some regions, the quantity of resources used per farm is too low and the combination of the various kinds of resources does not allow favorable incomes to farm families. These are the basic long-range problems of the particular farming regions discussed later.

Until the problem is more widely recognized and measures are taken to alleviate it, inefficient use of resources will continue in many regions for the reasons listed below:

(1) In many instances farming methods used are out of date and combinations of labor and capital are inefficient; (2) resources now used in one farming location could add more to national production and to family income if they were used in another location or in another industry; (3) soil is exploited and conservation discouraged as families with low returns to resources press their land for subsistence; and (4) part of the potential product and skills of human resources are lost because many farmers have too little capital to go with their labor: they lack adequate training for full development of skills; or they are uncertain as to the course of action to take.

Short-run programs built on price supports and supplementary measures may contribute little to solution of long-range resource adjustments. Further research is needed to explain unique facets of the productivity problem and to permit remedial measures to be put into effect in critical areas.

WHY THE STUDY WAS MADE

The study reported here was intended to determine differences in levels of income and to provide information on productivity of resources in different segments of our agriculture. Information on composition of and interrelationships in agricultural resources and products in the various regions is also provided.

Specific reasons for undertaking the study were:

(1) Comparatively little is known concerning the productivity of or the returns to capital and labor resources used in relatively homogeneous farming regions of the country. Previous studies aggregated dissimilar producing regions, and thus certain differences in resource productivity were averaged out or covered up.

(2) In designing methods and programs to increase farming efficiency and to raise incomes that are below desirable standards, information on resource productivity and returns is essential.

(3) Information is needed to guide allocation of labor and investment toward locations in which possibilities for farm production and income are favorable. Hitherto, emphasis in agricultural extension education has dealt mainly with how farmers can organize their resources more efficiently on individual farms.

(4) Information is needed to serve as a guide for the most effective use of agricultural resources at all times. Data that indicate gains or losses in national production, as labor and capital are shifted among areas having different agricultural potentials or between agriculture and industry, can be guides to increased efficiency. In times of national emergency, guides to increased efficiency are especially important; they should be ready when the emergencies arise.

It was intended to measure only the average productivity of farming resources used in different regions. No attempt was made to pro-

vide better approximations of marginal resource returns, as regional data necessary for such estimates were not available. Estimates for 68 different productivity regions of the country were made. These productivity regions were delineated in terms of crops produced and basic soil and land resources. This was done to eliminate discrepancies which arise when entire States are grouped together.

CONCEPTS AND METHODOLOGY

Limitations of the Data

Data obtained by the study reported here refer only to resources used on commercial farms and to the product of these resources. Not included is the product of or income from off-farm work. Off-farm employment represents an important use of resources in some regions, particularly in industrial regions such as parts of the Southeast, New England, and metropolitan areas. In some of these regions, addition of the income from labor used in off-farm employment to the value of production from farm-used resources can bring the average return for all farm-originating resources above that of other regions that have fewer off-farm employment opportunities.

Data obtained apply only to 1949, which was a benchmark year in certain respects. It fell between World War II and the Korean outbreak, and prices reflected throughout the economy mainly expressed consumer desires for civilian goods and services. Hence, the basic information provides a framework for measuring the relative values placed (by consumers) on the products produced and on the quantity of resources used in particular farming regions. It suggests, more nearly than can data from a war period or from an earlier period when consumers were fewer and had somewhat different tastes, the direction in which resources now in agriculture might best flow if the national level of income is to be at a maximum. Benchmark studies such as this need to be made for subsequent points in time when economic organization is "approaching an equilibrium state."

The year 1949 is perhaps as good as any that could have been selected for the study of farm productivity in this country. Generally speaking, it was a fairly good year for farming in most areas. The season ranged between satisfactory and ideal for planting and early development of crops. The weather was not equally favorable in all regions, although, in general, the variations were perhaps less than in most years. Total national production of principal crops was second only to the record production of 1948.

The study was focused on regional differentials in productivity. No attempt was made to examine differentials within the productivity regions outlined. But differentials in productivity of resources do exist between farms in the same region. Results of other studies suggest that productivity on some farms is high, even in regions where the average productivity of all units is low; and that productivity on other farms is low, even in regions where the all-farm average is high. These interfarm differences exist everywhere; they are perhaps explained by the same general phenomena which describe differences between regions.

LIMITATIONS OF AVERAGE PRODUCTIVITIES

Most of the data presented here are single averages for productivity regions. The analysis of resource productivity is in terms of average products of the resources in question. Average products are the total product, or one of the residual incomes, divided by the value of the input (fig. 1, P/I). A limitation of single averages as estimates of productivity is that they cannot show the effects of small changes in inputs upon the agricultural production of a region.

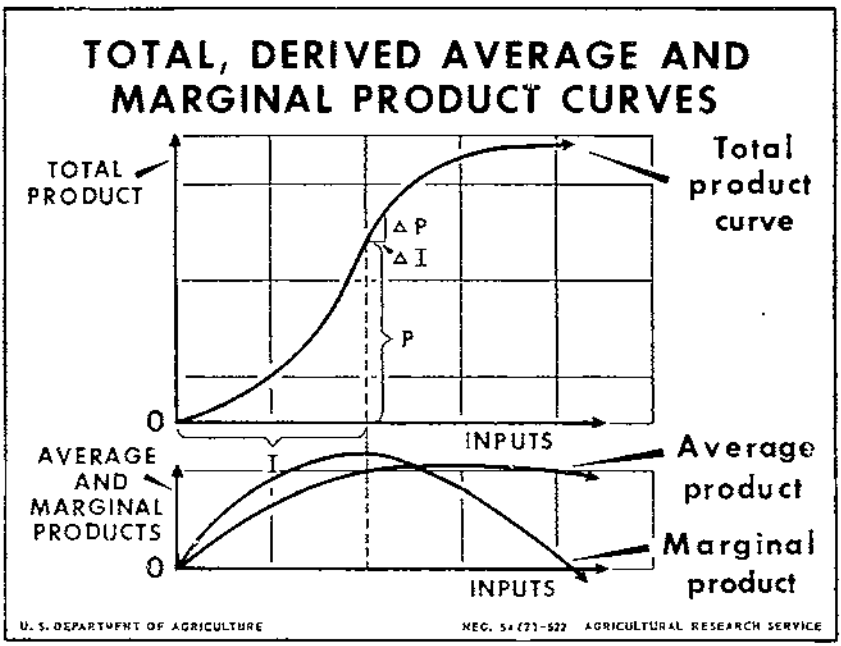

FIGURE 1.—When some inputs are increased in the process of production at the same time that other inputs are held constant, the added product resulting from each additional unit of input may at first increase, but eventually it will decrease. This idea of a diminishing marginal product is fundamental in the study of returns to resources used in agricultural production.

Ideally, we should be able to study many production and input possibilities for each region in order to find the most profitable program, or combination of products and inputs. In a very simple example, one may have information on the possible production of *one* commodity with various levels of *one* input when all other inputs are constant. Such information could be expressed graphically with a total product curve, as shown in figure 1, and also with curves for the average and marginal products. The marginal product is the ratio of added product to added input for small increments of input (change in product/change in input, or $\Delta P/\Delta I$ in fig. 1).

Marginal productivities provide a basis for allocation of resources to the product or region where they will earn the most. Although a series of inputs and resulting total products is needed to find marginal

productivities exactly, indirect ways of estimating them from single average products can be used.

Under special conditions the marginal product is equal to the average product, as at the point where the curves intersect in figure 1. These conditions are: (1) Constant returns to scale, and (2) the imputed payments to each of the inputs equals their marginal value products (*4, pp. 402–414*).[2] (It is believed that condition (1) is not fulfilled for all productivity regions, and especially not for those in the South which have many small farms.) This is sometimes called the residual or imputational method of computing the marginal product of one input.

Average products are sometimes used as approximations of marginal products, but this is advisable only when other information is available for use as a check. It is good to know the general shape of the average and marginal product curves when this is done. If the average curve is rising, the marginal curve is above it; and if the former is falling, the marginal curve is below it. When the average product is highest, the marginal product is equal to it. Also, the steeper the average-product curve, the farther away from it is the marginal product.

Limitations involved in productivity recommendations that are based on average products often arise from the fact that it is not known whether the marginal product is greater or less than the average product. The typical small farm has a surplus of labor and a shortage of land and capital. This situation makes the average product of labor very low and that of capital quite high. If more land and capital are added, some of the labor works full time and it is possible that the average product of land and capital rises. In this case the marginal product of land and capital is greater than the average product. Larger farms have more land and capital per worker, and the average products of both labor and other resources are probably high. Perhaps both of these average products decrease as more of each input is used, though not necessarily at the same rate.

Despite these difficulties, average products are valuable in pointing out big differences in productivity and in directing further study. Analysis, by regions, of the separate inputs and products stands as a worthwhile synthesis of the data. The productivity framework of this analysis should be valuable in directing attention to this important context in which census data can be used and understood.

An ideal study of resource productivity in the United States would include detailed analyses of differences related to size and type of farm. Prices and crop yields, for example, might be adjusted on the basis of averages for several years to make them more representative than data for 1 year. Greater attention might be given to situations characteristic of multiple-unit (cropper) farms and differences caused by tenancy. More complete data on inputs such as family labor, irrigation, and miscellaneous expenses would make estimates of net income more reliable. Finally, the estimation of marginal productivities from samples of farms and from experimental data presents possibilities. Such analyses represent a separate and perhaps a more promising approach to the detailed problems of efficient use of resources.

[2] Italic figures in parentheses refer to Literature cited, p. 64.

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Farms Included in the Study

The study of commercial farms, as distinguished from all farms, was made possible by the breakdown of data presented in reports of the 1950 Census of Agriculture (*14*). Previous to this census, data were not available separately for commercial and other farms.[3]

The 1950 Census of Agriculture reported a total of 5,379,250 farms in the United States.[4] The farms were classified into four groups: (1) Commercial farms, (2) part-time farms, (3) residential farms, and (4) abnormal farms.

In 1949–50, according to the 1950 census, there were 3,706,412 commercial farms in the United States. Commercial farms thus made up 69 percent of the total number of farms. But the role of these farms in the agricultural economy of the Nation is even greater than is indicated by their relative numbers. Commercial farms included 88 percent of the land in all farms and they accounted for 98 percent of the total value of farm products sold in 1949 (table 1).

Most questions and problems relating to efficiency of production and use of resources in agriculture apply primarily to commercial farms—those on which the major part of family income is obtained from sales of agricultural products. National policies and Federal and State legislation relating to agriculture are usually developed with commercial farms in mind. Operators and their families on these farms

TABLE 1.—*Number of farms, acreage, and value of products sold, by economic class of farm, United States, 1949* [1]

Economic class of farm	Farms		Land in farms		Value of farm products sold	
	Number	*Percent*	*Acres*	*Percent*	*Dollars*	*Percent*
Commercial [2]	3,706,412	68.9	1,021,354,592	88.1	21,713,216,602	97.5
Part-time [3]	630,230	11.8	48,298,060	4.2	391,193,054	1.7
Residential [4]	1,029,392	19.1	51,438,040	4.4	81,714,797	.4
Abnormal [5]	4,216	.1	38,698,448	3.3	90,437,246	.4
Total	5,379,250	100.0	1,159,789,020	100.0	22,279,562,699	100.0

[1] Data from U. S. Census of Agriculture: 1950 (*14, v. 2*).

[2] All farms, except those classified as abnormal, with a value of sales of farm products amounting to $1,200 or more. Also included are farms with a value of farm products sold of $250 to $1,199 that did not qualify as part-time farms.

[3] All farms with a value of sales of farm products of $250 to $1,199 provided (1) the farm operator worked off the farm 100 or more days in 1949, or (2) the nonfarm income received by the operator and members of his family was greater than the value of farm products sold.

[4] All farms, except abnormal farms, with a total value of sales of farm products of less than $250.

[5] Public and private institutional farms, community enterprises, experiment station farms, grazing associations, and similar agricultural units.

[3] A special report on the 1945 Sample Census of Agriculture included a breakdown of various income and expense data for farms grouped into each of seven economic classes. But these classes were not clearly distinguishable into commercial and other farms. Also, data were reported on a State basis and could not be broken down among different farming areas within States (*13, table 29*).

[4] Counted as farms, in this census, were all places of 3 or more acres that reported a value of agricultural products in 1949, exclusive of home gardens, amounting to $150 or more. The agricultural products could have been for home use or for sale. Also counted as farms were places of less than 3 acres that reported sales of agricultural products in 1949 amounting to $150 or more. Included also were places operated in 1949 for which the value of agricultural products in that year was less than $150 because of crop failure or some other unusual situation, and places operated in 1950 for the first time if normally they could be expected to produce these minimum quantities of farm products.

are the ones that are most vitally affected by agricultural prices, Government regulations and programs, and available agricultural information. The possibilities of, or the opportunities for, economic profit from farming are generally less important to operators of part-time, residential, and abnormal farms than they are to operators of commercial farms.

The absence, prior to the 1950 census, of data for types and economic classes of farms, has limited the possibilities of analyzing the organization and efficiency of farming in different sections of the country. Economic studies of farming in areas, States, and regions must use totals or aggregate data on land use, agricultural production, expenses, and other economic items. When data for all farms in an area are totaled or averaged, the resulting picture may not be a very good representation of commercial farming in the area. Inclusion of numbers of noncommercial farms and of economic data for these farms usually results in averages, percentages, or other figures that are not a true representation for commercial farms.

If the proportion of noncommercial farms is large, distortions may also be large. Data in appendix tables 17 and 18 show that in 26 of the 64 regions outlined more than a third of all farms are in the noncommercial part-time, residential, and abnormal classes. Distribution of farmland among commercial and noncommercial classes and average size of farms in these classes are shown, respectively, in appendix tables 20 and 21. Commercial farms average much smaller than abnormal farms in nearly all regions, but they consistently run larger than either part-time or residential farms.

ECONOMIC CLASSES OF COMMERCIAL FARMS

Although the scale of operations of farms classified as commercial varies considerably, these farms have the common characteristic that farming is a business enterprise and products are produced primarily for sale. In the 1950 Census of Agriculture (*14*), commercial farms are divided into six groups, or classes, on the basis of the total value of farm products sold, as follows:

Class:	*Value of farm products sold*
I	$25,000 or more.
II	$10,000 to $24,999.
III	$5,000 to $9,999.
IV	$2,500 to $4,999.
V	$1,200 to $2,499.
VI	$250 to $1,199.[1]

[1] Provided the farm operator worked off the farm less than 100 days and provided the income the farm operator and members of his family received from nonfarm sources was less than the value of all farm products sold.

In general, most commercial farms in a particular region are fairly similar in size, as measured either in acreage or in volume of production. The number of farms in each commercial class (classes I through VI) in each productivity region outlined in this bulletin is shown in appendix table 23. A tendency toward concentration of farms into 2 or 3 classes can be noted in most regions (appendix table 24). This bulletin shows how this tendency is related to geographic location and utilization of resources. Distribution of land and aver-

age size of farm among the six economic classes of commercial farms are indicated in appendix tables 25 and 26.

Analysis of data for individual classes of commercial farms is left for a future study. Data for individual classes of commercial farms, shown in appendix tables 23–26, should be consulted in evaluating the representativeness of data based on all commercial farms in specified regions.

Notwithstanding limitations due to differences in size of commercial farms within regions, use of data for commercial farms as a group is a significant improvement over use of data for commercial and noncommercial farms together. Comparisons between regions, of factors that indicate levels of efficiency in use of resources, are more meaningful when limited to commercial farms than when made on the basis of all farms. The representativeness of the data and the validity of the comparisons are increased by grouping commercial farms by regions that are highly homogeneous in regard to agricultural characteristics.

Productivity Regions

In this bulletin the aggregate production and input relationships in farming in specified regions are analyzed and comparisons between regions are made.

The degree to which the aggregate data reflect the prevailing characteristics of farming in a region depends on the degree of similarity among farms included in the aggregate. In a broad study such as this, a considerable range in some of the characteristics of farms included in the aggregate must be tolerated. The means used to reduce the dispersion or differences among farms grouped together is twofold: First, as explained above, the study is limited to commercial farms; second, commercial farms are grouped by regions within which agricultural resources and farming conditions and practices are relatively uniform.

Regions used in the study are not identical with those used in any other study or report. They were outlined expressly for this study on the basis of internal homogeneity in factors that affect or reflect the productivity of farm labor and other resources used in agriculture.

A starting point in outlining productivity regions was provided by the map of State economic areas, prepared by the United States Bureau of the Census in cooperation with the former Bureau of Agricultural Economics (*2*). State economic areas are subdivisions of States; they consist of single counties or groups of counties that have similar economic and social characteristics. The 3,101 counties, or equivalent subdivisions, of the 48 States were grouped into 501 State economic areas. These geographic units were used for tabulating and publishing much of the data in the 1950 Census of Agriculture (*14*). Some economic areas were combined for the tabulation of agricultural data, thus reducing the number of areas to 361 for agricultural purposes.

To reduce the detail of tabulation and analysis in the present study, and to present the findings in fairly concise form, an effort was made to group all State economic areas into a limited number of productivity regions showing relatively great differences in productivity or production conditions, or both.

In doing this, several measures were used as guides. Chief of these were the prevailing type of farming; average value of agricultural production per farm; proportion of commercial farms in the two lowest income classes (V and VI combined—see list in section titled "Economic Classes of Commercial Farms"); value of implements and machinery per acre of cropland; average farm-operator level-of-living index (*3*); and dominant physiographic features, such as soil, topography, and weather. The aim was to outline regions that were highly homogeneous in regard to these factors. Data on classes of commercial farms were obtained from the 1950 Census of Agriculture. Data on value of production and value of machinery, and on the level-of-living index, were obtained from State Economic Areas (*2*). Other sources of information included the report describing economic regions and subregions, prepared by the Scripps Foundation (*1*); a slightly revised edition of the map of economic subregions (*13, v. 5, pt. 10*); and the report including the map of generalized types of farming in the United States, prepared by the former Bureau of Agricultural Economics (*9*). Professional workers familiar with farming and agricultural resources in specific areas were also consulted. As a result of this work, 68 productivity regions and subregions covering continental United States were outlined. These regions are shown in figure 2, which shows also the distribution of commercial farms within each region.

Regions 50 through 64 were formed from residual territory after the first 49 regions had been outlined, and this accounts for their scattered locations. Some of these regions, particularly 51, 53, 57, 61,

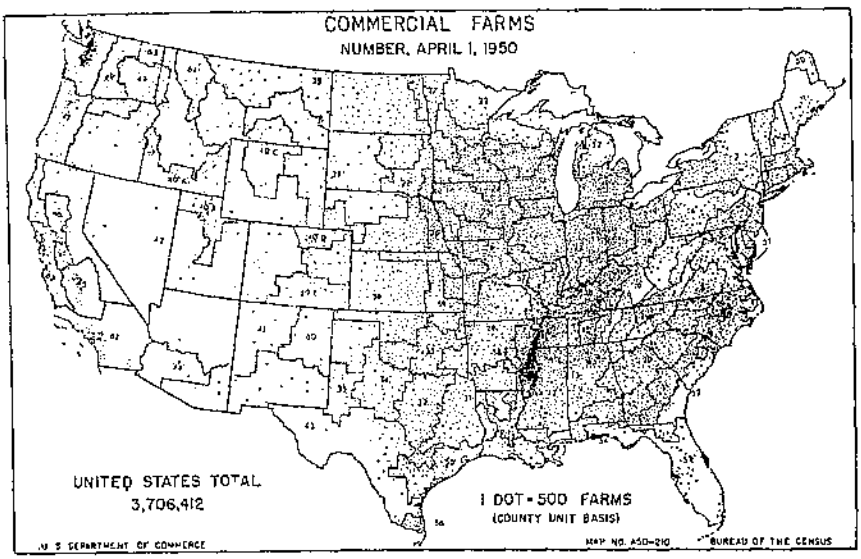

FIGURE 2.—Commercial farms are most densely concentrated in the eastern half of the United States, especially in the south central, southeastern, and east north central regions. There are heavy concentrations also in some localities in the Far West. The productivity regions used in this study are relatively homogeneous farming areas, and most of them extend across State boundaries.

and 62, include a rather wide variety of types of farms and of economic situations. Results of the analyses for these regions are therefore less reliable than those for most of the others.

The proportions of the total land area included in all farms, in commercial farms, and in other farms are shown (table 2). In about two-thirds of the regions, commercial farms occupy more than half of the land. In some regions, more than 90 percent of the land is in commercial farms. At the other extreme, in 2 regions less than 15 percent of the land is in commercial farms.

Throughout each productivity region, the dominant characteristics of the agricultural resources and the prevailing type of farming and economic development are quite uniform. Each region differs from adjacent regions in at least one significant economic factor.

The approximate total area of each productivity region, along with the acreage of land in commercial farms in each, is shown in appendix table 19.

TABLE 2.—*Percentage of total land area in all farms, in commercial farms, and in other farms, by productivity regions, 1949*

Productivity region	Land area			Productivity region	Land area		
	All farms	Commercial farms	Other farms [1]		All farms	Commercial farms	Other farms [1]
	Percent	*Percent*	*Percent*		*Percent*	*Percent*	*Percent*
1	22.1	14.3	7.8	36	92.9	91.5	1.4
2	35.7	25.3	10.4	37	87.3	85.8	1.5
3	54.6	46.5	8.1	38	85.2	83.9	1.3
4	40.5	28.6	11.9	39	88.5	86.1	2.4
5	66.1	55.7	10.4	40A	37.8	36.3	1.5
6	49.9	22.8	27.1	40B	46.4	44.5	1.9
7	58.8	41.4	17.4	40C	56.9	44.1	12.8
8	71.8	55.0	16.8	40D	75.6	73.8	1.8
9	62.3	53.7	8.6	40E	68.6	66.6	2.0
10	68.8	44.3	24.5	41	54.6	28.6	26.0
11	71.6	61.8	9.8	42	26.3	19.9	6.4
12	79.0	68.2	10.8	43	74.7	67.8	6.9
13	60.4	49.7	19.7	44	33.5	28.6	4.9
14	73.2	54.2	19.0	45	56.6	54.6	2.0
15	87.3	75.0	12.3	46	76.2	73.9	2.3
16	75.9	62.1	13.8	47	22.4	17.7	4.7
17	91.2	84.5	6.7	48	44.6	39.0	5.6
18	74.0	55.2	18.8	49	77.1	75.1	2.0
19	70.3	55.1	15.2	50	19.7	18.7	1.0
20	88.9	83.9	5.0	51	40.6	33.8	6.8
21	73.0	62.3	10.7	52	32.7	25.8	6.9
22	22.1	17.3	4.8	53	52.4	48.7	3.7
23	74.9	69.8	5.1	54	24.3	16.0	8.3
24	89.8	87.4	2.4	55	70.2	64.7	5.5
25	94.4	93.3	1.1	56	99.3	94.0	5.3
26	93.6	91.2	2.4	57	79.2	71.6	7.6
27	96.1	95.1	1.0	58	70.7	62.1	8.6
28	91.3	85.8	5.5	59	90.0	83.2	6.8
29	58.2	41.1	17.1	60	86.7	83.5	3.2
30	64.1	56.8	7.3	61	19.5	17.5	2.0
31	49.5	35.4	14.1	62	71.1	67.8	3.3
32	86.2	77.5	8.7	63	26.2	21.3	4.9
33	77.2	61.3	15.9	64	15.8	14.3	1.5
34	93.9	91.6	2.3				
35	90.6	89.5	1.1	United States	60.9	53.6	7.3

[1] Part-time farms, residential farms, and abnormal farms, as defined in footnotes to table 1.

How Value of Product Was Computed

This bulletin is concerned with gross and net returns from farming rather than with total value of agricultural production. Farmers realize their returns from farming through both sales and household

use of products from their farms. The value of farm products used up in other production (such as feed crops fed to livestock) is covered by the value of products ultimately sold. As a measure of gross returns, therefore, we are interested in the value of farm products sold plus the value of farm products used in farm households. The sum of these products constitutes "total product," as the term is used here.

Net returns to labor or to other specified resources used in farming can be computed or estimated as residuals if the value of the total product is known and if values can be determined or estimated for input items other than the one in question.

The 1950 Census of Agriculture (*14*) gives the total value of all farm products sold from commercial farms in each State economic area. Separate figures are also given on the value of all crops sold, all livestock and livestock products sold, and forest products sold. These data are reported for commercial farms, for noncommercial farms, and for all farms. The 1950 census does not report the value of farm products used in farm households.

The value of total product on commercial farms in each productivity region was computed in this study by first adding together the value of products sold in each State economic area within each productivity region, then adding to this an estimated value of farm products used in farm households. Value of services furnished by farm dwellings was not estimated. To find the value of products sold, census figures for the State economic areas in each productivity region were totaled. Estimating the value of products used in farm households required certain assumptions and computations; these are explained in the appendix.

How Value of Inputs Was Computed

For this analysis it was necessary to know the cost or estimated value of all major groups of input items for commercial farms in each productivity region in 1949. Expenditures for several groups of inputs are reported in the 1950 Census of Agriculture (*14*). These are listed for each economic class of farm and are totaled for all commercial farms in each State economic area. Expenditures reported in the census are those for hired labor; feed for livestock and poultry; livestock and poultry purchased; seeds, bulbs, plants, and trees purchased; gasoline and other petroleum fuel and oil; tractor repairs; other farm machinery repairs; and machine hire.

Other important input items for which costs or values had to be estimated were fertilizer and lime used, depreciation of machinery and equipment, depreciation of buildings, interest on investment in land, interest on investment in buildings, interest on investment in machinery and equipment, interest on investment in livestock, value of unpaid family labor, and value of operator's labor.

The question of whether to include taxes on real estate, personal property, and farmers' incomes was considered. It was decided that taxes would not be counted as farm inputs in the present analysis, as these expenses are determined to a large extent by factors outside the farm business.

Rent paid by tenants is not included as an input item. This bulletin is concerned with the productivity of groups of farms, by regions; it covers all types of tenancy. It does not attempt to show the differences in returns to farmers in various tenancy classes within a region. An analysis of the effects of tenancy arrangement on farm income might well be the subject of a separate study. With charges included for depreciation of buildings and for interest on the entire farm investment, as is done in the present study, all farms are on the same input-output basis, and interregional comparisons are in terms of total productivity. In a sense, all commercial farms in a region are treated as though they were owner operated and the capital were borrowed at commercial rates.

It is assumed that most of the cost of irrigation by individual farm enterprises is covered by the input items of labor, petroleum fuel, machinery repairs, depreciation of machinery and equipment, and interest on investment in land. Expenditures for water obtained from public or community irrigation enterprises, however, are not covered.

After the analysis was completed, data on cost of water obtained by farmers from multiple-farm enterprises became available for counties in 20 States (*14, v. 3*). Using these data, cost of water from such sources was estimated for commercial farms in 10 productivity regions. These 10 regions, all of which are in the Western States, include most of the areas where irrigation with water from large surface sources or from other group-irrigation enterprises is important. Average expenditure per commercial farm for water from multiple-farm enterprises in these regions ranged from a high of $1,390 in region 44 in Arizona to a low of $99 in region 40B in Utah. Second high was region 56 in Texas, with an average of $461.

In region 44 expenditure for water amounted to 5.7 percent of the total value of all other inputs; in region 56 it amounted to 4.1 percent; while in the other regions it was less than 2.5 percent. These figures are not large enough to affect the relative ranking of regions based on the input-output analysis reported on following pages, except possibly to a minor extent in a few instances. Estimated cost per commercial farm in each of the 10 regions is shown in appendix table 28.

No reliable data on miscellaneous minor expenses of production are available. Because of the irregularity with which certain minor expenses occur in farming, regional annual averages for such items would be difficult to estimate. Frequently, certain harvesting, hauling, and marketing charges are deducted by farmers before they report value of sales. It was believed best to avoid attempts at estimating miscellaneous minor expenses, as it was thought that their omission would not weaken the analysis.

"Total input," as the term is used here, is the sum of the annual values of the 8 expenditure items reported in the 1950 census and the 9 input items mentioned (p. 13). Brief explanations of the census items, and of the methods used to estimate other input items, are given in the appendix (pp. 67–73).

VALUE OF TOTAL PRODUCT ON COMMERCIAL FARMS

For purposes of this bulletin, "total farm product" means the value of all farm products sold plus the value of farm products used in farm households. Value of products sold was obtained from the 1950 Census of Agriculture (*14*). Value of farm products used in farm households was estimated from data given in the 1945 Census of Agriculture (*12*), and in more recent reports on farm income and prices issued by the former Bureau of Agricultural Economics. The method of estimating the value of farm products used in farm households is explained in the appendix. Also included in the appendix is a discussion of census data on the value of sales.

Estimated Value of Farm Production, 1949

The 1950 census shows that the total value of farm products sold from all farms in the United States in 1949 was approximately $22.3 billion. If to this is added an estimate of $2.3 billion for value of farm products used in farm households, the total value of farm production in that year would be $24.6 billion.

Approximately $23.3 billion, or 95 percent, of the total value of farm production was accounted for by commercial farms. Value of farm products sold from commercial farms was $21.7 billion. Estimated value of farm products used in households on these farms was $1.6 billion.

Of the total value of farm products sold in 1949 on commercial farms in this country, 44 percent was from crops, 55 percent was from livestock and livestock products, and about 1 percent was from forest products. Together, sales of all products accounted for 93 percent of the value of farm production. Farm products used in farm households made up 7 percent. Average value of production per commercial farm was estimated at $6,296 (table 3).

TABLE 3.—*Value of production on commercial farms, United States, 1949*

Group	Total	Average per farm	Relative composition
	Dollars	*Dollars*	*Percent*
Farm products sold:[1]			
All crops	9,693,007,877	2,591	41.2
All livestock and livestock products	11,991,661,746	3,236	51.4
Forest products	118,546,979	32	.5
Total	21,713,216,602	5,858	93.1
Farm products used in farm households[2]	1,620,645,054	438	6.9
Total, all farm products	23,334,861,656	6,296	100.0

[1] Data from U. S. Census of Agriculture: 1950 (*14*, p. 5).
[2] Estimated.

Regional Differences

Average value of production per farm varied widely among regions (fig. 3). The upper map in the figure shows total gross value of product; the lower map shows the total value after deducting the value of livestock and feed purchased. In general, the regions that

rank highest in average value of production per farm were in the Western States, while those ranking lowest were in the South and Southeast.

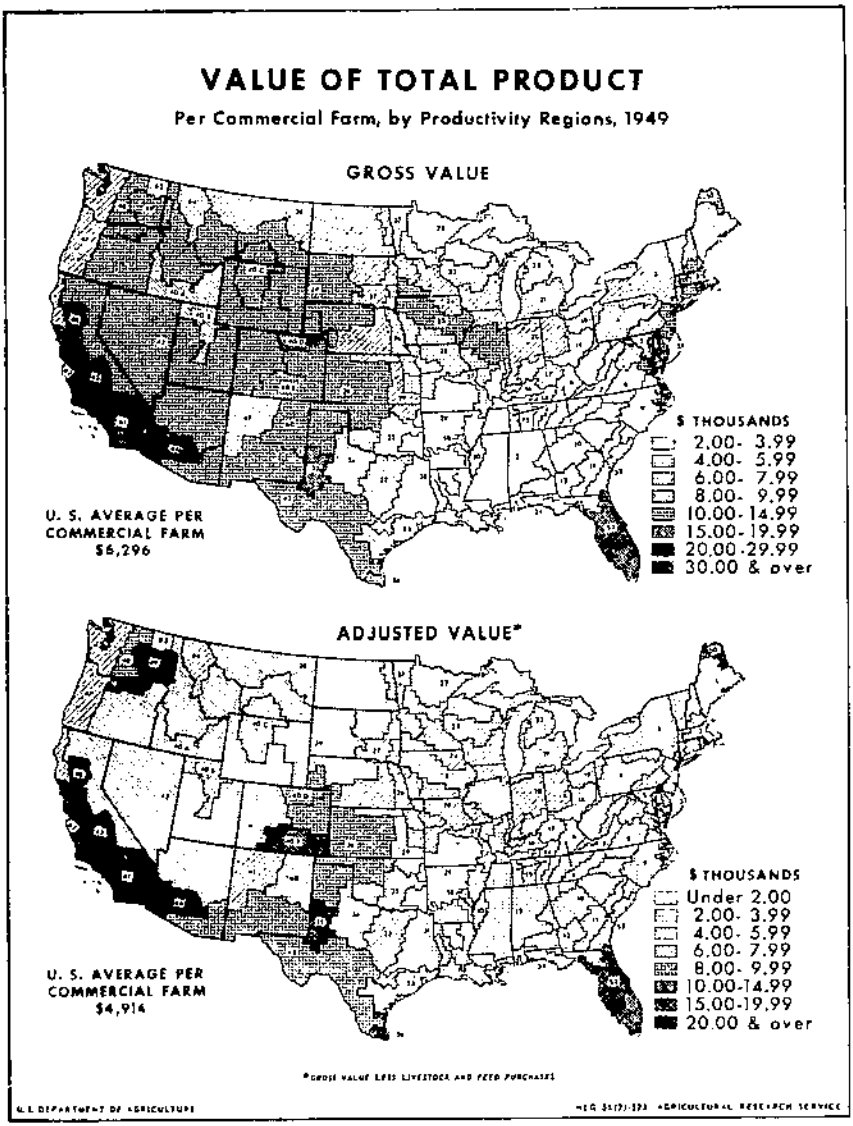

FIGURE 3.—Gross value of product averages more than $10,000 per farm in many regions; in others it is less than $4,000. Data on gross sales tend to exaggerate actual production in regions that buy large quantities of livestock and feed. The adjusted value of the product (TP_a) was found by subtracting purchases of livestock and feed from the gross value (TP_g). On the adjusted basis, relatively few regions show a value of product exceeding $10,000 per farm; and in most regions the average is less than $6,000.

In 22 of the 68 productivity regions, the gross value of all products averaged higher than $10,000 per commercial farm. Of these 22 regions, 17 were in the western half of the country. Top rank was held by region 44 (southwestern Arizona), with an average gross value of product per commercial farm of $38,473. In second place was region 45 (the central valley of California), with an average of $22,509. Ranking third and fourth, respectively, were regions 61 and 62 in southern and west central California. The Florida peninsula, region 53, ranked 6th with an average value of $16,514 per commercial farm. Region 25 (the central Corn Belt) was in 18th place with an average of $10,375. (See table 4.)

TABLE 4.—*Value and average composition of production on commercial farms, by productivity regions, 1940*

Productivity region	Commercial farms	Value of farm production		Composition of production			
				Sold			Used in farm households
		Total	Average per commercial farm	Crops	Livestock and livestock products	Forest products	
	Number	*1,000 dollars*	*Dollars*	*Percent*	*Percent*	*Percent*	*Percent*
1	14,168	88,849	6,271	17.2	70.7	4.3	7.8
2	24,109	273,505	11,345	31.5	64.2	.3	4.0
3	111,380	803,788	7,216	16.6	76.1	.9	6.4
4	39,679	200,523	5,057	16.5	71.0	1.0	10.6
5	65,448	532,646	8,132	27.4	65.3	.3	7.0
6	52,551	127,508	2,426	24.9	50.6	2.6	21.9
7	53,702	164,121	3,056	22.6	56.7	1.4	19.3
8	62,370	197,506	3,167	59.1	20.8	1.8	16.3
9	143,860	499,897	3,475	79.2	7.3	1.1	12.4
10	109,084	307,501	2,700	44.6	35.4	2.9	17.1
11	70,560	230,777	3,270	62.8	18.5	5.1	13.6
12	51,396	192,271	3,534	68.6	15.3	2.7	13.4
13	249,649	859,737	2,302	51.5	27.0	2.1	19.4
14	40,547	89,017	2,217	35.1	41.4	1.6	21.9
15	54,873	182,687	3,329	36.6	51.0	.7	12.7
16	64,423	222,369	3,452	30.3	57.1	.7	11.9
17	45,644	216,907	4,746	47.7	43.6	.2	8.5
18	42,972	171,099	3,982	20.7	68.8	.6	9.9
19	34,589	187,655	5,425	30.5	61.2	.7	7.6
20	183,572	1,176,320	6,408	32.5	61.6	.1	5.8
21	79,225	392,206	4,952	39.0	53.1	.3	7.6
22	45,308	150,213	3,316	16.5	69.5	2.4	11.6
23	89,009	408,078	4,538	7.8	81.4	.7	10.1
24	107,798	1,515,575	7,077	16.6	77.5	.1	5.8
25	105,120	2,024,280	10,375	32.0	63.3	(1)	4.7
26	101,319	549,596	5,385	21.6	72.7	(1)	5.7
27	112,550	785,259	6,977	33.1	59.7	(1)	7.2
28	123,447	682,633	5,530	22.0	70.2	.1	7.7
29	88,120	270,935	3,075	16.7	68.5	.9	14.0
30	148,917	516,535	3,469	53.7	7.5	.2	8.6
31	66,985	204,026	3,046	49.6	34.9	1.6	13.9
32	77,818	398,307	5,119	62.9	29.2	.1	7.8
33	31,031	113,154	3,646	33.5	52.7	.1	13.7
34	46,980	390,431	8,318	66.5	28.4	(1)	5.1
35	12,984	215,360	16,588	88.5	8.6	(1)	2.9
36	107,241	1,091,336	10,177	56.4	39.4	(1)	4.2
37	25,253	190,479	7,543	60.8	27.4	(1)	5.8
38	84,627	600,456	7,098	51.8	41.6	(1)	6.6
39	26,457	267,826	10,123	20.5	75.4	0.1	4.0
40A	25,051	227,519	9,082	52.7	43.3	(1)	4.0
40B	11,610	95,714	8,316	28.9	67.4	(1)	3.7
40C	7,003	71,288	10,179	31.6	63.6	(1)	4.8
40D	9,452	148,702	15,732	36.5	61.0	(1)	2.5
40E	8,312	100,207	12,785	46.5	50.6	.1	2.8
41	3,020	17,065	5,651	26.0	65.4	.4	7.3
42	40,661	419,489	10,315	26.0	68.3	.6	4.2
43	24,589	320,703	13,042	39.2	57.7	(1)	3.1
44	4,034	155,202	38,473	76.4	22.8	(1)	.8
45	20,083	452,047	22,509	74.9	24.0	(1)	1.1
46	24,113	393,634	16,325	60.0	38.2	(1)	1.7

[1] Less than 0.05 percent

TABLE 4.—*Value and average composition of production on commercial farms, by productivity regions, 1949*—Continued

Productivity region	Commercial farms	Value of farm production		Composition of production			
				Sold			Used in farm households
		Total	Average per commercial farm	Crops	Livestock and livestock products	Forest products	
	Number	*1,000 dollars*	*Dollars*	*Percent*	*Percent*	*Percent*	*Percent*
47	44,386	209,202	5,741	36.1	55.4	2.6	5.9
48	10,615	116,010	10,925	69.6	26.8	.2	3.4
49	14,966	220,302	14,720	77.8	18.8	.3	3.1
50	4,080	59,528	14,590	89.0	4.5	.8	5.7
51	41,072	472,607	11,260	36.4	59.5	.4	3.7
52	9,166	31,877	3,477	60.0	26.6	11.3	12.1
53	17,511	289,150	16,514	73.4	24.1	.6	1.9
54	14,158	56,402	3,984	39.2	45.5	2.7	12.6
55	39,645	321,212	8,103	65.5	29.3	.1	5.1
56	7,943	115,720	14,566	92.5	5.7	(1)	1.8
57	50,015	261,155	5,222	51.2	40.2	.3	8.3
58	5,340	32,433	6,073	85.6	8.5	.1	7.8
59	29,858	182,097	6,096	22.2	70.6	.1	7.1
60	6,261	64,981	10,378	34.3	61.6	(1)	4.1
61	28,868	536,035	18,569	55.2	43.9	(1)	.9
62	18,163	314,279	17,303	55.0	43.2	.1	1.7
63	1,899	7,755	4,083	18.3	65.3	4.4	12.0
64	4,186	21,220	5,071	24.3	65.9	1.7	8.1
United States	3,706,412	23,334,561	6,296	41.2	51.4	0.5	6.9

[1] Less than 0.05 percent.

Large acreages of land per farm contributed to the relatively high gross value of product per farm in most of the western half of the country. In most regions west of the 98th meridian, which runs north from the southern tip of Texas through eastern North Dakota, commercial farms averaged 500 acres or larger, compared with averages of less than 200 acres in most of the country east of that line. But irrigation, type of farming, and other factors were also important in producing a large total product. Irrigation facilities were reported on from 68 to 95 percent of the commercial farms in 10 of the 17 western regions in which gross product averaged higher than $10,000 per farm. In the remaining 7 regions, from 9 to 39 percent of the farms reported irrigation.

Types of farming in the 17 regions vary with location and other characteristics. Fruit, cotton, other field crops, poultry, and dairy or other livestock are the leading types. An indication that farming in many of these regions is intensive as well as large scale is seen in the fact that in 8 of the 17 regions, the average value of product per acre of all land in commercial farms was higher than the average for all commercial farms in the country.

In 19 productivity regions the value of total product per commercial farm averaged less than $4,000. All these regions were in the eastern half of the country. Most of them were east of the Mississippi and south of the Ohio River. Lowest on the list was region 14, which includes the eastern and western Highland Rim section of Tennessee and the Knobs section of south central Kentucky. In this region, the value of total farm product averaged only $2,217 per commercial farm. Three other regions had a total value of product averaging less than $3,000 per farm. These were region 13 (east south central

Cotton Belt), region 6 (Cumberland Plateau and southern Appalachians), and region 10 (southern Piedmont). Among the low productivity regions outside the Southeast were region 20 (Ozark-Ouachita) and region 22 (Great Lakes Cutover), ranking seventh and tenth from the bottom, respectively. Nineteenth from the bottom, with an average value of product per farm of $3,984, was region 54 (the Louisiana-Alabama-Florida Coastal Plain).

The percentage composition of the total production of each region is shown (table 4). Crop sales are 88 percent of the total in region 35 where a large proportion of the farms are large-scale mechanized units emphasizing cotton, wheat, and other cash crops; they are as high as 92 percent in region 56 which specializes in vegetables and fruit. Crops account for less than 8 percent of total sales in region 23 where crop production mainly represents feed for dairy specialization in the eastern part and for dairy and general livestock in the western part. Sales of livestock make up as much as 76 percent of the total product in region 3 which specializes in dairy and poultry products for the concentrated population centers of the East.

Home use of farm products is relatively greatest in regions 6, 7, 8, 10, 13, and 14, in the Appalachian Mountains and the Southeast, where small-scale and subsistence farms are concentrated. Home consumption of products, in contrast to their sale on the market, represents less than 3 percent of total farm production in regions 35, 40D, 40E, 44, 45, 46, 53, 56, 61, and 62—regions which specialize mainly in crops for sale.

Regions that show a high average gross value of product per farm generally also show the relatively largest net returns to operators' labor, after covering other costs. For example, the 19 regions that rank highest in average gross value of product per farm had output-input ratios of 1 to 1 or higher.[5] But only 4 of the 19 regions that rank lowest in average gross value of product per farm had output-input ratios as high as 1 to 1. In 10 of the latter 19 regions, the output-input ratios were 0.9 to 1.0 or lower. These relationships are discussed more fully in a later section.

In passing, it should be noted that noncommercial farms (mainly residential and part-time farms) are relatively much more numerous in low- than in high-productivity regions.

From the data in appendix tables 23 and 24, it can be seen that regional figures are weighted mainly by the economic class of commercial farms which predominates in a particular area. For example, such regions as 6, 10, and 14 in the Southeast have low income and low labor productivity because they have so many small farms (class VI). Such regions as 25, 44, and 45 have relatively small numbers of farms in this class, but they have many more in classes I, II, and III. As data presented on the following pages reflect particularly the economic class which predominates in a region (and hence the size of farm and quantity of capital), the figures may be misleading unless this point is remembered.

Although such regions as 4, 10, and 13 have low incomes per farm and low productivity per person, income and productivity would probably be just as great as in other areas if farms were reorganized to

[5] The output-input ratio is the ratio of the gross value of farm product to the total value of farm cost items.

become units in economic classes I, II, or III. It has been shown that for the same economic class, income per farm and product per worker may be even higher in such regions as 9, 10, and 13 than in such regions as 20, 24, 25, and 28 (*4, pp. 740–743; 5*).

Farm Resources

Figures shown above and those that follow for different productivity regions are only for farms and resources used on farms. They do not include nonfarm resources or segments of the regions that are not used for agriculture. For example, figures for regions 42, 47, and 49 do not include national forest lands and the products sold from them. Averages for regions 61 and 44 do not include areas represented by the Mojave Desert, Calif., and the Harquahala Plains, Ariz. All resources used in farming, however, are included in each region.

VALUE OF INPUTS

In order to facilitate analysis, commercial farm inputs were grouped into five categories: Livestock and feed purchases, cash expenses on crops and machinery, depreciation, interest on investments, and labor. Total inputs per farm and the percentage composition of these inputs are given in table 5. Inputs per farm are given in greater detail in appendix table 27, and it is believed that 90 to 100 percent of all relevant farm inputs were included.[6] Such items as farm shares of water charges and electricity were not available.

TABLE 5.—*Value of total inputs per commercial farm, and percentage composition, by productivity regions, 1949*

Productivity region	Value of inputs					
		Percentage composition				
	Total per farm	Livestock and feed purchased	Cash expenses on crops and machinery	Depreciation, buildings and machinery	Interest on investment	Labor, all kinds
	Dollars	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1	6,511	37.6	10.3	7.7	11.5	32.9
2	11,105	40.0	10.1	6.5	11.6	31.8
3	8,063	29.0	12.1	11.6	15.4	31.9
4	6,423	21.6	13.9	12.2	15.1	34.2
5	9,153	31.0	13.7	10.6	16.6	28.1
6	3,016	20.1	9.2	10.4	18.6	41.7
7	3,599	19.9	10.3	11.8	22.1	35.9
8	3,118	11.5	16.0	8.8	16.2	47.5
9	3,136	5.8	21.0	8.4	15.4	49.4
10	3,238	18.4	18.3	9.8	15.5	38.0
11	3,395	8.1	23.3	10.5	15.4	42.7
12	3,431	7.2	28.4	14.3	15.2	37.9
13	2,616	12.4	15.7	11.7	18.1	42.1
14	2,518	13.3	11.3	11.5	19.5	44.4
15	3,439	19.7	14.4	10.8	21.0	34.1
16	4,031	18.4	15.1	9.3	17.6	39.6
17	4,368	19.9	12.3	10.5	24.3	33.0
18	4,703	20.6	14.2	9.6	18.5	37.1
19	6,212	21.3	16.4	11.0	18.2	33.1

[6] Total value of products as reported by the census is understood often to exclude the part of production that is associated with certain expense items, such as milk hauling, commission charges, and cotton ginning, which are included in Agricultural Marketing Service estimates of value of sales.

TABLE 5.—*Value of total inputs per commercial farm, and percentage composition, by productivity regions, 1949*—Continued

Productivity region	Value of inputs						
		Percentage composition					
	Total per farm	Livestock and feed purchased	Cash expenses on crops and machinery	Depreciation, buildings and machinery	Interest on investment	Labor, all kinds	
	Dollars	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	
20	6,599	20.7	18.1	11.0	23.1	27.1	
21	5,063	14.3	16.3	14.3	20.2	35.1	
22	4,529	13.8	12.2	10.4	15.7	47.9	
23	5,555	16.0	12.9	10.9	17.4	42.8	
24	8,168	24.2	14.1	11.0	22.9	30.8	
25	10,047	26.8	14.6	9.4	25.3	23.9	
26	8,766	32.7	12.6	7.5	20.6	26.6	
27	7,554	20.3	15.7	9.0	21.5	33.5	
28	5,820	25.5	13.9	7.8	20.2	32.6	
29	3,871	28.7	8.2	8.2	15.8	39.1	
30	3,230	5.4	20.2	11.1	17.0	46.3	
31	5,556	17.7	8.7	10.3	18.8	44.5	
32	5,452	20.0	13.3	7.0	20.6	39.1	
33	4,690	20.2	11.7	7.3	17.8	43.0	
34	7,607	16.8	17.3	6.8	22.7	36.4	
35	11,668	6.7	21.8	6.5	21.5	43.5	
36	9,731	22.0	17.9	8.6	26.8	24.7	
37	7,362	8.5	20.8	12.4	20.0	38.3	
38	7,493	9.3	20.5	11.6	22.3	36.3	
39	10,376	25.2	12.6	6.9	27.2	28.1	
40A	9,324	19.0	14.9	11.0	21.0	34.1	
40B	9,177	31.5	10.1	7.9	19.8	30.7	
40C	10,618	23.5	13.1	9.0	23.5	30.9	
40D	14,631	42.3	13.4	7.1	15.7	21.5	
40E	11,551	23.9	17.1	8.1	22.3	28.6	
41	6,947	18.6	7.5	10.6	29.2	34.1	
42	10,765	22.3	11.5	9.2	25.9	31.1	
43	12,891	23.8	10.6	5.7	33.0	26.9	
44	24,276	17.8	21.3	4.6	16.6	39.7	
45	18,725	17.0	17.8	5.8	16.9	42.5	
46	14,727	24.5	15.7	7.2	20.7	34.9	
47	7,848	24.2	9.5	8.4	18.8	39.1	
48	10,564	13.8	12.2	8.9	17.3	47.8	
49	13,226	9.1	18.0	14.5	30.3	28.1	
50	12,051	3.7	35.9	10.3	11.4	38.7	
51	11,451	36.8	14.5	8.0	12.4	28.3	
52	3,927	11.4	18.0	11.4	18.5	40.7	
53	12,149	18.4	22.4	5.8	20.1	33.3	
54	4,386	22.1	14.7	11.3	17.8	34.1	
55	7,625	14.7	17.6	8.6	24.1	35.0	
56	11,198	4.2	21.8	6.9	23.4	43.7	
57	5,174	15.9	17.4	9.6	19.1	38.0	
58	5,084	6.4	25.6	13.2	18.2	36.6	
59	6,957	30.6	11.7	6.3	20.3	31.1	
60	10,316	30.2	12.2	5.8	27.6	24.2	
61	16,505	33.4	12.4	4.5	19.7	30.0	
62	16,113	27.6	11.5	6.1	20.3	34.5	
63	6,223	13.6	10.4	10.8	20.8	44.4	
64	6,248	15.5	10.9	10.4	23.6	39.6	
United States	6,448	21.4	15.2	9.4	20.5	33.5	

Although total inputs average $6,448 per commercial farm for the United States, they vary widely between regions across the country (fig. 4). Total inputs per farm, including the value of labor, vary from $2,548 for region 14 (central Tennessee and southern Kentucky) to $24,276 for region 44 (Arizona). Regional differences in quantity of total inputs follow much the same pattern as differences in total value of product. With these large differences in quantity of resources used, similarly large differences are to be expected in farm income.

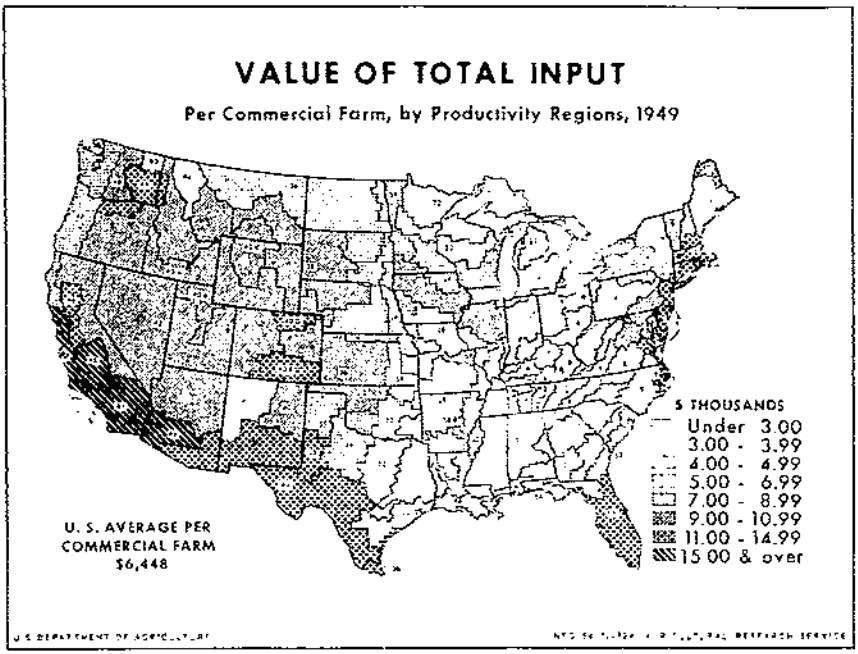

FIGURE 4.—Total inputs per farm are high in most of the regions that have a high value of gross product (fig. 3). The relatively fine differences between value of input and value of output are the differences between profit and loss, and they reflect the productivity of resources in each region.

A chief determinant of inputs used in farming is the type of enterprise that predominates. When farming in a region is highly specialized, it is easy to relate the inputs used to the one major crop. The size, or scale, of farming operations for any given crop or livestock enterprise also has much to do with the inputs used. For example, small farms may find it necessary to use relatively more labor than larger farms in order to maximize profits. But average farm size does not give the whole picture and so distribution of commercial farms on the basis of gross sales is presented in appendix table 24. It is necessary to refer to such a distribution of farms before deciding that farms of a certain size predominate in a certain region.

Labor

Labor is the chief input on commercial farms.[7] It amounts to $2,158, or a third of the total inputs for the United States. In regions 8 and 9, in Virginia and North Carolina, it amounts to nearly half of all inputs. Regions 11, 13, 14, 30, 31, 33, and 52 in the South also have labor inputs of more than 40 percent of the total. The cutover region of northern Wisconsin and Minnesota and region 63 in north-

[7] Value of operator and family labor was estimated on the basis of wage rates for hired farm workers in each region. (See appendix for details.)

eastern Washington also use relatively high percentages of labor. In these regions income is geared particularly to productivity of labor. Labor inputs are not large in an absolute sense, but they are *relatively* large because other resource inputs are low.

Areas that have the smallest percentage of labor inputs are highly mechanized or have large investments in livestock. Examples of the latter are the regions where livestock feeding predominates, including 25, 26, and 40D. Region 49 in Washington, along with some of the other dryland wheat areas, uses large machines and little labor as a rule.

The question of how much the farm labor in each region earns when compared with industrial labor, or with farm labor in different parts of the country, was a major concern of this study. Regions in which a large percentage of all farm inputs are in the form of labor frequently show relatively low returns to labor. But returns to labor can be high in some regions in which labor is a large percentage of total input. Examples are the highly specialized fruit and vegetable regions, such as 44 and 45 (Arizona and California), 48 (Washington), and 56 (southern Texas).

Purchases of Livestock and Feed

Purchases of livestock and feed are second in importance; they make up 21.4 percent of all inputs on commercial farms in this country. In some cattle-feeding regions, these are even higher than labor inputs. As would be expected, the percentages of these inputs vary more (from 3.7 percent in region 59 (Maine) to 42.3 percent in region 40D (Colorado)) than those of labor or any other input group shown in table 5. The variation in dollar amounts is from $175 per farm in region 30 to $6,195 in region 40D. Feeding of cattle usually requires relatively small amounts of labor, and therefore the regions of high-livestock-and-feed input are generally the regions of low-percentage labor input.

Appendix table 27 shows wide differences in feed purchases relative to livestock purchases across the country. Regions 1 to 5 in the Northeast, along with adjoining region 51, have considerable dairying and poultry production. As this is a feed-deficit area, most of the "livestock and feed purchases" are purchases of feed. Regions 8 to 12 and 52 on the Atlantic coast have much smaller purchases of livestock and feed than New England, but the proportion spent on livestock is higher.

Central and north central regions 15 to 21 and 25 to 29 have sizable purchases of livestock. Regions 59 and 60 in the southern Plains also have high livestock purchases. The pattern of cattle grazing in the West and cattle fattening in areas nearer the eastern markets typifies the midcontinent from Mexico almost to Canada. The data, however, show many "in-between" areas and exceptions to the rule.

Regions 39 to 43 cover a vast area and show a great deal of variety in type of farming and inputs used, but all have high livestock purchases. Investments in livestock are especially high in regions 39, 40C, 40E, 41, 42, and 43 in the West, as may be expected, because these are the range and cattle-raising areas. Again, much of the west coast is a feed-deficit area.

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Interest on Investments

Interest on investment makes up about a fifth of total farm inputs for the country as a whole, or $1,327 of the total $6,448 per farm.[3] Region 43, in southern Texas, New Mexico, and Arizona, has the highest interest charge both in dollar amount ($4,248) and in percentage of all inputs (33 percent) for the country. Generally speaking, the western ranching and cash-grain areas have high investments relative to labor and other inputs. The large farms and rich soil in the western Corn Belt (region 25, for example), help to explain its relatively large interest on investments and its low labor inputs.

The eastern and southeastern parts of the country appear to have the lowest interest charges per farm, because of the relatively low investments. Here one would expect the productivity, or efficiency, of added land or machinery per farm to be quite high, especially for the smaller farms in the Southeast. But increases in size of farm in these regions involve increases in both fixed and operating capital.

Cash Expenses on Crops

Cash expenses on crops are highest in intensive crop-producing regions such as 44, 45, 46, 50, 53, 56, and 35. The low cash expenses for some southeastern regions are to be expected—a good deal of what is spent there goes for fertilizer. For the country as a whole, crop and machinery cash expenses are $975 per farm, or 15.1 percent of total inputs.

Depreciation

Depreciation of buildings and machinery makes up a significant 9.4 percent of total farm inputs for the United States. More than 14 percent of the inputs in regions 21 and 49 are allocated to depreciation, while in regions 43, 44, and 45 the proportion is less than 6 percent. Depreciation expenses are closely related to interest on investment. Building depreciation (estimated at 2½ percent of building investment) is just half of the interest charge on buildings (5 percent), while machine depreciation (estimated at 15 percent of the 1949 value), shows a positive relationship to interest on machinery investment (estimated at 7 percent).

It has been pointed out that type and size of farm are two important factors in determining the inputs that are used. Other considerations that affect both farm size and inputs used are supply of capital, mobility of labor, and education. Low levels of education, cultural handicaps, lack of knowledge of alternative employment, and lack of funds with which to move are associated with the problems of farmers in some regions where relatively small farms and low labor returns persist. Capital limitations by lenders are possible anywhere and for many reasons, but poverty-stricken areas and places that have suffered "windfall" losses are likely to have the most reluctant lenders. Capital limitations normally mean that farmers must rely more on their own labor and land. They buy fewer things and have fewer opportunities to specialize.

[3] The method used in computing interest charges is explained in the appendix (pp. 71–72).

In a few instances, the choice of inputs is rigidly fixed for a single farming enterprise, but in agriculture one input may usually be substituted for another, within limits, as machinery for labor, or fertilizer for land. A farmer must find the least-cost combination of inputs if he is to obtain the highest possible profit, and roughly the same conditions must be fulfilled in each region if the Nation is to maximize the welfare of its citizens.

AVERAGE FARM INCOME

In this report, farm income is computed as a series of residuals by deducting, successively, various groups of cost items from the value of total product. Average residual incomes per commercial farm in this country, based on each of these computations, are listed opposite the various income measures. The income measures, TP_a through I–7, are explained immediately after the tabulation. Residual incomes per commercial farm for each productivity region are shown in table 6 and figure 5.

Gross Income

The first income measure, TP_a, is simply the estimated gross value of total products—the sum of the values of crops sold, livestock and livestock products sold, forest products sold, and farm products used in farm households. The second income measure is designated "TP_b": this is the value of total product adjusted for livestock and feed purchased. This adjustment has little effect on the total-product figures for regions in which inshipments of feed and livestock are relatively light, though for some heavy-feeding regions it is significant. Average values in different regions are shown in figure 3 and discussed on pages 15–20.

Average gross value of production and estimated average residual income per commercial farm after payment of specified portions of production expenses, for the United States, 1949, are shown in the tabulation below:

Income measure:	*Average per commercial farm*
TP_a	$6,206
TP_b	4,914
I–1	3,930
I–2	3,309
I–3	2,703
I–4	2,269
I–5	1,376
I–6	898
I–7	—152

Income measures used in the foregoing tabulation are computed as follows. Their applications are explained in the section "Residual Income," in connection with table 6.

TP_a—*Value of total farm product* (all farm products sold plus farm products used in farm households).

TP_b—*Value of total farm product* (after deducting the value of livestock and feed purchased).

I–1—*Gross farm income available for paying all labor, depreciation, and interest on investment in farm capital* (TP_a minus cash expenses on crops).

I–2—*Farm-income residual for operator and family labor and for depreciation and interest on investment* (I–1 minus expenditure for hired labor).

I–3—*Farm-income residual for operator and family labor and for interest on investment* (I–2 minus charge for depreciation of farm machinery, equipment, and buildings).

I–4—*Farm-income residual for operator and family labor and for interest on investment in land and buildings* (I–3 minus charge for interest on investment in machinery, equipment, and livestock).

I–5—*Farm-income residual for operator and family labor* (I–4 minus charge for interest on investment in land and buildings).

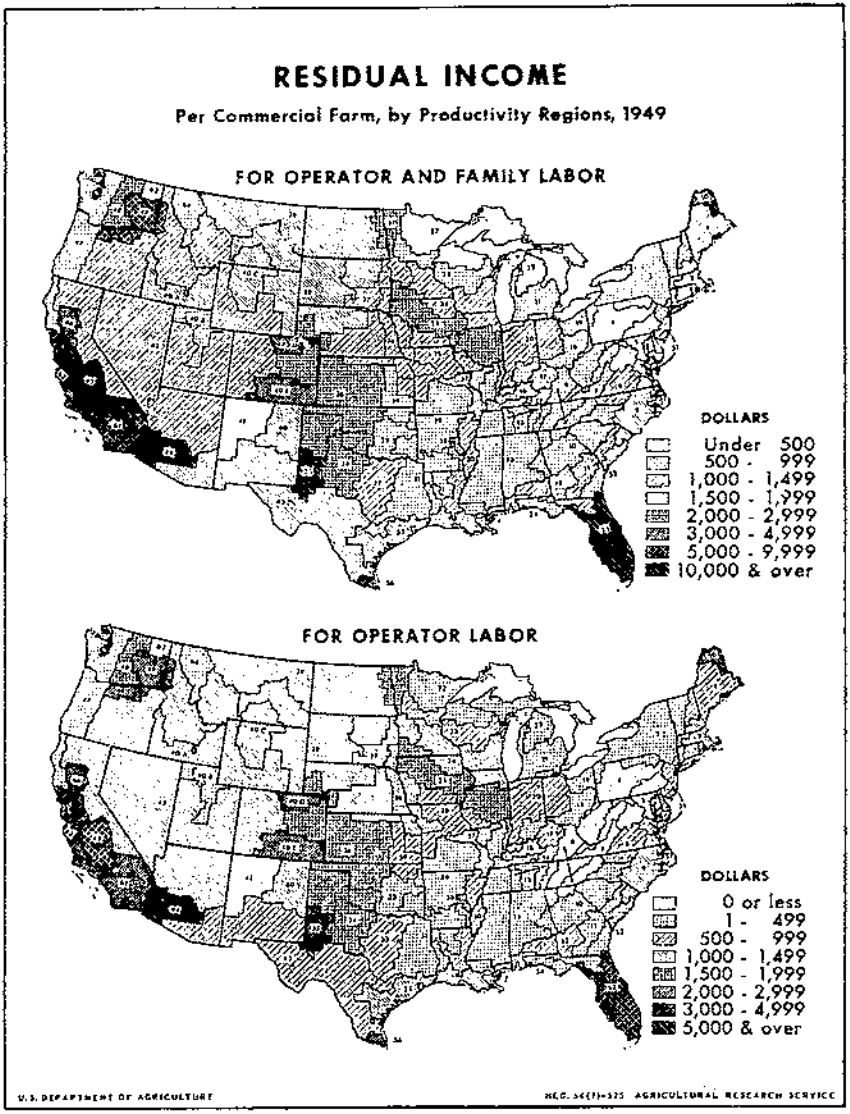

FIGURE 5.—High family income is the prime goal of most commercial farms, yet in only 12 regions did the family really net more than $3,000 from the farm business (upper map). The picture is still less bright from the standpoint of income residual for operator labor after allowing prevailing wages for family labor (lower map).

I–6—*Farm-income residual for operator labor* (I–5 minus estimated value of unpaid family labor).

I–7—*Net farm profit or loss to operator* (after deduction of imputed value of his own labor and all other specified costs).

Residual Income

The *gross farm income available for paying all labor, depreciation, and interest on investment in farm capital* is shown for each region in column headed "I–1" (table 6). This income measure was computed by subtracting cash expenses on crops and machinery from the adjusted value of total product. Cash expenses include total expenditures for seed and plants, fertilizer and lime, gasoline and other petroleum fuel, tractor repairs, other farm machinery repairs, and machinery hire. In most regions this residual income averages less than $6,000 per farm. In the southern Appalachians, the Central South, and the Ozark-Ouachita Mountains, the average is less than $2,000 per farm. These are regions of relatively small farms, much hilly or steeply sloping land, and generally low percentages of land in crops. Regions in which the average per farm exceeds $8,000 are mainly those along the southwestern fringe of the country, region 50 in northern Maine, and region 53 in Florida.

The *farm-income residual for operator and family labor and for depreciation and interest on investment* is shown for each region in column headed "I–2" (table 6). After deducting the cost of hired labor in addition to the expenses deducted in computing residual income I–1, many other regions—particularly those in the South—also fall below the $2,000 level. Again, the regions along the southwestern fringe, as well as southern Florida, northern Maine, and region 49 (Washington-Oregon-Idaho), show the highest average returns per farm. But the reduction from the I–1 residual is substantial in most of these regions because of the large expenditures for hired labor.

The *farm-income residual for operator and family labor and for interest on investment* is shown for each region in column headed "I–3" (table 6). This is a significant measure of farm income. It represents income available for farm family living as well as for payment of interest on farm investment. It is the residual after payment of the necessary cash expenses and after deducting the estimated depreciation of machinery and equipment. The depreciation charge may be considered a "must" expenditure, as it is the only allowance made for the maintenance of buildings and replacement of machinery necessary to stay in business. Payment of interest on borrowed capital may be deferred in adverse years in any region; actual allowance for interest may regularly be very nominal for owner-operators in low-income regions.

From the standpoint of expendability, therefore, the I–3 income represents the approximate maximum available for farm family living during the year. Because of special circumstances of individual farm families as to indebtedness, tenancy, and other factors, the significance of this income measure varies from farm to farm. As an average for a region, it represents a significant basis for comparison with other regions, where allowance is made for major differences in tenancy and capital ownership.

TABLE 6.—*Residual farm income per commercial farm after deducting specified items of production expenses, by productivity regions, 1949*

Productivity region	Income measure[1]						
	I–1	I–2	I–3	I–4	I–5	I–6	I–7
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	3,154	2,351	1,848	1,523	1,007	714	−240
2	5,777	3,787	3,062	2,650	1,778	1,324	240
3	3,899	3,000	2,067	1,437	822	264	−948
4	2,586	2,084	1,299	821	328	−300	−1,380
5	4,036	2,963	1,997	1,421	480	−51	−1,021
6	1,544	1,370	1,055	848	494	144	−580
7	1,966	1,711	1,288	992	494	152	−543
8	2,311	2,125	1,850	1,694	1,344	931	49
9	2,634	2,374	2,111	1,981	1,629	1,164	349
10	1,608	1,378	1,061	881	559	202	−442
11	2,205	1,805	1,448	1,244	925	543	−125
12	2,313	1,955	1,597	1,374	1,073	763	100
13	1,627	1,450	1,144	950	670	394	−254
14	1,500	1,494	1,202	999	704	380	−331
15	2,158	1,939	1,566	1,298	844	579	−110
16	2,101	1,911	1,535	1,264	827	406	−579
17	3,342	2,916	2,456	2,143	1,392	1,142	378
18	2,313	2,010	1,551	1,227	664	176	−811
19	3,054	2,509	1,926	1,414	692	158	−787
20	3,849	3,505	2,753	2,359	1,263	835	−182
21	3,221	2,745	1,948	1,502	801	330	−711
22	2,136	1,901	1,430	1,097	719	−29	−1,213
23	2,930	2,675	2,067	1,591	1,102	293	−1,017
24	4,791	4,315	3,414	2,745	1,544	884	−491
25	6,210	5,781	4,836	4,209	2,208	1,700	328
26	4,408	4,052	3,303	2,865	1,590	983	−381
27	4,256	3,979	3,299	2,762	1,672	923	−577
28	3,238	3,010	2,552	2,125	1,378	855	−296
29	1,649	1,477	1,159	891	547	103	−796
30	2,639	2,043	1,685	1,496	1,135	960	233
31	2,106	1,780	1,414	1,129	746	380	−510
32	3,303	2,542	2,149	1,823	1,029	660	−333
33	2,149	1,826	1,484	1,168	650	112	−1,044
34	5,728	4,340	3,822	3,369	2,093	1,757	711
35	13,263	9,479	8,726	8,283	6,219	5,976	4,920
36	9,297	5,647	4,810	4,168	2,205	1,665	446
37	5,384	4,657	3,744	3,229	2,272	1,677	181
38	4,567	4,376	3,607	2,841	1,835	1,144	−395
39	6,197	5,412	4,697	3,459	1,877	1,183	−253
40A	5,023	4,877	3,847	3,118	1,892	1,292	−242
40B	4,501	3,513	2,784	2,167	995	344	−861
40C	6,293	5,123	4,165	3,073	1,660	1,000	−439
40D	7,668	6,333	5,299	4,448	3,009	2,458	1,101
40E	8,040	6,657	5,625	4,701	3,049	2,549	1,230
41	3,843	3,166	2,430	1,850	400	−206	−1,296
42	6,642	5,328	4,335	3,129	1,543	913	−450
43	8,607	6,466	5,725	4,496	1,477	1,137	151
44	28,903	20,923	19,797	18,031	15,772	15,353	14,197
45	15,994	9,910	8,820	8,151	5,649	5,168	3,784
46	10,845	7,615	6,557	5,826	3,504	2,987	1,598
47	4,096	3,073	2,412	2,004	939	275	−1,107
48	8,172	5,314	4,378	3,817	2,554	1,969	361
49	11,141	9,610	7,690	6,701	3,680	3,121	1,404
50	9,810	6,530	5,278	4,734	3,901	3,591	2,509
51	5,379	3,654	2,744	2,277	1,325	845	−191
52	2,323	1,745	1,295	1,035	571	158	−460
53	11,565	8,402	7,691	7,137	5,252	5,046	4,365
54	2,373	1,903	1,407	1,064	625	262	−402
55	5,037	4,227	3,620	3,046	1,784	1,381	478
56	11,639	7,956	7,178	6,830	4,554	4,295	3,308
57	3,499	3,047	2,548	2,241	1,560	1,115	46
58	4,470	3,639	2,968	2,625	2,040	1,824	989
59	3,152	2,873	2,436	1,958	1,021	371	−861
60	5,996	5,249	4,652	3,671	1,808	1,194	62
61	11,011	7,724	6,976	6,501	3,722	3,286	2,064
62	11,005	7,361	6,375	5,677	3,009	2,562	1,100
63	2,501	2,337	1,963	1,149	371	−584	−2,140
64	3,421	2,941	2,202	1,750	817	183	−1,177
United States	3,930	3,309	2,703	2,269	1,376	808	−152

[1] For explanation of income measures, see p. 25.

In many regions in the eastern half of the country, the income residual for operator and family labor and for interest on investment averaged less than $2,000 per farm in 1949. In most regions throughout the country, the average was less than $4,000. The central Corn Belt, with an average of $4,800, was at approximately the same general level as northern Maine and many regions in the Great Plains and intermountain Western States.

The *farm-income residual for operator and family labor and for interest on investment in land and buildings*, after deduction of interest charges on operating investment (machinery, equipment, and livestock), is shown for each region in column headed "I–4" (table 6). This income measure represents the return to fixed or relatively fixed factors—land, buildings, and operator and family labor. In most regions, this residual averages less than $4,000 per commercial farm.

The *farm-income residual for operator and family labor* (after payment of all other inputs, including interest on investment in land and buildings) is shown for each region in the column headed "I–5" (table 6). The geographic pattern of this residual income is shown in the upper map in figure 5. In most parts of the country, the average was less than $2,000 per farm. This includes most of the western range regions, where most of the farmland is in large units but where large-scale farms are a relatively small percentage of the total number. In many regions, especially in the eastern half of the country, average farm family income was less than $1,000. In some regions in the Appalachians and in regions 41 and 63 in the West, it was less than $500.

A comparison of the average returns to operator and family labor and to interest on investment with the farm income residual for operator and family labor (I–5) reveals the large proportion of inputs that are in the form of investment (fixed and operating capital) in many regions. This is especially true in the central Corn Belt and in the range country and irrigated regions of the West (table 6).

The *farm-income residual for operator labor* (after allowing for wages to unpaid family labor) is shown for each region in column headed "I–6" (table 6). The geographic pattern of this average-income residual is shown in the lower map in figure 5. Again, the relatively low returns in many regions in the East command attention. A number of regions in the West also show very low operator's earnings.

The levels of operator's returns—that is, the *net farm profit or loss to operator* (after deduction of imputed value of his own labor and all other specified costs) is shown for each region in column headed "I–7" (table 6). The positive figures indicate that the average farm income was sufficient to pay all input items, including imputed wages for family and operator labor at prevailing hired wage rates, and to leave a profit. The negative figures indicate the extent to which farm returns were insufficient to pay all inputs. Regional distribution of surpluses and deficits shows relatively low returns, not only in the Appalachian and Great Lakes areas but in several regions in the central part of the country and in scattered regions in the West.

It should be remembered that the gross and residual income estimates shown in table 6 and in figure 5 include only farm income. They do not include income to the farm family from nonfarm sources or occupations, such as wages for work in town, mine, or forest, or earnings from a sideline occupation or business carried on by the farmer. On many farms, especially in low-income regions, earnings from off-farm sources are important in supplementing the farm family income.

Total values for each group of products and input items on all commercial farms in the United States in 1949 are listed in appendix table 22. Also shown in this table is the residual to labor after deducting the estimated cost or value of all inputs except labor. The residual may be thought of as the value of product added by labor, assuming that all other inputs are paid first. In practice, labor is not necessarily the residual claimant, but the concept is used here for the purpose of summarizing the differences between total value of product and estimated "costs" of production. Averages per farm for the various items, and their percentage distribution, are also shown in appendix table 22.

LABOR PRODUCTIVITY

In the major part of our agricultural economy, labor is the chief single input item. Priced at market wage rates, labor has a greater value than the annual services of land or other capital items. Labor also is the agricultural resource that has the greatest flexibility as to use. Except for industrial locations, land cannot be transferred for the production processes of nonfarm industries. Once capital has been put into machines and other tools of agriculture, it has few alternative uses elsewhere. Certain restrictions also apply to alternative uses of labor. These include individual skills and preferences for particular locations and types of work. But as the labor input is so great, analysis of its use was one of the main parts of the study reported here. Many farm families can attain a desirable level of living only if the productivity of their labor inputs is increased.

In general, areas of low labor productivity are those of high capital productivity, as labor is used in large amounts relative to the capital used with it. An increase in the amount of capital used with the existing labor of low productivity areas would increase returns to labor and lower returns to capital; a reduction of the labor force, because it would also decrease the labor/capital ratio, would have a similar effect. The characteristics of labor supplies and productivities which follow suggest how great the differentials in labor-capital ratios are and, consequently, why the productivity of labor varies so greatly between regions.

Supply of Labor Per Farm

The majority of labor inputs for the agriculture of this country are furnished by farm operators and their families. In most regions the labor of the farm operator constitutes one-half to two-thirds of the total labor used. Except in relatively few regions, the average annual labor input amounts to less than 2½ man-years; in the greater number of regions, it amounts to less than 1¾ man-years. (See table 7.) Labor inputs per farm are smallest mainly in regions of small

farms where soils and topography are not particularly favorable to production and mechanization of field crops. Region 63, in northeastern Washington, has a labor input of only 1.33 man-years per farm. Mountainous terrain and the unfavorable climate discourage large farm units.

TABLE 7.—*Average number of all farmworkers and average annual wage rates, on commercial farms, by productivity regions, 1949*

Productivity region	Average number of workers [1]	Average annual wage per worker [2]	Productivity region	Average number of workers [1]	Average annual wage per worker [2]
	Number	*Dollars*		*Number*	*Dollars*
1	1.57	1,370	36	1.66	1,458
2	2.21	1,593	37	1.67	1,687
3	1.74	1,474	38	1.57	1,728
4	1.63	1,345	39	1.73	1,582
5	1.99	1,206	40A	1.68	1,888
6	1.33	947	40B	1.68	1,674
7	1.45	892	40C	1.90	1,726
8	1.43	1,040	40D	1.99	1,560
9	1.67	927	40E	2.10	1,580
10	1.56	790	41	1.73	1,380
11	1.88	772	42	1.91	1,749
12	1.69	768	43	2.72	1,273
13	1.46	753	44	6.07	1,588
14	1.33	843	45	4.28	1,857
15	1.40	838	46	2.77	1,857
16	1.29	1,229	47	1.56	1,968
17	1.55	930	48	2.44	2,073
18	1.35	1,314	49	1.85	2,003
19	1.54	1,337	50	3.50	1,333
20	1.36	1,311	51	2.42	1,340
21	1.40	1,419	52	2.21	722
22	1.45	1,506	53	4.03	1,005
23	1.52	1,547	54	1.83	817
24	1.60	1,565	55	2.45	1,090
25	1.47	1,621	56	4.00	1,222
26	1.49	1,566	57	1.55	1,265
27	1.52	1,663	58	1.97	946
28	1.36	1,391	59	1.41	1,533
29	1.39	1,096	60	1.80	1,350
30	1.79	835	61	2.67	1,857
31	1.44	1,100	62	2.99	1,857
32	1.74	1,225	63	1.33	2,073
33	1.44	1,368	64	1.40	1,775
34	2.14	1,294			
35	4.16	1,223	United States	1.66	1,294

[1] Average number of all farmworkers (operators, unpaid family, and hired) on full-time equivalent basis, on commercial farms, 1949. The method used in estimating the number of full-time equivalent workers is described in the appendix, pp. 72–73.

[2] Estimated on the basis of data for hired workers obtained from the former Bureau of Agricultural Economics and from other sources.

Regions 16, 18, 28, and 29 form a long strip along the southern edge of the North Central States where farms are relatively small and labor inputs per farm are low. This strip has less productive soils than the main corn-producing area to the north. It is an area of transition in which slow changes are being made away from the pioneer farming pattern originally imposed on it. Its general topography has not encouraged large-scale and highly mechanized farming; its products require smaller labor inputs than do the crops of the Southeast proper. A somewhat similar situation exists in region 6 which is mainly in the Appalachian Mountains.

In contrast, labor input exceeds 4 man-years per farm in region 35, which is composed largely of the High Plains of Texas. Here

the large mechanized units, specializing in cotton, but with some grain sorghum and wheat, have large labor inputs. Only a fourth of this labor is supplied by operators and their families. Other regions with large labor inputs per farm include the Florida peninsula, south central California, the southern tip of Texas, and southwestern Arizona. These areas are characterized mainly by large-scale vegetable-, fruit-, and cotton-producing units. The average input of more than 4 men per farm is composed largely of hired workers. Productivity per man is considerably above the national average in all these areas. Labor inputs corresponding to 2 man-years of labor are found in most of the intermountain areas of the West, in the major market milk area of the Northeast, and in scattered areas of the Southeast.

Composition of Labor Input

Even though its productivity is low, labor often remains on a farm because it is provided by the farm family. For the Nation as a whole, the farm family supplies roughly three-fourths of the total labor input (table 8). About two-thirds of the family labor input is provided by the operator and the rest by the housewife and children. Hired help provides the greatest percentage of the labor input in regions that have the greatest labor input per farm. (See previous section.) In regions of large labor inputs per farm, over

TABLE 8.—*Estimated percentage composition of total labor inputs by productivity regions, 1949*

Productivity region	Total labor input			Productivity region	Total labor input		
	Hired workers	Unpaid family	Operator		Hired workers	Unpaid family	Operator
	Percent	*Percent*	*Percent*		*Percent*	*Percent*	*Percent*
1	37.5	17.9	44.6	36	27.0	22.4	50.6
2	26.4	12.9	30.7	37	25.8	21.1	53.1
3	39.0	21.7	43.3	38	15.0	28.5	56.5
4	22.8	32.7	44.4	39	26.9	23.8	49.3
5	41.7	20.6	37.7	40A	32.9	18.9	48.2
6	13.8	27.8	58.4	40B	35.1	22.1	42.8
7	19.7	26.6	53.8	40C	35.7	20.1	44.2
8	12.6	27.9	59.5	40D	39.3	17.5	43.2
9	15.7	30.7	53.6	40E	44.0	15.1	40.9
10	18.7	29.0	52.3	41	28.5	25.6	45.9
11	27.6	26.3	46.1	42	40.5	18.0	41.5
12	25.2	23.8	51.0	43	66.8	9.8	23.4
13	16.1	28.0	55.9	44	53.7	4.2	12.1
14	8.5	28.7	62.8	45	76.5	6.0	17.4
15	18.7	22.6	58.7	46	62.9	10.1	27.0
16	11.9	26.4	61.7	47	33.3	21.6	45.1
17	29.6	17.4	53.0	48	56.6	11.6	31.8
18	17.0	27.5	55.5	49	41.2	15.0	43.8
19	28.0	26.0	46.0	50	70.2	6.6	23.2
20	19.2	24.0	56.8	51	53.2	14.8	32.0
21	23.9	23.7	52.4	52	36.2	25.8	38.0
22	10.9	34.5	54.6	53	75.1	8.1	16.8
23	10.7	34.3	55.0	54	31.4	24.3	44.3
24	19.0	27.4	53.6	55	51.0	15.1	33.9
25	17.9	22.4	59.7	56	75.7	5.3	19.0
26	15.3	26.1	58.6	57	23.0	22.7	54.3
27	11.0	29.6	59.4	58	43.6	11.6	44.8
28	12.0	27.6	60.4	59	12.9	30.2	56.9
29	11.3	29.3	59.4	60	30.0	24.6	45.4
30	39.8	11.7	48.5	61	67.5	8.8	24.7
31	20.6	23.1	56.3	62	65.6	9.7	24.7
32	36.2	17.3	46.5	63	9.2	34.5	56.3
33	16.6	26.7	57.3	64	19.4	25.6	55.0
34	50.1	12.1	37.8				
35	74.4	4.8	20.8	United States	38.3	22.4	49.3

three-fourths of the total comes from hired labor. Farms that employ a high percentage of hired labor are more flexible in adjusting to price changes than are farms that use mainly operator and family labor. Family labor often has no alternative but to remain on the farm even though its returns are low.

Except for areas of large labor inputs mentioned in the preceding paragraph, the proportion of labor provided by family members other than the operator is lowest in regions where farms are of about two-man size, such as regions 30, 34, 40E, 55, and 58. Generally, these are regions that specialize in extensive crop or livestock production with relatively few chores that are adapted to labor by children and housewives. Once a year-round hired man has been added, only a small amount of farm labor is left to be performed by family workers other than the operator. Production depends on family workers to the greatest extent in tobacco and cotton regions, such as 9, 10, and 13.

Product Per Worker

An important measure of efficiency in agriculture is labor productivity. As labor inputs represent a large proportion of all inputs in agriculture, level of income is mainly a function of the value of product produced per laborer. Gross labor productivity is one measure of labor returns. It is computed by dividing total product per farm by total number of workers per farm. This quantity, shown by regions in the upper map in figure 6, indicates the total product that results from the equivalent of one man and the capital he uses; it imputes none of the total value of product to capital. Hence, its magnitude depends especially upon the amount of capital used per man.

Total product per worker is high in the productive corn areas, which include mainly the Clarion-Webster, Tama-Muscatine, and Drummer-Flanagan soils of the Midwest. It is high in the heart of the winter wheat area which stretches from Texas through Oklahoma, Kansas, Colorado, and southwestern Nebraska. It is great also in southern California, southwestern Arizona, and region 49, which includes productive wheat, irrigation, and fruit farms in parts of Washington, Idaho, and Oregon. These are the areas that have a high investment or a high current (annual) expense input per worker, although these two inputs are not perfectly correlated. Large gross product per worker occurs not only because labor productivity is high but also because the amount of product attributable to capital is high per worker.

Next in gross product per worker is the large agricultural area between the Sierra Nevada Mountains and the Rocky Mountains and extending east of the Rocky Mountains to include the main ranching areas of western Nebraska, North Dakota, South Dakota, and eastern Wyoming. As a whole, this large area ranks second in total investment and total annual inputs (current expenses except labor inputs) per worker. In a somewhat similar position with respect to gross product per worker and capital inputs per worker is region 26 on the western fringe of the Corn Belt. Region 2 in New England has a similar product per worker, although it has a much lower capital investment per worker. But its annual capital

input for current expenses (which include large purchases of feeds for dairy herds and poultry flocks, fertilizer, and spray materials for potatoes and vegetables) is higher than that for most other regions shown in figure 6.

Product per worker is very low in at least part of each Southeastern State and in parts of some South Central States. Product

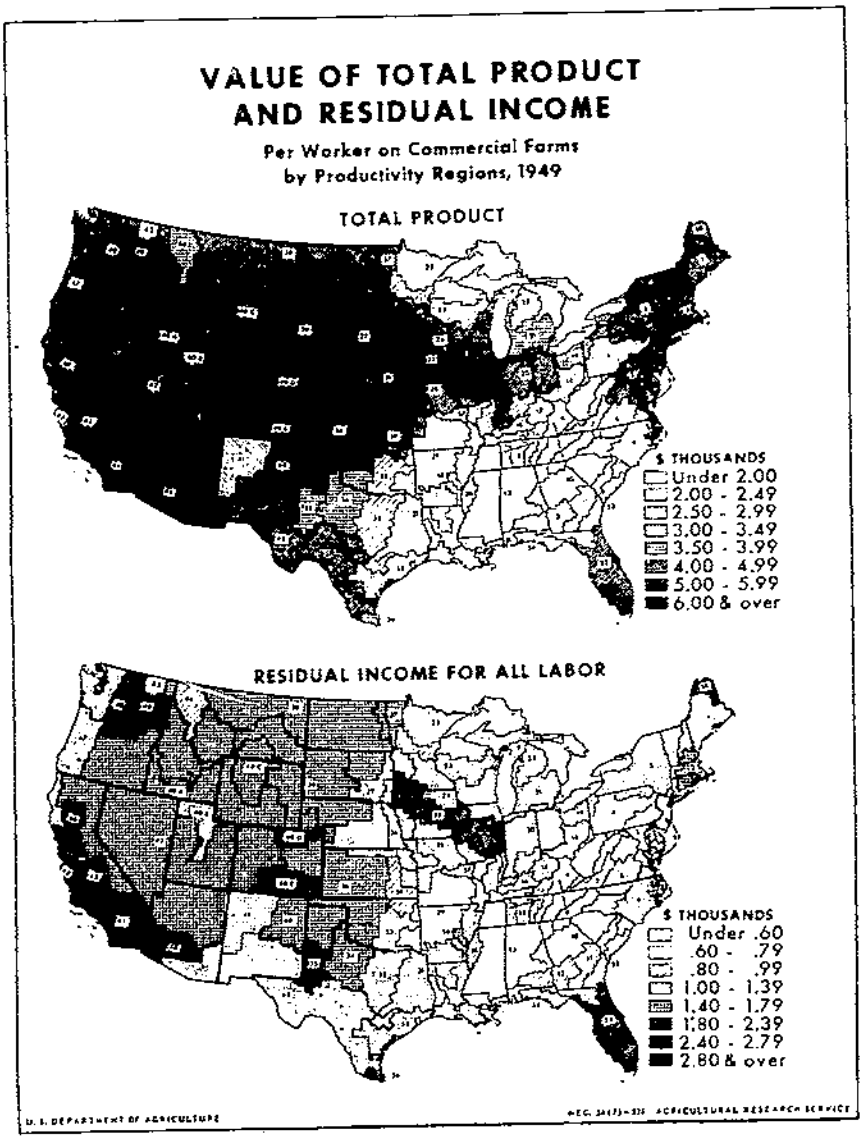

FIGURE 6.—Total product per worker is generally high where the value of resources per worker is high. Net productivity of labor, or the income residual for labor per worker, also tends to be high in such regions, but there are exceptions, as explained in the text. In many regions the income residual per worker was less than $600 for the year.

per worker is less than $2,000 in regions 30, 13, 14, 6, 10, 11, and 52. Included in this overall area is the heart of the Appalachian Mountains, which stretch from Pennsylvania through eastern Kentucky and Tennessee. It also includes major parts of Mississippi, Alabama, Georgia, North Carolina, and South Carolina. Parts of Louisiana, Arkansas, and Florida also are included, though most of Florida falls in productivity region 53 which has a gross product per worker of more than $4,000. Annual expenses per worker average less than $800 in most of this broad area, while capital investment generally is less than $6,000 per worker.

Gross product per worker is only slightly higher in the rest of this general area, with Florida excluded. (See fig. 6, regions 7, 8, 9, 12, 15, 29, 31, and 54.) Region 22 (the Great Lakes cutover) is similar with respect to product per worker, although investment and expense per worker are considerably higher. "Islands" with greater labor productivities exist within these regions of lowest productivity. Examples are the specialized rice and sugarcane regions, 55 along the gulf coast of Texas and Louisiana, 58 in central Arkansas, and the bluegrass-burley tobacco section of Kentucky (region 17).

The greater part of the North Central States, New England, the extreme Pacific Northwest, and the Southwest are in an intermediate position. Gross product per worker averages between $4,000 and $4,999 per farm.

A somewhat similar measure of gross labor productivity is provided by gross production minus the value of livestock and feed purchased. This adjusted total product divided by the number of man-equivalents in each region gives "the adjusted gross productivity per worker." This measure is better than the gross-product measure in some regions because the purchase value of livestock and feed represents an agricultural product that is not produced on the feeding farm.

This calculation changes somewhat the relative rank of the productivity regions. Regions 25, 44, and 49 remain at the top with an adjusted gross product of more than $5,000 per worker. Most of the western half of the country merges into a second category with an adjusted gross product per worker ranging from $4,000 to $4,999. Region 2 (southern New England), because of its heavy purchases of feed, drops into a fourth category in which the range is from $3,000 to $3,499. Lowest again is the major part of the Southeast, with exceptions of the kind pointed out previously. In New England and in large sections of the North Central States, most of the agriculture has an adjusted gross product per worker of only $2,000 to $2,999 per farm. Again, region 22 along the Great Lakes is second low.

Product Per Operator

Gross product per man-equivalent of farm operators is also a measure of interest. This ratio is computed from gross production without subtracting purchases of feed and livestock. To some extent it provides some estimate of the scale of output per full-time managerial unit. Gross production per operator is not identical with gross production per farm because some operators are on their

farms only part of the year. This measure is computed by dividing the gross product of each region by the number of full-time (12-month) operators in the region. Regions that rank highest, with more than $20,000 per operator, are those that use large amounts of capital and of hired labor per farm. In second place, with a gross product per operator of $12,000 to $19,999, is most of the area from the Sierra Nevada Mountains eastward through the Rocky Mountains and the hard winter wheat area. The North Central States and Northeastern States fall next in line, with the southeastern area and the Lake region again lowest.

When feed and livestock purchases are subtracted, adjusted gross product per operator is the counterpart of adjusted gross product per worker. Comparisons based on this measure show that regions 15, 44, and 53 (south central California, southwestern Arizona, and Florida) remain at a high level. This is because production in these regions includes mainly crops that depend relatively little upon livestock. The change is small also in the Great Plains (region 38 south through region 34) for the same reason. It is smallest in the Southeast and the Lakes region because of the cropping economy in the former and the type of subsistence livestock production, in combination with some crops, in the latter. Region 50, the Aroostook County potato-growing section of Maine, falls in the $15,000 to $19,999 range under either measure of product per operator.

Residual Income Per Worker

Although useful for certain comparisons, the figures explained in the preceding discussions have one limitation: They do not consider the product of capital in expressing relative labor returns. Aside from certain exceptions pointed out elsewhere, gross product of labor is greatest in types of agriculture that use the greatest amount of capital, even if labor productivity does not actually differ.

For example, suppose capital produces a return of 5 percent per dollar and labor produces a return of $2,000 per year-round laborer in each of 2 regions, A and B. Region B uses $80,000 and 2 workers per farm; region A uses $5,000 and 1 worker per farm. The gross product per farm in region B will be $4,000 from capital and $4,000 from labor, a total product of $8,000. If the $8,000 is divided by the number of workers (2), the gross product per worker is $4,000. In region A, the gross product per farm will be $250 from capital, plus $2,000 from labor, or a total of $2,250. The gross product per worker is $2,250. Hence region B appears to have a higher gross labor product. This illusion grows out of the fact that no product has been imputed to the capital that produced it. If we subtract the capital return ($80,000 at 5 percent) from the total product in region B, we have a remainder for labor of only $1,000. The product per laborer is $2,000, just as it is in region A when $250 is allocated to capital.

The lower map (fig. 6) shows the residual income per worker after a share of the total product has been imputed to capital in each region. This step has been taken to eliminate partially the difficulty outlined

above.[9] It was computed, first, by subtracting from gross product the value of annual expenses on crops and livestock, and depreciation and interest on working and fixed capital; second, by dividing the remainder by the number of man-equivalents (12 months) of labor. The figures for each region are shown (table 9, first column).

TABLE 9.—*Residual income per worker on commercial farms, by productivity regions, 1949*

Productivity region	Residual income per worker			Productivity region	Residual income per worker		
	All labor	Operator and family labor	Operator[1]		All labor	Operator and family labor	Operator[1]
	Dollars	*Dollars*	*Dollars*		*Dollars*	*Dollars*	*Dollars*
1	1,210	1,119	1,020	36	1,720	1,822	1,982
2	1,705	1,552	1,947	37	1,706	1,832	1,684
3	989	726	353	38	1,453	1,425	1,255
4	509	260	−534	39	1,539	1,490	1,391
5	780	414	−68	40A	1,749	1,674	1,595
6	502	430	185	40B	1,163	886	478
7	517	426	195	40C	1,394	1,365	1,201
8	1,070	1,075	1,095	40D	2,133	2,487	2,858
9	1,131	1,172	1,307	40E	2,158	2,628	3,034
10	506	440	246	41	622	322	−257
11	705	650	624	42	1,517	1,354	1,179
12	830	838	577	43	1,330	1,420	1,476
13	589	545	458	44	3,926	15,931	21,045
14	602	577	452	45	2,746	5,649	6,983
15	759	740	706	46	3,431	3,402	3,983
16	755	725	508	47	1,258	993	393
17	1,173	1,277	1,393	48	2,218	2,409	2,524
18	716	593	235	49	2,817	3,376	3,853
19	523	523	222	50	2,051	3,751	4,433
20	1,182	1,148	1,054	51	1,260	1,172	1,097
21	912	756	452	52	520	405	188
22	658	557	−37	53	2,088	5,968	7,421
23	593	510	344	54	598	500	323
24	1,263	1,188	993	55	1,283	1,487	1,664
25	1,555	1,599	2,000	56	2,064	4,695	5,651
26	1,306	1,262	1,130	57	1,295	1,311	1,327
27	1,282	1,235	1,026	58	1,447	1,838	2,072
28	1,181	1,148	1,043	59	924	832	464
29	517	445	126	60	1,419	1,435	1,456
30	967	1,051	1,103	61	2,605	4,136	4,979
31	744	654	469	62	2,255	3,009	3,462
32	1,034	927	815	63	470	307	−779
33	676	537	135	64	926	723	238
34	1,927	1,956	2,169				
35	2,401	5,567	6,948	United States	1,208	1,156	1,095

[1] Residual per full-time equivalent operator after deducting the estimated value of unpaid family labor and all other inputs.

The two regions having the highest residual product or income per worker are 44 in the Southwest and 49 in the Northwest. Region 44 is favored by a combination of factors, including an almost year-round growing season for citrus fruits, cotton, vegetables, and grass seeds; irrigation; large farms; and large annual capital inputs (current expense) per worker. This region, however, is in an intermediate position in respect to capital investment per worker. A somewhat similar situation exists in region 49 where some irrigation, favorable prices for fruit, soils favorable for wheat, and production of forest products

[9] It eliminates the difficulty only partially because the share imputed to capital is an average market price for capital resources rather than the marginal product of capital resources.

give a very high residual income per worker. Region 49 has not only a large crop acreage per worker but also very high ratios of capital investment and current expenses per worker.

Second highest in residual income per worker are the fruit, vegetable, and general cropping areas of California (regions 45, 46, and 61) and region 35 in Texas. In the third highest category are regions 48 in Washington, a large part of the hard winter wheat area, the productive prairie soils of the Corn Belt, the peninsula of Florida, and the intensive potato region in Maine. Largely, these are regions that specialize in cash crops and that have farms on a medium-to-large scale, favorable capital/labor ratios, and soils and climate favorable to the particular crop specialties. Next come the rest of the Great Plains (and bordering regions) and also most of Connecticut, Rhode Island, and Massachusetts; these regions have a residual income of $1,400 to $1,799 per worker.

The greater part of the Corn Belt, region 1 in the Northeast, the Atlantic seaboard to South Carolina, southern Texas and New Mexico, and the Pacific Northwest are in the $1,000 to $1,399 group. Lowest on the income scale are region 29, covering parts of Oklahoma, Missouri, and Arkansas; several regions in the Appalachian Mountains and the Southeast; and region 63 in northeastern Washington. Residual income per worker is less than $600 in these regions. The capital investment of less than $6,000 per worker is low, but it is no lower than that in other southeastern regions, such as 11, 12, and 30. These latter regions have incomes per worker as high as those for regions 15, 16, 18, and 19, stretching from northern Ohio to Tennessee, and for regions 22 and 23 in the upper North Central region. This is true even though capital per worker is considerably lower in this second category of southeastern regions. In other words, areas of low residual income per worker are found throughout the entire eastern half of the country, and they are intermixed with areas of considerably higher incomes.

Residual Income Per Operator and Family Worker

Residual incomes figured on a per-worker basis show the annual product per man-equivalent employed in agriculture after capital has received a return equal to its average price or return in each region. Thus, the figures suggest not only the average residual product of labor in each region; they also suggest disposable income per worker if all capital were hired or rented.

Perhaps more useful in the latter respect are the data in the second column of table 9. This column shows residual income per operator and family worker (that is, per nonhired worker) in each region after the following were subtracted from gross product: (1) Livestock and feed purchases, (2) current or annual cash expenses, (3) a capital charge on all working and fixed capital, and (4) the value of hired labor.

The resulting residual income per operator and family worker suggest, roughly, the disposable income per family worker after labor is paid when all capital resources were borrowed or rented. Residual income per operator and family worker is greater than residual income for all workers (hired as well as operator and family workers) when the value of product produced per hired worker is greater than

the wages paid. Operator and family residual income is less than residual income per worker when the wage rate is greater than the value of product produced by a hired worker.

The greatest residual incomes per operator and family worker are found in regions 35, 44, 45, and 53, where the averages are more than $5,000. This high figure is due to a combination of forces which include (1) the high productivity of all labor in these regions, (2) the fact that the value of product was higher in 1949 than the wage rate, and (3) the relatively large amount of hired labor used.

Next in rank are the regions that make up most of the remaining crop area of California, region 49 in Washington, region 56 in Texas, and region 50, Aroostook County, Maine. Following these are central Washington (region 48) and the wheat-irrigation-vegetable regions of Colorado (40D and 40E). Much of the West and Midwest and most of the eastern seaboard from Maine to South Carolina fall in the $1,000 to $1,999 range. Lower than these regions is the heart of the Southeast with a residual family income of $500 to $1,099. This "income belt" also stretches up through Ohio, Pennsylvania, and New York and borders all of the Great Lakes. Only regions 4, 7, 52, 41, and 63 have lower residual operator and family returns.

Region 63 is mountainous, and the climate and rainfall do not encourage efficient commercial farming. Most farms in the area are small subsistence units. When the value of hired labor on large farms is subtracted from the region's total product, the operator and family worker's residual income (weighted mainly with the incomes of small farms) is extremely low. This is true also to a large extent in region 41 where some of the farms represent subsistence units of Indian families.[10] Also, in region 41, production in 1949 was not particularly favorable; and although capital per worker was fairly high on many farms, the product of capital was relatively low.

Residual income per operator and family worker is low in region 52 because the small capital gives (1) a low return to labor relative to the wage rate and (2) a low return to capital relative to the interest rate assumed. Somewhat similar statements can be made about region 7. In region 4 the residual income per operator and family worker is low because the ratio (productivity of hired labor to wage of hired labor) is evidently low.

Residual Income Per Operator

In estimating residual income per operator, shown in the third column of table 9, the return subtracted for family labor was computed at the wage rate for hired labor. Hence, residual income per operator will be higher or lower than residual income per operator and family worker as discussed in the preceding section, depending on whether the value of product per family worker is greater or smaller, respectively, than the wage rate.

In most of the country, operator residual income is less than the hired wage rate. This does not mean that most farm operators had

[10] Income from Government payments was excluded as were incomes from nonfarm employment and investments in all regions.

losses during the year; actually, they had some positive returns from their own capital and from the labor of family workers. It does mean that (1) had the operators in these areas loaned their capital out at market interest rates; and (2) had they and their family members worked elsewhere at wage rates for hired labor, they would have had higher average incomes. It is, perhaps, true that not all family workers in the particular areas could have found employment at the market wage rate for hired farm workers. As mentioned previously, many family members have meager off-farm employment opportunities for their labor, so it is used on farms even though returns are low.

Extreme highs and extreme lows in residual operator income follow a regional pattern, as pointed out in the preceding paragraph. Most of the western half of the country and the Corn Belt have residual operator incomes that are lower than hired wages; so also have most of the Northeast and the Southeast. The greatest expanse of operator residual incomes averaging above wage rates is in the region that stretches southward along the coast of California into southern Arizona, and in western Texas northward through the hard red winter wheat belt. The Mississippi Delta region also stands out from the surrounding territory. Many scattered areas have residual operator incomes higher than even the most productive diagonal of the Corn Belt with its high capital investment per worker and its productive soils. This differential, as compared to the differentials of gross productivity, explained in a previous section titled "Product Per Operator," has this meaning: While the Corn Belt diagonal has a high gross product per worker (including operator, hired, and family labor), its return is not particularly high when its large capital investment and heavy input of nonoperator labor are considered.

Capital Input in Relation to Labor

Labor productivity and farm incomes are strongly affected by the amount of capital available per worker and per farm. In the economic environment which exists in the United States today, an average family with only a small amount of capital cannot, as a general rule, obtain an income from its farm comparable to that which could be earned if the family's resources (including labor) were remunerated at their market value in other economic uses. Although there are some offsetting forces, labor ordinarily can produce only a small product if it is combined with a small amount of capital resources. In this section certain ratios are presented which indicate the amount of capital available per man-equivalent of labor in the various regions. These data help to explain the labor productivity and income differentials which were presented in the preceding section.

The first two columns in table 10 show, respectively, the acres of all land and cropland per worker (man-equivalent) in the various regions. These land/labor input ratios are relatively unimportant, except that they suggest the intensity of agricultural production at various locations. Their value in explaining how capital invested in land may relate to differentials in labor productivity is limited, because they do not include the productivity and the capital value of the land.

TABLE 10.—*Specified input factors per worker on commercial farms, by productivity regions, 1949* [1]

Productivity region	All land in commercial farms	Cropland	Total investment [2]	Current expenses except labor [3]	All capital inputs [4]
	Acres	*Acres*	*Dollars*	*Dollars*	*Dollars*
1	123	36	8,428	2,306	2,784
2	43	17	10,541	2,848	3,428
3	98	48	12,217	2,443	3,158
4	83	46	10,216	1,998	2,593
5	67	41	13,623	2,544	3,306
6	93	32	7,560	900	1,322
7	90	35	9,791	1,043	1,601
8	73	27	6,489	791	1,145
9	42	19	5,394	661	950
10	81	37	5,793	965	1,287
11	83	38	4,944	756	1,035
12	91	44	5,408	952	1,262
13	76	35	5,720	713	1,038
14	82	42	6,558	691	1,065
15	83	52	9,224	1,103	1,618
16	110	71	9,723	1,339	1,888
17	71	49	12,598	1,203	1,889
18	106	55	11,742	1,576	2,233
19	75	45	13,237	1,964	2,700
20	106	81	20,501	2,412	3,530
21	90	65	14,558	1,806	2,625
22	122	49	8,561	1,139	1,629
23	107	57	10,809	1,458	2,093
24	97	69	20,923	2,367	3,536
25	127	104	31,876	3,476	5,203
26	135	102	22,281	3,111	4,321
27	220	144	19,395	2,238	3,308
28	150	89	15,437	2,022	1,487
29	133	55	7,735	1,272	1,732
30	44	29	5,532	664	971
31	139	51	8,159	907	1,371
32	141	61	11,765	1,264	1,907
33	183	69	10,316	1,277	1,856
34	248	91	14,950	1,452	2,260
35	183	75	11,443	980	1,583
36	422	228	29,319	2,342	4,411
37	219	179	15,861	1,840	2,721
38	555	303	18,750	1,973	3,036
39	1,462	226	28,455	2,683	4,313
40A	189	84	20,743	2,493	3,657
40B	273	50	19,526	2,705	3,787
40C	764	108	22,992	2,549	3,863
40D	277	121	20,577	4,622	5,773
40E	674	147	22,127	2,703	3,930
41	1,357	51	20,780	1,470	2,644
42	828	108	25,580	2,422	3,884
43	110	42	28,623	1,903	3,465
44	184	36	12,451	1,749	2,412
45	92	39	13,926	1,777	2,518
46	108	56	20,563	2,360	3,462
47	105	37	17,395	2,119	3,063
48	178	46	13,657	1,512	2,259
49	547	270	40,181	2,972	5,140
50	57	28	6,972	1,723	2,117
51	47	27	10,630	2,606	3,392
52	113	26	5,878	724	1,053
53	166	22	11,317	1,404	2,010
54	83	31	7,473	1,151	1,579
55	162	65	13,671	1,275	2,024
56	57	37	12,616	921	1,577
57	96	65	11,599	1,434	2,071
58	95	65	8,433	1,164	1,636
59	255	96	18,096	2,396	3,399
60	1,505	158	28,388	2,766	4,346
61	66	30	23,412	3,111	4,330
62	124	42	20,581	2,436	3,532
63	328	79	17,182	1,628	2,600
64	304	86	18,943	1,642	2,696
United States	165	71	14,413	1,785	2,684

[1] Totals for specified items per commercial farm divided by the average number of full-time man-equivalent workers.
[2] Total value of land, buildings, machinery, equipment, and livestock.
[3] Livestock and feed purchased, cash expenses on crops, and depreciation of buildings and machinery.
[4] Current expenses except labor, plus interest on fixed and operating capital.

Acres of all land or cropland per worker are few in southern California and in Aroostook County, Maine, even though capital investment per worker is high in these regions. Acres per worker are also relatively few along the Mississippi Delta. The land/worker ratio is also low in eastern seaboard regions, where farms are small and intensive with resources devoted to poultry, dairy products, vegetables, and fruits. All land and all cropland per worker are relatively low throughout the Southern States that lie east of the Mississippi River. Land per worker is also low throughout the Appalachian regions. All land per worker is high in the Great Plains and in the intermountain ranching area. But cropland per worker exceeds 120 acres mainly in the hard red winter and spring wheat producing regions.

Total capital investment per worker—including land, buildings, and all working capital—is highest in the diagonal across the Corn Belt (region 25) and in region 49 in the Northwest, as shown in column 3 of table 10. It is only slightly lower in the vast area that is devoted mainly to ranching but has a sprinkling of other types of farms (regions 39, 42, and 43), and in the specialized wheat area of the central and southern Plains (region 36). Concentrated regions of low labor productivity and incomes are also those which have a small capital investment per worker. These regions include particularly those stretching from southern Virginia through the South Atlantic States to the border of Texas. Only slightly higher are the Great Lakes region (region 22) and parts of Texas, Arkansas, and Louisiana. These regions rank somewhat similarly in labor productivity. The high investment per worker in region 49 is consistent with the high labor productivity of the region, but this is not true for the Corn Belt diagonal with its high investment. Similarly, regions 35 in Texas, 44 and 45 in the Southwest, and 50 in Maine do not have especially high capital investments per worker.

Some areas that have only small or medium-sized capital investments (real estate, machinery, breeding stock) have relatively large annual capital outlays in the form of current expenses.[11] Thus, a region may have a large total capital input, even though its continuing capital investment is small.

For example, central California (region 45) is not high in capital investment per worker but it is about average in current expenses (table 10). The difference is even more marked in region 2 (southern New England) where capital investment on dairy, poultry, crop, and vegetable farms is relatively small, but the annual outlay for feed, fertilizer, and other expense items is one of the largest in the country. Consistent with their low labor productivity and low capital investment per worker is the low ratio of current expenses per worker in the southeastern regions extending eastward from Texas through the Southern States, exclusive of Florida, and northward through the Appalachian area. The pattern of total product per operator in these regions is highly correlated with current investment per worker.

The last column in table 10 shows all capital inputs per worker. These data represent the total current expense plus the interest cost

[11] Current expense, as the term is used in this study, does not include hired labor because of the desirability of having separate data on capital and labor in the analysis, and in order to compute capital/labor ratios.

of all fixed and working capital in each region, divided by the number of man-equivalent workers in each. In effect, the ratios show the annual services of all capital used per worker. Although some differences exist, the geographic pattern is similar to that of current expenses except hired labor (table 10, next-to-last column). Highest ratios are found in parts of the main corn and wheat areas (regions 25 and 36), in region 49 in the Northwest, and in southern California (region 61). Ratios are lowest in the Appalachian and Southeastern States. Those in the Lake States cutover area (region 22) and the Ozark-Ouachita Mountains and surrounding areas (region 29) are only slightly higher. Region 54 on the gulf coast is also relatively low. This region of specialized vegetable production uses large amounts of labor relative to the total of annual capital services.

Capital per worker helps to explain productivity and income per person. This point is illustrated in figure 7, in which residual income per worker is plotted against all annual capital inputs per worker. Annual capital inputs include expenses for the year plus interest on working and fixed capital. All capital inputs account for about 25 percent of the variation in residual income per worker; no other single variable is so important in determining labor productivity. But capital inputs per worker do not account for all variations in residual income per worker. If this were true, the dot for each region would lie exactly on the regression line (fig. 7).

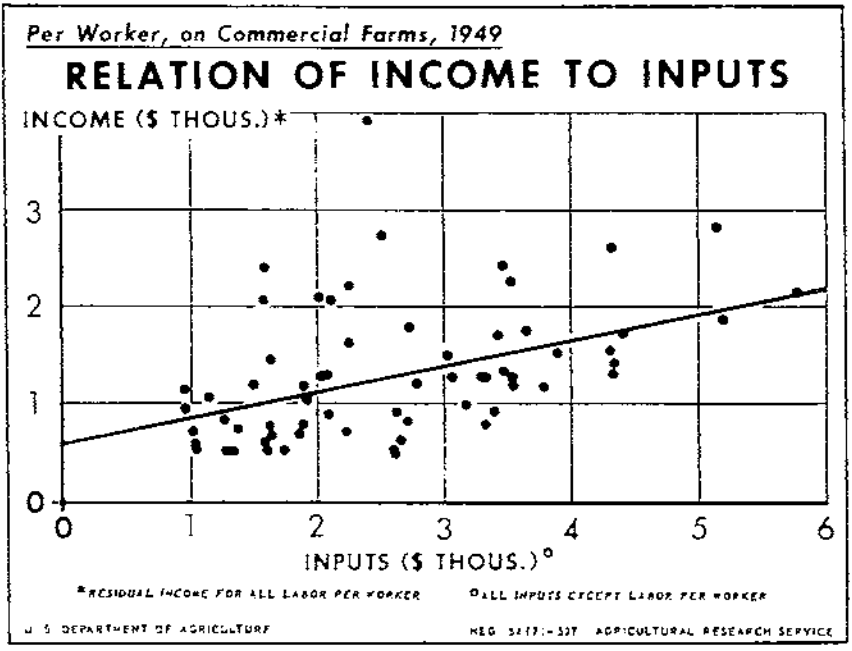

FIGURE 7.—The productivity, or residual net income, of labor is correlated with the quantity of all other inputs with which labor can work. In some cases, however, as indicated by the distribution of dots in this figure, regions show sizable deviation from the line of expected relationship.

Improved estimates of productivity might show that capital inputs account for more of the variation in labor productivity than is indicated in figure 7. For example, the return imputed to capital has been its market price. When this market price is greater than the marginal productivity of capital, the product or income imputed to labor is decreased; when the market price is less than the marginal productivity, the income to labor is increased. Additional factors, however, cause variations between regions in productivity and income to labor. The large fruit, vegetable, and cotton farms of Arizona and California are of a size to use labor efficiently.

Besides farm size, and economies to scale (which favor fruit and crop farms and permit efficient production and full use of hired labor), the specific nature and combination of other inputs used with labor also are important. One consideration is crop acres per worker. The regions in which farms specialize in crops adapted to mechanization tend to have high labor productivity. Regions 44 and 45, for example, have very high residual incomes per worker.

In very specialized regions, management is highly efficient, and farms are organized accordingly to give a large output of product per unit of labor and capital. For example, management is highly specialized in regions 44, 45, 50, and 61 and even in much of region 30. Emphasis given to management and efficient farm organization is considerably greater in such regions as 25, 35, 36, 40D, 49, 53, and 56 than in such regions as 6, 7, 10, 29, and 52. Also to be kept in mind is that figures for a single year are affected by weather variations between regions. In 1949, the year of the basic data, weather was quite favorable in the Corn Belt and in much of the Wheat Belt; it was somewhat less favorable in the Southeast and in many small localities elsewhere.

INVESTMENT PRODUCTIVITY

Capital investments are not inputs in the sense that they are completely transformed in production. Rather, they give services, which may be practically nonexhaustible as in the case of land, or slowly exhaustible as in the case of machinery. Livestock must be held for a fairly long period in order to produce for market or for home use, and in this respect animals, too, are a capital investment.

This bulletin includes analyses of both farm income and input productivities. For the latter purpose, an interest charge on investments should reflect the relative importance of investments as an input group. For computation of farm income, the interest charge should reflect the customary rate charged or earned on investment capital. These are not necessarily in conflict; but in this study, a market-rate approach was followed in allocating an interest charge of 5 percent to land and buildings, and 7 percent to machinery and livestock. The larger figure was used for machinery and livestock to reflect the difference in rates usually demanded by lenders, this difference being caused largely by the difference in risks involved with investments in these items as compared with investments in land. Machinery and livestock are often classified as "working" investments in contrast with "fixed" investments in land and buildings.

"Total capital investment," as the term is used here (see table 11), is the sum of the values of land, buildings, machinery (including other

TABLE 11.—*Value of capital investment on commercial farms, per farm and per acre, and percentage composition of investment, by productivity regions, 1949*

Productivity region	Total capital investment		Percentage composition of investment			
	Per farm	Per acre	Land	Buildings	Machinery and equipment	Livestock
	Dollars	*Dollars*	*Percent*	*Percent*	*Percent*	*Percent*
1	13,162	69	29	36	19	16
2	23,343	244	34	41	14	11
3	21,295	125	24	33	24	19
4	16,679	122	27	32	26	15
5	27,047	202	35	35	18	12
6	10,045	82	44	26	17	13
7	14,191	109	44	26	16	14
8	9,237	89	46	30	15	9
9	8,909	126	52	27	15	6
10	9,026	72	47	24	20	9
11	9,291	60	46	22	22	10
12	9,224	60	43	23	24	10
13	8,360	76	47	20	21	12
14	8,963	80	45	22	18	15
15	12,910	111	47	24	15	14
16	12,621	85	49	21	16	14
17	19,514	178	51	26	11	12
18	16,858	110	41	30	14	15
19	20,332	176	39	32	17	12
20	27,978	194	49	29	12	10
21	20,396	161	34	35	20	11
22	12,325	70	32	29	21	18
23	16,584	101	32	27	20	21
24	33,574	216	45	27	13	15
25	47,166	250	60	21	10	9
26	33,071	165	61	17	10	12
27	29,467	88	58	16	13	13
28	21,050	103	53	18	12	17
29	10,698	58	49	16	17	18
30	9,992	125	57	18	21	6
31	11,731	59	53	12	19	16
32	20,536	83	64	13	10	13
33	14,591	56	69	10	14	17
34	32,902	60	66	13	9	12
35	47,605	63	72	15	8	5
36	45,438	70	68	13	9	10
37	26,491	72	53	19	20	8
38	29,592	34	55	12	18	15
39	49,306	19	52	12	8	28
40A	34,933	110	57	14	17	12
40B	32,846	72	60	13	13	14
40C	43,676	30	53	11	13	23
40D	40,938	74	56	14	15	15
40E	46,245	33	57	14	11	18
41	35,739	15	57	9	12	22
42	48,962	31	52	12	12	24
43	77,043	27	65	13	4	18
44	75,547	68	72	12	8	8
45	59,614	152	71	13	10	6
46	56,883	100	69	13	10	8
47	27,125	166	62	17	13	8
48	33,272	77	55	18	16	8
49	74,560	78	63	18	14	5
50	24,436	123	32	36	28	4
51	25,731	228	37	37	17	9
52	13,026	52	47	24	19	10
53	45,610	68	66	16	8	10
54	13,691	96	46	18	21	15
55	38,430	84	61	14	11	14
56	59,482	221	75	15	8	2
57	18,003	120	56	20	15	9
58	16,709	87	54	17	24	5
59	25,544	71	62	11	10	17
60	51,276	19	63	10	6	21
61	62,350	305	75	14	6	5
62	61,542	147	71	13	8	8
63	22,918	72	52	16	17	15
64	26,465	62	59	12	14	15
United States	21,043	87	54	21	13	12

equipment), and livestock on commercial farms. On the more prosperous farms, capital investment is generally relatively large. In most types of farming, considerable capital is necessary so that the productivity of labor, and consequently the returns to the operator and his family, may be at a maximum.

To attain high levels of productivity in agriculture, it is important not only that the total capital be adequate in relation to the labor supply, but that the kinds of capital be in proportion to their potentialities in different environments. Data presented in the tables and maps that follow indicate capital investment per farm and per acre in various regions, the proportions of different kinds of capital used, and the returns to the farm family and investment in different regions. These data, together with data on residual incomes and labor presented previously, indicate combinations of capital and labor that are profitable in various regions; they indicate weaknesses in the capital-labor structure in some regions; and they suggest adjustments that would tend to maximize productivity.

Total Investment and Its Percentage Composition

The average capital investment on commercial farms of the United States in 1949 was $24,044. This amount was distributed as follows: 54 percent for land, 21 percent for buildings, 13 percent for machinery, and 12 percent for livestock, as can be seen from the last line of table 11. Value of investment ranged from $8,360 in region 13, to $77,943 in region 43. In general, the largest investments per farm were in the Southwest, including western Texas; isolated areas, such as 25, 49, and 53, also ranked high. Lowest investments were found in the eastern half of the country, especially in the Southeast.

Total investment amounted to $87 per acre for the country as a whole; it ranged from $355 per acre in southern California to $15 per acre in northwestern New Mexico. Investment per acre was high in the more densely populated areas, that is, in the Northeast, on the Pacific coast, and in some isolated areas with highly productive land. Lowest investment per acre was found in the southern part of the country and in the western range area.

Land makes up more than 70 percent of the total investment in regions 35, 44, 45, 56, 61, and 62. The warm climate of these southwestern regions eliminates much of the need for buildings, and machinery has not replaced labor for many of the specialty crops grown. The high relative importance of land typifies most of the West.

Buildings account for 21 percent of the total farm investment on all commercial farms in the country. The range is from 9 percent in region 41 (northwestern New Mexico) to 41 percent in region 2 (southern New England). In the latter region, farm acreages are small, and substantial buildings are used for dairy and poultry production because of the northern climate. In general, the proportion of investment in buildings is related to type of farming, kind of livestock production, and climate.

Machinery accounts for a high percentage of total investment in such specialized crop regions as 50 (Aroostook County, Maine) and 58 (rice-growing section of Arkansas) and also in many other regions where farms are relatively small in acreage. The value of machinery

exceeds the investment in buildings in no less than 16 regions—8 in the South and 8 in the West. The relatively lowest investment in machinery occurs in the same regions that have the highest percentage investment in land. These include the specialized fruit, vegetable, and cotton regions, along with ranching regions 39, 43, and 60. Investments in livestock makes up relatively high percentages of total investment in dairy and ranching areas, especially in regions 23, 39, 40C, 41, 42, and 60. They are correspondingly low in the crop-specialty regions.

Net Income Per Dollar of Total Investment

Net income is a residual computed by subtracting cash expenses, hired labor, and depreciation from gross income. In figure 8 it is expressed as a ratio to the total investment. The greatest significance of this measure lies, perhaps, in the implications that can be drawn from average productivity of capital with respect to its marginal productivity, where labor is ample to operate the additional capital. In 1949 the average net income per dollar of total investment for the United States was 0.112. which means that the return to investment plus family and operator labor was 11.2 percent of the value of the investment.

The Southeast, especially regions 8 and 9, has higher net incomes per dollar of investment than many other parts of the country. This may be explained partly by the low investment in this area and partly by the important place of family and operator labor in total farm inputs. In most of the Southeast. a large proportion of the residual income to investment and family labor is attributable to family labor when such labor is valued at even the relatively low farm wage rates that prevail in these regions.

When the value of operator and family labor (priced at local farm wage rates) is deducted. the only southeastern regions, excluding the Florida peninsula, that show residual returns per dollar of investment that are higher than the national average of 4.9 percent are the Virginia-Carolina tobacco area regions (8 and 9), the Kentucky Bluegrass and burley tobacco region (17). and the Georgia-Alabama peanut-and-tobacco area (region 12).

The fact that these areas show much higher returns to capital than adjacent areas is probably accounted for by their favorable position with respect to acreage allotments for tobacco and peanuts, the high support prices for these commodities. and a local shortage of capital sufficient to prevent a rise in land values that would reduce investment returns to average rates.

Other regions that have high net farm incomes per dollar of all investment are 35, 44, and 50. The unusually high profitability of farming in these regions in 1949 is the main explanation of this high investment productivity, but the fact that investment is a relatively low percentage of all inputs is also important.

The western range regions, region 47 on the Pacific coast, and regions 4, 5, 63, and 64, all had less than 9 percent net income to all investment. In some of these regions the explanation for this low return to investment lies in the high investment in relation to labor used. In others, like 4, 41, 63, and 64, the low farm income is mainly responsible.

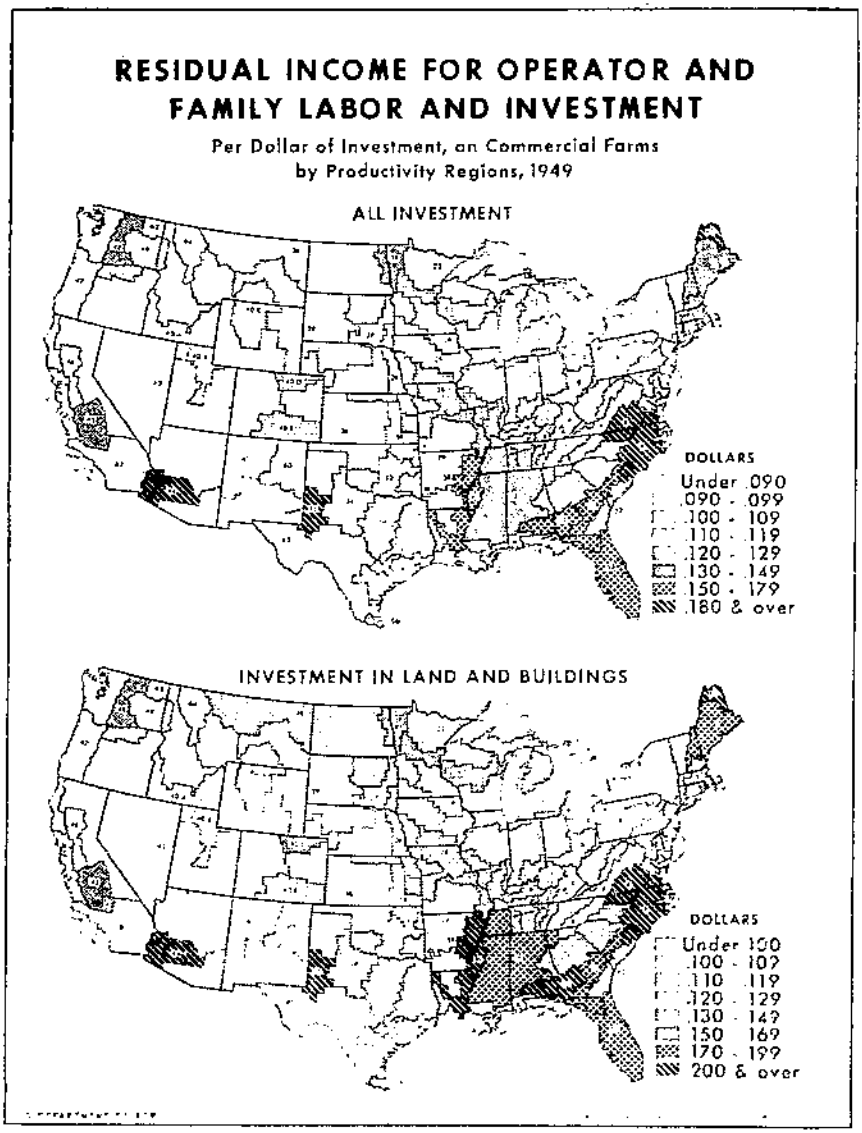

FIGURE 8.—The residual net productivity of all investment is generally high in those regions with relatively low investment. When the residual for investment is combined with the residual for operator and family labor, many regions with relatively low returns per commercial farm are seen to be relatively high. This is particularly true in much of the South and Southeast. Most regions in the Southeast have a high net return to the relatively fixed factors in production (family labor, land, and buildings) per dollar of investment in land and buildings.

Residual to Fixed Investment and the Farm Family

This residual is the return to factors in farming that are most fixed—land, buildings, and family and operator labor. Expressed as a ratio of the value of land and buildings (fig. 8, lower map), the areas lowest in such investments generally show the relatively highest rates of return.

The Southeast shows up even higher than with the previous ratio, and the same explanations are valid. In most of these southeastern regions, the high residual returns to family labor and investment are absorbed when an imputed wage is assigned to family labor. The high ratios of return to investment and family labor per dollar of investment suggest that opportunities exist in these regions for increasing farm income by increasing the quantity of other resources combined with labor, provided additional investments are made in technically efficient combinations of farm resources. General improvement of farm family incomes in these regions would also necessitate an increase in off-farm employment, both full- and part-time, for some of the people now on farms.

New England also has a high percentage return to land and buildings, as do regions 35, 37, 44, and 45. Again, there are many explanations, but the relative importance of family and operator labor as compared with land and buildings is fundamental.

The Corn Belt has only an average return to fixed investment and family and operator labor per dollar of fixed investment. The range livestock regions have even lower returns. The relative scarcity of labor tends to pull down the productivity of investment in land and buildings in the West. In contrast to the South, parts of the Corn Belt can be called "capital surplus" areas.

Residual for Capital Per Dollar of All Investment

If the residual income or value of product remaining after payment of costs or imputed value of all other input factors is credited to capital, this residual can be expressed as a rate of return on capital investment (table 12). In a sense, these data represent the earnings (interest or dividends) on farm capital used in the various regions, assuming that capital is the last or residual claimant in the allocation of returns. In computing this residual, the value of all other inputs (including operator and family labor at hired wage rates, but excluding interest on investment) was deducted from the gross value of product; the residual was then divided by the value of the total capital invested in land, buildings, machinery, and livestock.

It may be argued that capital should not be considered the residual claimant because of the lack of mobility and the limited alternative uses of the basic investment—land. But aside from this possible argument, this method of allocation of residual income is convenient in showing the relation of residual product to capital investment in different regions.

TABLE 12.—*Farm income residual for capital per dollar of total investment on commercial farms, by productivity regions, 1949*

Productivity region	Residual for capital [1]	Productivity region	Residual for capital [1]
	Cents		*Cents*
1	3.9	36	6.3
2	6.5	37	6.2
3	1.9	38	4.3
4	−2.4	39	5.2
5	1.8	40A	4.9
6	−0.3	40B	2.9
7	1.8	40C	4.7
8	6.0	40D	8.3
9	9.2	40E	8.2
10	0.7	41	2.9
11	4.3	42	4.8
12	6.8	43	5.6
13	2.6	44	24.1
14	1.9	45	11.7
15	4.7	46	8.2
16	1.0	47	1.3
17	7.4	48	6.6
18	0.5	49	7.4
19	1.7	50	15.9
20	4.8	51	4.8
21	2.1	52	2.1
22	−4.1	53	14.9
23	−0.3	54	2.8
24	4.1	55	6.9
25	6.1	56	11.9
26	4.3	57	5.7
27	3.6	58	11.5
28	4.2	59	2.2
29	−1.7	60	5.7
30	7.9	61	8.5
31	1.3	62	7.2
32	3.8	63	−3.7
33	−1.4	64	1.1
34	7.6		
35	15.6	United States	4.9

[1] Average farm income residual for capital after deducting all cost items except interest per commercial farm, divided by the average value of total capital investment per commercial farm. These data indicate the rate of interest actually earned on total capital investment, when interest is the residual claimant.

There is no established reason why the surplus that remains after all input factors are paid for should be credited to one resource rather than another. In the previous discussion of the residual to operator labor (pp. 29–30), the surplus was credited to the operator (column headed "I–7," table 6), and it could have been thought of as a labor and management return. In table 12 the surplus is allocated to investment, as an alternative method of comparing earnings in different regions.

The surplus is large in some regions and negative in others. In some regions it exceeds substantially the market rate of interest. It is apparent that in these regions farmers, on the average, make a profit on their investments, labor, or management. In regions with figures lower than the market rate of interest, it is apparent that farmers did not make a profit in the usual sense. But the actual level of earnings indicated for individual regions is less significant than the relative levels.

Percentage returns greater than 6 percent are found in 24 regions which perhaps have greater opportunities for returns on investment than are available to most farmers. In line with indications from other measures of return already discussed, highest earnings are generally found among regions in the Southwest and southern Plains; northern Maine and the Florida peninsula also show high returns.

Four regions in the Corn Belt show returns of less than 5 percent. Earnings of less than 3 percent are shown for 25 regions, most of which are in the eastern half of the country, but some scattered regions in the West and Northwest are also included. In scattered regions, returns from farming apparently are not sufficient to pay all other costs plus regular wages to family workers and operator, and nothing is left to credit to investment.

Many of the areas in the South where residual returns per worker are low also show low residual returns for capital. In contrast, the combined residual for family labor and investment per dollar of investment is high. This would indicate that investments to utilize existing labor supplies more effectively would bring good returns, but that investments which mean hiring additional labor might not be successful in many instances.

THE LAND RESOURCE

Land is of basic importance in agricultural production. Because of its role in determining or explaining the level of farm productivity, its characteristics in different regions should be examined. Land is usually the least flexible of a farmer's resources; most farmers find it difficult to change the acreage of their land. Possibilities for changes in quality of land are even more limited.

Quality of land is affected by topography; drainage; soil type; proportion in cultivation; nature and extent of improvements, such as buildings, fences, and irrigation facilities; and climate. Quality often varies greatly from one region to another. These differences should be taken into account in evaluating data on inputs and returns, such as those presented in this bulletin. Quality of land also varies from farm to farm within the same region.

Investment in land is a smaller proportion of the total than it was before the relatively large increases in investment in machinery, buildings, and livestock, which have occurred in the last 15 years. Land still accounts, however, for more than half the total value of investment on commercial farms in 41 of the 68 regions. In several regions it represents more than two-thirds. In very few regions it is less than a third of the total investment. Characteristics of land limit its use and the kind and quantity of other inputs that can be combined with it to economic advantage.

Land Composition of Farms

The average commercial farm in this country contains 276 acres. This is a composite of the sizes that prevail in different regions. Differences in average size between the eastern and western halves of the country are especially great. In much of the West, farms and ranches average more than 1,000 acres; and in some regions, more than 2,000 acres. In most of the eastern part of the country, however, the average is less than 200 acres. Acreage per farm in each region is shown (table 13, column 1).

The prevailing size of farm reflects an adjustment to climate, soil, topography, density of population, and other factors. Type of farming also is related to or affected by these and similar factors.

TABLE 13.—*Composition of farmland and land used for crops and pasture, showing average acreage per commercial farm, by productivity regions, 1949*

Productivity region	Farmland composition				Land used for crops and pasture	
	All land	Cropland	Woodland	Other land	Cropland harvested	Total land pastured
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
1	191	56	109	26	38	53
2	96	37	42	17	23	31
3	170	84	43	43	60	71
4	136	76	38	22	54	37
5	134	82	27	25	60	39
6	123	42	50	31	21	56
7	130	51	44	35	20	63
8	104	38	53	13	23	24
9	69	31	35	3	27	6
10	126	57	57	12	39	33
11	135	72	76	7	54	39
12	155	75	71	9	59	45
13	110	51	43	16	34	43
14	111	57	40	14	31	30
15	116	73	25	18	41	50
16	148	92	28	23	58	47
17	110	76	13	21	28	68
18	144	74	26	44	48	65
19	115	68	21	26	55	37
20	154	110	15	19	91	34
21	126	91	17	18	69	33
22	176	71	82	23	52	74
23	163	87	48	28	70	64
24	156	111	19	26	95	44
25	153	153	10	25	139	37
26	200	152	10	38	127	51
27	334	220	5	109	101	107
28	205	121	25	59	93	88
29	184	75	76	33	39	110
30	80	52	20	8	41	17
31	199	73	84	42	38	127
32	246	107	72	67	84	144
33	264	100	66	98	64	168
34	530	195	84	251	164	239
35	760	314	15	431	284	448
36	697	376	11	310	274	318
37	366	293	30	43	234	45
38	876	478	13	385	339	379
39	2,534	391	63	2,080	301	2,139
40A	318	142	12	164	97	163
40B	459	100	52	307	67	354
40C	1,451	205	66	1,180	134	1,238
40D	551	240	15	296	163	302
40E	1,410	307	106	997	197	1,057
41	2,334	88	694	1,552	48	2,164
42	1,585	207	248	1,130	131	1,364
43	2,861	113	510	2,238	83	2,730
44	1,116	248	45	353	171	861
45	392	168	41	183	112	235
46	390	158	49	95	93	172
47	161	58	66	37	35	91
48	431	112	66	253	68	314
49	1,015	518	96	401	255	482
50	199	100	83	16	71	23
51	113	64	35	15	50	16
52	250	57	173	20	36	92
53	469	88	378	203	44	545
54	151	58	71	22	33	69
55	396	160	124	112	97	203
56	229	148	47	34	123	81
57	150	101	30	19	80	41
58	187	128	43	16	91	35
59	359	135	32	192	105	217
60	2,716	285	331	2,102	204	2,388
61	176	79	13	84	51	92
62	370	121	69	177	69	246
63	438	105	273	60	69	275
64	423	119	138	166	70	301
United States	276	119	46	111	89	146

Of the total acreage in commercial farms, 43 percent is cropland, 17 percent is woodland, and the remaining 40 percent is mainly pasture and range. Composition of land in commercial farms (average acreage of cropland, woodland, and other land) is shown for each region (table 13). Acreage of cropland per farm follows somewhat the same pattern as average size in terms of all land, but differences between East and West are less extreme. The eastern part of the country has 4 regions that average less than 50 acres of cropland per farm; the West has only 2 regions in which the average is more than 400 acres.

In many regions of low farm income, not only is the acreage of cropland per farm small, but the percentage of cropland harvested is relatively low. This is true, for example, in southeastern and southern regions 6, 7, 14, 15, 29, 31, and 54. A low percentage of cropland harvested, however, is not always associated with low farm income. In region 17, for example, only 37 percent of the cropland is harvested, but a large percentage is in highly productive pasture. In regions 53 and 62, only 50 percent of the cropland is harvested, but much cropland is in orchards.

Pasture and range are important uses of farmland in most of the country, and especially in the western and southern Plains and intermountain areas. Acreage of all land pastured exceeds the acreage of cropland harvested in 45 of the 68 productivity regions. In many regions, much of the cropland is used alternately for pasture and for harvested crops.

In many low-income regions east of the Mississippi River, acreages both of cropland harvested and of pasture are small. But acreages of cropland harvested as well as of total land pastured are large in many higher income regions in the West. Development of irrigation has helped to increase the acreage of cropland in many parts of the West; it has also given such cropland versatility for use in production of a wide choice of crops.

Average Value

Values of land and buildings on commercial farms in this country in 1950 ranged from an average of $5,589 in region 13 (east south central cotton area) to an average of $63,171 in region 44 (southwestern Arizona) (table 14), and averaged $17,696. Investment in land and buildings exceeded $50,000 per farm in most of the West; in 6 western regions it exceeded $50,000 per farm. In many regions in the eastern part of the country (in the South, the East Central States, northern New England, and the northern Lake States) the average value ranged from $5,000 to $10,000 per farm. Value of farms is a reflection of number of acres per farm as well as of average value of land and of buildings per acre.

Value per acre is a rough index of the quality of land, or of its productivity for farming. In the vicinity of metropolitan areas, the value is affected also by the demand for land for residential and industrial uses (fig. 9, upper map). The relatively low values per acre in some regions are largely a reflection of the small proportion of land that can be used for crop production. This is true, for instance, in northern New England, the Appalachian areas, parts of the South,

TABLE 14.—*Value of land and buildings, per farm and per acre, on commercial farms, by productivity regions, 1949*

Productivity region	Value per farm	Value per acre	Productivity region	Value per farm	Value per acre
	Dollars	*Dollars*		*Dollars*	*Dollars*
1	8,517	44.49	36	39,265	56.36
2	17,456	182.73	37	19,130	52.33
3	12,298	72.31	38	20,078	22.93
4	9,858	72.31	39	31,628	12.49
5	18,819	140.50	40A	24,517	77.09
6	7,085	57.05	40B	24,028	52.33
7	9,956	76.57	40C	28,084	19.35
8	6,996	67.31	40D	28,787	52.24
9	7,042	101.67	40E	33,031	23.43
10	6,445	51.12	41	23,590	10.10
11	6,371	41.04	42	31,733	20.02
12	6,032	38.92	43	60,387	21.11
13	5,539	50.58	44	63,171	56.60
14	5,904	53.33	45	50,057	127.57
15	9,081	78.41	46	46,440	155.00
16	8,751	61.15	47	21,290	130.02
17	15,036	136.95	48	25,259	58.18
18	11,255	78.24	49	60,434	59.57
19	14,445	125.31	50	16,655	83.51
20	21,913	151.96	51	19,044	169.02
21	14,026	111.02	52	9,263	37.10
22	7,554	42.90	53	37,703	56.33
23	9,785	59.87	54	8,784	58.03
24	24,016	154.49	55	25,238	63.78
25	38,217	202.58	56	45,514	199.11
26	25,564	127.48	57	13,621	90.95
27	21,800	65.17	58	11,688	62.55
28	14,946	72.99	59	18,687	52.01
29	6,872	37.38	60	37,254	13.71
30	7,226	90.68	61	55,566	316.24
31	7,661	38.45	62	51,571	130.56
32	15,677	64.49	63	15,566	35.56
33	10,369	39.21	64	18,663	44.08
34	25,526	48.17			
35	41,289	54.34	United States	17,696	65.10

the cutover region of the Lake States, and the ranching areas of the West. The relatively high values per acre in some western regions are largely a reflection of the high value of irrigated acres. In general, the highest average values are found in the central and western Corn Belt and on the Pacific coast. Lowest in value per acre are the ranching areas of the West, the southeastern coast, northern New England, the northern cutover regions, and the Ozark-Ouachita mountain areas.

Production Per Acre

The total value of product per acre in 1949, adjusted by subtracting the value of livestock and feed purchased to represent more closely the actual production in each region, is shown (table 15). This measure indicates the gross productivity of farmland in the various regions. On the basis of value of product per acre, several regions in the eastern part of the country rank very high. All of those in the eastern part rank above the Great Plains and above most of the intermountain regions of the West. Regions along the Mexican border and in southern and central California show high value of production per acre, but the contrast between these regions and those in the eastern half of the country is less extreme on a per-acre basis than on a per-farm or per-worker basis. But the low-farm-income regions in the South and in other parts of the country are relatively low, even on the basis of production per acre. These data present a general picture of the intensity of agricultural production.

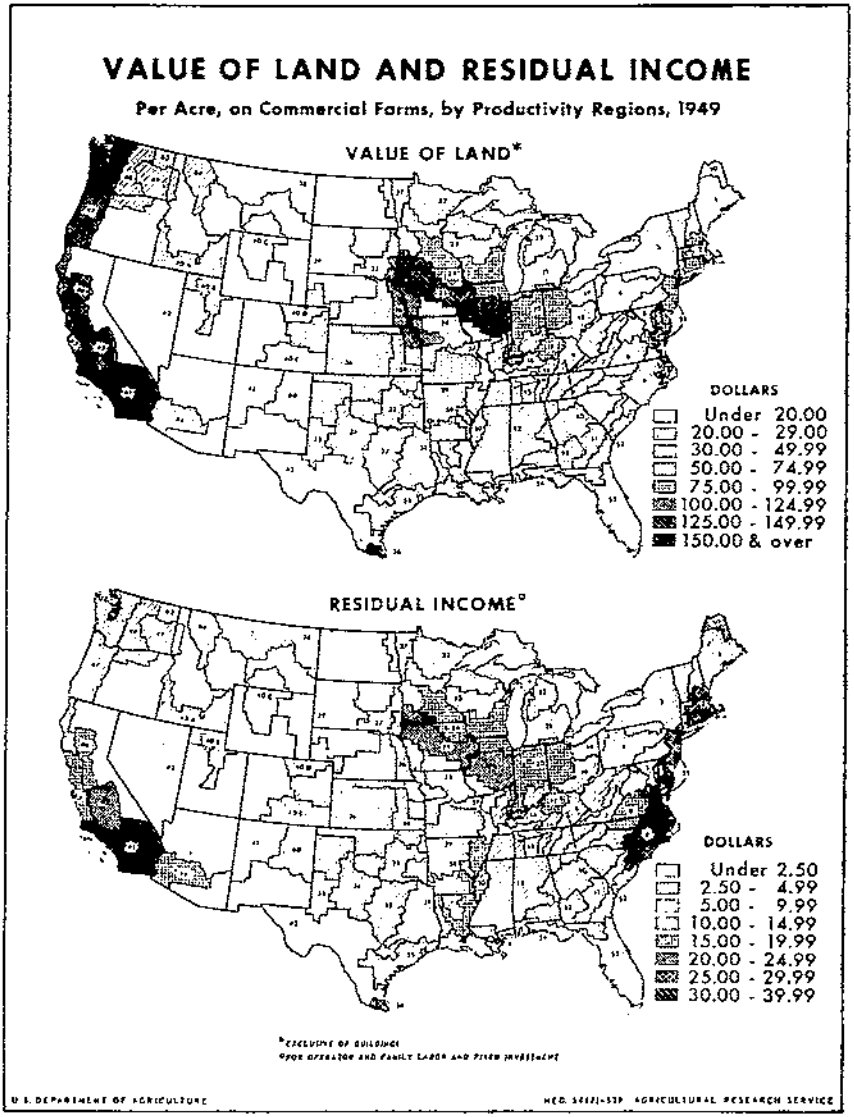

FIGURE 9.—Land values are closely related to the income residual for the family and for the fixed investment per acre. This indicates that the level of net earnings from all resources is capitalized into and reflected in land value on commercial farms.

TABLE 15.—*Estimated income per acre on commercial farms, by productivity regions, 1949*

Productivity region	TP_b [1]	I–4 [2]	Residual for land and buildings [3]	Productivity region	TP_b [1]	I–4 [2]	Residual for land and buildings [3]
	Dollars	*Dollars*	*Dollars*		*Dollars*	*Dollars*	*Dollars*
1	19.97	7.90	0.97	36	11.54	5.98	3.46
2	72.17	27.75	11.64	37	18.93	8.83	3.11
3	28.67	8.45	−1.36	38	7.31	3.24	.69
4	25.53	9.02	−6.40	39	2.90	1.37	.52
5	39.53	10.61	−.50	40A	22.99	9.80	3.09
6	14.82	6.90	−1.92	40B	11.81	4.72	.74
7	17.98	7.63	−.35	40C	5.30	2.12	.66
8	27.04	16.30	3.84	40D	17.31	8.07	4.61
9	47.56	28.58	9.07	40E	7.11	3.33	2.04
10	17.46	6.99	−.95	41	1.87	.08	−.05
11	19.30	8.01	1.25	42	4.99	1.97	.72
12	21.21	8.86	2.59	43	3.49	1.57	1.11
13	16.45	8.60	.24	44	30.60	16.96	15.55
14	16.98	9.02	−.33	45	49.24	20.77	16.02
15	22.91	11.21	2.97	46	43.93	18.44	13.08
16	18.92	8.83	−.99	47	29.57	12.24	−.26
17	35.32	19.52	10.28	48	21.80	8.79	3.74
18	20.81	8.63	−1.72	49	13.33	6.60	4.45
19	35.60	12.26	−.56	50	70.92	23.74	16.76
20	34.97	16.36	6.34	51	62.52	20.20	6.75
21	32.50	11.89	−.08	52	12.14	4.14	.06
22	15.27	6.23	−4.74	53	21.34	10.66	9.34
23	22.32	9.74	−2.23		19.92	7.03	.24
24	38.24	17.05	4.57	55	17.64	7.70	4.40
25	40.71	22.32	11.87	56	61.67	29.88	24.69
26	27.51	14.30	4.47	57	29.37	14.96	4.87
27	16.27	8.26	1.53	58	30.78	14.05	8.43
28	19.77	10.38	2.23	59	11.03	5.45	.20
29	10.69	4.85	−2.46	60	2.67	1.35	.71
30	41.32	18.77	7.45	61	74.33	37.00	27.56
31	12.13	5.66	−.64	62	34.77	15.36	10.20
32	16.36	7.40	1.87	63	7.40	2.62	−3.11
33	10.21	4.42	−1.99	64	9.69	4.13	−.58
34	13.29	6.36	3.75				
35	20.80	10.90	9.19	United States	17.83	8.23	2.69

[1] Average value of total product per commercial farm after deduction of value of livestock and feed purchased, divided by average acreage of land per commercial farm.
[2] Average income residual for family and operator labor and for interest on investment in land and buildings per commercial farm, divided by average acreage of land per commercial farm.
[3] Average income residual for land and buildings per commercial farm after deducting all cost items except interest on investment in land and buildings, divided by average acreage of land per commercial farm.

The income residual to operator and family labor and to interest on investment in land and buildings (income measure I–4) is shown on a per-acre basis by regions (fig. 9, lower map). On this basis several regions along the Atlantic coast, in the Corn Belt, and on the Pacific coast rank relatively high. These data reflect the return per acre in the various regions to the factors usually regarded as fixed—land and farm operator-family labor. The similarity of the geographic patterns of this measure of productivity and of the patterns of land value is apparent.

It should be kept in mind that high productivity per acre is only one of the elements of farm prosperity. Net returns per worker or per farm family are not always in line with productivity per acre. A study of the interrelations and differences in the geographic patterns of these measures, however, should suggest adjustments that will increase efficiency.

In the last column of table 15, the income residual to land and buildings is shown on a per-acre basis. These data indicate the value of product that would be left to cover interest on investment in these fixed-capital factors if all other input factors (including labor and

interest on investment in machinery and livestock) were paid first. It will be noted that in 20 of the 68 regions, the residual is a negative quantity. This means that in these regions the gross product was too small or other input items were too costly, on the average, for farmers to "break even" without claiming any return for their investment in land and buildings. As may be expected from data presented previously, most of the deficit regions are in the East and Southeast, and include the Lake States cutover and Ozark-Ouachita regions. As shown in figure 9 and in table 15, column 2, farm families in these regions received some net farm income, but these incomes were small even before any payments to fixed-capital investment.

In the eastern half of the country, only four regions—2, 17, 25, and 50—showed residuals to land and buildings that exceeded $10 per acre. Of these, region 25 had the highest value of land per acre (table 14). In the western half of the country, residuals exceeding $10 per acre were found in 6 regions—44, 45, 46, 56, 61, and 62. In these regions also, land values are relatively high.

PRODUCTIVITY IN RELATION TO ALL RESOURCES USED

One of the best measures of average resource productivity and efficiency is the relationship of production to all resources used in farming. A measure of this kind, although it is not perfect as it does not express differentials in marginal productivity, has three definite advantages: (1) The magnitude of the residual left to one category of resources does not depend on overpricing or underpricing another resource in relation to its actual productivity; (2) the residual to any one resource is less a function of the scale of operation in relation to overpricing or underpricing a particular resource; (3) it measures aggregate productivity of all resources together, although it cannot indicate which resource is used in excess and which in too small quantities.

Figure 10 presents interregional comparisons. Ratios show the value of output for each dollar of annual input of labor and capital. Value of labor was computed by multiplying the amount of all hired, operator, and family labor by the wage rate for hired farm labor. Annual capital inputs were computed by adding (1) all current or annual expense, and (2) interest charges, at market interest rates, on all working and fixed capital.[12] The total value of product (total output) of each region was then divided by the sum of the value of labor and capital expenses (total input).

This output-input ratio, as it is called here, thus suggests the efficiency of production in each region and indicates whether, if estimated market prices for resource services had been paid in each region, the production process would have resulted in a net loss or a net profit. A ratio of more than 1.0 indicates that the value of production was greater than the value of annual input and therefore resulted in a

[12] Taxes and interest on indebtedness were not included in annual expenses. This procedure was followed to allow estimation of resource inputs only. Taxes do not directly represent a resource input on farms. As interest was figured on all capital, whether or not it was borrowed, interest payments on debts and mortgages were not included to avoid double counting.

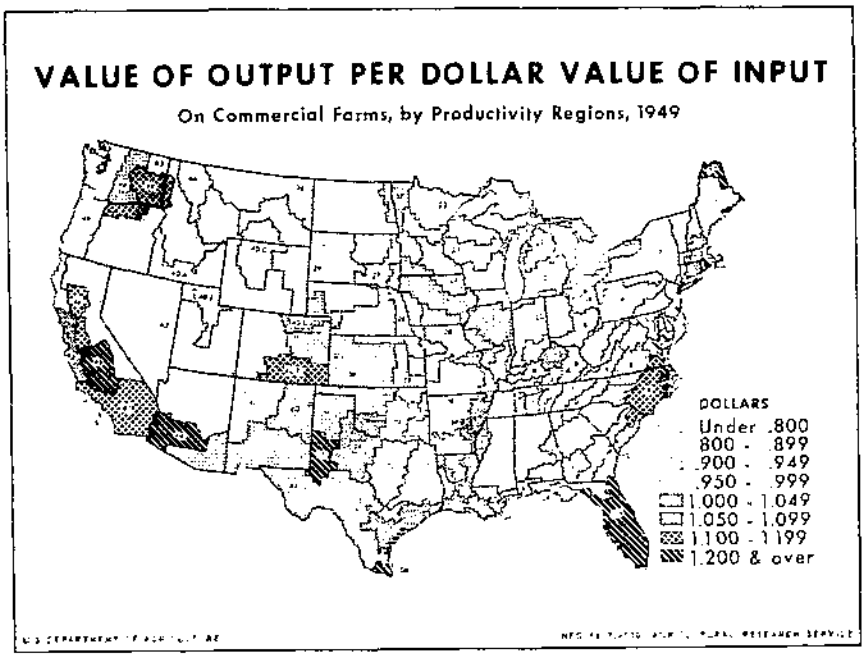

FIGURE 10.—In 5 regions the value of the product of commercial farms as a group is less than 80 cents for every dollar's worth of inputs. Only 28 regions show a profit when actual or estimated costs of all inputs are deducted. The output-input ratios are highest in the specialized-crop areas, reflecting high overall productivity of resources.

profit to the average farmer; a ratio of less than 1.0 indicates that the value of production was less than the value of the resource services used and therefore would have resulted in a loss had the farmers paid market prices for all inputs.

But, as previously mentioned, farmers ordinarily do not pay wage rates on their own or family labor and interest on their own capital. Hence, even when the ratio is less than 1.0, families have some net income for living expenses. The amount of such income depends particularly on (1) the magnitude of this ratio and (2) the quantity of resources or the volume of production, or both. The computed value of total input and the output-input ratio for each region are shown (table 16).

The pattern of output-input ratios throughout the many regions is similar to some of the labor productivity ratios discussed earlier. The two regions with the highest ratios are 44 in southwestern Arizona and 35 in west central Texas. These two regions have a larger volume of output per farm than most other regions. Average value of production per farm was $38,473 in region 44 and $16,588 in region 35. At the other extreme, region 63 of northeastern Washington had an output-input ratio of only 0.66 and a volume of output per farm of only $4,083; region 22 around the Great Lakes had a ratio of only 0.73 and a $3,316 volume of output per farm; region 33 in Oklahoma had an output-input ratio of only 0.78 and a volume of output per farm of only $3,646.

TABLE 16.—*Value of total inputs on all commercial farms and ratio of value of output to value of input, by productivity regions, 1949*

Productivity region	Value of total input	Ratio of output to input	Productivity region	Value of total input	Ratio of output to input
	1,000 dollars			*1,000 dollars*	
1	92,248	0.903	36	1,043,523	1.040
2	267,764	1.021	37	185,969	1.024
3	893,427	.895	38	634,370	.946
4	254,627	.758	39	274,500	.976
5	399,496	.888	40A	333,588	.974
6	158,473	.805	40B	105,641	.906
7	193,525	.848	40C	74,372	.958
8	194,446	1.016	40D	138,292	1.075
9	451,005	1.108	40E	96,057	1.106
10	356,125	.864	41	20,988	.813
11	239,424	.964	42	437,518	.958
12	187,000	1.028	43	316,983	1.011
13	652,840	.903	44	97,928	1.585
14	103,338	.870	45	376,079	1.202
15	158,770	.905	46	355,105	1.109
16	259,738	.856	47	348,448	.859
17	109,442	1.086	48	112,171	1.034
18	205,997	.831	49	197,956	1.113
19	214,887	.873	50	49,288	1.208
20	1,209,623	.972	51	480,640	.953
21	448,709	.874	52	36,010	.885
22	205,236	.732	53	212,735	1.350
23	499,395	.817	54	62,091	.905
24	1,615,976	.940	55	302,296	1.063
25	1,960,640	1.032	56	88,057	1.301
26	885,157	.957	57	258,718	1.009
27	850,408	.923	58	27,154	1.194
28	718,570	.950	59	207,744	.876
29	341,005	.795	60	64,603	1.006
30	482,211	1.071	61	476,549	1.125
31	238,177	.857	62	292,672	1.074
32	424,354	.939	63	11,821	.656
33	145,620	.777	64	26,159	.811
34	357,125	1.093			
35	151,505	1.422	United States	23,901,530	0.976

Also outstanding in output-input ratio is region 56 at the tip of Texas; region 45 in central California: region 50, Aroostook County, Maine: and region 53, the Florida peninsula. These regions are made up mainly of large farms that use considerable amounts of hired labor, fertilizer, and related inputs. The level of management also is quite high. These regions, however, are not homogeneous in respect to volume of output per farm. The Maine and Texas regions approached $15,000, and the Florida peninsula had $16,514, while central California had an average output of $22,509 per farm. Total capital per worker was above $10,000 in the California and Texas regions and between $6,000 and $8,000 in Aroostook County, Maine.

The next ranking regions in respect to output per unit of input are widely scattered over the country, with ratios falling between 1.10 and 1.20 in region 49 in Washington and Oregon, regions 46 and 61 in California, region 40E in Colorado, region 58 in Arkansas, and region 9 covering the Coastal Plain of Virginia and the Carolinas. There are no regions of this rank in the Midwest.

It should be remembered that this ratio is not an expression of physical output per unit of physical resources: it measures the value of output per dollar value of input. Accordingly, one region can have a larger physical output per unit of labor or physical capital than another, and it can still have a lower output-input ratio because prices of resources in the other region are relatively low. For example, physical product per worker may be larger in region 25 than in region

9. Still, the output-input ratio may be greater in region 9, partly because wage rates are lower.

Other factors also may help to explain these differentials in output-input ratios. One region may use more capital and labor per farm. Thus, as the marginal return of resources becomes lower, the average return, or output-input ratio, may also be lower. These factors might be expected to explain such differences as those found in regions 25, 36, or 37, as compared to region 9. However, the efficiency with which resources are organized and managed must also be considered. One might expect that some differences in both capital and managerial inputs would cause differences such as those found in the Coastal Plain and Piedmont (regions 9 and 10), although weather and the favorableness of tobacco prices may also account for a greater ratio in region 9.

Much of the country was included in an output-input ratio which indicates that the value of production exceeded the market value of the inputs, but not by more than 10 percent (that is, a ratio of from 1.00 to 1.10). The Red River Valley (region 37), the diagonal of the Corn Belt (region 25), region 48 in north central Washington, most of the hard winter wheat belt (region 36), the southwestern range area of Texas and New Mexico (regions 34, 43, and 60), the Texas-Louisiana gulf coast (region 55), and regions 57 (southeastern Missouri) and 12 (Georgia-Alabama peanut-tobacco area) fell in this category.

Region 12 had an output-input ratio of 1.03, the same as diagonal region 25 from Minnesota through Iowa and Illinois. In region 12, the volume of output per farm was only $3,534, while in region 25 it was $10,375. Region 12 compares favorably in output-input ratio, not because size of farm is comparable, but mainly because of differences in (1) wage rates relative to labor productivity, and (2) amounts of capital used per farm. Capital investment per worker averaged less than $6,000 in region 12, an amount that would not permit as low a marginal or average return as in region 25 where investment per worker is more than $30,000.

Most of the rest of the country west of the Mississippi has a ratio of 0.95 to 1.00. A ratio of this magnitude was also found in regions 1, 11, 15, 20, and 51. Below this vast area are those regions with a ratio of 0.80 to 0.95, including a diagonal strip centering on the Appalachians and running southwest from Vermont through New York, Pennsylvania, and Ohio, all the way to the gulf coast. In this category also is the upper Pacific coast; region 40B in Utah; 41 in northwestern New Mexico; 38 in Montana and the Dakotas; 27 in the western Corn Belt; 21, 23, and 24 in the Great Lakes area; and 52 along the South Carolina-Georgia coast. Even though wage rates are low in many of these areas and capital inputs per farm are small, value of output is low relative to the price of resources.

Many factors explain variations in the output-input ratio, which is the value of output produced per dollar of all annual resource inputs. Chief among these appears to be the scale of input. The fairly close relationship between the output-input ratio and the value of input per farm is illustrated (fig. 11). This single variable (scale of input)

accounts for about 40 percent of the interregional variation in the output-input ratio. That is, the aggregate measures of production relationships appear to indicate some fairly large economies to scale; a $1 input produces a greater value of output when it is used with a large total quantity of inputs or resource services. According to the data of figure 11, at the price levels of 1949, a total value of input smaller than $8,750 tends to result in an output-input ratio of less than 1.0. A value of input greater than $8,750 tends to result in a ratio greater than 1.0. The magnitude increases directly with value of input per farm. These figures mean that gains in income for larger farms, in regions where agriculture is organized on a relatively large scale, are more than proportional to the increase in the size of their units.

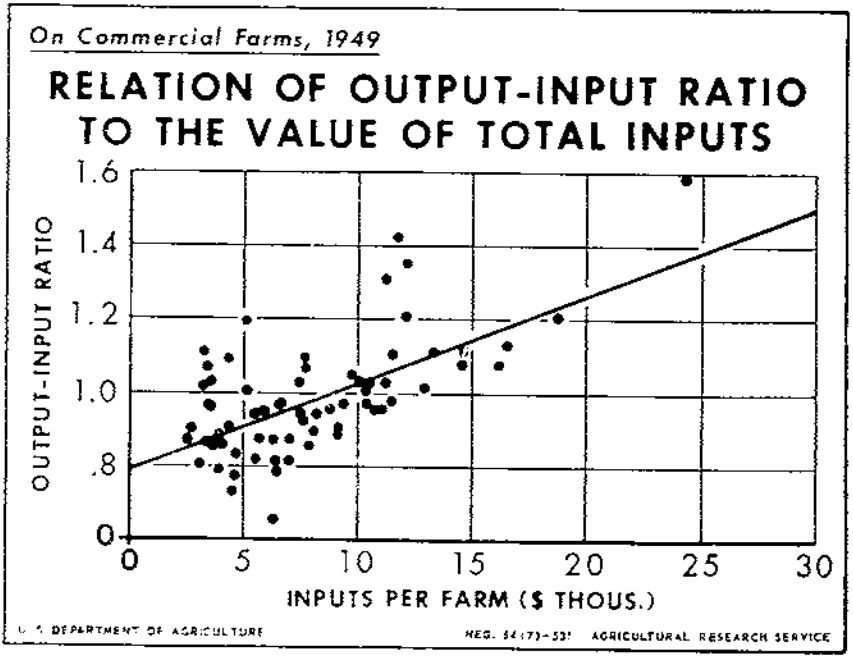

FIGURE 11.—The output-input ratio, or efficiency, is highly related to the average size of farming operations in most regions. Regions with relatively high output-input ratios are indicated by dots in the upper portion of the distribution in the figure; regions with low output-input ratios appear in the lower portion of the distribution.

An obvious cause of low income and low productivity in the many regions pointed out above is the small scale of farms and the few resources used per unit. This is particularly true in the regions bounded in a general way by regions 4 through 6 and 7 over to region 9 on the Atlantic coast, down to region 52, and across to region 30. It is true also for regions 22, 33, 63, and other scattered locations. Substantial increases in productivity of labor and farm family incomes

in these regions can be brought about only as farms use greater quantities of resources other than labor and attain a greater volume of output. Some of them can be brought about by using more resources and improved techniques on given acreages.

In the main, however, the greatest improvement could occur only if there were fewer farms and a much larger acreage per farm. At some point in combination, the three resources—land, capital, and labor—are either complementary, or they run into sharply diminishing returns if use of one is expanded greatly while the amounts of the other two remain fixed. In a few regions—53 in Florida, and 45 and 61 in California, for example—production is intensive, and a few acres per person absorb large capital and labor inputs to give favorable returns. Less intensive production (except, perhaps, for a few acres of tobacco, or intensive livestock enterprises such as raising broilers) does not give the same opportunities in such Atlantic coast regions as 8, 9, 51, and 52. Even the 80 or so crop acres per worker in region 63 of Washington do not allow highly favorable incomes, because the products grown are not favorable to intensive production, or to the absorption of large capital and labor inputs at favorable productivity levels on a given acreage of land.

Volume of input, however, does not fully explain interregional differences in the output-input ratio. If it did, all the data for individual regions would fall on the regression line in figure 11. Some regions, such as 9, 35, and 58, fall far above it; others, such as 22 and 63, fall far below it.

An important part of productivity analysis is to explain why these very large deviations exist in the general tendency of regression shown in figure 11. Deviations above the line often result from efficient management of given resources, together with relatively larger economies of scale for a given type of production. Another combination of factors is that some or all resources are priced at a level much lower than their productivity, although this may be a short-run phenomenon partly justified in risk and time discounts. This complex of factors is apparently important in explaining the relatively high output-input ratios of such regions as 9, 17, 30, 35, 56, and 58. Also, it would seem that the particular form and proportions in which capital, land, and labor resources are combined help to explain the high output-input ratios, in relation to the regression line, for such regions as 9, 35, and 58.

For several reasons, such regions as 63, 33, 4, 10, and 22 might have an output-input ratio that is low in relation to the regression line. These reasons would include the high price of resources relative to their productivity, a type of production not particularly related to economic demand, economies of scale that are very small for the particular products and techniques, and weather less favorable than in other regions. Further studies of productivity should attempt to isolate the variables that are important in explaining deviation of individual regions from the general trend line.

Efficiency in Relation to Prices of Resources

When data on resource productivity are examined in figures 6 and 10, there appears to be some inconsistency in the ranking of regions. In figure 6, for example, region 25 has a large total gross product per worker while region 9 is near the bottom of the scale. In contrast, region 9 is higher than region 25 in output-input ratios. But differences such as these are explained by the quantities and proportions of resources used as well as by the price of the resources. Total gross product per worker is high in such regions as 25 and in most of the regions west of the Missouri because the amount of capital used per worker is large.

Part of the total gross product per worker is actually attributable to capital. Allocation of part of the gross product to capital causes the picture to change somewhat, as is expressed in the lower map in figure 6. The relative ranking of regions, however, remains about the same as in the upper map. This is true because the return allocated per unit of capital (that is, the market price of capital) was generally less than the average productivity of capital. The residual product or income per worker in figure 6 also is mainly a physical reflection in the sense that it does not take into consideration the price of labor. In this respect, such regions as 24 and 37 rank above such regions as 9 and 17 in residual labor income or productivity.

However, when output expressed in relation to value of all inputs (fig. 10) is compared with residual product per worker (fig. 6), the relative positions of these regions are reversed. In terms of value of output relative to the price and value of inputs, regions 9, 17, and 30 rank above such regions as 25 and 27 as well as the range and wheat areas west of the Missouri River. These southeastern regions, therefore, are more efficient relative to the price of all resources used. While income residual to labor may be low when compared with United States average farm wages or with wages in nonfarm employment, the product per unit of input is relatively high considering the local price of all resources, including labor. Farm wage rates are considerably lower in the Southeast than in the Midwest, the Great Plains, or the Pacific coast regions. With prices of all resources considered, region 9 has a higher average efficiency than does region 25.

With the large number of families per 1,000 acres, the large size of families, and the high degree of labor immobility in the Southeast, farm wage rates in this general region can be expected to remain low for some time. Under these low wage rates, efficient farm production is consistent with a low gross or physical product per worker. Farm managers can afford to use labor with a low gross value of productivity when the price of labor is low. A major task of economic organization is to develop programs and procedures whereby the mobility of labor can be increased. With greater mobility more workers could move to other farming locations or to industries where higher incomes are possible. Labor productivity and wage returns

could then be more nearly equalized, and resource prices would cause output-input ratios to be more comparable between regions. The preferences, customs, and ideals of workers as individuals must, of course, be taken into consideration, and these factors could result in permanent interregional differentials in resource returns.

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APPENDIX

Estimation of Value of Products Used in Farm Households

The value of farm products used in farm households on all farms in 1944 was reported in the 1945 Census of Agriculture (*13*). Figures for each State are broken down by classes of farms within the State (*13*). In the present study, it was assumed that these data from the 1945 census could serve as a starting point in estimating the value of farm products used in farm households on commercial farms in 1949.

As a first step, the average value of home consumption per farm in 1944 was computed for each State economic area (*2*). Then, within each State, the average for each economic area was expressed as an index (percentage) of the State average. This reflected the differences in level of home consumption among the areas within each State.

The next step was to convert these average values for all farms into average values for commercial farms. The value of home consumption is reported for each of seven classes of farms within each State (*13, table 29*). (These classes are not the same as those used in the 1950 Census of Agriculture (*14*), but the combination of classes I, II, III, IV, and VI is approximately equivalent to the combination of all classes of commercial farms, I through VI, of the 1950 census.) The average value per commercial farm in 1944 was computed for each State by using the data for classes I, II, III, IV, and VI in the 1945 report. The index of level of home consumption in each economic area within the State (explained in the preceding paragraph) was then applied to the State average for commercial farms, to obtain an estimated value of home use per commercial farm for each State economic area in 1944.

The 1944 estimates of value of farm products used in farm households were then adjusted for changes in price level from 1944 to 1949, to make them applicable to 1949. In making this adjustment, consideration was given to the difference in changes in price levels for crops and for livestock and livestock products. Allowance also was made for the differences in proportions of crop and livestock products that make up total home consumption in the various States. Proportions of crop and livestock products in the total value of farm products used in the farm home in each State were computed from data given by States (*10*).

Indexes of changes in the price level of the principal crop and livestock products used were computed from price data given in various tables (*15*). The composite index developed for changes in the price level of livestock and livestock products was 1.27; for crop products the composite index was 1.06. These indexes were applied to the estimated 1944 values of livestock products and of crop products, respectively, in each State economic area, to obtain the values at 1949 prices.

Estimated 1949 values of livestock products and crop products per commercial farm were then added together for each economic area. This average value of home consumption per commercial farm was multiplied by the number of commercial farms in the area in 1949, to

get the total value of home consumption in each State economic area in 1949. The figures for economic areas within each productivity region were then totaled to obtain the total estimated value of farm products used in farm households on commercial farms in each productivity region.

Census Data on Value of Sales

In the 1950 Census of Agriculture (*14*), the value of farm products sold represents the approximate total of the gross cash income of farms. These data are given in the census for all farms and for commercial farms, by State economic areas. Gross sales for productivity regions in this report are totals of the reported gross sales by commercial farms in the State economic areas included in each productivity region.

Gross sales by all farmers, as reported in the 1950 census (*14*), are greater than gross income to agriculture, because interfarm sales are included. Feed crops, feeder cattle, and breeding stock bought by farmers contribute most to this duplication in gross sales. Inclusion of interfarm sales, however, does not affect the validity of the estimates of farm income made in the study. Farm income, or return to farm resources, is the difference between gross income and cost. The value of an item sold by one farm to another is reported as income on one farm and as cost on the other. Thus, in aggregative analyses, farmers' receipts from interfarm sales are offset by equivalent costs.

Value of sales in the 1950 census applies mainly to 1949. In general, value of sales of livestock, livestock products, nursery, greenhouse, and forest products is for the calendar year 1949. Value of the various crops sold is for production of the crop year immediately preceding the census enumeration. Included under crop sales is the estimated value of any part of a crop that was yet to be sold. Trades, such as trading eggs at a store, are considered to be cash sales. Farm products bought for immediate resale (dealer operations) are not considered as farm production and therefore are not counted either as farm expenses or as sales. However, resale of fattened feeder cattle is counted as farm production.

For many farms the sales enumerated in the 1950 Census of Agriculture do not represent their total gross cash income. Certain sales were excluded, and no provision was made for enumerating unusual sources of income. For example, sales of baby chicks, Government payments (such as those for soil conservation), and incomes received by farm operators for off-farm, and custom work, and as rent for land, are not included. Furthermore, actual sales values of products are sometimes understated. In some instances, renters did not report sales of products shared with their landlords. Enumerators and farmers were instructed to report gross sales without deductions of any kind, but full adherence to this rule could not be obtained. This often resulted in underreporting of the gross value of sales, particularly with the occurrence of marketing deductions for such products as vegetables, fruits, milk, and livestock.

Sales of poultry in important commercial broiler areas may be somewhat incomplete. Some operators who were producing broilers in 1949 had left the community before the census enumeration and could not be found. Also, those farm operators who fed broilers on

a contract basis for others may not have reported the sales, as they did not own the broilers.

In processing the farm schedules at the Bureau of the Census, before tabulation, adjustments were made on individual questionnaires when errors in reporting were detected. Thus, part of the underestimation and of other errors was eliminated, and the census was strengthened. But a degree of incompleteness of reporting remains because of the missing of farms and of other conditions referred to in preceding paragraphs.

The shortcomings of the census do not seriously affect use of the statistics as a measure of the relative importance of different producing groups. Furthermore, incompleteness in reporting products is usually linked with incompleteness in reporting expenses. In general, therefore, census data serve as a substantially good basis for the analysis in this bulletin.

Estimation of Value of Inputs

CENSUS DATA ON EXPENDITURES

Data on farm expenditures were obtained in the 1950 Census of Agriculture (*14*) for selected items only. Amounts reported for these items are total expenditures for the farm. For farms that were tenant operated, the totals include expenditures by both landlord and tenant.

Expenditures for hired labor include only cash payments. They do not include expenses for customwork, housework, or contract construction work.

Expenditures for feed include amounts paid for pasture, hay, grain, concentrates, millfeeds, salt, and mineral supplements. Also included are expenses for grinding and mixing feeds. Expenditures made by a tenant to his landlord for feed grown on the land rented by the tenant are not included.

Expenditures for purchase of livestock and poultry include amounts paid for baby chicks, poults, chickens, turkeys, bees, domestic rabbits, and fur-bearing animals kept in captivity, as well as for horses, mules, oxen, cattle, hogs, sheep, and goats.

Expenditures for seeds, bulbs, plants, and trees include only the cash outlay for these items.

Expenditures for gasoline and other petroleum fuel and oil include costs of only those quantities used in farm business. Petroleum products used for pleasure or used exclusively in the farm home are not included.

Expenditures for tractor repairs and for repairs to other farm machines include cost of labor as well as cost of parts. Included are amounts spent for tires and tubes for tractors and other farm machines, and expenses for plowshares, blacksmithing, and the like. Repairs to motortrucks and automobiles are not included.

Machine hire refers to custom work such as threshing, combining, silo filling, baling, ginning, tractor hire, and hired plowing and spraying. Expenditures include any labor included in the cost of such machine hire. This item does not include expenses for trucking, freight, or express.

COMMENTS ON MACHINE HIRE

In computing the value of farm inputs, the cost of machine hire was included as an item of expense. To some extent, expenditure for machine hire by one farmer represents income to another farmer. This is true when the machines or custom work are provided by *farmers*—for example, plowing, threshing, combining, and silo filling done by some farmers for others in the community. To the extent that payments for custom work go to farmers in the region, there was a double counting of machinery expense, as the cost of using farmer-owned machines is covered by expenditures for repairs and by depreciation and interest charged against the estimated inventory value of all machinery on farms. If the amount of machine hire (not including labor) paid to farmers had been known, it would have been excluded in computing the total value or cost of farm inputs; but separate data on amounts paid to farmers and to nonfarmer custom operators were not available.

It is believed that in some regions payments to nonfarmers for custom work account for the larger share of expenses for machine hire. Custom work that is done mainly by nonfarmer operators includes such services as airplane spraying for weeds, airplane spraying and dusting for insects, ground-equipment spraying of orchards, baling alfalfa, picking cotton, combining wheat, applying fertilizer to cottonfields, and leveling land for irrigation. These operations are important on many farms, especially those in the Western States and in some southern truck-crop, fruit, and cotton areas. The cost of machine hire is highest in regions where such custom operations are most common. Machine hire amounted to an average of $400 or more per commercial farm in 9 regions, all of which are west of the 96th meridian. In 20 regions, mainly in the eastern and northern parts of the country, this expenditure amounted to less than $100 per commercial farm. (See appendix table 27.)

In the absence of data showing expenditures for farmer-operated machinery hired, and in the absence also of data indicating the part of machine hire that represents hired labor, the entire amount of machinery hire was included as an input. The double counting in this item could mean that the inputs shown are too high, and the farm incomes shown too low, by amounts not exceeding $100 per farm in 20 eastern and northern regions, and not exceeding $200 in most other regions. But this possible overestimating is probably more than offset by certain miscellaneous items of expense which are not included in the analysis because of lack of information. Inclusion of the entire item as an input therefore affects relatively little the levels of residual income shown for the various regions.

Income from custom work done by farmers for others is in part a supplement to farm income. It is in about the same category as income from other off-farm work. For this reason it is not a part of gross farm income as computed in the study reported here.

ESTIMATES FOR OTHER INPUTS

Major input items for which values were estimated are: Fertilizer and lime, depreciation, interest, and unpaid family and operator labor.

Fertilizer and lime.—Estimates of the value of commercial fertilizer and lime used by farmers in each State in 1949 were obtained from

unpublished tabulations in the former Bureau of Agricultural Economics. These estimates included the value of mixed fertilizers, separate materials, and agricultural lime. The BAE figures were compiled from data on shipments or sales and prices of fertilizer materials assembled from individual States. These data included the value of fertilizer and lime distributed by Government agencies.

First, the BAE figures on fertilizer and lime for each State were adjusted to represent amounts expended by farmers rather than total values of materials used. This was done by subtracting the amount of the assistance provided farmers for fertilizer and lime under the 1949 agricultural conservation program.

The next step was to distribute the estimated expenditures for fertilizer and lime among the economic areas in each State. This was necessary in order to be able later to arrive at totals for productivity regions. In the absence of data on fertilizer for counties or other subdivisions in most States, the most feasible alternative appeared to be a distribution related to the values of crops harvested. Values of crops harvested in 1944 were already totaled by State economic areas; values by economic areas in 1949 would have to be built up from county data. It was believed that a distribution of fertilizer based on the value of crops in 1944 would be almost as reliable as a distribution based on the value of crops in 1949. Therefore, to save time and clerical work, the 1944 crop-value data were used as a guide in estimating distribution of fertilizer and lime within States.

Data on fertilizer shipments or sales by counties were obtained for 11 States. These county data were totaled by economic areas and then compared with distributions based on value of crops. In most of these States, distributions based on crop value agreed fairly closely with reported distributions. But in Kansas and Oklahoma, the two Great Plains States for which county data were available, the two distributions differed significantly. It was observed that in the Great Plains area of Oklahoma northward through North Dakota, a distribution based on value of crops harvested resulted in a disproportionately large allocation of fertilizer expenditures to the western parts of these States, because of the high proportion of the total value of crops accounted for by wheat.

Accordingly, fertilizer distributions within five States were recomputed on the basis of acreages of crops generally fertilized or mainly grown in areas in which use of fertilizer was heaviest. Crop acreages used as guides for the revised distribution were those for corn and cotton in Oklahoma; corn and oats in Kansas, Nebraska, and South Dakota; and corn, oats, and potatoes in North Dakota. The revised distributions in these States agreed well with expectations based on general information on fertilizer practices in these States.

The steps up to this point provided estimates of the total expenditures for fertilizer and lime on *all* farms in each State economic area. It was necessary to adjust these estimates to the commercial farm basis. For this adjustment the proportion of cropland harvested in 1949 was used as a guide. It was assumed that commercial farms in an area would have about the same proportion of total expenditures for fertilizer and lime as they had of the acreage of all cropland harvested in the area.

When these computations were made, estimates for all State economic areas in each productivity region were totaled to give the estimated expenditure for fertilizer and lime on commercial farms in each productivity region in 1949.

Depreciation.—To compute charges for depreciation of buildings, machinery, and equipment, it was necessary first to have figures on value of investment in these items. Ready-to-use data were not available. Hence, estimates were made on the basis of available data.

The 1950 Census of Agriculture (*14*) lists the average value of land and buildings per farm and per acre for commercial farms by State economic areas. But the census does not show separate values for land and buildings, nor does it show the total value of land and buildings for all farms in an area.

The first step, therefore, in estimating depreciation of farm buildings, was to compute the total value of land and buildings for commercial farms in each economic area. This was done by multiplying average values per farm by number of farms. The second step was to separate value of buildings from value of land in each area. This was done on the basis of the percentage that the value of buildings was of the total value of land and buildings in each State, estimated in a recent study by the Land Values Section of the former Bureau of Agricultural Economics.[15] In the absence of estimates for smaller units, the percentage for a State was applied to each economic area within that State. The separate values of land and buildings thus obtained for economic areas were then totaled by productivity regions.

The charge for depreciation of farm buildings in each productivity region was computed as 2½ percent of the estimated value of the buildings. This charge may be regarded as either a depreciation charge or a building-maintenance cost.

Computation of depreciation charges for machinery and equipment required first the estimation of total value of machinery and equipment. In making this estimate the total value of implements and machinery on all farms in 1945 was listed for each economic area. These data were available in the 1945 Census of Agriculture (*13*). Similar figures were not reported in the 1950 Census of Agriculture (*14*). The 1945 values for each area were expanded in proportion to the increase in numbers of tractors on farms in the area from 1945 to 1950. These values were then adjusted upward to reflect the change in price level for farm machinery from 1945 to 1950. (United States average prices paid by farmers for machinery in 1950 were 156.2 percent of the 1945 average prices.)

Estimated 1950 figures for value of machinery for each State economic area were then adjusted from totals for all farms to totals for commercial farms. This was done by referring to the 1950 census data on value of machinery repairs on all farms and on commercial farms. It was assumed that commercial farms in an area would have the same proportion of the total value of machinery on all farms as they had of the total value of farm machinery repairs.

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[15] These percentages, slightly revised for some States, are published in the March 1954 issue (released May 1954) of *The Farm Real Estate Market* (*7*).

A depreciation rate of 15 percent was chosen for use in computing the depreciation charge for machinery and equipment in all regions. This rate assumes an average length of life of about 15 years for all machines, and it appears to be a realistic rate to apply to annual inventory values which include machines in all stages of useful life or obsolescence. This rate appears to be at about the right level for use in a constant percentage system of depreciation covering the aggregate of machines in a region, and thus fits in with the inventory values used for this computation (*6*). In view of the lack of refinement of inventory value estimates for the various regions, it was felt that there was no reliable basis for applying different rates of depreciation in different regions.

Interest.—In setting up a basis for computing depreciation charges, the values of investment in land, buildings, and machinery and equipment on commercial farms were estimated and listed for each productivity region. The computation of interest charges for these groups of factors consisted of applying the selected interest rates to the estimated values of investment in each region.

The interest rate used on investment in land and buildings was 5 percent in all regions. This rate was considered a fair average and, for purposes of the study, served as a uniform rate to place this resource group on as equal a basis as possible in all regions. A study by the Farm Credit Administration showed that average contract interest rates on farm mortgages, recorded in March 1949, ranged from 4 to 5 percent in 28 States and from 5 to 6 percent in 20 States (*16*).

An interest rate of 7 percent was used on investment in machinery and equipment. This is somewhat higher than the average rate charged on non-real-estate loans by banks in most States in 1949. The average rate for the United States that year was 6.4 percent. Interest rates charged in the financing of machinery purchases tend to run higher than the average for all chattel loans because of the widespread use, in buying tractors and other machinery, of installment payment plans which include extra interest charges.

An interest charge was also computed on value of investment in livestock. For this computation the total value of livestock on commercial farms in each productivity region was first estimated. The United States Census of Agriculture for 1950 did not report the total value of livestock on commercial farms, but it did report numbers and total value for each class of livestock on all farms by counties. For commercial farms, numbers of horses and mules, cattle and calves, hogs and pigs, and chickens were reported by State economic areas. The value of investment in livestock on commercial farms was estimated from these figures.

Working from a 20-percent or larger sample of counties in each region, average values per head for horses and mules, cattle and calves, hogs and pigs, and chickens were computed from county data on numbers and values for each of these species. Resulting figures were weighted-average values per head on all farms, but it was assumed that they would apply about equally well to commercial farms. These average values were then applied to the total number of head reported

on commercial farms in the economic areas, to obtain the total value of these classes of livestock in each productivity region.

For sheep and lambs and for turkeys, no data were reported for commercial farms as distinguished from all farms. However, as very few of these livestock are found on noncommercial farms, it was felt that no significant error would result from crediting the total value of these species to commercial farms. The total value of these livestock in each productivity region was found by adding together the values reported for every county within each productivity region.

The interest charge on investment in livestock was computed by applying a rate of 7 percent to the total estimated value of horses and mules, cattle and calves, hogs and pigs, sheep and lambs, chickens, and turkeys in each region. The 7-percent rate is higher than the usual livestock loan rate in most States, but it does not seem too high to reflect the annual cost of investment in livestock. One reason for this is that the inventory value as of April 1 (the census date for livestock) is relatively low compared with the average for the year. Average values per head tend to be low because April 1 figures include a large proportion of young animals. Numbers of livestock as well as average values per head are generally higher in the last half of the year. Another reason is that this study does not include elsewhere any allowance for miscellaneous expenses on livestock.

Labor.—As mentioned previously, data on expenditures for hired labor were available in the 1950 Census of Agriculture (*14*). The 1950 census also reported a number of items relating to farm operators and included some information relating to hired workers and unpaid family workers on farms in the week preceding the enumeration. These data, together with certain data in the 1945 census (*13*), in reports of the former Bureau of Agricultural Economics, and in unpublished tabulations compiled by that Bureau, were used in estimating the total number of workers and the total value of labor on commercial farms in each productivity region.

One of the first estimates required was that of the annual wage rate for each productivity region in 1949. This wage rate was developed to express in terms of an annual wage the weighted average rates of pay for all hired workers in the region. First, a composite average monthly wage in 1949 was computed for each State on the basis of data in reports by the former Bureau of Agricultural Economics (*11, 12*). These monthly wages were then multiplied by 12 to obtain the average wage in each State. The average annual wage in each productivity region was derived from figures for the States by weighting the wage of each State in proportion to its percentage of all commercial farms in the region. Average annual wages were computed by four other methods also. The method described was chosen as the best.

The total number of hired workers, full-time equivalent, in each productivity region was estimated by dividing the total expenditure for hired labor by the estimated annual average wage in the region.

Numbers of unpaid family workers were estimated on the basis of data from several sources. The 1950 census provided data on the number of family members on commercial farms who worked 15 hours

or more in the week (generally in April) preceding the enumeration. A report by the former Bureau of Agricultural Economics (*8*) provided data on the number of family workers employed each month during 1949 in each State. Data in these reports were supplemented by data obtained from unpublished BAE tabulations on average number of hours worked per week in different seasons by unpaid family workers, hired workers, and operators in different geographic regions. The full-time man-equivalent number of family workers in each productivity region was estimated by counting each of the estimated number of family workers as 65 percent of a man-equivalent worker. The value of unpaid family labor was estimated by multiplying the man-equivalent number of family workers by the estimated average annual wage for the region.

One assumption in this study was that the farm business should be charged a labor cost for unpaid family labor and operator labor on hand, whether or not such labor was fully or effectively employed. Unpaid family labor was judged to be on hand to the extent expressed by the estimate of full-time man-equivalent family workers explained in the preceding paragraph. Operator labor was to be adjusted downward to allow for time spent on off-farm work and to allow for a lower potential workload by operators at the age of semiretirement.

Estimates for operator labor assumed that the number of operators equaled the number of commercial farms. This number of operators, however, was adjusted to allow for differences in the amount of time spent on off-farm work and for the age factor. Data on age of operators were obtained from the 1950 Census of Agriculture. In computing the adjusted number of commercial farm operators in each productivity region, a deduction of 60 percent was made in the number of operators 65 years old or older.

The amount of time farmers spend on off-farm work varies considerably between regions. The number of commercial farm operators who work off their farms from 1 to 99 days and the number who work off their farms 100 days or more were reported by State economic areas in the 1950 Census of Agriculture. These data, together with data from the 1945 Census of Agriculture on amount of time spent on off-farm work, were used in estimating the number of man-days of off-farm work by operators in each productivity region in 1949.

The number of operators, as obtained from the count of commercial farms and adjusted for the age factor, was reduced by 1 full-time operator for every 300 days of off-farm work during the year. The estimated total value of operator labor in each productivity region was computed by multiplying the adjusted number of farm operators by the average annual wage for the region.

Additional Tables

TABLE 17.—*Number of farms in each broad economic class, by productivity regions, 1949* [1]

Productivity region	All farms	Commercial farms	Part-time farms	Residential farms	Abnormal farms
	Number	*Number*	*Number*	*Number*	*Number*
1	30,830	14,168	5,313	11,311	38
2	42,014	24,109	5,971	11,772	162
3	159,673	111,350	19,396	28,737	170
4	76,356	39,649	13,321	23,245	141
5	102,994	65,498	14,742	22,613	141
6	196,215	52,551	30,018	113,538	108
7	116,205	53,702	21,626	40,816	61
8	95,295	62,370	9,168	23,708	49
9	170,487	143,860	8,681	17,879	67
10	222,181	109,984	41,649	70,446	102
11	94,563	70,560	9,743	14,227	33
12	70,396	51,398	6,855	9,042	8
13	428,057	249,619	67,514	110,788	136
14	68,969	40,547	11,153	17,264	5
15	77,652	54,573	9,953	12,768	58
16	100,912	64,423	15,175	21,297	17
17	55,902	45,644	4,256	5,951	51
18	77,416	42,972	13,137	21,247	60
19	59,867	31,589	10,250	14,950	78
20	234,623	183,672	25,440	24,481	130
21	111,872	79,226	17,652	17,000	95
22	70,412	45,308	11,302	13,755	47
23	103,312	89,909	7,420	5,960	23
24	222,781	197,798	12,041	12,716	227
25	211,440	195,120	7,536	8,395	95
26	115,958	101,319	6,954	7,580	74
27	119,945	112,550	3,530	2,920	45
28	156,763	123,447	13,223	14,050	43
29	172,621	85,120	33,565	50,547	89
30	184,287	148,917	16,035	19,311	24
31	145,741	60,988	26,736	51,987	30
32	107,743	77,518	12,661	17,179	87
33	55,525	31,031	9,660	14,790	43
34	51,206	46,936	3,575	3,661	31
35	13,972	12,981	430	556	3
36	119,493	107,241	5,734	6,387	131
37	26,901	25,253	965	685	18
38	89,067	84,627	2,293	1,963	124
39	29,354	26,457	1,458	1,379	60
40A	29,319	25,051	2,220	1,910	37
40B	16,303	11,510	2,571	2,170	52
40C	8,543	7,093	706	741	33
40D	10,774	9,452	715	606	1
40E	10,809	8,312	940	1,541	16
41	8,652	3,020	1,428	4,183	41
42	50,300	40,664	7,090	5,351	205
43	31,577	24,589	3,085	3,805	98
44	6,064	4,034	881	1,125	24
45	23,724	20,083	2,050	1,572	19
46	30,938	24,113	3,141	3,667	17
47	91,364	44,366	17,565	29,325	88
48	14,381	10,618	1,826	1,915	22
49	20,471	14,966	2,400	3,058	58
50	4,020	4,050	215	330	1
51	64,707	41,972	7,029	14,655	151
52	21,723	9,106	3,351	9,109	7
53	31,223	17,511	4,996	8,679	47
54	37,351	14,158	7,543	15,651	29
55	62,356	39,645	7,125	15,564	22
56	9,863	7,943	936	917	7
57	64,491	50,045	6,292	8,147	40
58	7,118	5,340	747	1,031	
59	42,724	29,858	5,526	7,275	65
60	8,690	6,251	720	1,663	26
61	42,556	28,868	5,585	7,961	142
62	26,326	18,163	3,492	4,615	56
63	3,069	1,899	580	590	
64	6,251	4,186	965	1,095	5
United States	5,379,250	3,705,412	630,230	1,029,392	4,216

[1] Based on data in U. S. Census of Agriculture: 1950 (*15*).

TABLE 18.—*Percentage distribution of farms among broad economic classes, by productivity regions, 1949* [1]

Productivity region	All farms	Commercial farms	Part-time farms	Residential farms	Abnormal farms
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
1	100	46.0	17.2	36.7	0.1
2	100	57.4	14.2	28.9	.4
3	100	69.8	12.1	18.0	.1
4	100	51.9	17.5	30.4	.2
5	100	63.6	14.3	22.0	.1
6	100	26.8	15.3	57.9	
7	100	46.2	18.6	35.1	.1
8	100	65.4	9.6	24.9	.1
9	100	84.4	5.1	10.5	
10	100	49.5	18.8	31.7	
11	100	74.6	10.3	15.1	
12	100	77.4	9.7	12.9	
13	100	58.3	16.8	25.0	
14	100	58.8	16.2	25.0	
15	100	70.7	12.8	16.4	.1
16	100	63.8	15.1	21.1	
17	100	81.7	7.6	10.6	.1
18	100	55.5	17.0	27.4	.1
19	100	57.8	17.1	25.0	.1
20	100	78.6	10.9	10.5	
21	100	69.0	15.4	15.6	
22	100	64.3	16.1	19.5	.1
23	100	87.0	7.2	5.8	
24	100	88.8	5.4	5.7	.1
25	100	92.3	3.7	4.0	
26	100	87.4	6.0	6.5	.1
27	100	94.5	3.0	2.5	
28	100	81.9	5.8	9 3	
29	100	51.0	19.4	29.5	.1
30	100	80.8	8.7	10 5	
31	100	46.0	18.3	35.7	
32	100	72.2	11.8	15.9	.1
33	100	55.9	17.4	26.6	.1
34	100	86.6	6.6	6.8	
35	100	92.9	3.1	4.0	
36	100	89 8	4.8	5.3	
37	100	93.9	3.6	2.5	.1
38	100	95.1	2.6	2.2	
39	100	90.1	5.0	4.7	0.1
40A	100	85.4	8.0	6.5	.2
40B	100	70.6	15.8	13.3	.1
40C	100	82.0	8.9	8.7	.3
40D	100	87.7	6.7	5.6	.4
40E	100	76.9	8.7	14.3	
41	100	84.9	10.5	48.1	.1
42	100	72.2	12.6	14.8	.5
43	100	77.9	9.8	12.0	.4
44	100	66.5	14.5	18.6	.3
45	100	81.7	8.6	6.6	.4
46	100	77.9	10.2	11.0	.1
47	100	48.6	19.2	32.1	
48	100	73.8	12.7	13.3	.1
49	100	73.1	11.7	14.9	.2
50	100	88.2	4.7	7.1	.3
51	100	64.9	12.3	22.6	
52	100	42.2	15.4	42.4	.2
53	100	56.1	16.0	27.8	
54	100	37.9	20.2	41.0	.1
55	100	63.6	11.4	25.0	
56	100	81.0	9.5	9.4	
57	100	77.5	9.8	12 6	.1
58	100	75.0	10.5	14.5	.1
59	100	69.9	12.9	17.0	
60	100	72.0	8.3	19.5	.2
61	100	67.8	13.1	18.7	.3
62	100	69.0	13.3	17.5	.4
63	100	61.9	18.9	19.2	.2
64	100	67.0	15.4	17.5	.1
United States	100	66.9	11.9	19.1	.1

[1] Based on data in U. S. Census of Agriculture: 1950 (*14*).

TABLE 19.—*Approximate total land area and land in commercial farms, by productivity regions, 1949*

Productivity region	Approximate total land area	Land in commercial farms	Productivity region	Approximate total land area	Land in commercial farms
	Acres	*Acres*		*Acres*	*Acres*
1	15,974,720	2,712,077	36	81,681,280	74,715,983
2	9,093,120	2,303,030	37	10,759,080	9,230,284
3	40,471,120	18,942,297	38	88,309,760	74,116,136
4	18,911,360	5,404,788	39	77,857,280	67,029,710
5	15,744,000	8,773,063	40A	21,982,080	7,967,741
6	28,309,160	6,459,155	40B	11,880,320	6,265,228
7	16,861,440	6,982,522	40C	23,031,680	10,164,186
8	11,700,080	6,481,748	40D	7,055,360	5,208,435
9	18,551,040	9,963,984	40E	17,587,200	11,716,788
10	31,259,960	13,867,752	41	24,674,560	7,049,009
11	17,717,760	10,954,770	42	323,924,480	64,459,269
12	12,369,280	8,430,373	43	103,706,880	70,349,060
13	55,612,960	27,584,853	44	15,736,960	4,501,811
14	8,282,880	4,489,070	45	14,427,520	7,879,923
15	8,474,880	6,355,680	46	9,774,080	7,224,838
16	14,839,680	9,219,998	47	41,079,040	7,268,028
17	5,030,240	3,011,426	48	11,816,320	4,610,320
18	11,208,320	6,181,726	49	20,210,320	15,185,005
19	7,238,400	3,987,522	50	4,355,200	813,690
20	31,582,800	26,470,919	51	13,971,200	4,728,920
21	16,055,760	10,009,402	52	8,880,000	2,285,635
22	46,140,800	7,976,887	53	24,087,680	11,721,802
23	21,060,480	14,604,212	54	13,415,040	2,143,098
24	35,176,960	30,749,227	55	24,238,720	15,687,607
25	39,433,600	36,808,702	56	1,932,160	1,815,730
26	22,284,160	20,317,632	57	10,467,200	7,490,571
27	39,591,680	37,647,346	58	1,695,760	997,700
28	29,456,000	25,278,104	59	12,597,280	10,727,159
29	30,383,040	16,199,795	60	20,381,440	17,018,303
30	20,899,200	11,867,121	61	28,996,480	5,072,445
31	37,761,680	14,349,429	62	9,902,720	6,714,604
32	24,734,720	19,155,916	63	3,856,960	831,101
33	13,390,720	8,206,205	64	12,430,720	1,772,117
34	27,154,560	21,869,680			
35	11,019,520	9,865,390	United States	1,903,824,640	1,021,354,502

TABLE 20.—*All land in farms and percentage distribution among broad economic classes, by productivity regions, 1949* [1]

Productivity region	All land in farms	Distribution of all land in farms				
		All farms	Commercial farms	Part-time farms	Residential farms	Abnormal farms
	Acres	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1	4,102,647	100	64.7	13.7	21.1	0.5
2	3,245,760	100	71.0	9.9	17.6	1.5
3	22,225,127	100	85.2	6.8	7.6	.4
4	7,653,088	100	70.6	13.8	14.8	.8
5	10,414,339	100	84.2	7.3	7.7	.8
6	14,130,120	100	45.7	16.1	37.9	.3
7	9,968,798	100	70.5	13.8	15.4	.3
8	8,467,355	100	76.6	8.3	14.7	.4
9	11,552,516	100	85.2	4.1	9.3	.4
10	21,518,266	100	64.4	15.4	19.8	.4
11	12,684,230	100	86.4	5.9	7.1	.6
12	9,771,340	100	86.3	6.2	7.4	.1
13	35,500,741	100	71.6	13.0	15.0	.4
14	6,059,422	100	74.1	12.8	13.1	------
15	7,399,020	100	85.9	7.6	6.2	.3
16	11,262,772	100	81.8	9.2	8.8	.2
17	5,405,767	100	92.7	3.4	3.4	.5
18	8,292,952	100	74.5	12.2	13.1	.2
19	5,086,798	100	78.4	10.6	10.4	.6
20	28,035,280	100	94.4	3.4	2.0	.2
21	11,722,242	100	85.4	8.5	5.6	.5
22	10,196,224	100	78.2	11.9	9.7	.2
23	15,771,628	100	93.2	4.2	2.5	.1
24	31,589,181	100	96.9	1.8	1.1	.2
25	37,224,070	100	98.9	.7	.4	------
26	20,859,504	100	97.4	1.5	.9	.2
27	38,059,748	100	98.9	.7	.3	.1
28	26,997,120	100	94.0	3.6	2.3	.1
29	22,916,261	100	70.7	15.9	14.1	.2
30	13,402,150	100	88.5	4.6	6.5	.4
31	18,676,865	100	71.5	13.0	15.3	.2
32	21,319,311	100	89.8	5.7	4.2	.3
33	10,338,984	100	79.4	10.9	9.5	.2
34	25,504,115	100	97.5	1.5	.8	.2
35	9,987,403	100	98.8	.5	.3	.4
36	77,883,681	100	98.5	.9	.4	.2
37	9,393,228	100	98.3	1.1	.4	.2
38	75,287,151	100	98.4	.8	.4	.4
39	68,578,076	100	97.3	.9	.5	1.3
40A	8,304,075	100	96.0	1.8	.5	2.2
40B	5,506,816	100	96.9	1.5	.1	1.8
40C	13,109,357	100	77.5	.9	.7	20.9
40D	5,332,640	100	97.7	1.3	0.9	.1
40E	12,071,060	100	97.1	1.5	1.3	.1
41	13,430,093	100	92.4	1.3	1.6	44.7
42	85,243,546	100	75.6	1.3	.8	22.3
43	77,472,394	100	90.8	1.1	.9	7.2
44	5,206,409	100	85.5	.8	.7	13.0
45	8,171,742	100	96.4	1.4	1.2	1.0
46	7,452,441	100	97.0	1.4	1.3	.3
47	9,199,709	100	79.0	10.6	9.8	.6
48	5,206,625	100	87.5	2.6	1.9	8.0
49	15,591,929	100	97.4	1.4	1.0	.2
50	856,504	100	95.0	2.2	2.7	.1
51	5,678,641	100	83.3	7.3	8.6	.8
52	2,902,950	100	78.8	9.0	11.9	.3
53	12,620,554	100	92.9	2.4	2.7	2.0
54	3,264,454	100	65.7	14.8	17.9	1.6
55	17,012,968	100	92.2	3.4	4.1	.3
56	1,918,428	100	94.6	.9	2.6	1.9
57	8,284,819	100	90.4	4.8	4.4	.4
58	1,136,439	100	87.8	4.7	7.5	
59	11,993,095	100	92.4	4.1	2.8	.7
60	17,676,730	100	96.3	1.5	1.6	.6
61	5,611,105	100	89.8	2.9	4.5	2.8
62	7,037,918	100	95.4	2.3	1.8	.5
63	1,021,901	100	82.3	10.5	8.2	
64	1,961,022	100	90.4	5.5	4.1	
United States	1,179,799,020	100	88.1	4.2	4.4	3.3

[1] Based on data in U. S. Census of Agriculture: 1950 (*14*).

TABLE 21.—*Average size of farms in each broad economic class, by productivity regions, 1949* [1]

Productivity region	All farms	Commercial farms	Part-time farms	Residential farms	Abnormal farms
	Acres	*Acres*	*Acres*	*Acres*	*Acres*
1	136	191	105	78	542
2	77	96	54	49	299
3	139	170	75	59	515
4	100	136	70	49	448
5	101	134	52	35	604
6	72	123	70	47	412
7	85	130	63	37	437
8	89	104	77	53	692
9	68	99	55	60	608
10	97	126	80	60	817
11	134	155	77	64	2,137
12	139	155	85	80	1,463
13	90	111	74	52	978
14	88	111	69	46	378
15	95	116	57	30	416
16	112	143	68	47	941
17	97	110	43	31	522
18	107	144	77	51	258
19	85	115	53	35	440
20	120	144	38	22	438
21	102	126	57	37	557
22	145	176	107	72	512
23	153	163	90	65	881
24	133	144	44	26	310
25	176	159	32	16	372
26	180	201	46	24	492
27	320	334	70	33	831
28	178	205	74	44	649
29	133	184	103	64	450
30	73	86	39	45	2,217
31	128	199	91	55	1,142
32	198	246	96	52	698
33	186	265	117	66	576
34	470	530	110	56	1,159
35	715	760	122	49	14,009
36	635	697	115	51	1,228
37	349	366	110	62	841
38	816	876	267	143	2,247
39	2,347	2,534	438	247	14,500
40A	283	318	47	24	4,591
40B	338	459	31	19	10,518
40C	1,535	1,491	152	120	82,984
40D	495	551	99	85	1,910
40E	1,117	1,410	158	105	991
41	1,556	2,334	122	53	146,690
42	1,504	1,585	152	82	92,808
43	2,453	2,861	277	179	57,007
44	869	1,116	49	33	28,508
45	344	392	68	63	3,907
46	241	300	34	26	1,459
47	101	164	55	31	633
48	396	434	76	53	18,018
49	702	1,015	88	53	604
50	185	199	89	70	499
51	85	113	52	34	297
52	194	250	78	38	1,138
53	406	669	60	39	5,530
54	87	151	64	37	1,800
55	273	396	81	45	2,518
56	196	229	175	55	5,114
57	128	150	61	45	635
58	160	187	72	53	.....
59	272	350	83	44	1,277
60	2,031	2,718	361	164	4,642
61	133	176	39	32	1,057
62	267	370	46	27	719
63	333	438	184	142	.....
64	314	423	111	73	337
United States	216	276	76	50	9,179

[1] Based on data in U. S. Census of Agriculture: 1950 (14).

TABLE 22.—*Summary of production, inputs, and product added, for commercial farms, United States, 1949*

Item	United States total [1]	Average per farm	Percentage distribution
Value of farm production:			
Sold:	*Dollars*	*Dollars*	*Percent*
Crops	9,603,007,577	2,591	41.2
Livestock and livestock products	11,991,661,746	3,235	51.4
Forest products	118,546,979	32	.5
Used in farm households	1,621,645,054	438	6.9
Total	23,334,861,656	6,296	100.0
Value of farm inputs:			
Purchases:			
Livestock and poultry	2,304,471,950	622	9.6
Feed for livestock and poultry	2,816,605,302	760	11.8
Seeds, bulbs, plants, and trees	509,326,861	137	2.1
Fertilizer and lime	690,792,676	186	2.9
Gasoline and other petroleum fuel and oil	1,090,787,448	294	4.6
Repairs:			
Tractor	376,415,854	101	1.6
Other farm machinery	374,767,397	101	1.6
Machine hire	579,047,088	156	2.4
Depreciation:			
Machinery and equipment	1,785,307,782	482	7.5
Buildings	457,853,203	124	1.9
Interest on investment:			
Land	2,392,897,138	646	10.0
Buildings	915,766,408	247	3.8
Machinery and equipment	833,130,431	225	3.5
Livestock	773,079,460	209	3.2
Total input excluding labor	15,900,177,998	4,290	66.5
Estimated value of farm labor:			
Hired	2,336,442,370	630	9.8
Unpaid family	1,771,927,401	478	7.4
Operator	3,892,991,334	1,050	16.3
Total labor	8,001,361,105	2,158	33.5
Total input	23,901,539,103	6,448	100.0
Value of product added:			
Residual to—			
Family and operator labor	5,098,241,288	1,376	
Operator labor	3,326,313,887	898	
All labor	7,434,653,058	2,006	
Deficit in farm family labor earnings	566,677,447	152	

[1] For 3,706,412 commercial farms.

TABLE 23.—*Number of commercial farms in each economic class, by productivity regions, 1949* [1]

Productivity region	Commercial farms						
	Total	Class I	Class II	Class III	Class IV	Class V	Class VI
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
1	14,103	446	1,558	2,921	3,037	3,573	2,033
2	24,109	1,977	5,195	5,517	5,086	4,116	2,218
3	111,380	2,763	10,716	34,096	30,057	18,829	9,009
4	39,649	391	2,778	8,702	10,930	9,898	6,860
5	65,498	2,735	11,601	15,689	14,518	12,767	8,185
6	52,551	186	976	2,259	5,612	15,195	28,293
7	53,702	409	1,541	3,119	7,172	15,963	25,498
8	62,370	255	1,918	3,758	16,213	26,010	15,116
9	143,860	286	1,829	14,731	56,234	49,478	21,302
10	109,984	683	3,061	5,869	13,680	36,592	50,096
11	70,560	574	1,734	4,292	15,078	26,541	22,341
12	84,398	380	1,593	4,748	13,836	20,323	13,578
13	249,040	1,695	3,871	8,583	27,471	77,570	131,059
14	40,547	43	406	1,434	4,845	13,757	20,062
15	54,873	347	1,768	4,746	11,704	19,503	16,805
16	61,423	264	2,178	7,502	15,264	20,057	16,158
17	45,644	536	2,722	7,470	14,000	13,485	7,431
18	42,972	271	2,116	6,235	11,628	13,230	9,402
19	34,689	442	2,461	7,765	11,225	8,553	4,140
20	183,572	3,306	23,614	51,266	51,425	35,060	18,001
21	79,225	779	5,111	17,448	24,861	21,170	9,866
22	45,[illegible]18	240	846	4,085	13,441	17,291	9,404
23	89,[illegible]09	306	3,078	20,739	35,936	21,994	7,856
24	197,798	3,871	31,711	76,697	54,603	22,371	8,545
25	195,120	9,826	56,062	76,426	34,293	15,280	7,290
26	101,310	3,756	15,810	32,059	27,026	15,468	7,140
27	112,550	1,782	14,524	39,244	34,510	15,770	6,320
28	123,447	1,823	11,113	27,929	35,904	28,890	17,788
29	88,120	542	2,410	6,274	15,858	29,637	33,399
30	148,917	2,273	4,218	8,689	25,715	61,007	46,355
31	66,088	556	1,843	4,356	10,916	22,016	27,301
32	77,818	1,259	5,825	14,332	22,921	21,096	12,472
33	31,031	263	1,019	2,935	7,125	10,336	9,350
34	46,036	2,033	8,370	12,985	11,803	8,188	3,457
35	12,054	2,300	5,108	3,261	1,305	712	268
36	107,243	7,344	21,210	30,241	27,030	15,733	5,653
37	25,233	847	3,731	6,966	7,707	4,190	1,722
38	84,627	1,739	12,197	26,829	26,138	13,138	4,586
39	26,457	1,929	5,321	6,960	6,700	3,576	1,662
40A	25,051	1,312	4,357	7,583	6,704	3,818	1,185
40B	11,510	657	1,492	2,866	3,216	2,398	882
40C	7,003	405	1,333	1,031	1,703	1,099	442
40D	9,452	1,159	2,391	2,657	1,855	953	434
40E	8,312	937	1,852	1,943	1,666	1,137	777
41	3,020	112	200	356	436	731	1,185
42	40,654	3,141	6,827	8,789	9,650	8,454	3,803
43	24,589	2,718	4,418	4,857	5,293	4,755	2,518
44	4,031	1,074	742	691	554	609	431
45	20,053	3,135	4,316	4,682	4,280	2,943	727
46	24,113	3,293	4,559	5,650	5,221	3,969	1,362
47	44,381	1,610	5,693	8,861	10,462	12,054	5,701
48	10,618	924	1,934	2,443	2,483	2,002	832
49	14,966	2,304	4,079	3,037	2,310	2,105	1,041
50	4,080	557	1,318	1,080	665	280	215
51	41,972	3,835	9,189	8,022	7,832	7,409	5,685
52	9,160	125	203	545	1,720	2,992	3,581
53	17,513	2,001	2,109	2,848	3,458	4,177	2,708
54	14,158	230	670	1,312	2,453	3,951	5,512
55	39,645	2,370	4,532	6,439	9,042	10,120	7,142
56	7,943	1,031	1,640	1,714	1,545	1,403	540
57	50,015	669	3,592	11,190	11,252	12,410	7,002
58	5,340	231	586	654	849	1,484	1,536
59	29,858	774	2,441	5,471	8,057	8,173	4,942
60	6,261	461	1,040	1,518	1,355	1,130	751
61	28,858	4,206	5,140	6,146	5,887	5,323	2,166
62	18,163	2,840	3,335	3,608	3,561	3,417	1,349
63	1,800	5	95	310	526	600	355
64	4,186	72	300	789	1,191	1,191	643
United States	3,709,412	103,231	381,151	721,211	852,392	901,316	717,201

[1] U. S. Census of Agriculture: 1950 (1).

TABLE 24.—*Percentage distribution of commercial farms among economic classes, by productivity regions, 1949*

Productivity region	Commercial farms						
	Total [1]	Class I	Class II	Class III	Class IV	Class V	Class VI
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1	100	3	11	21	26	25	14
2	100	8	22	23	21	17	9
3	100	2	15	30	27	17	8
4	100	1	7	22	26	25	17
5	100	4	18	24	22	20	12
6	100	(2)	2	4	11	29	54
7	100	1	3	6	13	30	48
8	100	(2)	2	6	26	42	24
9	100	(2)	1	10	39	34	15
10	100	1	3	5	12	33	46
11	100	1	2	6	21	38	32
12	100	1	3	9	25	37	25
13	100	(2)	2	3	11	31	52
14	100	(2)	1	4	12	34	50
15	100	1	3	9	21	36	31
16	100	(2)	3	12	24	31	30
17	100	1	6	16	31	30	16
18	100	1	5	14	27	31	22
19	100	1	7	22	32	26	12
20	100	2	13	28	28	20	10
21	100	1	6	32	31	27	12
22	100	(2)	2	9	30	38	21
23	100	(2)	3	23	40	24	9
24	100	2	16	39	28	11	4
25	100	5	30	36	18	8	4
26	100	4	16	32	27	15	7
27	100	2	13	35	31	14	6
28	100	2	9	23	29	23	14
29	100	1	3	7	18	34	38
30	100	2	3	6	17	41	31
31	100	1	3	8	16	33	41
32	100	2	8	18	30	27	16
33	100	1	3	10	23	33	30
34	100	4	18	28	25	18	7
35	100	18	39	25	10	6	2
36	100	7	20	28	25	15	5
37	100	3	15	28	31	17	7
38	100	2	14	32	31	16	5
39	100	7	20	26	25	15	6
40A	100	5	17	30	27	15	5
40B	100	6	13	25	28	21	6
40C	100	6	19	28	26	16	6
40D	100	12	25	28	20	10	5
40E	100	11	22	23	20	13	9
41	100	4	7	12	14	24	39
42	100	5	17	22	24	21	9
43	100	11	18	20	22	19	10
44	100	27	18	15	14	15	11
45	100	16	22	23	21	15	4
46	100	14	19	24	22	16	6
47	100	4	13	20	24	27	13
48	100	9	18	23	23	19	8
49	100	16	27	20	15	14	7
50	100	14	32	28	16	6	5
51	100	9	22	19	19	18	14
52	100	1	2	6	19	33	39
53	100	12	13	16	20	24	16
54	100	2	5	10	17	28	39
55	100	6	11	16	23	26	18
56	100	13	21	22	20	19	7
57	100	1	8	22	28	25	15
58	100	4	11	12	16	28	29
59	100	3	8	15	27	27	16
60	100	7	17	24	22	18	12
61	100	15	18	21	20	18	8
62	100	16	18	20	20	19	7
63	100	(2)	5	10	28	32	19
64	100	2	7	19	28	28	15
United States	100	3	10	20	24	24	19

[1] The sum of the percentage figures for individual classes in this table is not always exactly 100 percent because of rounding to the nearest whole percentage point.

[2] Less than 0.5 percent.

TABLE 25.—*Percentage distribution of land in commercial farms among economic classes, by productivity regions, 1949* [1]

Productivity region	Commercial farms						
	Total [2]	Class I	Class II	Class III	Class IV	Class V	Class VI
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1	100	7	16	24	24	19	10
2	100	16	27	23	16	12	7
3	100	6	23	34	22	11	4
4	100	2	12	26	27	20	12
5	100	12	24	25	19	13	7
6	100	3	5	8	16	30	38
7	100	5	10	13	19	26	27
8	100	3	6	12	20	33	18
9	100	2	7	17	36	26	11
10	100	6	10	12	18	27	27
11	100	12	13	14	22	25	14
12	100	8	14	17	24	24	13
13	100	6	9	10	16	26	31
14	100	1	4	9	18	34	34
15	100	4	10	16	25	28	17
16	100	2	8	19	27	25	18
17	100	7	14	23	28	20	8
18	100	2	10	20	28	25	14
19	100	3	13	28	31	18	7
20	100	6	24	33	23	10	4
21	100	3	12	29	30	19	7
22	100	2	4	14	33	33	14
23	100	1	7	29	35	19	6
24	100	4	22	40	23	8	2
25	100	10	40	34	12	4	1
26	100	8	23	35	22	9	3
27	100	6	22	36	25	9	2
28	100	5	17	29	27	16	7
29	100	4	6	11	22	30	26
30	100	23	16	13	16	20	12
31	100	9	14	15	20	24	19
32	100	10	17	23	24	17	8
33	100	8	10	16	23	25	17
34	100	34	24	20	14	7	2
35	100	47	31	14	5	2	1
36	100	30	27	22	14	6	1
37	100	10	24	30	24	10	3
38	100	12	26	32	21	8	2
39	100	36	28	18	11	5	2
40A	100	36	26	21	12	4	1
40B	100	58	17	12	7	4	1
40C	100	46	26	14	9	3	1
40D	100	27	32	21	14	4	2
40E	100	45	26	14	8	4	2
41	100	51	18	14	7	6	4
42	100	54	21	12	8	4	1
43	100	53	24	13	6	4	1
44	100	68	18	4	2	7	1
45	100	70	15	8	4	3	1
46	100	60	19	11	5	3	1
47	100	16	24	21	20	15	5
48	100	48	19	16	9	5	2
49	100	50	29	12	6	3	1
50	100	29	33	21	11	4	2
51	100	18	27	19	16	12	8
52	100	20	11	14	21	20	14
53	100	53	22	10	8	6	2
54	100	12	17	17	19	19	16
55	100	41	20	14	12	9	4
56	100	58	22	11	5	3	1
57	100	5	15	27	27	17	9
58	100	26	27	15	13	11	10
59	100	21	17	22	21	15	6
60	100	52	20	13	8	5	2
61	100	50	15	10	8	7	2
62	100	53	22	12	7	5	2
63	100	4	7	23	31	25	10
64	100	14	20	22	21	17	6
United States	100	26	21	21	16	11	6

[1] Acreage of land in all commercial farms is shown, by productivity regions, in table 19.

[2] The sum of the percentage figures for individual classes in this table is not always exactly 100 percent because of rounding to the nearest whole percentage point.

TABLE 26.—*Average size of commercial farms in each economic class, by productivity regions, 1949*

Productivity region	Commercial farms						
	All classes	Class I	Class II	Class III	Class IV	Class V	Class VI
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
1	191	441	269	219	180	144	140
2	96	182	120	96	72	64	69
3	170	424	200	187	140	109	92
4	136	317	228	161	134	111	97
5	134	373	188	141	113	88	78
6	123	1,027	351	238	182	127	86
7	130	906	451	292	184	115	73
8	104	715	355	201	116	83	76
9	69	810	379	116	65	52	52
10	126	1,120	471	286	177	104	75
11	155	2,232	798	365	159	104	70
12	155	1,826	744	298	146	101	82
13	110	1,045	669	331	164	93	66
14	111	506	456	289	160	110	77
15	116	640	360	216	138	92	63
16	143	577	351	237	165	117	87
17	110	617	266	153	100	74	56
18	144	460	291	203	129	117	94
19	115	244	204	146	111	86	64
20	144	490	265	173	118	76	53
21	126	358	242	166	122	90	67
22	176	600	402	263	197	153	119
23	163	552	326	207	157	125	104
24	144	336	202	149	120	96	75
25	189	301	252	175	127	85	52
26	200	440	300	221	165	117	77
27	334	1,345	553	350	266	205	144
28	205	709	351	258	188	138	100
29	184	1,249	399	288	225	167	127
30	50	1,211	455	178	78	38	31
31	190	2,138	985	460	245	143	92
32	240	1,568	571	311	204	156	115
33	364	2,632	776	453	269	202	147
34	530	4,131	710	377	286	212	145
35	760	2,021	602	424	400	248	203
36	697	3,096	939	555	373	261	186
37	366	1,126	595	351	283	209	140
38	876	606	1,557	872	591	453	338
39	2,534	12,623	3,536	1,763	1,102	700	683
40A	318	2,166	485	217	138	92	65
40B	459	4,679	598	228	121	87	75
40C	1,451	11,617	1,977	766	486	305	313
40D	551	1,228	691	415	385	233	211
40E	1,410	5,975	1,670	650	576	399	313
41	2,334	31,920	6,284	2,609	1,193	570	268
42	1,585	11,034	1,960	917	510	304	228
43	2,861	13,679	3,871	1,628	854	555	379
44	1,116	2,858	1,096	282	178	535	50
45	392	1,757	268	130	82	68	72
46	300	1,323	297	142	70	60	66
47	164	699	300	171	137	92	67
48	434	2,405	445	308	174	120	127
49	1,015	3,[illegible]53	1,088	575	360	243	139
50	109	908	202	158	132	131	110
51	113	223	140	113	90	78	62
52	250	359	1,285	599	284	151	86
53	669	2,988	1,153	392	254	170	85
54	151	1,165	553	273	162	103	61
55	396	2,706	703	336	214	133	90
56	229	1,047	240	115	61	32	46
57	150	574	282	184	140	105	88
58	187	1,115	406	228	138	72	62
59	359	2,863	728	424	275	192	127
60	2,718	19,081	3,352	1,424	997	704	492
61	176	709	150	78	71	63	40
62	370	1,262	443	222	123	90	75
63	436	5,831	638	619	486	346	234
64	423	3,414	1,156	502	309	253	176
United States	276	2,422	567	298	191	123	85

TABLE 27.—*Value of inputs per commercial farm by productivity regions, 1949*

Productivity region	Purchases					Repairs		Machine hire
	Livestock	Feed	Seed and plants	Fertilizer and lime	Gasoline and other petroleum fuel	Tractor	Other machinery	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	360	2,088	97	219	198	42	53	60
2	765	3,684	203	339	315	87	86	89
3	457	1,863	155	229	279	91	111	112
4	343	1,235	133	238	252	76	87	107
5	958	1,870	193	305	305	109	129	155
6	233	372	51	124	52	11	16	23
7	331	387	69	118	83	22	32	48
8	111	246	51	264	88	21	20	46
9	63	118	45	383	130	24	25	53
10	151	414	45	314	109	38	25	62
11	125	149	91	384	158	51	31	76
12	119	128	146	421	163	58	36	150
13	154	170	42	190	79	29	19	52
14	205	133	61	85	62	18	22	41
15	382	294	80	117	128	47	40	83
16	317	427	89	138	175	58	52	95
17	504	364	83	183	118	35	40	77
18	348	640	103	180	180	56	55	98
19	375	946	161	275	206	88	96	134
20	560	795	161	296	349	120	117	152
21	309	498	134	170	274	95	111	140
22	180	447	78	75	195	53	69	83
23	240	650	109	71	251	66	109	112
24	775	957	193	138	377	117	149	180
25	1,496	1,198	229	199	487	164	178	214
26	1,798	1,071	108	83	379	135	149	194
27	845	687	170	38	475	130	181	183
28	781	702	116	110	257	90	86	150
29	427	682	52	52	93	27	30	63
30	85	90	80	148	169	80	33	145
31	268	362	49	44	99	35	19	64
32	484	608	99	48	234	101	49	193
33	476	470	104	55	181	66	41	104
34	805	469	148	80	384	157	105	432
35	412	371	231	151	741	306	173	940
36	1,438	690	188	46	621	220	250	418
37	306	319	280	47	652	176	207	172
38	412	283	163	13	716	191	260	168
39	1,603	1,612	122	9	578	160	212	230
40A	1,028	742	253	74	451	145	194	272
40B	1,217	1,076	168	36	315	87	107	209
40C	1,578	914	166	21	606	199	210	192
40D	4,311	1,884	284	66	710	223	282	404
40E	1,814	954	268	64	720	239	240	456
41	725	505	77	34	228	60	42	77
42	1,292	1,108	169	80	481	142	155	206
43	2,005	1,003	148	63	542	175	116	323
44	2,005	1,419	594	357	1,257	572	429	1,757
45	1,344	1,845	418	653	795	441	319	700
46	1,379	1,754	235	470	584	324	225	479
47	421	1,478	133	74	256	87	76	120
48	646	814	186	161	423	144	176	203
49	545	652	392	200	727	382	432	249
50	204	242	1,075	1,911	632	231	346	139
51	835	3,382	396	529	369	132	123	115
52	158	288	124	308	158	50	29	39
53	847	1,365	380	1,304	451	166	130	256
54	275	693	189	194	173	53	30	54
55	471	651	218	134	409	222	119	242
56	214	257	514	116	815	411	149	431
57	355	468	120	171	261	103	80	159
58	98	225	207	180	439	195	121	158
59	1,379	752	96	72	278	105	100	162
60	2,220	889	116	45	505	162	140	285
61	2,071	3,436	315	474	504	196	169	393
62	1,215	3,238	253	438	400	227	185	240
63	373	471	89	30	272	74	79	109
64	474	494	73	9	218	84	96	102
United States	622	760	137	186	294	101	101	156

TABLE 27.—*Value of inputs per commercial farm by productivity regions, 1949*—Continued

Productivity region	Depreciation		Interest on investment				Labor			Total input
	Machinery	Buildings	Land	Buildings	Machinery	Livestock	Hired labor	Unpaid family	Operator	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	385	118	191	235	180	145	803	383	954	6,511
2	489	236	401	471	238	184	1,990	454	1,084	11,105
3	766	177	261	354	353	277	898	558	1,117	8,063
4	651	134	224	269	304	174	502	718	976	6,423
5	729	237	467	474	340	236	1,073	531	970	9,153
6	249	66	223	131	116	91	174	350	734	3,016
7	330	93	311	187	154	142	255	342	695	3,599
8	207	68	214	136	96	60	186	413	882	3,118
9	202	61	230	122	94	36	260	486	824	3,136
10	262	55	213	109	122	55	230	357	644	3,236
11	306	51	216	103	141	63	400	382	668	3,395
12	336	52	198	103	157	66	328	310	663	3,434
13	265	41	197	83	124	70	177	276	648	2,616
14	243	49	197	98	113	90	96	324	711	2,548
15	298	75	304	150	140	128	219	265	689	3,439
16	310	66	305	132	145	120	190	421	955	4,031
17	333	127	498	253	155	158	426	250	764	4,368
18	339	120	323	240	156	166	303	488	887	4,793
19	522	161	400	322	244	168	575	534	945	6,212
20	518	204	688	408	241	183	344	428	1,017	6,590
21	621	176	350	351	290	156	476	471	1,041	5,663
22	382	89	200	178	178	155	235	748	1,184	4,529
23	495	113	262	227	231	245	255	813	1,306	5,555
24	672	229	744	457	314	355	476	690	1,345	8,108
25	693	252	1,407	504	324	303	420	538	1,432	10,047
26	522	137	1,003	275	243	252	356	607	1,364	8,786
27	502	116	854	236	203	274	277	749	1,500	7,554
28	364	94	559	188	170	257	228	523	1,145	5,820
29	276	42	260	84	129	139	172	444	899	3,871
30	313	45	270	91	146	43	596	175	727	3,236
31	330	36	310	73	154	131	326	366	890	3,556
32	316	67	659	135	147	179	771	309	903	5,452
33	304	38	443	76	142	174	323	538	1,156	4,090
34	414	104	1,069	207	193	260	1,388	336	1,046	7,607
35	578	175	1,713	351	270	173	3,784	243	1,056	11,668
36	652	155	1,552	311	318	324	650	540	1,219	9,731
37	784	129	698	259	366	149	727	595	1,496	7,362
38	778	91	821	182	363	303	491	694	1,542	7,493
39	570	145	1,291	291	266	972	785	694	1,436	10,376
40A	910	120	986	240	425	304	1,046	600	1,534	9,324
40B	620	109	954	217	289	328	988	622	1,205	9,177
40C	837	121	1,161	243	391	701	1,170	660	1,448	10,618
40D	889	145	1,150	289	415	436	1,235	551	1,357	14,631
40E	766	166	1,320	332	357	567	1,483	500	1,319	11,555
41	954	82	1,016	164	305	545	677	606	1,090	6,947
42	842	151	1,264	302	393	813	1,354	600	1,393	10,765
43	495	246	2,526	493	231	908	2,141	340	986	12,391
44	908	218	2,723	436	423	443	8,960	409	1,166	24,276
45	890	200	2,102	400	415	254	6,054	481	1,384	18,725
46	872	186	1,950	372	407	324	3,230	517	1,389	14,727
47	544	117	831	234	254	154	1,023	664	1,382	7,848
48	786	150	902	301	367	194	2,858	585	1,608	10,564
49	1,574	346	2,329	692	735	254	1,631	559	1,627	13,226
50	1,029	223	387	446	479	65	3,280	310	1,082	12,081
51	672	238	477	475	314	153	1,725	459	1,036	11,451
52	360	78	308	156	172	91	578	413	608	3,927
53	525	186	1,514	371	245	309	3,163	206	681	12,149
54	434	62	314	125	202	141	470	363	664	4,386
55	536	121	1,019	243	250	324	1,360	403	903	7,625
56	585	193	1,889	387	273	75	3,703	259	927	11,198
57	410	89	503	178	191	116	452	445	1,007	5,174
58	693	98	449	130	281	92	811	216	835	5,084
59	365	70	795	139	170	310	279	653	1,232	6,957
60	468	129	1,601	259	218	763	747	614	1,132	12,310
61	526	222	2,334	445	245	229	3,287	436	1,222	16,505
62	780	206	2,166	412	364	334	3,644	537	1,372	16,113
63	582	92	593	185	271	243	254	955	1,556	6,223
64	567	82	770	163	265	277	480	634	1,360	6,248
United States	482	124	646	247	225	209	630	478	1,050	6,448

TABLE 28.—*Estimated cost of water to commercial farms from multiple-farm-irrigation enterprises for selected productivity regions, 1950*

Productivity region	Estimated costs to commercial farms			Productivity region	Estimated costs to commercial farms		
	Total	Average per farm	Proportion of total inputs		Total	Average per farm	Proportion of total inputs
	1,000 dollars	*Dollars*	*Percent*		*1,000 dollars*	*Dollars*	*Percent*
44	5,609	1,390	5.7	40A	4,814	192	2.1
45	3,466	173	.9	40B	1,145	99	1.1
46	5,894	236	1.6	40C	1,313	187	1.8
61	9,918	343	2.1	40D	1,320	140	1.0
48	2,657	250	2.4	66	3,659	461	4.1

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