L. Grose

Supplement to the Survey of Current Business

INCOME DISTRIBUTION

IN THE UNITED STATES

UNITED STATES DEPARTMENT OF COMMERCE

OFFICE OF BUSINESS ECONOMICS


U.S. DEPARTMENT OF COMMERCE
NATIONAL INCOME
BALANCE OF PAYMENTS
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OFFICE OF BUSINESS ECONOMICS

U. S. DEPARTMENT OF COMMERCE
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OFFICE OF BUSINESS ECONOMICS
M. JOSEPH MEEHAN, *Director*

INCOME DISTRIBUTION

IN THE UNITED STATES

By Size, 1944–1950

Prepared in the Office of Business Economics

National Income Division . George Jaszi, Chief

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Foreword

THE present volume initiates a new series on the size distribution of personal income, a further development of the general body of national income statistics regularly published by the Office of Business Economics.

To the business community, the estimates provide a valuable tool of market analysis. They show the distribution of the Nation's purchasing power according to the size of family income, and thus focus on a factor which is a major determinant of consumer demand. More generally, the new data contribute materially to an understanding of the structure of income flows and to the evaluation of the Nation's economic processes and progress.

The report contains estimates of income size distribution for 1944, 1946, 1947, and 1950. These will be carried forward as the basic underlying data become available for later years. The estimates show how the families of the Nation are distributed along the income scale and how that distribution has changed over time. Separate information for families of two or more persons and unattached individuals, and for farm operator and nonfarm families is given.

Additional data are provided on the structure of incomes and of the families receiving them, including statistics on Federal income taxes paid, the composition of families, and the size distribution of wage and entrepreneurial earnings.

The estimates for 1944, 1946, and 1947 utilize a relatively large volume of primary data available for those years. In essence, they represent a combination of two main basic sources of information on size distribution—compilations from consolidated statistics of individual income tax returns and sample field surveys of family income. Both are essential to the preparation of the present estimates. These two sources have been adjusted so as to account for income totals consistent with the personal income series of the Office of Business Economics. Detailed statistical methods designed to make the most intensive use possible of the basic data were employed for these years. For the year 1950, for which all data are not yet available, a preliminary estimate was prepared by more summary methods.

The new information, being integrated with the national income and product accounts of the Office of Business Economics, can be used directly to broaden the view of the economy now afforded by these accounts. Other available statistics on family income distribution, while less inclusive than the data presented in this report, are valuable in their own right, particularly because of the additional detail which they provide on the income patterns of various component population groups.

M. Joseph Meehan

Director, Office of Business Economics.

Acknowledgments

THIS report was prepared in the National Income Division of the Office of Business Economics. The estimates were developed by Selma F. Goldsmith, Chief of the Income Size Distribution Section, with the assistance of Hyman B. Kaitz and Maurice Liebenberg. In addition to participating in the formulation of the general methodology, Mr. Kaitz devised many of the special procedures for integrating the several sets of basic data on before-tax incomes, and Mr. Liebenberg developed techniques for measuring family income tax liabilities. The report was written by George Jaszi and Selma F. Goldsmith.

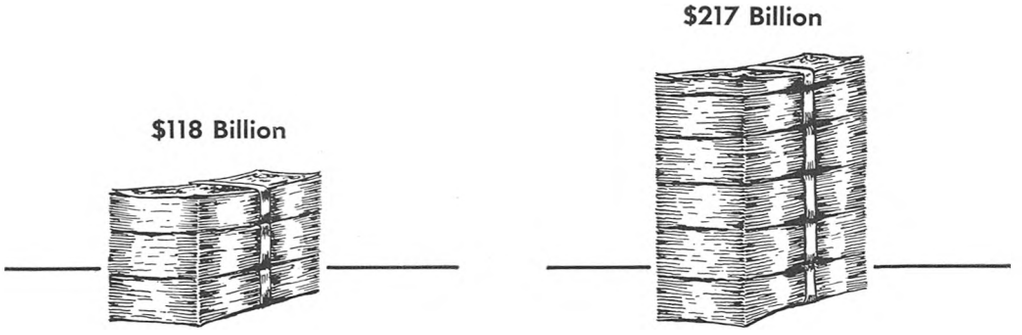
Acknowledgment is due also to agencies that furnished the primary data, mainly the Bureau of Internal Revenue, the Bureau of the Census, the Board of Governors of the Federal Reserve System, and the Bureau of Agricultural Economics. Staff members of these agencies assisted the National Income Division in the interpretation of the source data and by furnishing many unpublished breakdowns.

We also wish to thank the technicians in this field, both in and out of the Government, who reviewed all or parts of the draft manuscript and gave us the benefit of their suggestions.

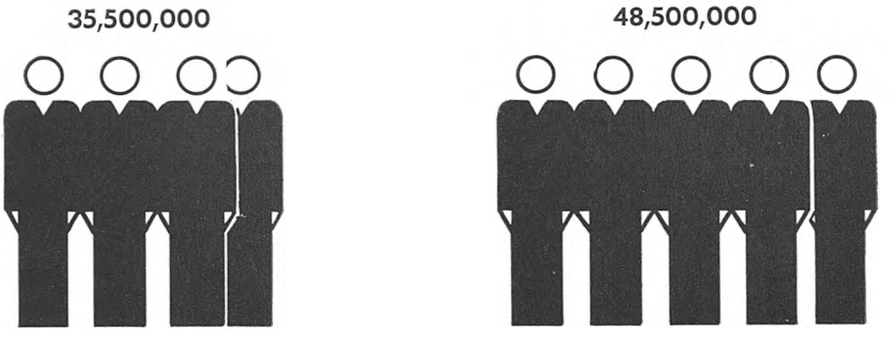
The Interagency Technical Committee on Income Distribution—chaired by the Budget Bureau, and made up of representatives from the Office of Business Economics, the Bureau of Agricultural Economics, Bureau of Labor Statistics, Bureau of the Census, and the Board of Governors of the Federal Reserve System—contributed at an early stage to the planning of the present estimates and was instrumental in procuring many of the statistical tabulations that were required.

FAMILY PERSONAL INCOME

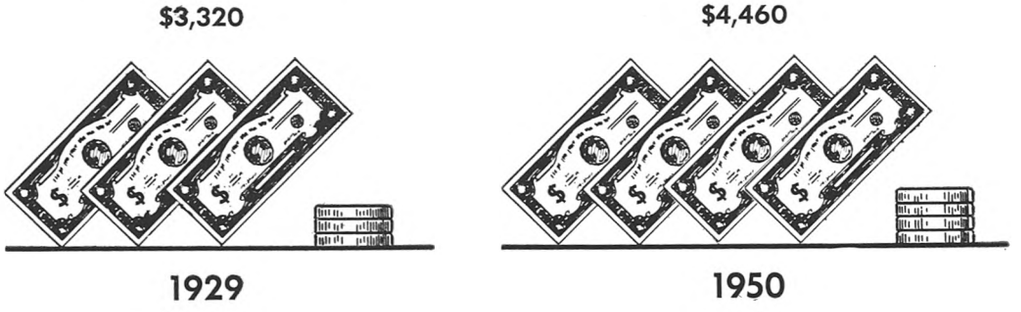
TOTAL REAL INCOME* increased at an average annual rate of about 3 percent from 1929 to 1950



CONSUMER UNITS rose at a rate of 1½ percent . . .



with AVERAGE REAL INCOME* per consumer unit advancing at a rate of 1½ percent



* IN 1950 DOLLARS

Chapter 1

Introduction

New Data for Market Analysis

THE income size distributions published in this report have been planned as an integral part of the general body of national income statistics regularly published by the Office of Business Economics. The new series provides a size breakdown of personal income received by civilian families and individuals, showing the number of such consumer units in successive income size groups and aggregate income at each income level. These data can be used directly to amplify the picture of the economy which is afforded by the national income and product accounts.

Information on personal income is of direct importance to businessmen because this total is a close indicator of consumer purchasing power. The breakdown of income on a State basis, for instance, which is published annually, is used widely by the business community in the determination of regional sales objectives and in the measurement of sales performance.

The size distribution of income represents an added, and equally important, tool of market analyisis. By showing how the total income of consumers is distributed in layers representing various ranges of family income—for instance, how much income goes in the aggregate to families that receive more than $25,000 in a given year; how much to families receiving between $7,500 and $10,000; how much to families receiving between $4,000 and $5,000, etc.—these statistics throw light on an important feature of consumer markets on which information hitherto has been incomplete. As is well known, the character of consumer demand, with respect to both types and qualities of consumer goods and services demanded, is greatly influenced by the size of family income, and this factor needs to be taken into account in marketing. The cross-section view of the distribution of personal income by income size which is provided in this report, and the changes which are shown in this distribution over time, will be of considerable aid to the business community in arriving at effective marketing programs and policies.

Apart from many other specific uses, the new data will be an aid to general economic analysis aimed at a better overall understanding of our economy.

The new series can be introduced best by setting them against the background of the existing national income statistics of the Office of Business Economics.

As explained in the 1951 *National Income* supplement to the SURVEY of CURRENT BUSINESS, these statistics provide measures of national output and a statistical picture of the economic structure in the framework of which this output is produced, distributed, and used.

The national economic accounts are based on the daily economic transactions that occur in the course of producing and distributing the Nation's output. In classifying these transactions to derive a significant view of the economy, the latter is divided into four major sectors—businesses, consumers, government, and foreign—and is depicted in terms of the interrelated transactions among these sectors, as summarized by a set of economic accounts.

This set consists of a national income and product account which sums the productive transactions occurring in each sector in order to derive measures of output for the economy as a whole; four current accounts which show the flows that determine the income of each sector, how that income is used and what part of it is devoted to saving; and finally a consolidated saving and investment account which shows the disposition of the Nation's saving among the various forms of investment.

Behind these six accounts there is a vast amount of detailed information which sheds further light on the precise composition of the broader aggregates which are shown in the summary accounts. The usefulness of these accounts is enhanced by this supporting body of detailed data; conversely the use of the detailed data is made more effective if they are related to other parts of the economy within the framework of the national accounts.

One of the most significant accounts in this system is the personal income and expenditure account, by means of which the transactions of the consuming public are summarized.

This account shows personal income—the current income (before income taxes) received by persons from all sources—by type of income receipt, such as labor income, entrepreneurial income, interest and dividends, and transfer payments. It also shows the tax payments and consumption expenditures that are made out of this income, and the balance that is devoted to saving.

Supporting information permits more detailed analysis of the income flow by type of income, and by industrial and regional origin. Detailed breakdowns are available of taxes by type of taxes, consumption expenditures by type of product, and of saving by type of asset and claim in which the saving is invested.

The present report provides a new breakdown of the bulk of the income side of the personal account, namely, a breakdown by size of income. The income that is covered represents the personal income flowing to the civilian noninstitutional population of families and unattached individuals. Income received by military personnel on posts and by the civilian institutional population, as well as income retained on behalf of individuals by nonprofit institutions, and private trust, pension, and welfare funds, is excluded.

The families that are classified by income size group are defined as units of two or more persons related by blood, marriage, or adoption, and residing together. Unattached individuals are defined as persons not living with relatives.

HOW THE MEASURES WERE OBTAINED

Reliable data on income size distribution are difficult to obtain. Perhaps the most important reason for this condition is that the source material upon which estimates of income size distributions rest must be derived from reports by consumer households. Data of this type have been scanty and are less reliable than the business, government, and other institutional records from which the estimates of aggregate national income are largely derived. These records do not lend themselves to estimates of income size distributions.

The two major sources of data on income size distribution consist of sample field surveys of family income and Federal individual income tax returns. The development and improvement of sample survey data over the past decade has facilitated greatly the preparation of income size distribution estimates. These survey data are extremely useful for analyzing differences in income distribution among component population groups and variations in income-expenditure patterns. However, some basic problems of securing data in such surveys have not been solved. Thus, it appears from comparison with the national aggregates and other independent evidence that many of the sample surveys have failed to account for substantial amounts of family income, although this situation has been materially improved in the past few years.

The extension of the Federal individual income tax over the past decade has provided another set of data, in the form of summaries of the Federal individual income tax returns tabulated by the Bureau of Internal Revenue. During World War II the minimum income for filing tax returns was sharply lowered and the coverage of tax returns thereby extended. The incomes reported on the tax returns, like those disclosed by the surveys, fall short of the independently estimated national aggregates and, in addition, require many complex adjustments to convert them from a return to a family unit basis.

However, at least for the years 1944, 1946, and 1947, to which the basic estimates published in this report refer, the coverage of several of the major components of income was higher in the tax returns than in the surveys, and extensive use of the tax data in deriving the estimates was indicated for this reason. In some instances in which survey coverage of total income did not fall short of the coverage provided by tax data, use of the latter was nevertheless indicated, because the detail available from the tax data lent itself more readily to a careful adjustment to the national aggregates.

A basic contribution of the present report consists of the systematic combination of tax return and survey data to derive comprehensive income size distribution estimates for the years 1944, 1946, and 1947. Comparisons of the tax return and survey data with the present distributions are presented in the appendix.

Generally speaking, the income totals reported on tax returns were supplemented by income data from Census Bureau and Federal Reserve Board surveys for types of income not covered by these returns. And surveys were used also for information on family composition and other characteristics required for converting the tax statistics, in which the tax return is the reporting unit, to a basis in which the unit of classification is the family.

The various sources of income—wages and salaries, entrepreneurial income, dividends, etc.—disclosed in the tax returns as supplemented by survey data fell short of the independent estimates for the corresponding sources of income embodied in the Office of Business Economics aggregate personal income series. The difference was small, in relative terms, in the case of wages and salaries but fairly substantial for certain other types of income.

The income size distribution estimates published in this report have been fully adjusted to the national aggregates. This will greatly facilitate the use of income size distribution estimates in the framework of general market analysis. Information on the size distribution of certain segments of income is deficient and makes estimation difficult, but care was taken to obtain the best possible adjustment of the reported data by treating each major income source separately, and by utilizing intensively all available information bearing on the subject.

Systematic integration of survey and tax data, together with a refinement of statistical techniques, has resulted in a very useful market guide. Nevertheless, certain limitations attach to the present figures which reflect for the most part inadequacies in the basic source material. The detailed description of the methodology underlying the size distribution estimates given in the appendix of this report will aid users in evaluating their reliability.

Chapter 2

Highlights of Income Distribution 1944-50

IN THE year 1950 the families and unattached individuals that form the civilian noninstitutional population of the Nation received a total income (before income taxes) of $217 billion.

The bulk of this income was paid out by the business system, but substantial amounts stemmed from the government, and smaller sums represented receipts for services rendered within the household economy and incomes from abroad.

Almost two-thirds of the total consisted of wages and salaries and certain minor forms of labor income, as can be seen from the chart on page 16. About one-fifth represented the net profits of entrepreneurship, including the earnings of farm and nonfarm proprietors, independent professional people, and individual landlords. The remaining seventh consisted of dividends and interest and transfer payments, such as social security benefits and payments to veterans.

Monetary incomes accounted for 95 percent of the aggregate. The remainder—about $12 billion—consisted of incomes in kind.

As a background for the analysis of the size distribution of income, it is useful to review the growth of aggregate and average income over time. For this purpose 1929, a year of high economic activity, provides a convenient prewar benchmark. Comparisons between 1929 and the prosperous postwar year 1950 bring to light mainly long-term trends relatively undisturbed by cyclical factors.

The $217 billion income of 1950 contrasts with $84 billion for 1929. This increase in current dollar income was at an average annual rate of about 4½ percent. Although the higher general price level was a significant factor in the increase, the growth in real income was much more important. With 1929 income expressed in terms of prices paid by consumers in 1950, income rose from $118 billion to $217 billion. The average annual rate of increase in total real income was about 3 percent.

Over the same period average real income per consumer unit (family or unattached individual) increased at an average annual rate of about 1½ percent. In absolute terms (measured in 1950 dollars), the increase was from $3,320 in 1929 to $4,460 in 1950. As illustrated in the frontispiece, a rise in the number of consumer units, from 35½ to 48½ million, accounted for the remainder of the 3 percent annual increase in real income.

Before-Tax Distribution in 1950

The size distribution of income in 1950 will be examined in the next two sections, followed by a discussion of the separate distributions for major groups of consumer units in 1947. The 1950 data are preliminary, and are presented in more summary form than those for other years covered in this report, because complete tabulations of the tax return information, on which the basic estimates of the Office of Business Economics rest, are only now becoming available for that year.

Distribution by income levels

The manner in which the income total of $217 billion was distributed among the 48½ million consumer units of families and unattached individuals in 1950 can be seen from the chart on page 4. Incomes of consumer units (before income taxes) are indicated in $1,000 ranges at the center of the chart. The bars to the left show the percentages of the total number of consumer units having incomes in those ranges; and the bars to the right show the percentages of the total income that can be found in each income range.

The chart shows the typical characteristics of income size distributions. In these distributions a large proportion of consumer units have incomes lower than the national average, some considerably below it. The number of units having above average incomes diminishes rapidly as one ascends the income scale.

In 1950, for instance, two-thirds of consumer units had

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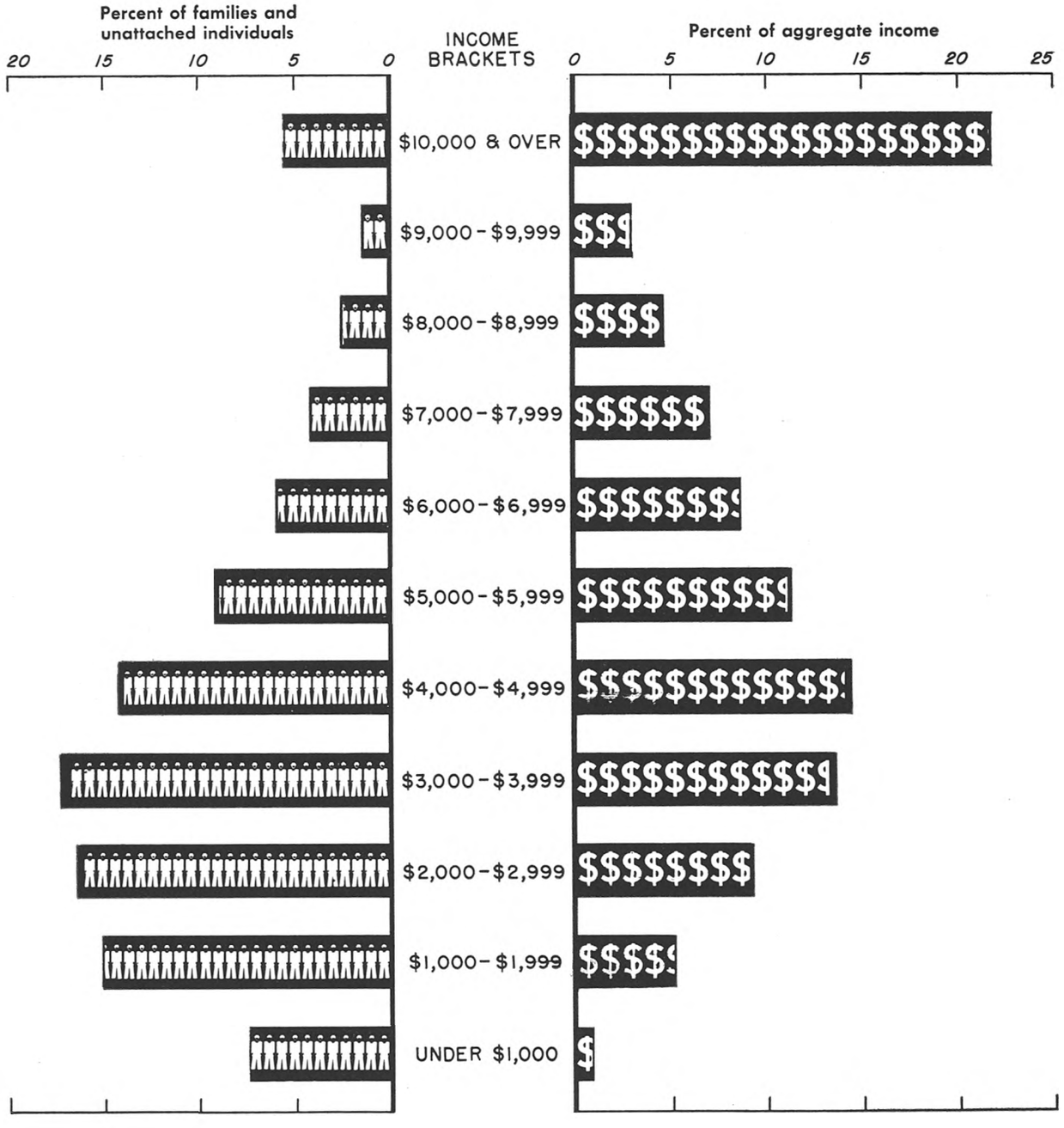
Distribution of Consumer Units by Size of Family Personal Income in 1950



incomes smaller than the national average of $4,460, and one quarter fell below $2,000. Incomes up to $10,000 accounted for about 95 percent of income recipient units. The extended tail of the distribution formed by the remaining 5 percent cannot conveniently be shown in the chart. These units are all combined in the $10,000 and over bar.

The percentage distribution of total income which mirrored this placement of consumer units on the income scale was pitched considerably higher. Two-thirds of family personal income was in the hands of units receiving more than the national average, and somewhat over one-fifth was accounted for by the $10,000 and over group alone. Almost 95 percent of income was received by consumer units with incomes over $2,000.

As compared with the national mean income of $4,460 in 1950, the income bracket between $3,000 and $4,000 represented the modal income range, namely, the range within which the largest proportion of consumer units was found. The median income in 1950 was $3,610. This was the amount that divided the distribution of families and unattached individuals into two equal groups, one having incomes above and the other having incomes below the median.

Low income groups

One of the most striking features of the chart is the relatively high proportion of consumer units located near the bottom of the income scale. To a substantial extent these figures indicate those of our Nation's families whose economic status is relatively low, but the following considerations will show that a complete identification between low income consumer units and low living standards in the usual sense of the term cannot be made. This is so because low income consumer units do not consist of families that, except for the size of their incomes, are a representative cross section of the population. Allowance for their special characteristics must be made. Among the large number of low income families there are many whose relative economic position is not measured adequately by the summary data on income distribution.

For instance, there are included at the bottom of the size distribution consumer units that were not in existence during the entire year. The part year earnings at which these units are classified are not representative of their actual command over goods and services over the full year period covered by the size distribution statistics.

A young person who graduates from school in June, finds a job some time in the second half of the year, and sets up residence apart from his family, is a case in point. He is included in the size distribution in the income bracket corresponding to his part year income. But the smallness of this income is in no way evidence of poverty. Young couples establishing themselves in independent households during the year similarly affect the statistics.

It is likely that ample earnings opportunities, high marriage and birth rates, and progressive alleviation of the housing shortage during the postwar years, as manifested in the high rate of new consumer unit formation, have given rise to a substantial number of low income units of this type. The effect of these part-time units on the income size distribution is discussed further in chapter 3.

Account should also be taken of the fact that in many cases low income units have smaller than average requirements, and that for this reason a simple identification of low income and inadequate living resources cannot be made. The fact that a far higher proportion of unattached individuals is at the low end of the income scale than is the case among multiperson families constitutes direct evidence in this connection.

This pattern is not shown for 1950, which represents a preliminary summary estimate, but it can be seen for 1947 and earlier years. For example, in 1947 over six-tenths of the unattached individuals had incomes under $2,000, as contrasted with only one-sixth of all multiperson families, and less than one-seventh of nonfarm family units.

Unfortunately, it is not possible to push the analysis much further on the basis of existing data, but it is known, for instance, that a substantial number of aged and retired couples can be found at the lower end of the income scale. These have in general fewer needs and responsibilities than growing families with minor children. Evidence available in this connection will be presented later in this report.

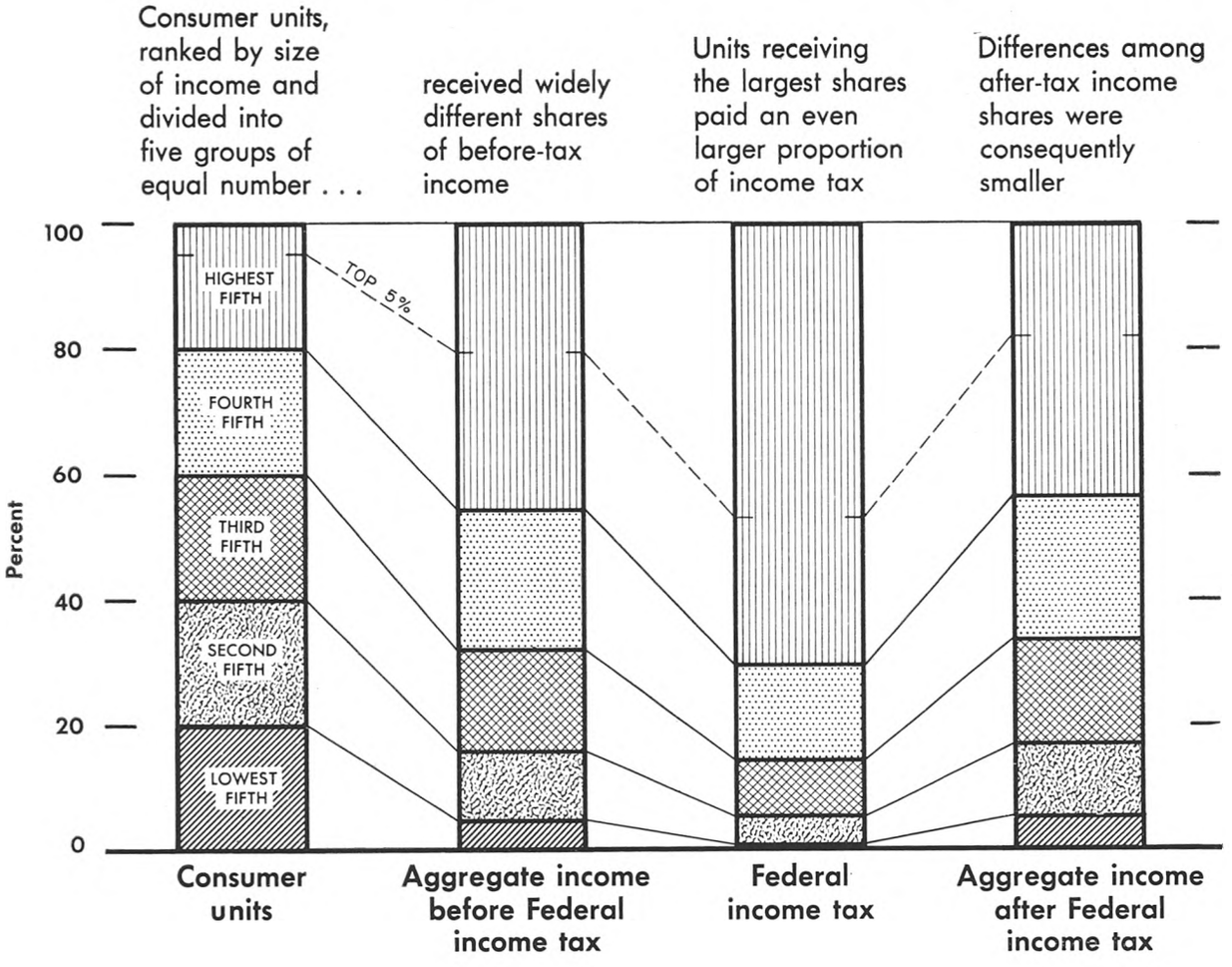
It may also be noted that some of the units that receive low incomes consist of retired people who have planned to supplement current income receipts by drawing on accumulated savings. In these instances also, low income is not evidence of low economic status.

The classification of some families at the lower end of the income scale may be due in part to a low valuation of income. For instance, the income consumed by farm families in kind—the net value of food and fuel produced and consumed on farms—is valued at farm prices, in harmony with the general design of national income statistics. As is indicated in the following section, 36 percent of farm operator families fell in the income range under $2,000 in 1947, as compared with less than 14 percent of the nonfarm family group. An alternative valuation of home-produced food at retail prices would have added to farm operators' incomes, and reduced somewhat the proportion of farm units in the low ranges of the income scale.

Furthermore, there is probably some correlation between the size of family incomes and the prices that families have to pay for consumption goods. For instance, as has been noted, farm families account for a larger proportion of consumer units at low than at high income levels. Despite difficulties of measuring urban-rural differences in cost of living, it is generally agreed that price levels are somewhat lower for rural than for urban families, largely as a result of differences in the regional distribution of these two groups. If statistical correction could be made for this factor, relative differences in the resulting distribution of real incomes (i. e., incomes corrected for differences in purchasing power) would be smaller than those in the dollar distributions given in this report.

It should also be remembered that there is a considerable turnover in the low income brackets. Many consumer units are thrown into these brackets as the result of short-run

Percent Distribution of Family Personal Income, Federal Income Tax, and After-tax Income in 1950



vicissitudes such as temporary sickness, unemployment, or business reverses. To many others—young people starting out in economic life—a low income status represents the bottom rung of the economic ladder which they confidently hope to ascend. While genuine privation may be involved in many of these cases, they nevertheless differ significantly from those that represent a chronic low income core.

As has been mentioned, data are lacking at present for a comprehensive evaluation of the economic position of the low income groups. An intensive investigation that would distinguish among the significant types of units included and throw light on the factors leading to low incomes would be an important step in extending knowledge in this field.

Top income groups

Certain of the transitory factors that cause a turnover among consumer units and place some of them in low income groups in any one year serve to place others temporarily in high income groups. Generally speaking, the effect of these factors is a wider relative dispersion in the income distribution for any given year than would be found in a distribution in which the family income represented the total received over a number of adjacent years. (See chapter 3.)

In addition, the data for the upper end of the income distribution require interpretation because of certain characteristics of the income definition. For example, the definition of family personal income which underlies this report excludes undistributed corporate profits as well as capital gains and losses. Inclusion of either of these items in the family personal income total would in 1950, and more generally in conditions of prosperity and economic expansion, increase the income of high income recipients.

Relative income distribution

The relative distribution of income, as distinct from the distribution by absolute income level, is brought into focus by the accompanying chart. The consumer units of the Nation are ranked according to the size of their incomes in

1950 and divided into five groups, each containing 20 percent of the total number. The top fifth, or quintile, earning the highest incomes is depicted as the top segment of the first bar. (The dashed line in this segment refers to the top 5 percent of consumer units.) The subsequent four segments show the subsequent fifths of consumer units, arranged in descending order of their incomes.

All consumer units with incomes in excess of $6,000 fell into the top quintile in 1950, and those with incomes above $10,500 comprised the top 5 percent. The next three quintiles, in descending order, included those receiving incomes ranging from about $4,200 to $6,000, $3,000 to $4,200, and $1,800 to $3,000, respectively. The lowest 20 percent of the Nation's consumer units received incomes below $1,800 in 1950.

The second column of the chart shows the proportion of total income going to each fifth of the Nation's consumer units. Thus, the top 20 percent of these units received approximately 46 percent of total income, whereas the lowest 20 percent received about 5 percent of it. The national average income of $4,460 lies in the quintile next to the top, near the lower range of the incomes included in it. Accordingly, this fifth as a whole receives a somewhat more than proportionate share of total income while the next two fall below, although not by so much as the bottom quintile.

Impact of Federal Income Tax

The preceding discussion has been in terms of incomes before the payment of taxes. In the following paragraphs an initial step toward an analysis of taxes is made, in the form of an examination of the Federal individual income tax which is a major component of the total tax structure. A more comprehensive investigation of the total impact of government on the income distribution which would take into account the impact of all Federal, State, and local taxes, as well as of government expenditures, has not been attempted.

Taxes in relation to income

The following tabulation shows for the year 1950 the percentages of total family personal income absorbed by the Federal individual income tax at successive levels of income. From a negligible magnitude for incomes below $1,000, the effective rate (i. e., the ratio of tax liability to family personal income) progresses gradually to 8 percent for incomes in the $7,500–$10,000 range. In the $10,000-and-over group the rate is about 19 percent. On the average, Federal individual income tax liability absorbed about 8½ percent of total income. State and local individual income taxes, which are not taken into account here, took less than ½ percent of total family personal income in 1950.

Percentage of family personal income taken by the Federal individual income tax, 1950

Family personal income level	Tax rate (percent)
Under $1,000	(1)
$1,000–$1,999	1. 9
$2,000–$2,999	3. 5
$3,000–$3,999	4. 6
$4,000–$4,999	5. 2
$5,000–$7,499	6. 9
$7,500–$9,999	8. 1
$10,000 and over	18. 6
All income groups	8. 4

1. Less than 0.05.

In the interpretation of the rates in the table it should be noted that the definition of income underlying the income distributions is broader than that of taxable income underlying the Federal income tax. It includes income in kind, the bulk of which is not taxable, and certain types of monetary income, such as social security benefits, which are also exempt from taxation. Furthermore, the income totals underlying the present distributions include money amounts of other types of income that for one reason or another are not reported on Federal individual income tax returns.

Also, the rates given in the table are average rates for all consumer units in given brackets of income and therefore conceal substantial variation in liabilities among units. This is particularly true of the top bracket shown in the table where the range of incomes covered is very broad, but applies also to other income brackets where tax liabilities vary mainly because of differences in the number of exemptions claimed.

Moreover, the rates in the table represent, in effect, averages of bracket rates imposed upon segments of taxable income and are computed on the basis of income before allowances for deductions and exemptions. Thus, they are substantially lower than marginal rates applicable to increments of taxable income.

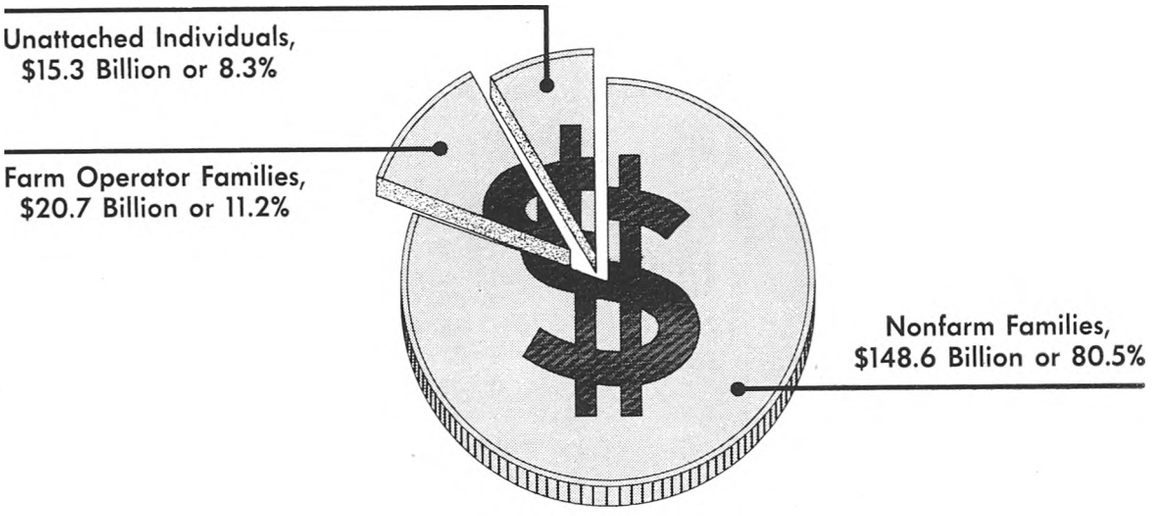
After-tax incomes

The impact of the Federal income tax on family personal income is brought into focus by the last two bars of the chart just discussed, which show clearly the graduation of

Distribution of Family Personal Income

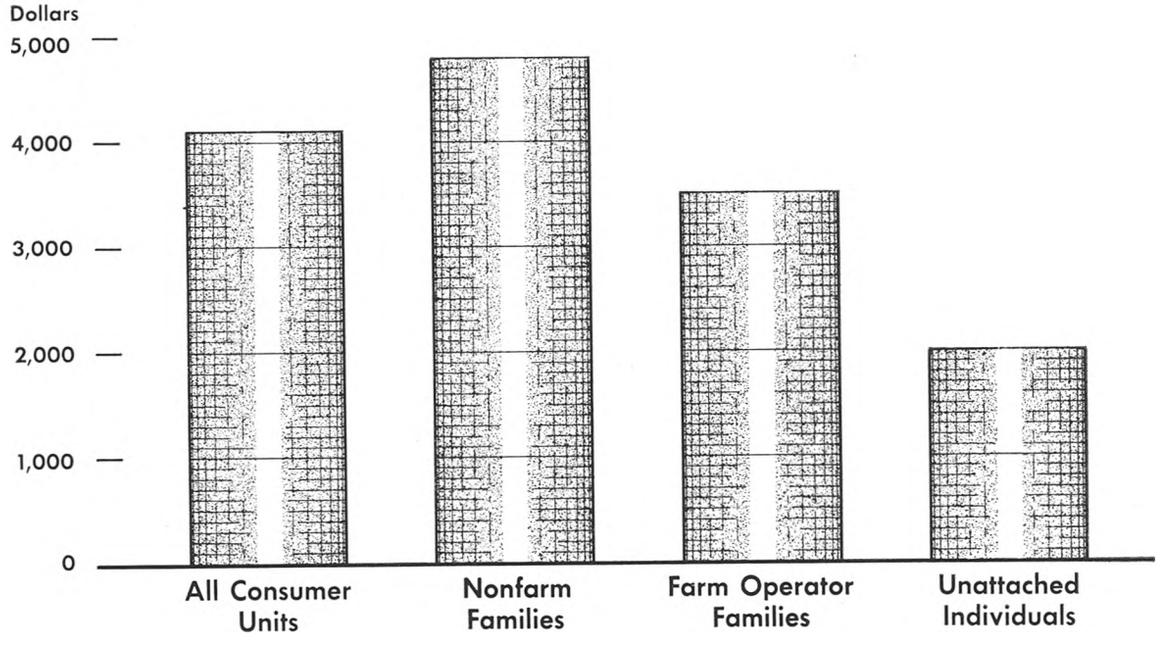
Among Major Types of Consumer Units in 1947

Nonfarm families received a preponderant share of TOTAL INCOME . . .



Total, $184.6 Billion

and their AVERAGE INCOME substantially exceeded that of farm operator families and unattached individuals



Federal income taxation. The top 20 percent of consumer units, which received approximately 46 percent of total income accounted for 70 percent of total income tax liability. The top 5 percent of consumer units received about 20 percent of total income and was the source of 47 percent of taxes. In contrast, the bottom 20 percent which received about 5 percent of income accounted for about 1 percent of taxes. The remaining three fifths, which are located between the two extremes, also paid shares of taxation that were smaller than their shares of total income. Only as one penetrates into the upper quintile is the position reversed, with consumer units contributing a larger share of income taxation than their share of aggregate income. The actual dividing line was at about $9,000 of income.

The fourth bar of the chart shows the distribution of income after tax among the quintiles of the Nation's consumer units classified, for comparability with the preceding bars, on an income before tax basis. For these broad groupings the after-tax distribution differs moderately from the before-tax distribution shown in the second bar. For instance, the impact of the Federal income tax reduces the percentage share of the upper quintile from 46 to somewhat under 44, or by roughly 5 percent.

The moderate change in the distribution of income, in spite of substantial differentials in the incidence of taxation, is due to the particular structure of the Federal income tax. Rates sufficiently high and progressive to result in a marked modification of percentage shares are reached only in the upper income ranges. But these upper income ranges do not account for a proportion of total income large enough to affect strikingly the distribution of income among the quintiles depicted in the chart.

The changes effected by the Federal individual income tax in the percentage shares of income were relatively much larger near the top of the income scale. For example, the percentage share of income of the top 5 percent of consumer units—those with incomes of over $10,500 in 1950—was reduced by the tax from over 20 to 18, or by about 12 percent, as compared with the 5 percent reduction for the top quintile as a whole. Corresponding percentage decreases would be even more striking if the analysis were carried to the very highest percentile groups.

Major Groups in 1947

Further light is shed on the structure of incomes by a separate examination of the income distribution for three different types of consumer units: nonfarm families, farm operator families, and unattached individuals. The discussion is in terms of the 1947 data, the last year for which reliable breakdowns are available. Even though prices and physical volumes have risen since that year, it is believed that most of the broad conclusions which are suggested by the situation in 1947 have applicability also for more recent years.

The 1947 data are all on a before-tax basis, and no analysis of the differential impact of the Federal income tax on the three types of consumer units is made. While the detailed results of such an analysis cannot be predicted, it seems very likely that on an after-tax basis the relative position of farmers would appear more favorable than on a before-tax basis.

Nonfarm families

Certain key data relating to the three types of consumer units are summarized in the accompanying chart. As can be seen, nonfarm families are the preponderant group. In 1947 they constituted 70 percent of all consumer units and received 80 percent of total income. The average income of this group was $4,780, as compared with an average of $4,130 for all units. It is for this massive group, which includes all multiperson families except those of farm operators, that the estimates published in this report are most firmly founded.

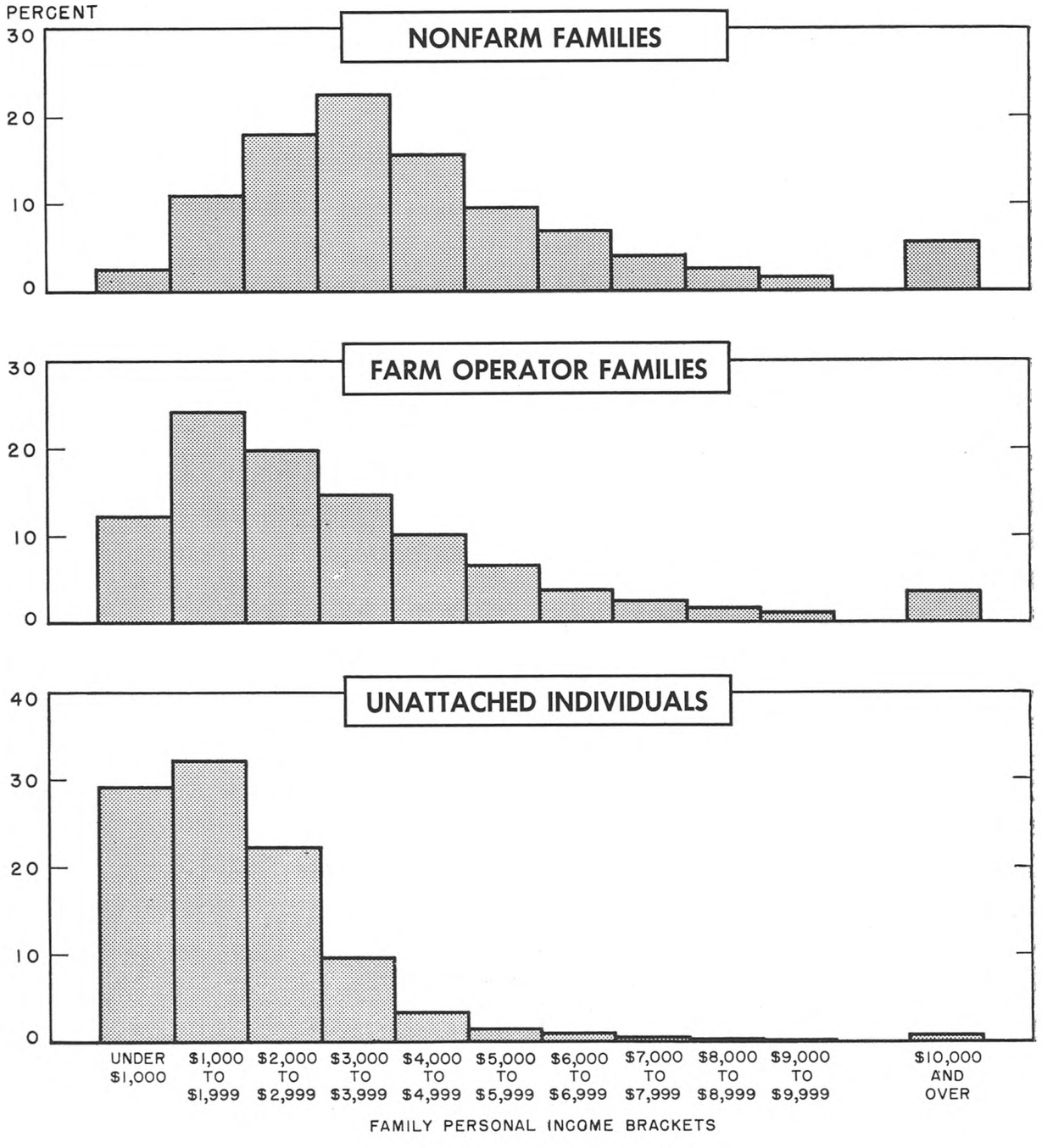
The remaining 20 percent of the income went to the other 30 percent of consumer units, consisting of the families of farm operators and of unattached individuals. Farm operator families accounted for 11 percent of the income and for 13 percent of the units. For unattached individuals the disparity was greater. This is reflected in their average income, which was $1,980 as compared with $3,510 for farm operator families.

Farm operator families

The farm group covers all families that operate a farm as defined in the 1945 Census of Agriculture, including both owner- and tenant-operators. The total income of this group, from farm as well as nonfarm sources, is covered. Farm laborers (other than those living with a relative who is a farm operator) are included among unattached individuals or with nonfarm families rather than with farm operator families. The farm operator classification is not based on residence. A sizable number of families not classified as farm operators live on farms and some farm operators live in villages and urban communities.

Farm operator families include a considerable number of families to whom farming was only an incidental sideline and not their major economic activity. Classification of this group with nonfarm families would have been preferable because it would have resulted in a more meaningful series for the farm operator group, and also because there is some

Percent Distribution of Major Types of Consumer Units by Size of Family Personal Income in 1947



question whether sufficient allowance for the nonfarm income of this group could be made within the framework of the farm operator estimates. However, the data on farm income did not permit a segregation of this group, and the estimates must accordingly be qualified with these factors in mind.

Another circumstance bearing upon the interpretation of the income distribution figures for the farm operator group is the significant element of imputed income that is included in the aggregates. This income is valued, conservatively, at farm prices, although for some purposes, a retail valuation might be more appropriate. Valuation of imputed income at retail prices would decrease somewhat the proportions of farm operator families in the low income brackets.

The farm distribution also calls for comment with respect to the procedure by which the value of farm inventory change—a component of the income of farm operator families—was distributed by income size. Since information on the size distribution of this item was not available from the basic source material, its aggregate net value in each year was distributed in proportion to the size distribution of realized net money farm income, i. e. of farm receipts less expenses which do not take into account the value of inventory change. Evidence on the distribution of farm inventory change is too fragmentary to permit inference as to whether a systematic bias was introduced by this procedure.

More broadly, the basic differences in the mode of living make meaningful income comparisons between farm and nonfarm families very difficult. In spite of the imputation of key items, many forms of income and production that arise within individuals' households escape measurement although similar items are taken into account if they are part of a market economy. Items thus omitted are relatively more important for farm than for urban families.

Also the greater complexity of urban life calls for many unavoidable expenditures in the course of earning one's living which have no counterpart in the rural economy. On the other hand, the urban population has access to many types of consumption goods and services which are not easily available to farm families. For these and other reasons it is not possible to measure with any degree of precision differences in the level of living for farm and urban families. The conclusion that is most usually drawn, however, is that comparisons based upon the present income definitions tend to overstate the economic status of nonfarm families relative to that of farm families.

Unattached individuals

Individuals who do not live with relatives are defined as unattached individuals. They may be living in their own dwelling units; or share a dwelling unit with a family or with another individual, for instance as lodgers or as domestic servants; or they may reside in boarding houses or hotels. Lodgers in private homes and occupants of boarding houses and hotels constituted about one-half of the entire group in 1947.

It is apparent that the characteristics of this group differ greatly from those of multiperson families. The outstanding difference is of course that in the case of unattached individuals there is usually only one claimant on income, whereas there are always two or more claimants on the incomes of multiperson families. In the interpretation of the average income figures of the three types of consumer units this difference should be taken into account.

If the three types of consumer units are ranked according to the average income per consumer unit, unattached individuals are lowest, falling considerably below farm as well as nonfarm families. However, if per capita income figures are calculated which take the size of the family into account, the average income of unattached individuals appears higher than that of the other two groups—$1,980, as compared with $870 for farm operator families and $1,340 for nonfarm families.

Quite apart from the fact that unattached individuals may be supporting dependents not living with them, this correction for family size overstates the relative position of unattached individuals as compared with members of multiperson families, as far as real command over goods and services which yield economic satisfaction is concerned, because much of family consumption is of an overhead nature and benefits individual family members regardless of the size of the family. However, it is also clear that the per consumer unit averages, which do not make any allowance at all for differences in family size, tend to create an overly unfavorable impression of the relative economic status of unattached individuals.

Distributions by income levels

The distribution of the three types of consumer units along the absolute income scale in 1947 may next be examined. The relevant data for this purpose are summarized in the accompanying chart.

The significant contrast is between nonfarm families on the one hand and farm operator families and unattached individuals on the other. Whereas only a small percentage of nonfarm families is found at the lower end of the income scale, a considerable proportion of farm operator families and unattached individuals is in that location. For example, less than 3 percent of the nonfarm families had incomes under $1,000 in 1947, as compared with 12 percent of farm operator families and almost 30 percent of unattached individuals. The reverse picture is presented in the upper income ranges. Thus, more than 30 percent of the nonfarm family group had incomes of $5,000 or more in 1947, as compared with 19 percent of farm operator families and less than 4 perecnt of unattached individuals.

The following tabulation, in which the 1947 data are rearranged to show the percentage composition of consumer units in each family personal income bracket, suggests a similar conclusion, namely, that consumer units whose income is probably estimated conservatively, or units whose needs are on balance below the average, predominate in the lower income ranges. Unattached individuals and farm families constitute the bulk of consumer units below $2,000 and account for an important fraction of the next higher family

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income bracket also. In contrast, nonfarm families predominate in the higher income brackets and form a rapidly diminishing part of the total at lower levels.

Composition of consumer units, 1947

[Percent]

Family personal income level	All consumer units	Nonfarm families	Farm operator families	Unattached individuals
Under $1,000	100. 0	20. 9	19. 2	59. 9
$1,000-$1,999	100. 0	47. 0	19. 4	33. 6
$2,000-$2,999	100. 0	65. 8	13. 9	20. 3
$3,000-$3,999	100. 0	81. 4	10. 0	8. 6
$4,000-$4,999	100. 0	84. 9	10. 6	4. 5
$5,000-$5,999	100. 0	85. 9	11. 0	3. 1
$6,000-$6,999	100. 0	88. 7	8. 8	2. 5
$7,000-$7,999	100. 0	87. 4	10. 3	2. 3
$8,000-$8,999	100. 0	87. 9	10. 1	2. 0
$9,000-$9,999	100. 0	87. 1	10. 9	2. 0
$10,000 and over	100. 0	87. 1	10. 4	2. 5
All income groups	**100. 0**	**69. 6**	**13. 2**	**17. 2**

The distribution of the farm operator group is an interesting feature of this table. The relative importance of this group is largest in the lowest income brackets, diminishes rapidly as one ascends the income scale, and then increases somewhat in the upper income ranges. Unattached individuals accounted for a somewhat larger proportion of consumer units in the $10,000 and over income range than of those in the immediately preceding income brackets shown in the tabulation.

Effect of imputed income

As has already been mentioned about 95 percent of personal income consists of monetary flows. The remainder, imputed income, constituted part of each major type of income included in the personal income series except transfer payments. Wages and salaries in kind are least important both absolutely and percentagewise. Imputed profit income—in the form of the net value of food and fuel produced and consumed by farm operator families and the net rental value of owner-occupied homes—is largest. Imputed interest income—measuring mainly free services rendered to depositors by commercial banks and the property income of life insurance companies retained on behalf of policyholders—is intermediate in value.

The table following shows the percentage shares of total family personal income inclusive of imputed items received by successive fifths of consumer units ranked by size of such income in 1947, and comparable figures for the same aggregate after imputed items have been removed. It can be seen from the table that the effect of the imputations is somewhat to reduce relative income differences. In other words, imputed items constitute a larger proportion of low incomes than of higher incomes, on the average. This pattern reflects largely the distribution of imputed profit incomes and of imputed wages and salaries. Imputed interest income did not operate in this direction.

Family size and composition

To evaluate comprehensively the size distribution of income it would be necessary to go beyond the data for the three major consumer groups here presented, and to examine consumer units in detail with respect to the structure of families, the degree of their urbanization, their regional distribution, and other characteristics. Unfortunately, the source data did not lend themselves to the development of breakdowns of this sort which would tie in with the present estimates.

However, in the table on page 13 certain data on the size and composition of families (farm and nonfarm taken together) are presented which are relevant to the present analysis. These distributions are based upon a definition of income that differs somewhat from the one used in the present report. Nevertheless, broad inferences with regard to corresponding quintiles of families underlying the present report are permissible. The specific data, based on information collected by the Census Bureau, refer to 1948 but can be used more generally in interpreting the postwar situation since the relations displayed have considerable stability.

Distribution of family personal income inclusive and exclusive of imputed income, 1947

[Percent]

Quintile [1]	Family personal income (including imputed income)	Family personal income excluding imputed income [2]
Lowest	5. 0	4. 3
2	11. 0	10. 7
3	16. 0	16. 0
4	22. 0	22. 2
Highest	46. 0	46. 8
Total	100. 0	100. 0

1. Consumer units ranked by size of the income indicated in column heading.

2. In subtracting the several imputed items, food and fuel produced and consumed by farm operator families was taken at gross rather than net value because a separate estimate of expenses incurred in connection with home-produced food and fuel could not be derived.

Most directly relevant to the present discussion is the information on family size, as an indicator of the claims made on total family incomes in the successive quintiles. The average size of the family is lowest in the bottom fifth of families—somewhat in excess of 3 persons—and is seen to rise in the succeeding quintiles until it reaches almost 4 in the top fifth. In other words, on the average the larger the size of family income the larger is the number of persons sharing it. Thus, allowance for differences among income groups in the number of persons dependent on a common family income operates to increase somewhat the relative shares of income received by the lower fifths and to decrease the shares of the upper quintiles.

The relatively small average size of family in the lowest fifth reflects the numerical importance of two-person fami-

lies—representing in large part older-aged or newly married couples—in that quintile. The Census data for 1948 indicate, for example, that two-person units accounted for 47 percent of all families within the lowest fifth, as compared with 33 percent within the second fifth, and 28, 26, and 22 percent, respectively, within the next three higher fifths.

The table opposite also shows that the average number of earners increases markedly as we ascend the income scale—from 1 in the lowest fifth to 2 in the top fifth. The number of children under 18 years per family, on the other hand, increases from the first to the second and third quintiles, but decreases subsequently, from the third to the fourth and again to the top fifth.

The latter movement may be related to the typical life cycle of families. The smaller number of children in the low bracket reflects a disproportionate number of newly married and aged couples without minor children. In the second and third quintiles growing families, whose earning capacity is increasing, preponderate. The decrease in the number of children under 18 years at the top of the income scale reflects the predominance of mature families that have reached the peak of their earning power and whose children have grown up and are no longer in a dependent status.

This interpretation is confirmed by figures shown in the table for the percentages of families without any children under 18 years within the several fifths. The proportion drops sharply from the lowest to the second fifth, drops again from the second to the third fifth, and then rises in the fourth and again in the top fifth.[1]

Also indicative of basic differences in family composition among the several quintiles are the census-based data on the proportion of families with heads aged 65 years old and over.

Family composition, 1948

Quintile [1]	Average number of—				Percent of families		Media age of family head
	Persons per family	Earners 14 years old and over per family	Children under 18 years		Without children under 18 years	With heads aged 65 years old and over	
			Per family	Per family with 1 or more children			
Lowest	3. 29	1. 06	1. 14	2. 36	51. 9	27. 6	52
2	3. 52	1. 32	1. 29	2. 12	39. 7	11. 2	42
3	3. 58	1. 40	1. 30	2. 05	37. 2	7. 7	41
4	3. 62	1. 62	1. 19	1. 99	40. 7	6. 7	42
Highest	3. 94	2. 03	1. 03	1. 93	47. 1	7. 9	47

1. Families ranked by size of family money income (before income taxes).

This proportion is markedly higher for the lowest fifth of families—28 percent—than for the other quintiles, where it ranges between 7 and 11 percent. The median age of family head was also highest for the 20 percent of families with lowest incomes. As the table indicates, the median was 52 years in that fifth, as compared with 42, 41, and 42 years, respectively, in the next three quintiles, and 47 years in the top fifth.

Changes in Income Distribution

From 1944 to 1950—the period covered by the size distribution series presented in this report—there was a marked rise in aggregate current dollar family personal income. This income (before income taxes) totaled $148 billion in 1944, $171 billion in 1946, $185 billion in 1947, and $217 billion in 1950. Average income per consumer unit, in current dollars, increased from $3,610 in 1944 to $3,940 in 1946, $4,130 in 1947, and $4,460 in 1950.

Current dollar incomes

These increases were reflected in upward shifts in the distribution of consumer units by current dollar income brackets. As the chart indicates, the proportions of families and unattached individuals in income brackets under $4,000 declined and the percentages in the higher brackets increased.

In 1944, for example, 30 percent of the consumer units had incomes under $2,000, as compared with 23 percent in 1950. The proportions with incomes between $2,000 and $4,000 in the two years were 40 and 34 percent, respectively.

In contrast, the percentages of consumer units in all brackets above $4,000 increased, with the largest relative rises taking place above $5,000. In 1944, there were 15 percent of the families and unattached individuals in the income range between $5,000 and $10,000, and 3 percent in the range $10,000 and over; in 1950 the corresponding proportions were 23 and almost 6 percent.

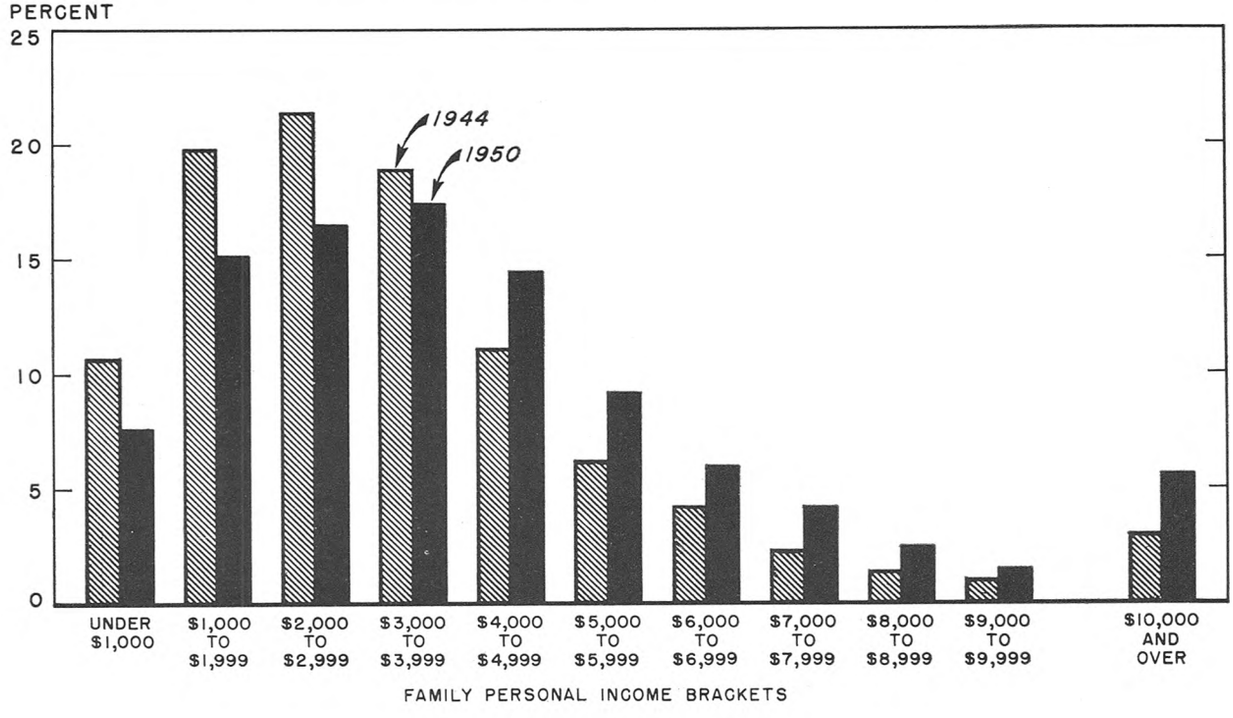
Real incomes

If calculations are made to eliminate the effect of price changes by expressing the income figures for all of the years in terms of the prices of a single year, it is found that the increase in total family personal income over the 1944-50 period is relatively small. In fact, it does not appear on a per consumer unit basis except for the span from 1947 to 1950.

1. It is interesting to note that when families without any children under 18 years are excluded—i. e., when the calculations are made in terms of the mean number per family having one or more children under 18 years—the average number of children decreases throughout the quintile range. None of the figures on children presented here should be interpreted as birth rates mainly because children 18 years old and over are not covered in these statistics.

Percent Distribution of Consumer Units by Size of Family Personal Income

In terms of current dollars, the proportions of consumer units in income brackets above $4,000 increased markedly between 1944 and 1950



However, the deflated income figures for this period do not measure with any real precision the actual changes that occurred. In the first place, the price deflators that can be constructed probably exaggerate the price rise that took place directly after the end of World War II because they understate the price level during the war. This understatement is due to the fact that certain "hidden" increases in prices that occurred during the war were not reflected in the wartime price indexes.

Secondly, certain additional factors must be taken into account in interpreting the income figures over this period from the standpoint of changes in the standard of living. The effects of rationing and of forced saving during the war resulting from shortages of consumer goods meant that family expenditures for goods and services accounted for much smaller proportions of total family income in the war years than in the postwar period. This factor together with changes in the rates and impact of the Federal individual income tax make it extremely difficult to determine the changes in real incomes that took place over this period. Furthermore, even in less unusual periods price indexes, which refer to goods and services, are not fully adequate for deflating family incomes which are used also for taxes and saving.

In addition, variations in the composition of families, such as in the size of the consumer unit dependent on the family income, introduce further difficulties in determining changes in real income. Between 1944 and 1946, for example, the average number of persons per consumer unit increased, reflecting the return to civilian life of large numbers of

military personnel, and after 1946 fell sharply as a result of the high rate of family formation in the postwar period.

In this connection it may be noted that deflated consumption expenditures per consumer unit increased during all of the years covered in the report, in spite of the limitations of the price deflators.

Relative income distribution

To compare the relative distributions of income in the several years covered in this report, the percentage shares of total family personal income received by successive fifths of consumer units ranked by size of such income were calculated for each year. These are shown in the accompanying tabulation.

It may be noted that comparisons in terms of family personal income after income taxes would also have been useful. However, except for the estimates of the distribution of income after Federal individual income taxes for 1950 that were discussed earlier, such after-tax distributions have not been calculated.

In examining the table it is important to remember that the figures measure changes in the relative distribution of the *real* income available to consumer units in the various brackets only insofar as changes in the cost of living were similar for all income groups. To the extent that such changes operated differentially, changes in the distribution of real income would differ from the patterns shown in the table. Allowance for such possible differential changes could not be made.

It should also be kept in mind that these figures reflect the average experience of broad income groups and do not indicate that individual consumer units necessarily shared that experience. Consumer units comprising any one quintile are not identical units from year to year. For example, to the extent that individual units shifted their relative position on the income scale—e. g., moved from a given fifth in one year to a higher or lower fifth in another—they may have experienced very large relative changes in income status that are concealed by the average changes shown in the table.[2] It may be noted that as a result of these shifts in the relative position of given consumer units, an income distribution in which family incomes received during several adjacent years are combined will tend to show a smaller relative dispersion than distributions reflecting annual family incomes. (See chapter 3.)

The tabulation shows that the pattern of relative income shares was basically similar in all four of the years covered in the report. There was a slight rise in the percentage share of the top fifth of consumer units between 1944 and 1946 and a small decline thereafter, so that the relative share of this top group, as well as the corresponding shares of the other quintiles, were about the same in 1950 as in 1944.

In other words, the marked rise in current dollar incomes that occurred during this period apparently did not serve to alter to any significant degree the pattern of relative income differences as measured in this way. A similar stability in relative shares appears if the comparison is made for smaller groups of consumer units, e. g., for deciles, and also if attention is focused on the very top income groups. As the table indicates, the percentage shares of the top 5 percent of consumer units, for example, varied only slightly over this period.

The stability in the relative income shares may to some extent reflect certain of the inadequacies in the basic data. Thus, in the absence of satisfactory size distribution statistics for the farm operator group for the several years, it was assumed that relative income differences in this sector were basically the same over the period covered here. But the stability in relative shares appears also in the more firmly based nonfarm sector where the size distributions were developed, as has been explained, by combining annual data from tax returns and the sample field surveys. Although the 1950 distribution is preliminary, there is no reason to believe that the pattern shown in the table will be altered to any significant extent by revisions based on the fully detailed tabulations of tax returns that will become available for that year.

Distribution of family personal income, 1944, 1946, 1947, and 1950

[Percent]

Quintile	1944	1946	1947	1950
Lowest	4. 9	5. 0	5. 0	4. 8
2	10. 9	11. 1	11. 0	11. 0
3	16. 2	16. 0	16. 0	16. 2
4	22. 2	21. 8	22. 0	22. 3
Highest	45. 8	46. 1	46. 0	45. 7
Total	100. 0	100. 0	100. 0	100. 0
Top 5 percent	20. 7	21. 3	20. 9	20. 4

Stability in the relative shares of the top income groups in the period since 1944 is shown also in a recent study by Dr. Simon Kuznets. His figures for the percentage shares of income ("economic income variant") received by the top 5 percent of the population are 18.7 for 1944, 20.0 for 1946, 19.1 for 1947, and 19.3 for 1948.[3]

The absence of significant variation in the relative distribution of income for the 1944–50 period, it should be noted, applies to a fairly short time span that was generally characterized by prosperous economic conditions. It should not be taken to apply to longer run time periods or to periods of marked cyclical changes.

2. An analysis of income changes between successive years for identical groups of spending units classified by income bracket is included in the Federal Reserve Board surveys. See, e. g., *Federal Reserve Bulletin*, August 1950, pp. 953–954, and September 1952, pp. 992–993.

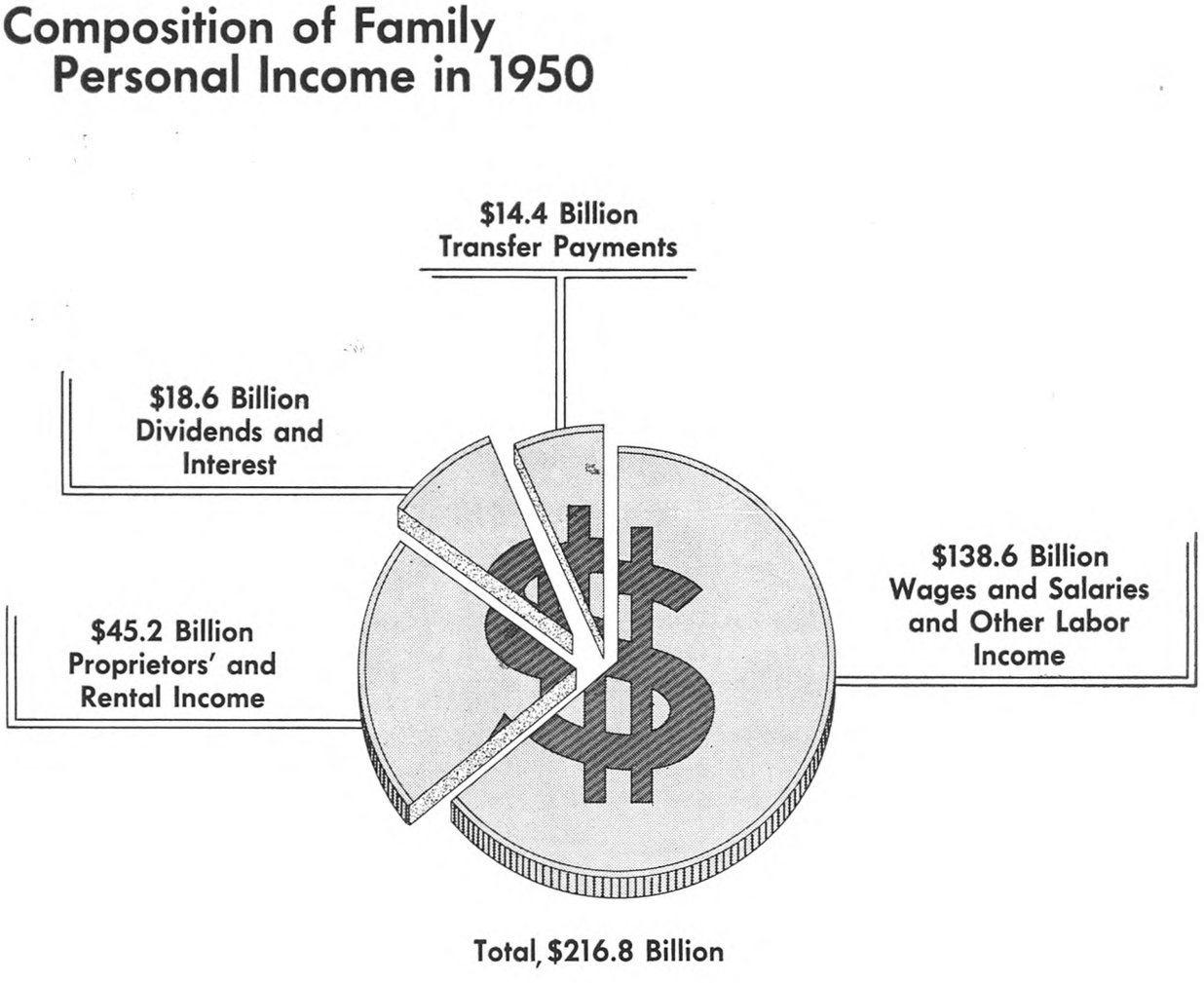
3. *Shares of Upper Income Groups in Income and Savings*, Simon Kuznets assisted by Elizabeth Jenks, National Bureau of Economic Research, New York, 1953, pp. 453, 635 (with the figure for 1948 extrapolated by "basic variant" series). The definitions and statistical methodology adopted by Kuznets differ from those underlying this report, so that exact quantitative correspondence in the two sets of estimates cannot be expected. For example, the present series applies to the top 5 percent of consumer units (families and unattached individuals) whereas Kuznets' figures are for the top 5 percent of the population (the 5 percent of persons represented on those individual income tax returns reporting the highest per capita incomes).

Kuznets' data show that in contrast to the recent stability the percentage shares of income received by the top 1 and 5 percent of the population decreased very markedly during the years of economic expansion following 1939, and that a downward trend in these shares appears to have begun after 1929. This decline appears in the before-tax as well as in the after-Federal-income-tax measures of income used by Kuznets though it is most pronounced in the latter case.

Among the reasons adduced by Kuznets for the sharp decline after 1939 in the before-tax income shares of the top income groups was a lessening of relative differences in the distribution of wages and salaries. This followed in part from the decline in unemployment that took place from 1939 on, in part from the greater than average wage increases between 1939 and 1948 in those sectors where average wages were relatively low in 1939, and in part from the shift of workers away from low-wage sectors during that period. Another important factor making for reduced percentage shares of income received by the top few percent of the population was a decrease over the period in the relative importance of property income in the aggregate income total of the Nation and a corresponding increase in the total of other income shares.

An examination of available data indicates that the years between 1944 and 1950 covered in the present report were characterized by a relative stability in the several factors discussed for the longer run by Kuznets. Unemployment, of course, was at a low level throughout the war and postwar periods. While data confined to the wage-salary income share are not directly available, the Census Bureau sample survey data indicate that only a very slight decrease occurred between 1944 and 1950 in relative income differences among wage-salary families, i. e., those whose major earnings were from that source.

Also, the composition of family personal income in terms of broad types of payment remained relatively stable over this period. For example, the percentage of total family personal income accounted for by dividends and personal interest income in the 4 years studied in this report varied only between 7 and 9 percent, and the combined share of wages and salaries, other labor income, and transfer payments received by families and unattached individuals, varied only between 69 and 71 percent.



Chapter 3

Income and Income Recipient Unit

IN THIS chapter the definitions of income and of the income recipient unit will be discussed in turn. The statistical sources and methods used to derive estimates conforming to these definitions are described in the following appendix.

Family personal income, the income total that is distributed by size, may be defined briefly as the current income received by families and unattached individuals from all sources, inclusive of transfers. It represents the income that is available to these consumer units for personal taxes, consumer outlays, and saving.

A family is defined as a group of two or more persons related by blood, marriage or adoption, and residing together. Unattached individuals are persons not living with relatives, other than military personnel on post and members of the civilian institutional population. The latter two groups are excluded from the size distribution estimates.

Family Personal Income

The new series on the size distribution of income is integrated both definitionally and statistically with the personal income series published by the Office of Business Economics.

Relation to personal income

In estimating total personal income, however, nonprofit institutions, and private trust, pension, and welfare funds are consolidated with individuals proper, and the income which they receive is considered part of the total, as being received on behalf of individuals. Since the transactions of these institutions and funds are relatively small, this merger is a convenient device which permits an accounting for the income flow that is much simpler than the one that would be necessary if these entities were kept apart.

In contrast, it is preferable to exclude nonprofit institutions and private trust, pension, and welfare funds from the standpoint of preparing income size distributions. It would not be meaningful to classify them by the size of their own income; and to allocate their income to consumer households would be rather artificial.

A second source of difference between personal income and the income total underlying this report is that the income size distributions are confined to the civilian noninstitutional population. Members of the armed forces living on posts, and the civilian institutional population—inmates of penal and mental institutions, and residents of homes for the aged, infirm and needy—are excluded.

It is evident that the classification of the institutional population by size of income would not be particularly meaningful. That of the armed forces would constitute a more interesting and significant extension of the data. However, comparisons with the distribution of civilian incomes would be difficult, because of the distinctive nature of military service. For most analytical purposes the size distribution of civilian incomes would have to be kept separate; its significance is not impaired by lack of data pertaining to the armed forces.

Derivation of family personal income

Aggregate family personal income is derived from personal income by making two sets of subtractions, the first for the personal income of institutions and the second for the personal income of the institutional population.

The former item consists of the property income of nonprofit institutions—religious organizations, social and athletic clubs, labor organizations, nonprofit schools and hospitals, charitable and welfare organizations and other nonprofit organizations serving individuals—of transfer payments (grants and gifts) to such institutions from government and business (net of transfers by nonprofit institutions to individuals), and of the undistributed income of private trust, pension and welfare funds.

The income of the institutional population consists of the income of military personnel on post (net of family allow-

ances and allotments) and of the income of the civilian institutional population. The pay of members of the Armed Forces who returned to civilian life during the year is not counted as part of the military deduction. Conversely, the civilian pay of persons entering the Armed Forces during the year is included in the deduction.

These adjustments to net military income are necessary because the incomes of the civilian population are defined to cover the total income received during the year by individuals who were in civilian noninstitutional status at the year end. The implications of this definition for the size distributions are discussed below.

In principle, the deduction for the income of the civilian institutional population is similarly measured. Deducted also is an allowance for the income of persons who died during the year.

Definition of family personal income

In analogy to personal income, the personal income of families and unattached individuals may be defined as the current income received by families and unattached individuals from all sources, inclusive of transfers.[1]

It covers incomes derived from all sectors of the economy: from the business system; from the household economy, for productive services—such as domestic services—rendered within its framework; from nonprofit institutions, and private trust, pension, and welfare funds; from the Federal, State, and local government; and from abroad. It is measured as the sum of wage and salary receipts (net of social insurance contributions), other labor income, proprietors' and rental income, dividends, personal interest income, and transfer payments. It is the income total that is available to families and unattached individuals for personal taxes, consumer outlays, and saving.

Significant aspects of the definition of family personal income are discussed most conveniently in connection with its breakdown by type of payment. Even though this breakdown does not appear separately in the family income distributions presented in this report, a brief discussion of the components will make more meaningful the aggregate that is distributed according to size of family income. For a more detailed explanation of personal income, in the context of the complete set of the national accounts, the reader is referred to the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS.

Labor income

Wage and salary receipts and other labor income represent incomes received by individuals in an employee status. In addition to the items of monetary remuneration commonly so regarded, wages and salary receipts include executives' compensation, commissions, tips, and bonuses, and also payments of imputed income or income in kind. These and other imputed components of personal income are discussed separately below. Other labor income (in family personal income) consists of compensation for injuries, pay of the military reserve, and a few other minor items.

Wage and salary receipts are counted when paid and are net of social insurance contributions. These contributions consist of employer and employee contributions to government administered funds set up under the Social Security and Railroad Retirement programs, State health insurance funds, the retirement funds established for government employees, and military life insurance funds. They are excluded from personal income because they are not received by individuals; and this is probably the most appropriate treatment, especially since benefit payments from social insurance funds are included in personal income.

As an alternative it would be possible to define personal income before deduction either of total contributions for social insurance or before deduction of employees' contributions. The payments of these contributions would then be treated analogous to personal taxes and nontax payments which, including the part withheld at source, are considered as one of the uses to which personal income is put.

Business earnings

Proprietors' and rental income measure the net earnings of private enterprises other than corporations. Proprietors' income consists of the earnings of sole proprietorships and partnerships, and covers farm and nonfarm enterprises as well as independent professional practitioners. Monetary earnings as well as income in kind is included.

Rental income of persons consists of the supplementary income of individuals from the renting of property and also includes both monetary and imputed items.

The definition of monetary business earnings follows Federal income tax practice very closely, with the following significant exceptions pertaining to (1) capital gains and losses, (2) the valuation of inventory change, (3) depreciation and kindred allowances, and (4) property income received.

1. Capital gains and losses are excluded. A case can be made for the desirability of counting them as part of family personal income, but the difficulties involved in framing a logical and statistically feasible definition of capital gains and losses would in any event suggest their exclusion from the estimates. Capital gains and losses incurred by individuals in a nonbusiness capacity are similarly excluded from family personal income.

2. Inventories used up in production are consistently valued at current replacement cost prices in order to arrive at a proper definition of business earnings accruing from current production. In prevalent methods of inventory accounting used by business the book cost of inventories used up may differ from current replacement cost and therefore give rise to positive or negative elements in reported profits which reflect the price changes of assets rather than earnings from current production.

3. In arriving at net business income in the framework of the national income accounts no deduction is made for depletion.

1. It should be noted that transfers among families (and unattached individuals) have not been measured, because of lack of adequate statistical information.

Depreciation charges are in general based upon Federal income tax practice—original cost to purchaser. However, in the case of farm proprietors' income, depreciation is figured on a current replacement cost basis. For statistical as well as conceptual reasons this method, which is inherently preferable in the context of measuring current income and accords with the treatment given to inventories, has not been extended to other industries.

4. Finally, incidental property income received by unincorporated enterprises is generally excluded in calculating net business incomes, and counted as flowing directly to the owners of unincorporated enterprises in their personal capacities.

Dividends and interest

Dividends and personal interest income represent incomes derived from the ownership of securities, loans, and other financial claims.

The monetary component of personal interest income includes government interest received by individuals as well as interest originating in other sectors of the economy. In addition to these monetary flows, personal interest income has important imputed components.

Transfer payments

Finally, transfer payments consist of payments to families and individuals, other than government interest, for which no current productive service is rendered. Government transfer payments preponderate, but smaller amounts are also paid by business, and (in the context of family personal income) by nonprofit institutions and private pension and welfare funds.

One major type of government transfer payments consists of social security benefits under the social security and allied programs, including retirement programs for Federal, State, and local government employees, and Government life insurance schemes. Public assistance is another important type of transfer. Another significant subgroup comprises payments to former members of the Armed Forces. These include military pension, disability, and retirement payments, mustering-out payments and terminal leave benefits to discharged servicemen, and readjustment, self-employment, and subsistence allowances to veterans.

The major element in business transfer payments is bad debts incurred by consumers. The treatment of this item as a transfer payment becomes fully understandable only in the context of the complete set of national accounts. In these accounts consumer expenditures are, in general, valued at full market prices and no allowance is made for consumer defaults. Hence, in order to arrive at a correct amount of consumer saving, consumer bad debts must be considered part of consumers' income and are conveniently regarded as transfers for which business receives no *quid pro quo*.

Transfer payments by nonprofit institutions and private pension and welfare funds include cash relief and pensions distributed by these entities.

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Imputed incomes

Personal income includes in addition to monetary income flows certain imputed items.

As has been noted in the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS, these imputations constitute departures from the basic core of monetary transactions on which the national income and product estimates are built into an area where measurement is much more difficult because of the problems of selection and valuation that are involved. The principle of including nonmonetary income flows that are relevant to economic analysis provides a general guide, but the selection and treatment of particular items must to a considerable extent remain pragmatic or conventional.

The imputations in personal income can conveniently be discussed in three groups: those affecting labor income (imputed wages and salaries), those affecting proprietors' and rental income (imputed profits), and those affecting personal interest income (imputed interest).

Wages in kind

An imputation is made for wages and salaries paid in kind in the form of food and lodging in industries in which this type of arrangement is of quantitative importance and is regarded as involving a clear addition to income. Imputed items are valued at cost to the employer.

In the context of family personal income the major items of this type are the value of food provided free to domestic servants and the free food and lodging furnished to farm laborers. Among the remaining food imputations are wages in kind of workers employed in eating and drinking places. Employees of nonprofit institutions—such as churches and hospitals—are another significant group for which an imputation is made. An allowance for free food as well as free lodging is included.

Imputed profits

Two profit-type imputations are made: One for the net rental value of owner-occupied farm and nonfarm dwellings and one for the net imputed value to farm proprietors of food and fuel produced and consumed by them.

The imputation for the rental value of owner-occupied homes provides comparable treatment between rented and owner-occupied housing. It treats home ownership as a business producing housing services which are sold to the homeowner in his capacity as a tenant. For nonfarm owner-occupied units these sales are estimated in terms of the sum for which the particular type of home could be rented, and the expenses of the homeowners are deducted to obtain net rent.

The imputation for food and fuel produced and consumed on farms is accomplished by counting the value (at farm prices) of food and fuel produced and consumed on farms as farmers' receipts in addition to actual marketings. The cost chargeable to these receipts to derive net income—farmers' expenses and inventory change—are similarly calculated

without a segregation between output that is marketed and output that is consumed on the farm.

Imputed interest

Among all the imputations, those affecting the interest flows are undoubtedly the most complex. They are of two distinct types, one exemplified by an imputation of interest income derived from commercial banking, the other by imputed interest income derived from life insurance. Both suggest themselves strongly in devising an integrated set of national accounts—taking cognizance not only of personal income, but also of its disposition as well as of the intermeshing income and product flows of the rest of the economy—and can be fully understood only in that context.

An imputation of interest in connection with commercial banking is made in drawing up the national income and product accounts because in large part the productive operations of that industry are not charged for explicitly but are financed by the retention of property income earned on loans and investments. If only the explicit sales (service charges) of the banking industry were taken into account a serious underestimate of its contribution to total production would be involved.

To prevent such an underestimate an allowance is made for productive services furnished by the banking industry free of explicit charge. This item is measured by the excess of property income earned over interest actually paid out to depositors. It is assumed that these services consist mainly of the handling of deposits (checking, bookkeeping, and investment services) and that they accrue to the owners of these deposits in proportion to the volume of deposits held. To the extent that consumers own bank deposits they derive a *pro rata* share which is measured by imputed interest income. Similar, but quantitatively much less important, imputed flows arise in connection with the investment trust type of financial institutions.

The life insurance imputation treats the property income earned by life insurance companies as distributed to policyholders. This treatment is dictated primarily by the fact that it is the only one devised so far that will give a consistent treatment of saving with special reference to life insurance. It is paralleled by an inclusion of the operating expenses of life insurance companies in consumer expenditures and the exclusion of premium and benefit payments from the purview of the accounts.

It can be seen that as far as the effects on the measurement of saving is concerned this merging of the income and expenditures of life insurance companies with those of consumers is tantamount to a combination of consumer and life insurance saving. The resulting saving figure measures the net change in the assets and liabilities of life insurance companies and consumers on a consolidated basis.

Somewhat similar, but quantitatively much less important imputations, are made for mutual financial institutions other than life insurance.

Role of imputed income

In deciding to include imputed as well as monetary items in family personal income consideration was given to the recent tendency in this country to confine the income concept to monetary items in studies of income size distributions.[2] This tendency contrasts with earlier endeavors to include imputed income flows as well as with the practice underlying some outstanding studies of income size distribution made in other countries.

Two elements seem to be involved in this tendency. In the first place, it is prompted by the difficulties of obtaining meaningful information on imputed items from respondent families in field surveys of income size distribution. Secondly, it is due to the belief that purely monetary flows are more significant for economic analysis.

In planning the present report the statistical argument was discounted because of the desire to integrate the size distributions with the personal income series and because tolerably reliable estimates of the size distribution of imputed items could be obtained on the basis of relationships from earlier surveys or from indirect evidence. For instance, imputed interest originating in banking could be distributed on the basis of information on the ownership of bank deposits.

The omission of imputed items has been advocated on conceptual grounds, mainly because no techniques have yet been devised to value them in a manner which will ensure their equivalence with the monetary flows with which they are combined. There is a great deal of truth in this argument, and it may also be granted that the inclusion of imputed income flows may lead to some difficulties in the use of detailed size distribution data which are absent in the case of the aggregate estimates. From the standpoint of the broad overall view of the income structure of the economy which is here intended, however, an inclusion of imputed income flows is preferable to their neglect.

In the case of wages and farm profits the case for imputation is very strong in spite of the disadvantages that may be introduced through inadequate methods of valuation. The case for the net rental imputation is similar. The interest imputations, however, are of less direct significance in personal income studies. As has already been explained, the life insurance imputation is made because it permits a treatment of saving that is consistent and meaningful accounting-wise. Finally, the commercial banking interest imputation could have been omitted from the series without practical loss to the size distribution estimates. The major consideration in favor of inclusion in this instance was the desire to obtain as complete integration as possible between the new series on family personal income and the rest of the national accounts.

2. The definition of income which underlies recent field surveys of income size distribution differs from the concept of family personal income mainly because it excludes imputed income flows. Most other differences can be regarded best as statistical, being suggested largely by the nature of the information that can be obtained from field surveys (as distinct from the sources from which the national aggregates are derived). See part 1 of the appendix.

Time period

The incomes distributed by size in this report are those received during a given year. The choice of this time period is the only practical one for a general purpose time series such as that presented here. Its effect on the relative income differences shown by the data should, however, be noted.

If the time period chosen had been longer than a year, it is likely that the relative income differences shown would have been smaller than those that appear for any given year in the report. The relative position of individual units along the income scale tends to change to some extent from year to year. (For instance, temporary factors, such as extraordinary business gains or losses, or sickness and unemployment, which place individual units at the extremes of the income distribution in any given year, tend to cancel out if incomes received over several years are combined.) Given this circumstance, and provided that the relative distributions in the adjacent years approximate each other, combined distributions will show smaller relative income differences than annual distributions. Conversely, income distributions for a period shorter than a year will show greater dispersion than annual distributions under these assumptions.[3]

Size distributions of national income

The size distribution of income given in this report has been envisaged as a breakdown of the income total appearing in the personal account. From the standpoint of functional studies of consumer behavior it is a useful aggregate, and it is useful also for comprehensive studies of the distribution of the national output. However, in the latter connection certain limitations of the concept should be noted.

It does not take account of certain items of income that ultimately accrue to individuals but are not distributed to them (such as undistributed profits). And it takes only partial account of the role of government in the effective distribution of income: the effects of government transfer payments are considered, but the effects of taxation and the incidence of government services on the various income groups are not taken into account.

To obtain a comprehensive view of income distribution and of the effects on it of government receipts and expenditures it might be preferable to start with the national income aggregate and to allocate it to the various income groups whether or not the income has been actually distributed. Next, the effect of transfer payments and taxation on the income distribution would be taken into account. Finally, an allowance for the effects of government services on the various income groups could be allowed for.

In this manner a very comprehensive view of income distribution could be obtained. It is clear, however, that this could not be done by tracing the actual course of income flows but only on the basis of supplementary assumptions. For instance, undistributed corporate profits would have to be allocated among families in proportion to the flow of dividend payments or according to data on the distribution of corporate ownership by family income level. The effect of taxation could be calculated only on the basis of detailed assumptions as to tax shifting and incidence. The allocation of government services would create the most serious conceptual and statistical problems.

A comprehensive study of this type would represent a special analytical investigation based on assumptions that might not receive general consent, rather than the provision of a new set of statistics usable in various types of analysis, which is the prime objective of the present report.

The Family Unit

As has been indicated in connection with the definition of family personal income, the population covered by the size distributions is the noninstitutional civilian population of the continental United States. Members of the Armed Forces on post as well as the civilian institutional population are excluded. So are nonprofit institutions, and private trust, pension and welfare funds, entities which are treated as personal income recipients within the context of total personal income.

Classification into families

The noninstitutional civilian population is grouped into families (and unattached individuals not living in families). It is these units that are classified by size of income in the size distribution statistics.

Thus the family is regarded as the ultimate unit of classification appropriate for the overall general purpose estimates of income size distribution published in this report. Distributions in terms of alternative units of classification are seen as belonging in the province of analytical studies directed at specific objectives. This decision to regard the family as the unit of classification reflects the fundamental importance of that institution in the fabric of our society. We cannot dispense with it as the central point of reference in analyzing the economic status of the population, and it constitutes the basic unit also for the study of consumer behavior as affecting the working of the economy.

In the former type of investigation it will be found that, even though the status of the human individual is the ultimate concern, the family must be used as the basic unit for analysis. This is so because the economic interdependence

3. In addition, even if the specific assumptions made in the text are not met, it is true that the relative dispersion in a distribution in which the basis of classification is total family income received over a period of several years, cannot be larger than the weighted average of the relative dispersions for the several individual years (where the weights represent total incomes in the several years).

among family members makes it difficult to evaluate the living standard of an individual member except within the context of the family.

A large part of family income is allocated to items that involve benefits to individual family members which are to a large extent independent of the size and composition of the family—expenditures for many consumer durables are an obvious example, but many nondurable and service expenditures have similar "overhead" aspects, and saving, as provision for unexpected contingencies, to a degree belongs in the same category. Essentially because of this "overhead" nature of many of the benefits derived from family income, the family must be the basic unit of analysis.

Needless to say, it will often emerge that the investigation cannot be pushed far enough without distinguishing further among families of different types. However, the further distinctions that must be made depend on the particular problem that is under examination. No general definition of the income receiving unit emerges, superseding that of the family.

Most functional studies of the economy suggest the same lesson: In studying the relation between income and consumption and saving, for example, the family cannot be superseded, because it is the basic unit deciding upon the disposition of a common family income. Intensive investigation will, however, have to distinguish among different types of families.

There are exceptions to this generalization. In functional studies of the economy in which individuals appear in their capacity as producers rather than consumers, the individual earner may be preferable to the family as the basic unit of classification. But since this type of use of income size distributions is much less widespread, the size breakdowns which they require must be regarded as information supplementary to the family distributions.

Definition of family

In this report, a family is defined in the same way as in recent releases of the Bureau of the Census, as a group of two or more persons related by blood, marriage or adoption, and residing together. Unattached individuals ("unrelated individuals" in the Census Bureau releases) are defined as persons not living with relatives.[4]

This "demographic" definition of the family, specifying the criteria of common domicile and relationship, has been adopted in contrast to a group of definitions in which the common use of family income is substituted for the relationship criterion. These "economic" definitions of the family bring out the fact that from the standpoint of economic analysis it is the financing of common benefits out of common resources that is essential in the definition of the family, rather than the physical or legal fact of relationship.

There is no disagreement between the two definitions in the large majority of cases in which the family consists of the husband and wife and their minor children living with them. Important cases of disagreement arise, however, in instances when some related adults—grown children or other relatives—live in the household, for it is in these instances that the "relationship" and "income" criteria may yield different results.[5]

In 1948 some 13 million of the 37 million families of two or more persons in this country contained one or more relatives 18 years of age or older besides the head of the family or his wife. From recent surveys that have applied the economic definition of the family it would appear that somewhat more than 6 million units would be added to the total number of families if the income criterion were substituted for the relationship criterion.

Since the economic definition of the family involves the splitting of incomes that according to the demographic definition would be reported as a unit, it is evident that more economic than demographic families are found at lower and fewer at higher income levels. The differences are quite significant. For instance, according to the surveys of the Federal Reserve Board, the number of units with incomes above $5,000 is diminished by one-fifth in 1948, when an economic definition is substituted for the demographic definition used in this report.

The use of the demographic definition in constructing the present estimates was strongly suggested by the fact that it underlay the basic Census Bureau surveys which were important sources of data. Difficult statistical problems would have been involved in the conversion of the data to the economic definition on a detailed basis.

Alternative definitions

However, quite apart from these statistical considerations, the demographic definition of the family may be defended on the ground that it is questionable whether the bulk of the additional units segregated in practical applications of the economic definition enjoy a substantial measure of genuine economic independence.

The unmarried grown-up son or daughter who pays his parents for his room and board but reserves the balance of his income to spend on his own account has frequently been singled out as constituting an independent economic unit in surveys applying the economic definition of the family. But it would appear that payment for room and board is not an adequate test for establishing the presence of real economic independence. In many instances these payments are either nominal or else far in excess of the going rate. Only in rare cases is an exact *quid pro quo* calculation, analogous to that for the genuine roomer and boarder, made. Thus these earning sons and daughters usually participate in much of the common life of the family, and only very rarely can they be regarded as independent from the group of relatives with whom they live.

However, it must be recognized that instances of marked economic independence sometimes do occur within a group

4. For further detail on the groups covered, see part 3 of the Appendix.

5. Nonrelated adults living with families are not an important source of disagreement in practice. The bulk of these adults are roomers and boarders who do not pool their incomes with those of the family and are almost always regarded as separate units under both definitions.

of related persons who live together. For instance, two related sets of parents with their children may occupy the same living quarters but nevertheless maintain almost complete independence with respect to their expenditures for most categories of consumption. It would be preferable to treat such families as separate units in income size distribution statistics.

Fortunately for the problem of family definition, it appears that doubled-up units living in substantial economic independence from each other are far less numerous than might be supposed. In surveys using the economic definition of the family, such as the recent surveys of the Federal Reserve Board and the 1935–36 National Resources Committee Study, the bulk of units that were segregated from their relatives were found to be single sons and daughters of the type just discussed; relatively few were doubled-up multiperson units.

In these circumstances, the simplicity and objectivity of the demographic definition of the family is an important point in its favor. The concept of interdependence which underlies the economic definition of the family is difficult to state precisely, although the broad idea involved—the sharing of income for common purposes—is fairly clear. And it is even harder to formulate specific tests for the use of data collectors by which to judge whether the interdependence envisaged actually holds in any given instance. The more clear-cut the test, the more likely it is to work in an arbitrary manner in concrete cases, violating the spirit of the definition which it is designed to implement. On the other hand, the more general the test which is to be applied, the greater is the danger that the data will be biased by the subjective judgment of the enumerator.

With minor exceptions, both the demographic and the economic definitions of the family accept the common domicile criterion. Even though no practical proposal has ever been made to dispense with this criterion, such suggestions have been advanced in some general discussions in which the problem of measurement was not seriously faced.

The most common case which has invited a broadening of the family concept beyond that of a group of persons having a common domicile is that of elderly parents living alone who are being supported by children who live elsewhere. A broadening of the family concept to include relatives living in different households is, however, extremely difficult to apply in practice. Even apart from the difficulties that would be encountered in formulating relatively unambiguous tests for combination, the desirability of merging such nonhomogeneous units would be questionable. It would appear that the economic interrelations involved would be best taken account of by a comprehensive coverage of interfamily gifts and contributions.[6]

Needless to say, many classification problems arise in the concrete application even of the relatively clear-cut demographic definition of the family.[7] However, they are not of sufficient practical importance to be discussed in this brief summary of the subject.

6. See footnote 1.
7. For example, in the present report college students are enumerated with their families, whereas in certain other studies they are counted as unattached individuals if they lived away from home while attending college.

Problems of Comparability

Some of the major problems of comparability that arise in the interpretation of size distribution data are discussed in the following sections.

Shifts in individual status

In the estimates published in this report the classification of individuals into the units distinguished in the distributions (families and unattached individuals) is as of a point in time, the end of the calendar year. The income ascribed to these consumer units is the total income received over a period of time—the calendar year—by the individuals who constitute these units at the end of it.[8]

For units that are composed of the same individuals throughout the year this procedure results in an accurate picture of the income size distribution. However, many individuals belong within a given family unit, or are in an unattached status, only during part of the year. During the remainder of the year, they may belong within another family, or they may not be a part of the civilian noninstitutional population at all. In these instances the number and composition of consumer units change during the year, and the present procedures may not lead to a proper enumeration and matching of incomes and recipient units. Distortions of the income size distributions may result.

The simplest case of distortion arises when an individual who was a non-earning dependent during part of the year becomes an income recipient and establishes himself separately from his family during the remainder of the year. Such an individual will be listed at an income level corresponding to his part-year earnings, although it is evident that these understate his annual income status as an unattached individual.

8. This manner of classifying units and attributing income has been adopted because of the characteristics of the sample surveys of the Bureau of the Census which constitute an important data source of the present estimates. It will be noted in part 1 of the appendix that the classification of individuals and consumer units, although adjusted to a year-end population total, incorporated the pattern of a somewhat later date, namely the date to which the Census Bureau surveys refer. This fact reinforces the points which are developed in the text on the simpler assumption that the classification of consumer units is as of the end of the calendar year.

Shifts of individuals within the civilian noninstitutional population which result in additions to the number of consumer units during the year will introduce a downward bias into the estimates. For all units taken together this is evident from the fact that a correct income total is divided by a number of units that is too large, the part-year character of some of these units not having been taken into account.[9]

Shifts which lead to a decrease in the number of consumer units impart an upward bias to the size distribution estimates. In these instances a correct income total is divided by a number of units that is too small, units that existed only during the earlier part of the year not having been taken into account.

Shifts of individuals among the civilian population which do not result in changes in the number of consumer units are not a source of upward or downward bias in the sense in which the term has been used. Both total income and the total number of units is correctly stated in this instance, with offsetting errors in the incomes of the units enumerated.

In addition to shifts of individuals within the civilian noninstitutional population there are shifts in and out of this sector. These cases differ from the previous ones, because total income as well as the number of consumer units may be misstated. Their effects cannot be predicted unless further assumptions are introduced.

Importance of shifts

Data are lacking at present for making a conclusive analysis of the bias which has been introduced into the present size distributions by shifts of individuals within, and in and out of the civilian noninstitutional population. But the large increase in the total number of consumer units that occurred in the postwar period indicates the possibility of a significant downward bias for those years.

Additions to the number of income recipients on a broad scale are characteristic of our expanding economy and by and large result in the creation of additional consumer units of unattached individuals and families. The normal processes of new unit creation were significantly accelerated in the postwar period by favorable economic opportunities and the gradual alleviation of the housing shortage. In the postwar period these forces making for a downward bias in the distributions were much more potent than those leading to the merger of existing units and to a consequent upward bias in the estimates.

9. The effect on the component units is more difficult to trace. For instance, if the move to independent status is made by an individual who was a supplementary earner beforehand, the income of the parent family will be understated, because it will not include the income received by the supplementary earner.

The income at which the new unit—the unattached individual—is classified may be more or less than the income that is representative of its true income status. On the one hand, the income of the supplementary earner is wrongly attributed to the new unit. This is a source of overstatement. On the other hand, no allowance is made for the part-time character of the income received by it. This is a source of understatement. The two errors are exactly offsetting when the annual rates of the two incomes are the same. On balance it is very likely that the rate of independent income will exceed that of the supplementary income. In these cases the new units as well as the "parent" units will be classified at income levels which fall short of their true annual income status.

The effects of changes in the number of consumer units since 1944 which were due to exits from and entries into the civilian noninstitutional population are difficult to measure. Deaths, to the extent that they lead to the understatement of family incomes because of the exclusion of incomes of persons who died during the year, introduced a downward bias into the statistics. In instances in which deaths are accompanied by the disappearance of a consumer unit (for instance when an unattached individual dies or when the widow and orphans of a deceased person join the family of relatives) their effect on the income distribution is indeterminate.

The shift of civilians into the military establishment during 1944 which is reflected in the estimates for that year had effects on the income size distribution which can be analyzed in the same terms as the effects of deaths. The reabsorption of members of the Armed Forces into the civilian population in the postwar period tended to introduce an upward bias to the extent that military incomes were included in the incomes of existing civilian consumer units which the returning servicemen joined. The estimates for 1946 are influenced by this factor.

Comparing nonhomogeneous units

In summary uses of the income size distributions it is to some extent possible to regard the consumer units enumerated as similar to each other, except with respect to income, and to derive broad conclusions without considering further differences among them. These units differ from each other, however, in significant characteristics other than income. This may affect cross-section studies as well as comparisons over time. Also given units change their characteristics or go out of existence and new units are created, further adding to the difficulties of temporal comparisons. In checking preliminary conclusions and in intensive uses of the data it is important to keep these factors in mind.

For instance, the significance of the income units at the lower end of the income scale cannot be assessed merely in terms of their numbers as compared with the number of units in other income groups. An analysis must be made of the particular characteristics of the low income units as compared with those of the higher income groups, noting all factors that have bearing on differences in family needs.

Most important in this connection is the composition of the family—the numbers and types of persons depending on a given family income. For instance, it is generally found that a particularly large proportion of the units at the lower end of the income scale consist of unattached individuals rather than multiperson families. The fact that the claims made on the income of these individuals are generally smaller than the claims made on the incomes of families is a significant fact in interpreting the income distribution of the Nation.

Again, a comparison of the low income groups in the thirties and in the postwar years merely in terms of numbers would be deficient, because the units are not homogeneous. It is important, for instance, to note the preponderance of relief families at the low end of the earlier distributions and

the much greater relative importance of retired people in recent years.

Split-ups and mergers in which particular units lose their identity also call for notice. For example, the alleviation of a housing shortage may result in an undoubling of family units over time. Quite apart from the problem of part-time units during the transitional period which has already been discussed, this splitting-up of income recipient units will cause a greater concentration of units at lower income levels than would exist had this undoubling not occurred. This will lead to a mistaken diagnosis of changes in the income size distribution unless the underlying factor, affecting the comparability of units, is recognized.

A similar split-up of units makes it difficult to analyze the effects of social security programs on the income size distribution. The payment of social security benefits has added, other things being equal, to the income flow going to the population and a shift into higher income brackets might be expected on this score. However, this tendency cannot at all clearly be traced in the statistics, because the very improvement of living standards due to the flow of social security benefits has in many cases permitted aged and unemployed persons to maintain separate households instead of doubling up with primary family units as in pre-social security days.

Studies of the effects of cyclical fluctuations in total income on its size distribution are another example in which noncomparability of units owing to split-ups and mergers introduces difficulties of analysis. The decline of family incomes during depressions is partly counteracted in size distribution statistics by the fact that families or unattached individuals that are in straitened circumstances double up; and, conversely, the increase of incomes during prosperity is partly counteracted by the splitting up of family units which is likely under these conditions. This noncomparability of units raises difficulties if the aim is to study the effect of the business cycle on income size distribution exclusive of the effects that stem from changes in the recipient units.

Income size distributions based on an economic definition of the family would be less subject to some of the difficulties of interpretation that have been mentioned. For example, in some cases the economic definition would treat as two separate families a group of related persons who were temporarily doubled-up at the close of World War II. In these cases the alleviation of the housing shortage in the postwar period and the accompanying undoubling of units would not result in an increase in the number of families. In other instances, however, the use of the economic definition would not serve to eliminate problems of comparability. For example, the economic definition of the family would not provide a solution to the problem of comparability over time raised by the introduction of social security benefits.

Need for detailed breakdowns

In all these instances, as well as in the examples given earlier in this chapter, in which analysis was impeded by the nonhomogeneity of the income recipient units, the major statistical requirement is for additional breakdowns of the data. Separate information is needed on the income size distribution of types of families and unattached individuals which differ significantly from each other. Distributions distinguishing families of different sizes and composition come to mind immediately. But many other characteristics, such as geographic area, farm or nonfarm residence, size of community, occupation of the family head, number of earners in the family, and the major sources of family income, may also be involved, depending upon the nature of the particular analysis.

Availability of detailed distributions of this type, geared to the national estimates, will make for progress in instances in which analysis is now impeded by the noncomparability of consumer units.

Appendix

Sources, Methods and Statistical Tables

THE estimates presented in this report show the distribution of families and unattached individuals by size of family personal income for selected years, and the distribution of aggregate family personal income among these consumer units.

Families and unattached individuals are defined as in recent field surveys of the Census Bureau. Broadly speaking, these units cover the civilian noninstitutional population, with families defined as units of two or more related persons living together, and unattached individuals as persons living apart from relatives. The income concept used in the distributions is the same as that underlying the personal income series of the Office of Business Economics, with the exception that personal income received by members of the armed forces not living with their families, by inmates of institutions, and by nonprofit institutions, and income retained by private trust, pension and welfare funds is excluded. These definitions are discussed in chapter 3.

The appendix which follows describes the statistical methodology underlying the estimates and presents the statistical tables that contain the results of the study.

Contents of Appendix

Part 1

Distributions for 1944, 1946, and 1947

THE distributions for 1944, 1946, and 1947 by level of family personal income (before income taxes) presented in this report were derived by combining consolidated statistics from Federal individual income tax returns with those collected in recent sample field surveys of family incomes, and adjusting the results so that they would account for the family income totals included in the personal income series.

Because of the low filing requirements introduced during World War II, the coverage of the tax return statistics has been very broad in recent years, thus providing a relatively firm basis for the size distribution estimates. Relationships determined from the field survey data were used mainly to convert the tax returns into family units and to add the various types of income that were not required to be reported for tax purposes. The personal income series provided control totals which were used to correct these several sets of data for undercoverage of income.

SOURCES OF DATA

Federal individual income tax returns were required to be filed in this period by all persons with gross incomes of $500 or more. In addition, several million persons with smaller incomes filed returns mainly to obtain refunds of withheld taxes. The data from these returns have been tabulated by the Bureau of Internal Revenue by size classes of total ("adjusted gross") income and also by size classes of each of the various major categories of income reported on the returns.[1]

Despite their broad coverage and relative reliability, the tax return tabulations do not provide all of the necessary statistics for constructing family income distributions. In the first place, the unit of classification in the tabulations—the tax return—is not equivalent to the family. More than one tax return is filed in many instances by members of the same family and the tabulations treat all returns as separate units. The information tabulated from the tax returns does not provide a basis for matching the returns filed by the several members of a particular family, nor even for separating the tax returns of one-return families from other returns.

In 1946, for example, almost 53 million individual income tax returns were filed as compared with a total of 43 million families and unattached individuals, with the latter figure including a substantial number of consumer units whose incomes were either low enough or of such a type that they were not required to file returns. Because of this difference in the unit of classification, the income bracket in which many tax returns are included is substantially lower than that of the family units to which these returns belong.

A second difficulty stems from the fact that a number of different kinds of income are not required to be reported on tax returns, as, for example, social insurance and veterans' benefits, and various types of nonmoney income that are included in total family income. Still a third limitation arises because certain types of income as stated on tax returns fall short of the corresponding totals in the personal income series.

The second major source of data on income size distribution is the nationwide sample field surveys of family incomes. Such surveys have been conducted annually since 1944 by the Bureau of the Census of the United States Department of Commerce as an adjunct to its Monthly Report on the Labor Force, and since 1945 by the Survey Research Center of the University of Michigan for the Federal Reserve Board as part of its annual Survey of Consumer Finances.[2] These surveys are useful in their own right mainly because of the detailed information which they provide on incomes of component family groups and on the relationships between family income and other economic variables.

In these surveys trained enumerators interviewed small representative samples of from 3,000 to 25,000 households and determined, among other items, the amounts of income of different types received by the several members of each family unit during the preceding calendar year, and various

1. The tabulations for each year are published in *Part I* of *Statistics of Income*, Bureau of Internal Revenue, U. S. Treasury Department. In addition, a number of tabulations with more detailed breakdowns were made available by the Bureau as indicated in following sections of this Appendix.

2. The annual Census Bureau survey statistics have been published mainly in release series P–60 (e. g., "Income of Families and Persons in the United States: 1950," Series P–60, No. 9), and those from the Federal Reserve Board surveys in various articles in the *Federal Reserve Bulletin* (e. g., "Income, Selected Investments, and Short-term Debt of Consumers," *Federal Reserve Bulletin*, September 1952).

In addition to its published tabulations the Census Bureau provided a large number of special tabulations for use in the present project as described in later sections of this Appendix. The Federal Reserve Board also furnished unpublished data from its surveys, and the Bureau of Agricultural Economics of the U. S. Department of Agriculture, cooperating with the Census Bureau in the income survey for 1946, provided detailed sample data on the composition of farm operator family income in that year (see section 6).

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other characteristics with respect to the size and composition of the family. The sample data are inflated by the agencies conducting the surveys to represent all families and unattached individuals included in the survey universe.

With respect to the definitions of income and the income recipient unit the survey data are better suited for the purpose at hand than the tax return statistics. The recipient unit in many of the survey tabulations is the family or unattached individual as defined in the present report, and the family income that is used as a basis for classification by income size is defined to cover a wider range of money income items than the tax return statistics. Like the tax returns, however, the income measure used in recent surveys does not include the value of various types of personal income, mainly income received in kind.

All of the income field surveys have been found to understate the total money income of consumer units, although the current situation in this respect has greatly improved. The percentage understatement has varied among the surveys and was fairly sizable for the period under consideration here. The available evidence indicates substantial variation, also, in the extent of understatement among the several categories of income. In the case of the Census Bureau surveys the undercoverage has been largest in relative terms for the various items of property income and smallest for wages and salaries. Even for the latter item, however, the proportions unaccounted for are larger in the Census Bureau sample surveys than on tax returns for this period.[3]

Income understatement is due in large part to errors of response and nonreporting which follow from the tendency of respondents to forget or understate the amounts of income they received during the year. In some cases, also, the person furnishing the income information for the family may not have full knowledge of the sums received by other family members, and in others he may have misunderstood the scope of the family income that was being measured.

In some surveys part of the understatement may be due to the method of inflating the sample data. For instance, adequate allowance may not be made for income differences between families selected in the sample for whom responses were not obtained and those furnishing the requested information. Another possible source of understatement may stem from the failure to ascertain the presence of all of the families and unattached individuals living in the particular dwelling units selected in the sample.

Also, the income data from the surveys (as well as those from tax returns) are subject to sampling variability, but this factor is believed to be of less importance in the overall income coverage than response and nonreporting errors.[4]

Another limitation of the survey data is that, unlike the tax statistics, they lack detail for the income ranges above $10,000. This follows from the small size of the recent samples coupled with the fact that more extended sample enumeration of the upper income groups would be extremely difficult and expensive.

In view of the deficiencies in the tax and field survey data it appeared that the most reliable estimates of size distribution would be obtained by combining the two sets of statistics in such a way as to utilize the best information from each source, and adjusting the results so that they would account for the corresponding totals included in the personal income series of the Office of Business Economics.[5]

SUMMARY OF PROCEDURES

The combination and adjustment of statistics from income-tax returns and field surveys is necessarily a complicated procedure, as will emerge from the detailed discussion below.

In essence, the methodology underlying this report involved the estimation of distributions of individual earners by size of wage-salary and nonfarm entrepreneurial earnings; the combination of these individual earners into family units classified by size of family earnings; and the addition of other types of income to family earnings to obtain a distribution by size of family personal income for nonfarm families and unattached individuals. For farm operator families, the distributions were obtained directly on a family-unit basis by determining the distribution of this group by size of family money income and then adding the various types of nonmoney income they received.

The distributions of individual wage-salary earners and nonfarm entrepreneurs were based on data from income tax returns which provided much better coverage of these types of earnings than the field surveys for the period under consideration.[6] Relationships based on the survey data were used for combining the individual earners into families, and for adding the several types of income not reportable on tax returns, e. g., veterans' payments and family allowances, and social insurance benefits and assistance. Interest, dividends and rental income were added to family earnings on the basis of tax return data, supplemented, for families in the lower income ranges, by the field survey statistics. In the case of farm income, the coverage of the field enumerations was found to be higher than that of tax returns and accordingly the distributions for the farm operator family group were based on that source. In combining these several income categories, the basic size distribution data for each were adjusted so that they would total to the cor-

3. For comparisons of the amounts of income accounted for in the sample surveys (and on individual income tax returns) with the personal income series, by categories of income, see Selma F. Goldsmith, "Appraisal of Basic Data Available for Constructing Income Size Distributions," Part VI of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

4. Evaluations of the techniques used in recent sample field surveys are included in the following publications: "Income of Families and Persons in the United States: 1950," Census Bureau release P–60, No. 9; "Methods of the Survey of Consumer Finances," *Federal Reserve Bulletin*, July 1950; "Field Surveys of Consumer Income: An Appraisal," Part IX, *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

5. A detailed description of this series is contained in the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS.

6. Measures of the relative coverage of the various income categories could be derived only for the Census Bureau surveys since the Federal Reserve Board tabulations for this period did not include breakdowns by type of income.

Annual size distribution data for wage-salary earnings are available, also, from the Bureau of Old-Age and Survivors Insurance of the Federal Security Agency. Despite their broad coverage these data could not be utilized in the present estimates because they applied only to workers with wage credits in "covered" employment and could not be integrated with size distribution statistics from tax returns or the field surveys.

responding aggregate amount from the personal income series.

The following is a brief description of the steps of the estimating procedure. A more detailed account is presented in sections 1–7.

First, distributions were developed for individuals by size of civilian money wages or salaries (section 1), and by size of nonfarm entrepreneurial money earnings (section 2), on the basis of distributions of individual income tax returns by size of each of these categories of earnings. It should be noted that these distributions were developed initially for individuals rather than for families because the tax return distributions approximated individual earners more closely than family units.

For the wage-salary category, the main adjustments made in the tax return tabulations were to split those returns that covered wage-salary earnings of both husband and wife, and to add the earnings of the major groups of wage-salary earners not covered in the tax return universe. These adjustments were introduced in order to match as closely as possible the group of individuals in the comparable distributions from the field surveys. Relationships from these surveys were used to combine individual earners into families—as later described.

For nonfarm entrepreneurs the tax return distributions were adjusted separately for broad industry groups to account for the corresponding income totals from the personal income series. For the major professional groups, use was made of data collected in recent mail questionnaire surveys conducted by the Office of Business Economics.

The next step was to add the frequency distributions of wage-salary earners and nonfarm entrepreneurs, making allowance for overlap in instances where the same person received both types of earnings during the year (section 3). Members of farm operator families who received these types of earnings were subtracted from the combined distribution because the farm operator family distributions were derived by a different estimating procedure (section 6).

The methodology thus far related to the distributions of individuals by size of their own earnings. These distributions were next converted into distributions of nonfarm families (and unattached individuals) by size of family civilian money earnings, i. e. by the size of the combined earnings of the several earners in the family (section 4). This was done by subdividing the all-earner distribution into separate distributions for unattached individuals and for individual earners belonging in families with 1, 2, 3, etc., earners, and then combining the earnings of the several persons in multi-earner families. Relationships determined from tabulations of Census survey data in which individuals were classified into various number-of-earner-families, and cross-classified by size of their own earnings and by size of total family earnings, provided the basis for these two steps.

Next, was the addition to civilian money earnings, for nonfarm families and unattached individuals separately, of the various other kinds of income comprising family personal income (section 5). Two groups of income items were distinguished here, the first covering the several categories included in family money income as defined in the recent field surveys, and the second including nonmoney items plus certain adjustments in order that the income definition would agree with the coverage of family personal income.

The first group of items included property income (monetary interest, rents, dividends, and fiduciary income), military family money income (veterans' payments, family allowances and allotments, and military pay of armed force personnel who returned to civilian life), and social insurance benefits and assistance and miscellaneous money income items. Estimates were derived of the proportions of families in each civilian money earnings bracket (including a no-earnings bracket) receiving various combinations of these types of income, and of their distribution by size of such income. The earnings and other money income of these families were then added and the families shifted to brackets of total family money income.

Data from tax returns were used as a basis for deriving these estimates for the middle and upper income ranges in the case of property income, and those from the field surveys for the property income estimates for lower income brackets, as well as for the estimates for the other income categories listed above. For each of these income categories, the data from tax returns and the field surveys were adjusted so that they would account for a control total of aggregate income determined from the personal income series and an estimated total number of recipient units.

Nonmoney items of income of nonfarm families and unattached individuals—imputed rental value of owner-occupied nonfarm dwellings, wages and salaries in kind, and imputed interest—were distributed largely on the basis of data from earlier field surveys or from related data collected in the recent field surveys of the Federal Reserve Board. The addition of these items plus certain definitional adjustments yielded distributions by size of family personal income for these groups of consumer units.

For farm income, the coverage of tax returns both in terms of numbers of units and aggregate amounts was found to be smaller than that of the blown-up field enumerations. The income distributions for farm operator families—all those containing a person who operated a farm—were therefore based on the latter source (section 6).

First, the farm operator family group was distributed by size classes of family money income by adjusting sample data from the 1950 Decennial Census of Population for this group of families in such a way as to account for the annual aggregate net money farm income estimated independently by the Bureau of Agricultural Economics plus the money income received by these families from other sources. Next, nonmoney income items—food and fuel produced on farms and consumed by members of farm operator families, and rental value of farm dwellings—together with the value of farm inventory change were added, largely on the basis of relationships from earlier surveys that included measures of the value of imputed items.

Summary distributions for all consumer units were obtained by combining the distributions for farm operator

families with those for nonfarm families and unattached individuals (section 7).

EVALUATION OF ESTIMATES

The estimates of the distribution of income by size are based on greatly improved sources of statistical information that have become available during the past decade.

In the first place, the coverage of the tax return series has been very much broader since World War II than in prewar years, due mainly to the lower filing requirements introduced early in the war. In the income distributions prepared for earlier years the data from income tax returns could be used only to construct estimates for the top ranges of the income scale, which were then linked directly to field survey data for the low and middle income brackets.

Secondly, advances in sampling techniques have added to the reliability of the statistics from the sample field surveys of family income. Despite their relatively small size the recent surveys provide more representative nationwide statistics than the larger surveys conducted in the past.

In addition to the larger coverage and better quality of the basic data, the present estimates incorporate marked improvements in the methodology for integrating the several sets of source material. By taking separate account of each of the major categories of income, as outlined above, the tax return and field survey data were combined by procedures that utilized the best information available from each source. Thus it was possible to use to full advantage the more reliable tax return data for wages and salaries and nonfarm entrepreneurial earnings, to turn to the field survey statistics for farm income and for items of income not covered on tax returns, and to combine the data from the two primary sources for the various types of property income.

Improved statistical procedures were an important factor in the effective use and integration of the basic data sources. For instance, techniques were developed for combining earners into families, based on patterns derived from survey data, which made it possible to use effectively the data on the distribution of earnings derived mainly from tax returns which could not have been introduced if this statistical bridge between the distribution of earners and families had not been developed. Similarly, information on the distribution of the various types of money income other than earnings from both the tax returns and field surveys could be utilized to best advantage in building up the family income distributions because procedures were devised for utilizing income patterns which indicated how these forms of income combined with each other and with family earnings.

Separate treatment of the major income categories made it possible to incorporate most effectively into the income size distributions control totals of income that were based on the personal income series of the Office of Business Economics. The development of the estimates in this manner had the advantage of isolating the areas in which adjustments in the primary data were required and permitted these adjustments to be made in the light of all the information available regarding these specific areas instead of in a more summary manner. A similar integration with the personal income series was not attempted in earlier studies.

Despite these various improvements, certain limitations attach to the present estimates which reflect for the most part deficiencies inherent in the basic source material. These should be borne in mind in interpreting the figures.

The main limiting factor is the undercoverage of income in the primary data. The combination of the tax return and field survey statistics reduced the extent of undercoverage well below the level for either of the two sets of data taken separately, but the fact remains that the proportions of income unaccounted for were fairly substantial for certain of the income categories. Although every attempt was made to distribute the missing amount of income within each income category in the most reasonable manner, some error must necessarily attach to estimates of this kind. Results obtained by careful and detailed adjustments cannot be as satisfactory as those which would have been derived had the basic data been complete as to income coverage.

Income undercoverage—reflecting, in part, amounts not required to be reported on tax returns—was smallest in relative terms for the wage-salary category where the tax returns accounted for approximately 95 percent of the civilian money wage or salary total in each of the 3 years. For nonfarm entrepreneurial money earnings the tax return data for 1947 totaled to 85 percent of the corresponding figure derived from the personal income series.

In the case of net money farm income the coverage of the inflated sample data from the recent Decennial Census of Population was approximately 80 percent of the comparable total estimated by the Bureau of Agricultural Economics. The census data were used as a basis for estimating the income size distributions for the farm operator family group because relative income differences appeared more reasonable than those from other source material for the period under consideration, and the proportion of income accounted for by the census data was substantially larger than the coverage in field enumerations or in income tax returns for years to which the estimates described here refer.[7]

For each of the other three major income categories—property income, family military income, and social security benefits, assistance, and miscellaneous money income—the differences in income coverage could be measured only roughly since absolute amounts from the surveys and tax returns were not incorporated directly into the estimates. Instead, as is explained in section 5, one or both sets of primary data were used as a basis for estimating, by earnings level, the percentages of nonfarm families receiving each of the three categories of income and the mean amounts per recipient family, and these figures were applied against the numbers of nonfarm families in the several earnings brackets.

For property income—monetary interest, dividends,

7. In connection with the text references to the coverage of tax returns, it should not be inferred that differences between personal income and the amounts shown on tax returns consist entirely of underreporting of *taxable* income on income tax returns. Aside from possible differences in income definition between the two series that may not have been fully allowed for, some of the income omitted from tax returns would not be taxable even if properly reported, inasmuch as it would be offset by the credits and deductions allowable.

rents and income distributed by fiduciaries—the amount obtained by applying relationships from the combined survey and tax return data in this manner totaled, before adjustment, to about 60 percent of the corresponding aggregate in the personal income series. For the military income category, the corresponding proportion yielded by applying survey relationships was approximately two-thirds, and for social security benefits, assistance, and miscellaneous money income, about three-fourths.

It appears on balance that some of the most serious limitations in the primary data relate to the farm operator family group. In deriving the income distributions for this sector, it was necessary to assume, as described in section 6, that relative income differences in the family money income distribution in each of the years covered by the report were the same as those shown for 1949 by the sample from the Decennial Census of Population. With respect to farm inventory change, which was not included in the source material, the assumption was made that its distribution was proportionate to that of net money farm income. Off-the-farm money income of farm operator families was based on amounts reported in the census enumeration. This may have understated the actual amounts received, and thus may have resulted in an overstatement of the numbers of farm operator families in the low ranges of the income scale.

The problem of income measurement for the farm operator group was further complicated by the relative importance of nonmoney income items and the fact that it was necessary to base allocations on relationships determined from earlier survey data. Only when improved farm income surveys are made will it be possible to measure the biases that may have been introduced by these several procedures.

It should be noted also, that, corresponding to the valuation in the personal income series, farm prices were used to value the home-produced food consumed by farm operator families. A higher pricing—e. g., at retail levels—would have increased the incomes of the farm operator group, with the largest relative additions occurring in the lower ranges of the income scale.

It is important to remember that the farm operator family distributions include all families operating farms even though farm operations constituted only a secondary source of income for a sizable number of these families. This somewhat unrealistic classification was dictated by the fact that the control totals of gross and net farm income were not available separately for "part-time" farm families.

The income size distributions for nonfarm families are the most reliable component of the present series. This is due in large part to the very high coverage of wages and salaries in the tax return statistics and also to the fact that by integrating the various sets of primary data reasonably good coverage was obtained for other income categories.

However, as indicated above, the basic data were less satisfactory for several types of income that represented fairly sizable components of nonfarm family income in the lower ranges of the income scale. Statistics on the distribution of social security benefits and assistance by family earnings brackets, for example, could be obtained only from the sample field surveys. Data for most of the Federal, State, and local government programs that are included in this category were not available with breakdowns by size of family earnings so that they could not be used as a basis for allocating the amounts of income unaccounted for in the surveys.

In the absence of definitive data, the correction to add the missing income in this category was made for each year on the assumption that undercoverage was relatively greatest in the lower ranges of family earnings (section 5). A similar procedure was followed for family military income.

In the case of nonfarm entrepreneurial income it seemed most reasonable to assume that the missing income was distributed proportionately to the reported amounts within most of the industry sectors (section 2). The item of noncorporate nonfarm inventory valuation adjustment which was not covered in the field survey or tax return statistics was allocated among family money income brackets on the basis of the corresponding distribution of nonfarm entrepreneurial income (section 5). Because of the relative importance of entrepreneurial income, as well as of property income, in the upper ranges of the income scale, possible errors in the distributions for these categories are reflected mainly in the estimates for the higher income brackets.

The distributions by income level of the several nonmoney income items accruing to the nonfarm section were less satisfactory than those for the money income categories. In general, they were based either on relationships between money and imputed values established from earlier surveys or on related data from current surveys that were not entirely suitable for the purpose at hand.

Another limitation of the statistics is connected with the definition of the family unit that was taken over from the Census Bureau surveys. The difficulty arises because certain of the changes that take place during the year in the composition of families are measured inadequately in most of the recent field surveys. As a result, some consumer units that were in existence for only part of a year are classified in income brackets that do not reflect their actual economic positions. The same is true of full-period units in instances where one or more of the earning members of the family were no longer part of the unit at the time of the field interview—e. g., because of death or entry into the Armed Forces—and whose earnings during the year were not included in the family total.

This factor, discussed in chapter 3, had the net effect of overstating the proportion of units in the lower income brackets. The limitation is particularly important in the case of unattached individuals, a considerable number of whom were part-period units, e. g., young persons who as nonearning dependents were living with their families during the first part of the year and then later established their separate position. The low bias in incomes imparted by this factor, together with other difficulties that arise in obtaining adequate samples for unattached individuals, are the major reasons why distributions for this relatively small group are less satisfactory than those for nonfarm families constituting the great bulk of consumer units.

Part 1, Section 1

Civilian Wage-Salary Earners

By Wage-Salary Level

THE distributions of individual wage or salary earners by civilian money wage or salary level for 1944, 1946, and 1947 were based primarily on data reported on individual income tax returns. These figures are tabulated annually by the Bureau of Internal Revenue for publication in *Statistics of Income*, Part 1.

The wage-salary statistics from tax returns required two major types of adjustment, those relating to the unit used in the Bureau of Internal Revenue tabulations—the tax return—and those relating to the coverage of the tax return series. These adjustments were made in order to derive a distribution of individual earners which was later converted (section 4) into a family distribution.

The adjustments relating to the tax return unit were needed because some returns covered wages or salaries earned by two persons, the husband and wife. In such cases it was necessary to separate the earnings of the two spouses and assign each to his own earnings class. A converse problem with respect to the unit of measurement was presented by a smaller group of tax returns filed separately by husbands and wives in "community property" States.

The second type of adjustment—for the coverage of the tax return series—was made in order to allow for the major groups of civilian wage or salary earners who did not file tax returns either because their receipts were below the legal filing requirement or because of evasion. Several million tax returns with wages or salaries of less than the $500 filing requirement were filed in each of these years because they were entitled to refunds of tax withholdings; hence the adjustment for undercoverage of the tax return data, although sizable, was not so large as would otherwise have been the case.

Because the desired distribution was for civilian wage or salary earners in the continental United States the adjustments for coverage also included subtracting tax returns of persons in Alaska and Hawaii, and of officers in the military forces, part of whose military pay above $1,500 was reportable in this period under certain circumstances. As indicated in the later discussion, a complete adjustment of the wage-salary distribution for coverage was not attempted. The earnings of a fairly numerous group of part-time workers who

Exhibit 1.—*Number of individual income tax returns with wages or salaries and number of individual civilian wage or salary earners, by money wage or salary level, 1944, 1946, and 1947*

[Thousands]

Money wage or salary level	1944			1946			1947		
	Tax returns	Earners		Tax returns	Earners		Tax returns	Earners	
		Covered by tax returns	Adjusted for coverage [1]		Covered by tax returns	Adjusted for coverage [1]		Covered by tax returns	Adjusted for coverage [1]
$1–$499	3,247	4,377	7,657	4,990	6,268	9,154	4,482	5,635	8,556
$500–$999	5,093	6,022	7,109	5,482	6,531	7,606	4,760	5,705	6,888
$1,000–$1,499	6,257	6,822	7,334	6,367	7,082	7,745	5,455	6,196	6,915
$1,500–$1,999	6,134	6,408	6,270	7,071	7,416	7,328	6,517	7,128	7,080
$2,000–$2,499	5,428	5,469	5,357	6,694	6,710	6,629	6,808	6,957	6,900
$2,500–$2,999	4,816	4,748	4,665	5,316	5,194	5,130	6,161	5,961	5,909
$3,000–$3,999	6,241	5,868	5,774	6,021	5,579	5,492	8,136	7,773	7,696
$4,000–$4,999	2,361	2,116	2,094	2,145	1,821	1,787	3,207	2,831	2,795
$5,000–$9,999	1,138	1,166	1,146	1,309	1,366	1,331	1,768	1,756	1,726
$10,000–$24,999	170	177	176	260	276	274	311	329	328
$25,000–$49,999	26	28	27	37	39	39	44	47	47
$50,000 and over	6	6	6	7	8	8	8	9	9
Total	**40,916**	**43,207**	**47,615**	**45,700**	**48,290**	**52,523**	**47,658**	**50,326**	**54,849**
Aggregate money wages or salaries (billions of dollars)	$91.1	$91.1	$91.8	$99.2	$99.2	$100.1	$114.8	$114.8	$116.1
Mean money wages or salaries (dollars)	$2,227	$2,108	$1,928	$2,171	$2,054	$1,906	$2,409	$2,281	$2,117

1. For groups excluded, see discussion under "Adjusted Distribution" in this section.

received very small amounts of wages during the year were added at a later stage of the estimating procedure (see discussion under "Adjusted Distribution" at end of this section).

Exhibit 1 summarizes for each of the 3 years the distribution of tax returns by wage or salary level as tabulated by the Bureau of Internal Revenue, the same distribution converted to an individual wage-salary earner basis, and the individual wage-salary earner distribution adjusted for coverage. The derivation of the two latter distributions is described in some detail below.

Tax Returns Converted to Wage-Salary Earners

Income tax returns were required to be filed in this period by all persons with gross incomes of $500 or more, and could be filed by persons with incomes below that amount. Each person filed his or her own return, except that husbands and wives could report their combined income on one return. A child's income was not included on the tax return of his parents; instead, he had to file his own return if his income was above the legal filing requirement.

The basic data on wage or salary income tabulated by the Bureau of Internal Revenue for each of these years included the frequency distribution of individual income tax returns reporting wage or salary income by size brackets of wages or salaries, and the aggregate amount of wages or salaries reported on these returns.[1] Mean wage or salary income was estimated for each wage-salary bracket on the basis of the relative magnitudes of the frequencies in the bracket and in adjoining brackets.[2] These estimated means were given a small proportionate adjustment so that when multiplied by the frequencies in the several brackets they would account for the reported aggregate wage-salary income.

In converting this distribution to an individual-earner basis, the several adjustments described below were made in terms of more detailed wage-salary brackets than are shown in the summary exhibits. In most instances the calculations were in terms of $100 intervals to $499, $500 intervals to $4,999, and the following intervals in the upper ranges: $5,000 to $7,499, $7,500 to $9,999, $10,000–$24,999, $25,000–$49,999, $50,000–$99,999, $100,000–$499,999 and $500,000–$999,999.

Returns covering one and two wage-salary recipients were not distinguished in the distribution of tax returns. However, the classifications by marital status that were given in certain other tabulations described below served to delimit the two-income group. These classifications were: joint returns of husbands and wives; separate returns of husbands and wives; separate community-property returns of husbands and wives; and returns of "single persons" (covering returns of all types of persons other than husbands and wives).

For separate returns of husbands and wives and for returns of single persons, the frequency distribution of returns by wage or salary classes corresponds to a distribution of individuals. Most of the joint returns also cover the wages or salaries of only one person, usually the husband, because the classification, "joint," refers to returns on which exemptions are claimed for both spouses regardless of whether one or both reported the receipt of income. But a sizable number of the joint returns represent cases where both spouses received incomes (from wages or salaries and/or from other sources) and reported the combined amount on one return. Hence, part of this group, namely, two-income joint returns on which wages or salaries were reported by both spouses, required decombination.

The first steps of the adjustment procedure apply to these joint returns. The processing of the remaining category—separate community-property returns—is described later.

JOINT RETURNS

The basic tabulations of individual income tax returns include figures on the total number of joint returns filed in each year but do not segregate returns on which both husband and wife reported wages or salaries. However, certain supplementary tabulations of tax returns were available for 1944 which made it possible to derive the required estimates. The following discussion, therefore, is confined to a large extent to the estimates for that year with brief mention of the derivation of the corresponding figures for 1946 and 1947.

The adjustment procedure for joint returns included three main steps. The first was to estimate the total number of

1. See, for example, *Statistics of Income for 1944*, Part 1, U. S. Treasury Department, Tables 2 and 9.

2. The means were calculated for the wage-salary brackets given in *Statistics of Income*, which are much finer than those shown in exhibit 1. For income brackets accounting for approximately the lower 80 percent of frequencies, means were computed in most instances under the assumption of a straight-line density function, by use of the formula

$$m_2=\frac{c_2^2(f_3/c_3-f_1/c_1)}{12(c_2+.5c_1+.5c_3)f_2/c_2},$$

where m_2 is the difference between the mean of the given bracket and its midpoint; the subscripts, 1, 2, and 3 refer respectively to the bracket below the given bracket, the given bracket, and the bracket above; c_1, c_2 and c_3 are the various bracket sizes; and f_1, f_2 and f_3 are the frequencies in the several brackets.

For brackets accounting for the upper 10 to 20 percent of the frequencies, means were generally computed by a formula based on the Pareto curve:

$$\bar{x}=\frac{v}{v-1}\left(\frac{x_1F_1-x_2F_2}{f}\right),$$

in which $\bar{x}$ is the computed mean of the bracket; F_1 and F_2 are the cumulative frequencies above the lower and upper bracket limits, x_1 and x_2, respectively; $f=F_1-F_2$; and $v=[\log\ (F_1/F_2)]/[\log\ (x_2/x_1)]$. For the final "and over" income bracket the average income was computed in most instances by the formula $\bar{x}=vx_1/(v-1)$, where v is the value derived from the preceding bracket, and x_1 is the lower limit of the "and over" bracket.

These formulas are discussed in more detail in Maurice Liebenberg and Hyman Kaitz, "An Income Size Distribution from Income Tax and Survey Data, 1944," Part VII of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

joint returns with two wage or salary recipients; the second to determine the distribution of these returns by *return* wage-salary level, which was subtracted from the wage-salary distribution of all returns with wages or salaries; and the third to determine the distribution of the individual spouses covered on such returns by *individual* wage-salary level, which was added back to the wage-salary distribution.

Number of returns with two wage-salary earners

The number of joint returns with two wage or salary recipients could not be determined from a count of the tax returns, because the tax return form, although it provides space for the wage-salary earnings from each employer, does not segregate the earnings of the husband and wife when both report on the same return. For the year 1944, however, the returns included additional questions asking for the amount of the husband's income separately from the wife's in cases where the return included income of both spouses.[3] These questions, it may be noted, referred to total income and were not confined to wage-salary receipts.

It was on the basis of the replies to these questions in 1944 that the number of joint returns with two wage-salary earners was estimated, by determining, first, the number of two-income joint returns with some wage or salary receipts, and, next, the number of them with both spouses reporting wages or salaries.

A special tabulation of the replies for 1944 classified joint returns, separately for Forms 1040 and Forms W–2, into those reporting one and two income recipients, and, within each classification, into those reporting wages or salaries and those not so reporting. (All of the returns on Forms W–2, by definition, reported wages or salaries.[4]) In addition, all of these breakdowns were available separately for returns filed in community and in noncommunity property States.

The tabulated number of two-income joint returns with wages or salaries was used for noncommunity property States, but was discarded for community property States where a sizable number of joint returns were described as covering two income recipients only because the State laws permitted splitting of income between husband and wife. Instead, the number of joint returns with wages or salaries in community property States that covered two actual income recipients was estimated (for Forms W–2 and 1040, separately) by assuming that the ratio of two-income joint returns with wages or salaries to all joint returns with wages or salaries was the same in community as in noncommunity property States. This adjustment reduced the total number of two-income joint returns reporting wages or salaries in 1944 from a tabulated 5.4 million to 4.0 million (2.8 million Forms 1040 and 1.2 million Forms W–2).

3. A similar segregation of one- and two-income returns was called for on the returns for 1943 and 1945, but for later years the question was not included on Form 1040 returns.

4. Form W–2, the withholding receipt for income tax withheld from wage or salary earnings, was the optional return which could be filed by persons whose total income was less than $5,000, consisting of wages or salaries shown thereon and not more than $100 of wages not subject to withholding, dividends, and interest. Form 1040, the regular income tax return, was filed by persons not permitted to use Form W–2, and by those who, though eligible to use Form W–2, found it to their advantage to use Form 1040.

The figure of 4.0 million, covering all *two-income* joint returns with wages or salaries, required further reduction to arrive at the number that covered *two wage or salary recipients*. This reduction was applied to Forms 1040 only. In the case of Forms W–2 all of the 1.2 million joint returns with two income recipients were assumed to represent families in which both husband and wife had received some wage or salary earnings during the year. This led to some overstatement of the actual number of returns with two wage-salary recipients because of the inclusion of returns on which all of the reported wage-salary income was earned by the one spouse and the income reported by the other was solely from interest or dividends in an amount less than $100. However, the number of returns with this pattern could be assumed to be fairly small.

For Forms 1040, however, a large number of the two-income returns with wages or salaries doubtless represented families in which only one of the spouses earned wages or salaries during the year and the income reported by the other spouse was from non-wage-salary sources. Approximately one-half of the 2.8 million two-income Form 1040 joint returns with wages and salaries were estimated to be of this type.[5] For these, the tabulated distribution of returns by size of wages or salaries already corresponded to a distribution of individual wage or salary earners. The other half of this group, representing Form 1040 returns on which both spouses reported wages or salaries, when added to the corresponding group of Form W–2 returns, yielded an estimated total of 2.6 million joint returns with two wage or salary earners that required decombination.

As exhibit 2 indicates, this compared with a grand total of 40.9 million returns reporting wages or salaries in 1944. Thus, even allowing for a fairly substantial margin of error in the estimate of the number of returns requiring decombination, it is apparent that this group is only a small percent of the total number of returns. Possible errors in the subsequent estimates of the wage-salary distribution of the group, therefore, could not have led to substantial error in the overall distribution.

Exhibit 2.—*Number of individual income tax returns with wages or salaries and number of individual wage or salary earners covered by tax returns, 1944, 1946, and 1947*

[Thousands]

Item	1944	1946	1947
Tax returns with wages or salaries:			
(1) Joint returns with two wage or salary earners	2,589	2,967	(1)
(2) Separate community property returns of nonearning spouses	298	377	(1)
(3) All other returns	38,029	42,356	(1)
(4) **Total**	40,916	45,700	47,658
Individual wage or salary earners covered by tax returns [(4) plus (1) minus (2)]	43,207	48,290	50,326

1. Not estimated.

For 1946, the number of joint returns requiring decombination was estimated at 3.0 million. This was derived by

5. This proportion was derived on the basis of Census survey data on the percentages of male and female income recipients who reported wages or salaries as one of their income sources.

procedures similar to those for 1944, except that where breakdowns were not available for 1946 use was made, with appropriate modifications, of certain of the relationships established for 1944. For 1947, an estimate of the total number of wage-salary earners covered on returns was derived in more summary fashion by multiplying the number of tax returns reporting wage or salary receipts in that year by the ratio of the estimated number of wage-salary earners to the number of returns with wages or salaries in 1946.

Distribution of returns with two wage-salary earners

The frequency distribution by size of *return* wage-salary income of the 2.6 million joint returns that had been estimated above to require decombination in 1944 was derived separately for the 1.2 million Forms W–2 and the 1.4 million Forms 1040.

For Forms W–2, the distribution was based on a tabulation for 1944 of two-income Form W–2 joint returns in non-community States by size of adjusted gross income.[6] Adjusted gross income represents the sum of wages and salaries and net income from other sources reported on the return (before the subtraction of allowable nonbusiness deductions and of exemptions). For these 1.2 million returns it was reasonable to assume that a classification by size of adjusted gross income corresponded very closely to one by size of wage or salary income. As indicated above, one of the requirements for filing Form W–2 was that income from sources other than wages or salaries could not exceed $100. Also, in 1944 only 6 percent of Form W–2 returns reported the receipt of items other than wages or salaries and the aggregate of such income was very small.

For Forms 1040, however, a similar assumption could not be made. Unlike Forms W–2, not all of the Form 1040 returns reported wages or salaries, and the distribution by adjusted gross income class of the returns with wage-salary earnings would be expected to differ from those without such earnings. Moreover, even for returns reporting wages or salaries, a distribution by adjusted gross income class would not correspond to one by wage-salary class because many of the Form 1040 returns reported sizable amounts of non-wage-salary income.

Instead, the following procedure was used. First, the 1.4 million Form 1040 joint returns with two wage-salary earners were distributed by adjusted gross income level, based on the corresponding percentage distribution of Form 1040 joint two-income returns with wages or salaries. The latter was derived from a frequency distribution by adjusted gross income level that was available for all Form 1040 joint two-income returns, by subtracting returns with no wages or salaries at the various levels. The numbers subtracted were estimated on the assumption that within each adjusted gross income class above $7,000 the percentage of returns without wage-salary income was the same for these Form 1040 joint two-income returns as for all Form 1040 joint returns. For adjusted gross income classes below $7,000, for which data limited to Form 1040 joint returns were not available, corresponding percentages referring to all Form 1040 returns were used.

Second, the distribution of returns with two wage-salary earners by adjusted gross income level was converted into a distribution by wage-salary level by using a cross-distribution, tabulated by the Bureau of Internal Revenue for 1946 relating to all returns with wages or salaries, showing returns distributed by size classes of adjusted gross income and, within each such class, by size classes of wage or salary income. The number of two wage-salary earner returns in each size class of adjusted gross income was distributed among wage-salary classes proportionately to the corresponding frequency distribution in the cross-tabulation, and the results for all adjusted gross income classes were combined.[7]

The frequency distribution by size of *return* wage or salary income for all returns covering two wage-salary earners was derived by adding this distribution for Forms 1040 to the corresponding distribution for Forms W–2. The aggregate amounts of wage-salary income for the two-earner returns in the various wage-salary brackets were derived by multiplying the frequencies by estimated means for the corresponding brackets.[8] These frequencies and aggregate amounts were then subtracted from the distribution, by wage salary level, of all returns reporting wages or salaries.

Distribution of earners on two wage-salary returns

As indicated above, a distribution for the *individual* wage or salary earners covered on the two-earner returns was required as a substitute for the distribution of *returns* that had been subtracted from the wage-salary distribution. This distribution was estimated largely on the basis of special tabulations of two-income joint returns by size of husband's income cross-classified by size of wife's income. These were available separately for joint returns filed on Forms W–2 and Forms 1040 for 1944, based on the answers to the special questions that were included on both tax return forms for that year, described above.

Each of these tabulations was first transformed, by cross-addition, to show a distribution of returns by size of combined husband-wife income cross-classified (1) by size of

6. *Statistics of Income for 1944*, Part 1, U. S. Treasury Department, p. 40.

7. A similar cross-tabulation was not available for 1944. However, it was reasonable to assume that the distribution of returns by size of wage or salary income, *within* any given adjusted gross income class, would not differ substantially for the 2 years. A test was made which confirmed this hypothesis. Bureau of Internal Revenue tabulations of *all* returns reporting wages or salaries were available for 1944 classified by (a) adjusted gross income class, and (b) wage or salary income class. The number in each adjusted gross income class, as given in (a), was distributed by wage or salary classes by using the corresponding percentage distribution from the 1946 cross-tabulation. The results, when summed for all adjusted gross income classes, were found to be in close agreement with distribution (b).

8. See footnote 2.

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husband's income, and (2) by size of wife's income.[9] For Forms W–2 and 1040 separately, the distribution of joint returns with two wage-salary earners by size of return wage or salary income was inserted in the combined husband-wife margin and the number in each combined class was distributed by size of husband's and by size of wife's income proportionately to the corresponding frequency distribution given in the cross-tabulation.[10] The sum of the derived distributions for husbands and wives on Forms 1040 and W–2 yielded the estimated wage or salary distribution of individual wage or salary earners on two-earner joint returns. Aggregate wage-salary income for the individual earners in each bracket was estimated by multiplying the frequencies by estimated means for the several brackets.

The wage-salary distributions of the two-earner joint returns and of the individual earners covered on these returns are shown in columns 2 and 3 of exhibit 3. These figures, which are for 1946, were derived similarly to those described for 1944 except that certain of the 1944 cross-tabulations, which were not available for 1946, were used with appropriate modification for the later year. For 1947, the separate adjustments described here and under "Separate Community Property Returns" were not made. Instead, the distribution of tax returns by wage or salary level for that year was converted into a distribution of the individual wage-salary earners covered on the returns on the basis of the relationship between the return and the derived individual earner distributions for 1946.

SEPARATE COMMUNITY PROPERTY RETURNS

The Bureau of Internal Revenue distribution of all tax returns by wage or salary level required a further adjustment because it included separate community property returns on

9. The basic cross-tabulation presents the number of returns in given cells, for example, the number in a cell in which the husbands report between $3,000 and $4,000, and the wives between $1,000 and $2,000. The combined incomes of these husband-wife units thus range between $4,000 and $6,000. The problem of cross-adding—i. e., the problem of determining, in this case, the frequency of husband-wife units with combined incomes of $4,000 to $5,000 and the frequency of those with $5,000 to $6,000—is one of interpolating for frequencies lying above or below a line cutting the cell at forty-five degrees.

The simplest procedure, and one that is moderately good if the cell is very small in size, would be to assume that all the frequencies are concentrated either at the center of the cell, or preferably at a point determined by the mean incomes of husbands and wives. In the above example, this would place all husband-wife units either at $5,000, or, assuming in this illustration that the mean income of husbands is $3,550 and that of wives $1,600, at $5,150.

The procedures used here, and in most other cases of cross-addition throughout the report, however, allowed for a spread of frequencies throughout the cell. The method used most often was to assume a uniform distribution of frequencies within the cell and to interpolate by the formulas given below which were developed for the general case of rectangular cells. The income range on the narrower side of the rectangle is denoted by s, the range on the other side by g, and the minimum and maximum values of the sum of the two variables within the cell (in this case, the combined income of husbands and wives) by d and h, respectively. Then the proportion, r, of husband-wife units with combined incomes of less than some specified amount, w, is as follows:

$$\text{(1) If } d<w\leq d+s, \qquad r(w)=(w-d)^2/2sg$$

$$\text{(2) If } d+s\leq w\leq d+g, \qquad r(w)=(w-d-.5s)/g$$

$$\text{(3) If } d+g\leq w<h, \qquad r(w)=1-(h-w)^2/2sg$$

In the above illustration, where the cell is square, the formulas assign one-half of the husband-wife units between $4,000 and $5,000, and the other one-half between $5,000 and $6,000. If a second illustration is taken in which the cell covers a range of husbands' incomes from $4,000 to $5,000 and of wives' incomes from $500 to $1,000, then the proportion of husband-wife units with combined incomes between $4,500 and $5,000 is given by either the first or second formula as .25.

For many cells, closer approximations were obtained by assuming a nonuniform distribution function within the cell, of the form $f=a+bx+cy$, where f is the density at given values of husband's income, x, and of wife's income, y, and a, b, and c are constants. In cases where the cell was square and where the interpolation point was midway between the minimum and maximum combined incomes of husband-wife units (i. e., where $w=\frac{1}{2}(d+h)$), then

$$(4)\quad r(w)=1.5-(a_x+a_y)$$

where a_x is the proportion of the income range of husbands in the cell up to the point denoted by their mean income, and a_y is the corresponding proportion for wives. The values of a_x and a_y, which were not given in the cross-tabulation, were estimated by using the formulas given in footnote 2. In the first example above, where the cell is of the type required for (4) to be applicable, $a_x=.550$, $a_y=.600$, and $r(\$5{,}000)=.35$.

Cells which were not square and those in which the interpolation point was not midway between the minimum and maximum combined incomes of husband-wife units were frequently broken into square cells of the type that was required in order that (4) could be applied, or broken into smaller cells for which (1), (2), or (3) could be used. Under the assumption of the nonuniform linear function above, such breakdowns were obtained by the following formulas. The proportion of frequencies in the cell falling below some specified value of husbands' income, x, is given by:

$$(5)\quad r(x)=p_x+p_x(1-p_x)(3-6a_x),$$

and the corresponding proportion below some specified value of wives' income, y, by:

$$(6)\quad r(y)=p_y+p_y(1-p_y)(3-6a_y).$$

The proportion of frequencies below *both* x and y is given by:

$$(7)\quad r(x,y)=p_xr(y)+p_yr(x)-p_xp_y,$$

where a_x and a_y are defined as above, p_x represents the proportion of the income range of husbands in the cell up to the point of interpolation, and p_y represents the corresponding proportion for wives.

For example, in the second illustration above, all of the husband-wife units with combined incomes below $5,000 must fall below the diagonal of a square subcell in which the husbands' incomes range from $4,000 to $4,500 and the wives' incomes from $500 to $1,000. The proportion of units in the original cell falling in this square subcell could be found by applying formula (5), and the proportion of units in the square subcell falling below the diagonal by applying formula (4), computing a_x in formula (5), and a_x and a_y for the square cell in formula (4), by the methods given in footnote 2. (It may be noted that the values of a_x for the original cell and the square subcell are not identical.)

It may be noted also that the above formulas were adapted for use when the problem was to subtract through, rather than add through, a cross-tabulation. For example, at a later stage in the estimating procedure this kind of subtraction was required where the available tabulation showed tax returns cross-classified by size classes of dividends and adjusted gross income, and the desired cross-classification was by size classes of dividends and adjusted gross income exclusive of dividends (section 5). With w defined as $x-y$, and d and h representing, as in the case of addition of the two variables, the minimum and maximum values of w within a cell, formulas (1) through (3) above, which assume a uniform distribution of frequencies within the cell, could be used for subtraction without any modification. For square cells in which $w=\frac{1}{2}(d+h)$, formula (4), which assumes the type of nonuniform distribution described above, becomes

$$(8)\quad r(w)=a_y-a_x+.5,$$

with a_x and a_y defined as above.

Additional discussion of some of the interpolation formulas given above and in footnote 12, may be found in Maurice Liebenberg and Hyman Kaitz, "An Income Size Distribution from Income Tax and Survey Data, 1944," Part VII of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

10. This procedure assumed that the distribution for a given class of combined adjusted gross income was applicable to the same size class of combined wage-salary income. The assumption was entirely reasonable for Forms W–2, where reported adjusted gross income and wage-salary income were practically identical, but was doubtless subject to error in the case of Forms 1040.

which one spouse reported wages or salaries earned by the other, and the other spouse correspondingly reported incomplete wage-salary earnings. In order to derive a distribution of individuals by size of wage or salary income it would have been necessary to deduct separate community property returns from the initial wage-salary distribution, and to substitute for them the underlying frequency distribution of individual earners by actual wage or salary level. In the absence of satisfactory data, the adjustment was confined to the group for which the misclassification was most pronounced, namely to husband-wife units in which one of the spouses did not earn any wages or salaries during the year but reported one-half of wages or salaries earned by the other spouse.

Exhibit 3.—*Adjustments to number of individual income tax returns with wages or salaries to derive number of individual wage or salary earners covered by tax returns, by money wage or salary level, 1946*

[Thousands]

Money wage or salary level	All returns with wages or salaries	Joint returns with two wage or salary earners		Separate community property returns of couples with one wage or salary earner		Individual wage or salary earners covered by tax returns (1)−(2)+(3)−(4)+(5)
		By tax return level	By individual earner level	By tax return level	By individual earner level	
	(1)	(2)	(3)	(4)	(5)	(6)
$1–$499	4,990	53	1,348	22	6	6,268
$500–$999	5,482	103	1,175	29	5	6,531
$1,000–$1,499	6,367	193	951	50	6	7,082
$1,500–$1,999	7,071	335	767	96	8	7,416
$2,000–$2,499	6,694	465	619	148	10	6,710
$2,500–$2,999	5,316	485	490	141	15	5,194
$3,000–$3,999	6,021	799	444	135	48	5,579
$4,000–$4,999	2,145	435	86	50	74	1,821
$5,000–$9,999	1,309	89	48	64	163	1,366
$10,000–$24,999	260	10	7	17	36	276
$25,000–$49,999	37	1	(1)	2	5	39
$50,000 and over	7	(1)	(1)	(1)	1	8
Total	**45,700**	**2,967**	**5,935**	**754**	**377**	**48,290**
Aggregate money wages or salaries (billions of dol.)	$99.2	$8.9	$8.9	$2.6	$2.6	$99.2
Mean money wages or salaries (dollars)	$2,171	$3,000	$1,500	$3,448	$6,897	$2,054

1. Less than 500.

Three steps were involved in the adjustment. (a) Approximately 0.3 million husband-wife units accounting for 0.6 million of the 1.3 million separate community property returns filed in 1944 were estimated to be of this type. To derive this figure an estimate of the total number of separate community property returns with wages or salaries was made, and the proportion of these returns which covered couples in which only one spouse actually earned wages or salaries during the year was estimated on the basis of noncommunity property State relationships. (b) These 0.6 million returns were distributed by adjusted gross income class in proportion to an estimate of the corresponding distribution of all separate community property returns reporting wage or salary receipts. The distribution was then converted to wage-salary classes by using the cross-tabulation of returns by adjusted gross income and wage-salary size classes referred to in connection with the discussion of joint returns under "Distribution of returns with two wage-salary earners." The resulting distribution was subtracted from the Bureau of Internal Revenue distribution of all returns by wage-salary level. (c) Since the typical pattern permitted by State law was a 50–50 split of wages and salaries between the two spouses, the actual wage-salary distribution of the earning spouses was estimated by taking one-half of the returns in each wage-salary bracket from (b), assigning them to twice the amount of wage-salary income, and then interpolating to determine the frequencies for the usual income intervals. This distribution was then substituted for the one subtracted in (b).

Distributions (b) and (c) for 1946, derived by methods similar to those for 1944, are shown in columns 4 and 5 of exhibit 3.

Adjustments for Coverage of Tax Returns

The distributions of individual wage or salary earners derived from income tax returns required adjustment to add persons who did not report their wage or salary receipts to the Bureau of Internal Revenue, and to subtract certain minor reporting groups falling outside the category of civilian wage-salary earners in the continental United States. These two adjustments are described next, followed by a discussion of the miscellaneous group with very small earnings not covered in the adjusted wage-salary distributions.

ADDITIONS

Wage or salary earners not covered in the Bureau of Internal Revenue universe did not bulk large in the aggregate when measured in terms of their total wage or salary earnings, because the low tax return filing requirement of $500 in this period, together with the tax-withholding system, ensured a very high coverage of wage or salary receipts. Furthermore, the tax returns included part of the group with wage-salary earnings of less than $500, namely persons earning these small amounts who filed returns to obtain refund of withholding taxes or to declare other types of income they received during the year. In 1946, for example, the 45.7 million returns declaring some wage or salary earnings included 5.0 million reporting less than $500 of wages or salaries.

The wage-salary tabulations were not available with classifications by occupation or industry so that it was not possible to determine precisely the groups in the labor force that were incompletely covered. It was decided, therefore, to limit the adjustment for noncoverage to farm laborers and domestic servants, which are the two groups most likely not to file returns considering their special characteristics and the fact that they are not covered by the tax-withholding system.[11]

11. It may be noted that some of the nonfilers may have had credits and deductions in excess of their incomes and would be nontaxable even if they had filed returns.

Estimates of the frequency distribution of farm laborers by money wage or salary level were based mainly on data from a sample survey covering the incomes of this group of workers in 1947. The data were obtained for the Bureau of Agricultural Economics by the Bureau of the Census in its regular Current Population Survey of December 1947. Questions on amounts of money wages or salaries earned during 1947 from farm and nonfarm work were asked of each person who indicated that he had done some farm work for money wages during that year. Estimates of the wage-salary distribution of these workers appear in "The Hired Farm Working Force of 1947," Bureau of Agricultural Economics, U. S. Department of Agriculture, July 1948.

The survey data required adjustment to allow for understatement in the amounts of wages and salaries reported by respondents. In the absence of data on the relative extent of understatement in the various wage brackets, the following procedure was used. The percentage distribution of farm laborers by size of money wages for 1947 from the sample study, adjusted slightly so as to include certain types of laborers not covered in the survey, was applied against the estimated total number of persons who had worked for farm money wages during that year. This total, it may be noted, included not only persons whose major activity during the year was farm wage work but also those who worked as farm laborers for only short periods.

The resulting frequencies in the various wage brackets when multiplied by the average wage at each bracket yielded a first estimate of the aggregate money wage earnings of this group. This aggregate was compared with the Bureau of Agricultural Economics' independent estimate of the total cash farm wage bill after allowance had been made for some variations in population and wage-salary coverage between the two sets of data. The difference between the two aggregates was taken to represent total understatement of income in the "blown-up" survey.

The correction for understatement in the size distribution was made by assuming the same percentage understatement by farm laborers at all wage-salary brackets, i. e., by distributing the aggregate understatement in the total cash farm wage bill among wage-salary groups in proportion to the aggregate money wages reported. Farm wage workers in each wage bracket were accordingly shifted up the wage scale by a constant percentage so that the Lorenz curve of money wages shown by the sample data was maintained.[12]

This 1947 Lorenz curve was used, also, to estimate the wage-salary distributions for farm laborers for 1944 and 1946. On the assumption of an unchanged Lorenz curve for the 3 years, the frequency distributions by wage-salary income for the two earlier years could be derived directly, once the number of farm laborers and their aggregate wage-salary income in each year had been determined.

Domestic servants were distributed by size classes of money wages or salaries on the basis of census survey data for this occupational group and then adjusted to allow for understatement of income in the field enumeration. The adjustment to allow for income understatement was made, similarly to that for farm laborers, by comparing the aggregate money wages accounted for by the survey data for the domestic servants group with the corresponding amount included in the personal income series, and by shifting the units up the wage scale so as to add the missing income and maintain the Lorenz curve.

The combined distribution for farm laborers and domestic servants in 1946 that was added to the wage-salary distribution derived from tax returns is shown in exhibit 4, column 2. As indicated there, the additions were limited to persons with money wages of less than $1,500, who comprised the

12. Two income distributions have the same Lorenz curve if the percentage of units at any given income point, x, in the one distribution is equal to the percentage at the income point, kx, in the second. The constant, k, is the ratio of the arithmetic mean incomes of the two distributions. Thus the determination of a size distribution having the same Lorenz curve as that of some given distribution becomes simply a matter of interpolation.

For example, assume that a distribution is to be derived that has the same Lorenz curve as some given distribution but that has an arithmetic mean 50 percent higher. All of the income levels in the original distribution share proportionately in this increase, e. g., the percentage of units within the initial income bracket, $2,000 to $3,000, will move up to the bracket, $3,000 to $4,500. Since an income bracket, $3,000 to $4,000 is desired for the final distribution, an interpolation procedure is necessary to separate the $3,000 to $4,500 bracket into two parts, $3,000 to $4,000 and $4,000 to $4,500. This is equivalent to separating the original income bracket into two parts, $2,000 to $2,666.67, and $2,666.67 to $3,000 (since $4,000 is 50 percent greater than $2,666.67).

The interpolation procedure that was used in most cases was based on the assumption that the frequencies in the income bracket could be fitted with a linear density function. In such instances, the proportion of frequencies in the bracket falling between the lower limit of the bracket and the point of interpolation is given by

$$r=p+p(1-p)\ (3-6a),$$

where a is the proportion of the income range of the bracket up to the point denoting the arithmetic mean income of the bracket, and p is the corresponding proportion up to the point of interpolation. The proportion of aggregate income between the lower limit of the bracket and the point of interpolation is given by

$$q=s+\frac{x_1}{\bar{x}}\ (r-s),$$

where $s=p^2+p^2(1-p)\,(2-4a)/a$. The fraction, $x_1/\bar{x}$, is the ratio of the lower bracket limit to the bracket mean. In the illustration considered above, suppose that the average income in the initial bracket is $2,600. Then $a=.600$, $p=2/3$, $x_1/\bar{x}=.769$, whence it follows that $r=.533$, and $q=.490$.

Unlike the farm laborers discussed above, the distributions for most of the other groups where similar techniques were used (e. g., nonfarm entrepreneurs in section 2) extended into the upper income ranges. In these instances, for brackets accounting for approximately the upper 10 to 20 percent of the frequencies, interpolation was based on Pareto curves fitted to cumulative frequencies above the income bracket limits. For closed brackets, the proportion of frequencies falling between the lower limit of the bracket and the point of interpolation is given by

$$r=\frac{1-(x_1/x_p)^v}{1-(F_2/F_1)},$$

and the corresponding proportion of aggregate income by

$$q=\frac{x_1F_1-x_pF_p}{x_1F_1-x_2F_2}.$$

The terms, x_1, x_2 and x_p are, respectively, the lower and upper limits of the income bracket and the point of interpolation; F_1, F_2 and F_p are the cumulative frequencies above each of those points; and $v=[\log(F_1/F_2)]/[\log(x_2/x_1)]$. In some cases where mean incomes were available for closed brackets in the upper ranges of a distribution, a more complicated Pareto curve fitting procedure was used, based on data for the given bracket alone, rather than on the cumulative frequencies above given income points.

For the final "and over" income bracket, the formulas above for r and q were used with the term F_2/F_1 in the first, and x_2F_2 in the second, deleted, and v was calculated as above but using data from the preceding bracket. Where the average income, $\bar{x}$, for the "and over" bracket was known, v was computed by use of $v=\bar{x}/(\bar{x}-x_1)$.

bulk of these two categories of workers. It was assumed that those who earned more than that amount were for the most part engaged primarily in other occupations and were presumably already covered in the tax-return universe. The additions accounted for $2.3 billion in 1946, slightly more than 2 percent of total wages and salaries reported on tax returns.

SUBTRACTIONS

The two main groups of wage-salary workers that were subtracted from the distribution derived from tax returns were military commissioned officers and wage-salary workers in Alaska and Hawaii. These were omitted because the desired distribution was for civilian wage or salary earners in the continental United States. This was the group to which the cross-tabulations that were later used in converting individual earners into family units were limited (section 4).

As exhibit 4 indicates, the adjustment to exclude military commissioned officers was relatively small, accounting for less than $1 billion of wages and salaries in 1946. During the war and early postwar period the first $1,500 of money pay received by members of the Armed Forces was excluded in computing gross income for tax return purposes. Since returns were required to be filed only by persons with $500 or more of gross income this meant that for the most part only officers with more than $2,000 of money pay would file returns. Furthermore, members of the Armed Forces on sea duty or outside the continental United States could postpone filing until several months after their return to the country, so that only part of the officers in these higher wage brackets were actually included in the tabulations.

The total number of officers in each branch of the armed services was distributed by size classes of military money pay on the basis of data on strength and money pay by grade and rank for the 3 years, made available by the Department of Defense. For 1944 and 1946, the number of officers in each income bracket above $2,000 was reduced by the same proportion (by 50 percent in 1944, and 15 percent in 1946) to exclude officers who were estimated to have postponed filing tax returns.

The percentage reductions were based on data on the proportion of officers outside the continental United States on the March 15 following each year, with a rough allowance for the number returning to the country within the next several months. (Generally speaking, the cutoff date for the tax return tabulations for any given year is the end of the following calendar year, and consequently officers returning to the United States in the latter part of the year would not be included in the tax return tabulations covering the preceding year if they made use of the permission to postpone filing.) The resulting distributions were then shifted down the wage-salary scale by $1,500 to correspond to the amounts that would actually be reported on officers' tax returns. The distribution thus derived is shown for 1946 in exhibit 4, column 3.

Tax returns filed in Alaska and Hawaii accounted for approximately $0.5 billion of the $99.2 billion total of wages and salaries reported on all returns in 1946. The wage-salary data for these territories were not available with a classification by size, and the adjustment to exclude them consisted merely of a proportionate reduction in the frequency distribution of all civilian wage-salary earners.

Exhibit 4.—*Adjustments to number of individual wage or salary earners covered by tax returns to derive number of civilian wage or salary earners, by money wage or salary level, 1946*

[Thousands]

Money wage or salary level	Wage or salary earners covered by tax returns (1)	Domestic workers and farm laborers [1] (2)	Military commissioned officers filing tax returns [2] (3)	Civilian wage or salary earners [3] (1)+(2)−(3) [4] (4)
$1–$499	6,268	2,928	----	9,154
$500–999	6,531	1,158	49	7,605
$1,000–$1,499	7,082	747	49	7,745
$1,500–$1,999	7,416	(*342*)	55	7,328
$2,000–$2,499	6,710	(*196*)	51	6,629
$2,500–$2,999	5,194	(*116*)	41	5,130
$3,000–$3,999	5,579	(*110*)	62	5,493
$4,000–$4,999	1,821	(*16*)	26	1,787
$5,000–$9,999	1,366	(*6*)	29	1,331
$10,000–$24,999	276	----	----	274
$25,000–$49,999	39	----	----	39
$50,000 and over	8	----	----	8
Total	**48,290**	[1] 4,833	**362**	**52,523**
Aggregate money wages or salaries (billions of dollars)	$99.2	[1] $2.3	$0.9	$100.1
Mean money wages or salaries (dollars)	$2,054	$476	$2,486	$1,906

1. Only the domestic workers and farm laborers with wages under $1,500 have been added to earners covered by tax returns; the remainder were assumed to have filed returns.
2. Officers are classified by salary estimated to have been reported on tax returns, i. e., $2,000 less than their military money pay.
3. See text for discussion of civilian wage or salary earners not covered in this distribution.
4. Includes, also, an adjustment to remove earners in Alaska and Hawaii.

ADJUSTED DISTRIBUTION

The adjusted frequency distribution of civilian wage or salary earners derived for 1946 is given in the last column of exhibit 4. The number of persons in the lowest wage bracket of this column would be substantially larger if the wage-salary distributions had been adjusted further to include *all* persons who earned $1 or more of civilian money wages or salaries during the year. As indicated above, the adjusted distributions presented here cover civilian earners who are estimated to have reported some wages or salaries on income tax returns plus farm laborers and domestic servants. Except for these two latter groups, they do not include persons who worked for only short periods during the year and were not required to file returns, and persons who did not declare their wage earnings on tax returns, or who did not file tax returns even though required to do so.

The available evidence suggests that the group excluded from the adjusted wage-salary distribution may be fairly large in number but that the great bulk of these persons were part-time workers who earned very small amounts of wages or salaries—probably a few hundred dollars or less. The excluded group can be roughly measured by comparing the number of persons included in the wage-salary distribution with the estimated total number who worked for civilian money wages or salaries at some time during the year. In 1947, for example, the adjusted distribution accounted for 55 million wage-salary earners, and the estimated total was ap-

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proximately 60 million.[13] For 1946, the gap was about 2 million larger.

At the same time, however, the corresponding gap in aggregate wages and salaries is found to be relatively small. The adjusted distributions derived from tax returns for 1946 and 1947, for example, accounted for only $1 billion to $2 billion less civilian money wages or salaries than the most nearly comparable totals derived from the personal income series. A reconciliation of the aggregate amount of wages or salaries reported on tax returns and the total included in the personal income series is shown, for 1946, in exhibit 5.

A correction in the wage-salary distributions was not made to include these marginal part-period earners mainly because the earnings of this same group appear also to have been omitted in the field surveys of family income which were used as a basis for converting the individual earner distributions into family units (section 4). Instead, the wages and salaries not accounted for in the wage-salary distributions were distributed by family income brackets, at a later stage in the procedure, proportionately to the aggregate family incomes that had been estimated for those brackets (section 5).

13. For 1947, according to a Census Bureau survey, the total number of persons in the civilian noninstitutional population who worked for money wages or salaries during the year was 56 million, and the total reporting any type of employment for pay or profit during that year was 64 million. ("Work Experience of the Population in 1947," Series P–50, No. 8, Table 2.) In analyzing the Census figures, Emmett Welch has stepped-up the 64 million total by 5 million to allow for undercoverage (see p. 569 of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951). The 60 million for the total number of wage-salary earners in 1947 was derived by assuming that most of Welch's step-up applied to the wage-salary group. Other estimates of the number of persons working for civilian money wages or salaries during the year have been built up by adding to the number reporting wage credits under the Old-Age and Survivors Insurance program, estimates for the groups in noncovered wage-salary employment, e. g., railroad and Government workers, domestics, farm laborers. These estimates also totaled about 60 to 62 million for 1946 and 1947 (*Studies in Income and Wealth*, Vol. 13, p. 313, and data underlying series on total annual paid civilian employment shown in table 8 of *Quarterly Summary of Wage, Employment and Benefit Data*, November 1952, Federal Security Agency.)

Exhibit 5.—*Civilian money wages or salaries: Comparison of aggregate amount in personal income series, in size distribution of individual wage-salary earners, and on income tax returns, 1946*

Item	Billions of dollars
Personal income series:	
Wage and salary receipts as in personal income	**109.2**
Less: Military wages or salaries	8.0
Less: Nonmoney civilian wages or salaries (of farm and nonfarm workers)	1.2
Less: Civilian wages of persons who entered Armed Forces or died	.8
Plus: Employee contributions for social insurance	2.0
Plus: Earnings of groups excluded from entrepreneurial income size distributions, and miscellaneous fees [1]	1.0
Equals: Civilian money wages or salaries	**102.3**
Tax returns:	
Wages and salaries reported on individual income tax returns	99.2
Less: Reported earnings of military officers and wages of workers in Alaska and Hawaii	1.4
Plus: Money earnings of domestics and farm laborers estimated as not reported on tax returns [2]	2.3
Equals: Civilian money wages or salaries accounted for in size distribution of wage-salary earners [3]	**100.1**

1. Groups excluded from entrepreneurial income size distributions include part of the contract construction and finance industries, and newsboys (exhibit 7, footnote 1). Miscellaneous fees include directors', jury and witness fees, and fees to justices of the peace (exhibit 11, footnote 6). Offset against these items is a small amount of salaries earned by professional persons who engaged in both entrepreneurial and salaried work during the year. These salaries are covered in the entrepreneurial income size distributions (exhibit 7, footnote 1).
2. See footnote 11 in this section.
3. For comparability with the total derived above from the personal income series, the figures of $100.1 billion requires further adjustment to allow for differences in the coverage of the two series. For example, certain occupational expenses that were deducted in determining wages and salaries reported on tax returns, and wage-salary earnings of persons who did not file tax returns (other than domestics and farm laborers) should be added for comparability with the total included in the personal income series. The procedure used here was to distribute the difference between the two totals ($2.2 billion in 1946) among family income brackets as explained in section 5 (exhibit 12, footnote 1).

Nonfarm Entrepreneurs

By Entrepreneurial Earnings Level

THE distributions by size of nonfarm entrepreneurial net money earnings, covering individuals who were actively engaged during the year in nonfarm noncorporate businesses or in professional activities, were based on data from income tax returns, as tabulated by the Bureau of Internal Revenue, supplemented, for selected professional groups, by data from questionnaire surveys conducted by the Office of Business Economics. Estimates for the farm entrepreneurial group, derived from other source material, are described in section 6.

The basic data from income tax returns for the nonfarm business group, although deficient in a number of respects, were superior to those available from the small sample field surveys which constituted the only other source of information on the distribution by size of net income for this group of earners. The amount of business income accounted for by the sample surveys was substantially smaller than that reported on income tax returns whenever a comparison of the two sources could be made.

Furthermore, the income tax data permitted the examination and separate adjustment of the distributions for the various industry groups, whereas the field survey data were for the most part based on samples that were not large enough to permit such breakdowns. Also, the tax return information was classified by detailed income brackets at the top end of the size distribution—above $10,000—where a large part of entrepreneurial earnings are concentrated, in contrast to the field survey data where, again, such detail was not warranted by the size of the samples.

The procedure used in deriving the present series was as follows. First, for 1945 and 1947, frequency distributions by size of entrepreneurial net money income for individuals in each of 11 nonfarm industry groups were derived from Bureau of Internal Revenue data for sole proprietorships and partnerships. Second, these distributions were adjusted so that they would account for total nonfarm entrepreneurial money income as estimated by the National Income Division in its personal income series. In the case of doctors, dentists, and lawyers, use was made of data from questionnaire surveys covering these professional groups. Finally, estimates for 1944 and 1946 were derived by interpolation. These several steps are described below.

Distribution From Tax Returns

An individual with entrepreneurial income reported his income from this source on a Form 1040 individual income tax return under "net profit (or loss) from business or profession" if he operated a sole proprietorship, or "net income (or loss) from partnership" if his income represented a share of the profits of a partnership.[1] In the former, but not the latter, case he reported the industry classification of the enterprise. For partnership income, in addition to the reports on individual income tax returns, special informational returns were required to be filed by each partnership which showed, among other items, the total net income of the partnership proper, its industry classification, and the number of partners sharing in the income.

For the period under consideration, the following tabulations of these data in the form of frequency distributions by net income classes were available: First, for 1945 and 1947, as part of the Bureau of Internal Revenue program of tabulating entrepreneurial income data by industry for odd calendar years, frequency distributions of sole proprietorships (from individual returns), and of partnerships (from partnership returns), each classified by industry groups, by size classes of net income of the proprietorship or the partnership. Second, annual frequency distributions, without any industry classification, of individual income tax returns reporting net income or loss from business or profession (sole proprietorships), or reporting net income or loss from partnerships, each by size classes of such net income reported by the individuals. In the case of partnership income the major definitional difference between the two sets of data is that the frequencies and the income brackets in the first set refer to the partnership proper, and those in the second set to the individual partners.

In addition to the frequency distributions, a third major set of tabulations of entrepreneurial income data for 1945 and 1947 referred to the aggregate amounts reported as net profit and as net loss, separately, by industry for proprietorships in both years and for partnerships in 1947, and by industry and net income classes for partnerships in 1945.

1. Form 1040F returns filed by farm operators are included in the tabulations of the Form 1040 returns.

The distributions of nonfarm entrepreneurs presented here were developed mainly from the first and third sets of tabulations, where the industry classifications made it possible to remove the tax returns of farmers and to deal separately with entrepreneurs in the various nonfarm industry groups. These industry tabulations, furthermore, were based on somewhat larger samples of tax returns than the other distributions, and had the additional advantage in the case of separate community property returns on which business income was divided between spouses, that in determining frequencies and amounts the business was counted only once, with all of the business income attributed to one spouse. The second type of tabulation was used, as indicated below, as a check on the reasonableness of the derived distributions of individual partners by size of their own shares of partnership net income.

The frequency distributions for 1945 and 1947 of proprietorships and of partnerships by size of proprietorship and partnership net income, respectively, which were available by fairly detailed industries, were each summarized into the following 12 major industry groups: farming; other industries related to agriculture, forestry, and fisheries; contract construction; finance, insurance, and real estate; manufacturing; mining; doctors, dentists and lawyers; other professional and social services; other services; retail trade; wholesale trade; and transportation, communication, and public utilities. These distributions were classified by the following entrepreneurial net income brackets: Loss (with detailed intervals available for partnerships), $1,000 intervals to $9,999, $5,000 intervals to $24,999, $25,000–$49,999, $50,000–$99,999, $100,000–$299,999 and $300,000 and over. In general, these brackets were used in carrying through the several adjustments described below.

The frequency distributions of the proprietorship and partnership returns for industries other than farming for 1947 are summarized in the first two columns of exhibit 6.

For each net income bracket a mean and aggregate net income was derived for each of the industry groups. For 1945 partnerships, these means were calculated directly from the third set of Bureau of Internal Revenue tabulations referred to above. For proprietorships, and for partnerships in 1947, the means were based on those for 1945 partnerships, adjusted so that the overall aggregate net income for each group would agree with the amount tabulated for the industry by the Bureau of Internal Revenue.

The returns of partnerships in each industry group and income bracket were then converted into distributions of the individual partners by size of the income shares each of them drew. This conversion was based on a special tabulation made available by the Bureau of Internal Revenue showing the number of partnership returns, separately for those with 2, 3, and 4 or more partners, by industry and by size classes of net income of the partnership. Data were also given for the total number of partners in each industry.

The frequency distribution of the individual partners by size of their respective shares of partnership net income was derived by assuming that the partners in each number-of-partner class divided the income of the partnership evenly among themselves. Thus, in each income bracket, for each industry group, the partners in 2-partner firms were each assigned one-half of the mean net income of the firms, those in 3-partner firms, one-third, etc. A special tabulation indicated that a high proportion of partnerships actually divided partnership net income in this fashion. The resulting frequency distribution of partners was felt to be reasonable, also, because it agreed closely, for all industry groups combined, with the frequency distribution of individual income tax returns by size of individuals' net partnership income, referred to above.

Exhibit 6.—*Number of individual and partnership income tax returns reporting nonfarm business or profession, by level of sole proprietorship or partnership net income, and number of nonfarm entrepreneurs by level of individual entrepreneurial net money earnings, 1947*

[Thousands]

Entrepreneurial income level	Tax returns filed by—		Partners in nonfarm partnerships [1] [2]	Nonfarm entrepreneurs	
	Nonfarm proprietorships	Nonfarm partnerships [1]		Covered by tax returns (1)+(3)	Adjusted
	(1)	(2)	(3)	(4)	(5)
Loss	378	90	203	581	545
Under $1,000	973	90	435	1,408	1,434
$1,000–$1,999	823	78	311	1,134	1,114
$2,000–$2,999	522	69	237	759	732
$3,000–$3,999	291	63	134	425	469
$4,000–$4,999	176	55	105	281	310
$5,000–$9,999	323	154	212	535	657
$10,000–$24,999	152	116	118	270	352
$25,000–$49,999	25	38	26	51	63
$50,000 and over	5	22	9	14	18
Total	**3,668**	**775**	**1,790**	**5,458**	**5,694**
Aggregate entrepreneurial net money earnings (billions of dollars)	$9.9	$7.0	$6.8	$16.7	$19.7
Mean entrepreneurial net money earnings (dollars)	$2,699	$9,032	$3,799	$3,060	$3,460

1. Column 2 shows the distribution of partnerships by level of net income of the partnership; column 3 the distribution of partners by level of partnership net income of the individual partners.
2. Includes an adjustment to subtract returns of persons reporting themselves as engaged in "real estate" but without any gross receipts from business.

In the "finance" industry an adjustment was made in the frequency distribution of partners to eliminate a selected group of returns, namely those on which the filers indicated that they were engaged in "real estate" operations but reported no gross receipts "from business." They were presumed to represent private individuals, as distinct from real estate firms, who were reporting rental income from dwellings or other real estate that they owned and leased to others. In conformance with the income classifications underlying the personal income series this type of income is included under rental income of persons, and not under proprietors' income in the present size distributions. The frequency distribution of the excluded group was based on a special tabulation by net income bracket of tax returns of partnerships in "real estate" reporting no gross receipts "from business."

The derived distribution for 1947 for partners in industries other than farming is shown in column 3 of exhibit 6, and the combined distribution of proprietors and partners in column 4.

Adjustment to Income Aggregates

The aggregate entrepreneurial net money income in each of the industry groups for 1945 and 1947, from tax returns, was next compared with the corresponding figures in the "Income of unincorporated enterprises" component of the personal income series. The derivation of the latter estimates is explained in the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS, pp. 70–79. For recent years, the estimates for nonfarm industries are based in large part on data from the individual income tax returns themselves, but supplementary data, such as statistics on retail sales, various other sets of census data, the Office of Business Economics series on number of operating businesses, and questionnaire surveys of the incomes of selected professional groups, have also been incorporated. The farm income series included in the estimates is derived by the Bureau of Agricultural Economics entirely independently of the tax return information.

The comparison (which was made after the figures from the personal income series had been adjusted, as described later, to agree with the Bureau of Internal Revenue data with respect to industry classification and types of income included) indicated that the discrepancy was greatest for farming, followed by the trade and service groups. Because of the large discrepancy in farming, the tax return information was discarded, and, as indicated in section 6, resort was had to Decennial Census data in deriving the size distributions for that industry.

Within the nonfarm entrepreneurial sector, separate treatment was accorded doctors, dentists and lawyers where income data were available from the questionnaire surveys on which the estimates in the personal income series are based. The methodology for these professional groups is discussed next, separately from that for other nonfarm industry groups.

DOCTORS, DENTISTS, AND LAWYERS

For physicians and surgeons, dentists, and lawyers, mail questionnaire surveys were conducted by the National Income Division, in most instances in cooperation with the several professional associations in these fields. These surveys, which comprise the basis for the average entrepreneurial net income estimates for the three professional groups in the national income series, are described in the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS, pp. 71–72.

The professional surveys provided percentage distributions of persons who reported some income from self-employment in each of these occupations during the year, by size of their annual net earnings from their professional activities.[2] For each of the three professional groups, these percentage distributions were applied to the estimated total number of persons who were engaged in such activities, in order to obtain the frequency in each earnings class. The totals were derived by applying step-up ratios, based on the survey data, to the National Income Division series on "number of active proprietors" in these professions. These step-ups were made to allow for the fact that the earnings size distributions attempt to cover all persons in these occupations who received some income from self-employment during the year, whereas the active-proprietor series represents the number devoting the major portion of their time to these professions.

OTHER NONFARM ENTREPRENEURS

For the other 10 nonfarm industry groups in the entrepreneurial sector, where income tax returns represented the only comprehensive set of basic data on income size distribution, the adjustment to the entrepreneurial net money earnings total in the personal income series was as follows. First, the frequency distribution for each of these industries that had been derived from tax returns was corrected so that it would account for the estimated total number of entrepreneurs in the industry. Second, the adjusted frequencies were shifted along the earnings scale so that the total earnings from the personal income series was accounted for and the Lorenz curve held constant.

Number of entrepreneurs

The number of entrepreneurs estimated for each of the nonfarm industries was based on the National Income Division annual "number of active proprietors" series. The latter required three types of adjustment for the purpose at hand.

First, the industrial classification was adjusted at several points so that it would agree with the classification used in the tax return tabulations. For example, proprietors of small manufacturing firms who were included in the service industry group in the "number of active proprietors" series were transferred to the manufacturing classification, and certain subgroups in the retail trade industry were transferred to services and to wholesale trade.

A second adjustment was to exclude several types of workers from the "number of active proprietors" series. These consisted of a subgroup of workers within the contract construction industry having no formal places of business but operating on their own account from their homes (such as carpenters and painters), and of insurance solicitors in the "finance" industry selling insurance on a commission basis without offices of their own. Some of these workers probably reported their earnings as wages and salaries on their tax returns and the group as a whole was treated in the present

2. Accordingly, a small amount of salaries was included in the entrepreneurial income distributions for these three professions, and excluded from the wage-salary distribution (exhibit 5, footnote 1).

size distribution estimates as part of the wage-salary category (exhibits 5 and 7).

A third adjustment was to step up the "number of active proprietors" to allow for turnover in the business population. Step-up ratios were derived by relating Office of Business Economics' quarterly series on births, deaths, and transfers of firms, by industry, to the average number of businesses in the industry in existence during the year.

For most of the industry groups the number of proprietors (including partners) reported on tax returns for 1945 and 1947 was found to agree fairly closely with the adjusted number derived in the above manner. In each of these industries, accordingly, the frequency distribution of entrepreneurs previously derived from tax returns was adjusted proportionately to account for the adjusted figure. In retail trade where the difference between two series was larger, the proprietors not covered in the tax return series were assumed to have been more heavily concentrated in the low entrepreneurial net income groups than those reporting on tax returns. The frequency distribution of this nonreporting group was based on a special Bureau of Internal Revenue tabulation showing the distribution by net income classes of firms in this industry with relatively small gross receipts. A similar assumption that the firms not covered on tax returns earned relatively small amounts of net income was made in the case of the industry group "agriculture other than farming."

Entrepreneurial net money earnings

The correction for differences in the number of nonfarm proprietors accounted for only a small part of the entrepreneurial earnings missing from tax returns. The balance of the difference was distributed among the various earnings brackets in such a manner as to leave the Lorenz curve in each industry unchanged.[3]

To determine the amounts to be added in this manner the figures on total net income of unincorporated enterprises by industry from the personal income series required several adjustments. The first two of these were similar to those described above under "number of entrepreneurs"—i. e., to allow for differences in industry classification, and to eliminate groups not covered in the entrepreneurial tax return series. A third was to adjust the totals from the personal income series to allow for differences in income coverage. The noncorporate nonfarm inventory valuation adjustment was subtracted because it is not a component of taxable income, and so were goods withdrawn from inventories for their own use by entrepreneurs in retail trade, on the assumption that most of them did not properly account on their tax returns for this item (exhibit 7).

ADJUSTED DISTRIBUTION

The adjusted frequency distributions of nonfarm entrepreneurs in 1945 and 1947 were derived by adding the distributions for the 11 nonfarm industry groups. The results for 1947 are shown in the last column of exhibit 6.

3. See section 1, footnote 12.

A reconciliation of the three sets of data on number of entrepreneurs and aggregate entrepreneurial net income—the totals in the personal income series, those underlying the distributions by size of nonfarm entrepreneurial net money income, and those reported on income tax returns—is shown in summary form for 1947 in exhibit 7.

The income distribution in that year, it will be noted, accounted for $19.7 billion of nonfarm entrepreneurial net money income, or $3 billion more than the comparable total reported on tax returns. This excess agrees closely with an estimate of the "extra" nonfarm entrepreneurial income disclosed by the auditing of tax returns, based on the preliminary findings of a recent Treasury Department audit study for 1948. However, the data from the audit study differ in several respects from those presented here so that precise conclusions cannot be drawn from them.

Exhibit 7.—*Net money earnings of unincorporated enterprises and number of active proprietors: Comparison of totals in personal income series, in size distribution of individual earners, and on income tax returns, 1946 and 1947*

Item	Net income (billions of dollars)		Number (millions)	
	1946	1947	1946	1947
Personal income series:				
Net income of proprietors and number of active proprietors, as in personal income	35.4	35.4	10.3	10.9
Less: Farming	14.8	15.6	4.8	5.0
Equals: Nonfarm industries	20.6	19.8	5.5	5.9
Less:				
Noncorporate nonfarm inventory valuation adjustment	—1.8	—1.5	.....	.....
Groups excluded from entrepreneurial income size distributions [1]	1.1	1.3	.6	.7
Adjustment for stocks withdrawn for nonfarm proprietors' own use	.4	.4	.....	.....
Plus: Adjustment to allow for turnover in entrepreneurial population	.....	.....	.5	.5
Equals: Adjusted net money earnings and number accounted for in size distributions of nonfarm entrepreneurs	21.0	19.7	5.4	5.7
Tax returns:				
Entrepreneurial net profit and number of entrepreneurs reported on tax returns [2]	.....	22.8	.....	8.8
Less:				
Farming	.....	5.9	.....	3.2
Returns in the real estate industry with no gross receipts from business	.....	.2	.....	.1
Equals: Adjusted net income and number for nonfarm industries [3]	.....	16.7	.....	5.5

1. Includes part of the contract construction and finance industries, which were transferred to the wage or salary category as described in text. The net income figure in this line also includes newsboys' income (transferred to wages or salaries) and patronage refunds and stock dividends paid by farmers' cooperatives (included in the income distributions of the farm operator family group). Offset against these items is a small amount of salaries earned by professional persons who engaged in both entrepreneurial and salaried work during the year (exhibit 5, footnote 1).

2. Amount represents net profit reported in the industry tabulations of sole proprietorships (from individual income tax returns) plus ordinary net income reported by partnerships (from partnerships income tax returns). Industry tabulations not available for 1946.

3. For comparability with the income aggregate derived above from the personal income series, the figure of $16.7 billion should be adjusted further to subtract such items as interest, dividends, and net gains (and losses) from sales of property other than capital assets received by partnerships, and net income of enterprises in Alaska and Hawaii, and to add business income received by fiduciaries, depletion allowances, and net operating loss carryover from prior years. The available data indicated that these several adjustments just about offset each other in 1947.

Unfortunately, the audit study results are not available by size classes of business income so that it was not possible to use them in distributing the $3 billion excess among entrepreneurial income brackets.

The number of nonfarm entrepreneurs included in the adjusted size distributions requires some comment. Based on the National Income Division "number of active pro-

prietors" series, the total was 5.7 million in 1947 (exhibit 7). This was well below an estimate of 7.1 million for the number of persons "engaged for pay or profit in a nonfarm business or profession" during that year, based on a census survey on the work experience of the population.[4] The true difference is, of course, smaller than the overall figures indicate because of the exclusion from the 5.7 million total of some 0.7 million persons who were assumed not to have reported themselves as entrepreneurs on tax returns (exhibit 7). Part of the remaining 10 percent difference in the figures may be due to the fact that family members who assisted the household head in a business enterprise, and were not included as "active proprietors," may have reported themselves as working for profit in the census work-experience enumerative survey. On the other hand, some of the difference may be due to an inadequate allowance for "turnover" of entrepreneurs in deriving the total number of entrepreneurs included in the size distributions. It is not believed, however, that any understatement in numbers due to this factor is large enough to affect the entrepreneurial size distributions to an appreciable extent.

For 1944 and 1946, tabulations of the entrepreneurial income reported on tax returns were not available with an industry breakdown, and the estimates for these years were based on the corresponding distributions for 1945 and 1947 that were derived above. For 1944, the Lorenz curve of nonfarm entrepreneurial income was assumed to be the same as in 1945.[5] For 1946 it was based on the curves for 1945 and 1947, with most weight being given to the former year because 1946 average entrepreneurial incomes in most industries were closer to the 1945 than to the 1947 averages.

The total number of nonfarm entrepreneurs and the aggregate net money entrepreneurial income included in the size distributions for 1944 and 1946 were derived from the personal income series by adjustments similar to those described above. These control totals, together with the Lorenz curves, yielded the required frequency distributions.

This procedure was believed to yield more reliable estimates than an alternative one based on changes between years in the all-industry distribution of individual income tax returns reporting business and partnership income. As indicated earlier in this section, such tabulations are available annually. Their major disadvantage is that they do not permit the separation of returns of farmers from those of the nonfarm entrepreneurial group. Because of the relatively large income discrepancies in farming (exhibit 7), and the probability that this industry accounts for varying fractions of the entrepreneurial income reported on tax returns in different years, the absence of an industry breakdown in these tabulations makes them much less useful for the purpose at hand than the industry tabulations.

4. "Work Experience of the Population in 1947," Bureau of the Census, Series P–50, No. 8, Table 2.

5. See section 1, footnote 12.

Part 1, Section 3

Combined Distribution of Earners

By Individual Money Earnings Level

THE next step in the procedure was to combine the frequency distributions obtained in the preceding sections for civilian wage or salary earners and for nonfarm entrepreneurs to derive the distribution of all civilian earners by size classes of their civilian money earnings.

This civilian-earner distribution was not required for earners in farm operator families, because the income distribution of the farm group was derived by a different estimating procedure, as described in section 6. Before adding the two frequency distributions, therefore, it was necessary to exclude members of farm-operator families who worked off their farms at some time during the year.

The distributions of the remaining earnings could not be added directly because an adjustment was required to allow for persons who received both wage-salary and nonfarm entrepreneurial income during the year. Since these persons appeared twice in the distributions that had been derived—once in the wage-salary distribution and once in the nonfarm entrepreneurial distribution—they had to be removed from both distributions, and then added back by level of their combined earnings from these sources. The two adjustments are described next.

Exclusion of Earners in Farm Operator Families

The farm group that was eliminated consisted of all members of farm-operator families who were engaged in off-the-farm work during all or part of the year. This included the farm operator who worked off his own farm for some period during the year, and members of his family who were employed full or part time at nonfarm occupations or who worked for money wages on other farms.

Since the bulk of such employment consisted of wage-salary work, the subtraction of earners in farm-operator families was confined to the wage-salary group.[1] The total number of persons in farm-operator families receiving civilian money wages or salaries, and their distribution by wage-salary level in 1946, were based on data from a family income survey for that year. This 1946 field survey, which also provided the basic data for a number of further steps in the estimating procedure, was conducted jointly by the Bureau of the Census of the United States Department of Commerce and the Bureau of Agricultural Economics of the United States Department of Agriculture, with the latter agency covering the farm-operator population and the former the remainder of families and unattached individuals.[2]

For 1944 and 1947, the corresponding frequency distributions were derived from that for 1946 by extrapolating the mean wage-salary earnings of this group of workers on the basis of the National Income Division series on average annual earnings of employees (*1951 National Income* supplement, table 26); estimating the number of farm laborers from information supplied by the Bureau of Agricultural Economics; and assuming that the Lorenz curve of the distribution was constant over this period.[3]

The distribution of wage-salary earners in farm operator families in 1946 is shown in column 2 of exhibit 8, where it is subtracted from the distribution of all wage-salary earners that was derived in section 1.

1. In 1946, for example, a Bureau of the Census-Bureau of Agricultural Economics survey indicated that there were some 0.3 million members of farm-operator families who received some nonfarm self-employment income during the year. An adjustment to exclude this group was not made here because the number was relatively small and because of the probable lack of comparability between the entrepreneurial income data in the sample survey and on tax returns for this group of workers. The nonfarm entrepreneurial income of the farm group was excluded, however, in determining nonfarm family income in section 5 (see exhibit 12, footnote 1).

2. The Census Bureau covered households other than those of farm operators as well as an overlap group consisting of the households of farm operators having fewer than 10 acres or not living on the farms they operated. In the special tabulations of the survey covering all households that were provided by the Census Bureau, the Bureau of Agricultural Economics schedules for the overlap group were excluded.

3. See section 1, footnote 12.]

Two-Source Earners

As has been indicated, it was also necessary to adjust the distributions of wage-salary earners (after exclusion of the farm group) and nonfarm entrepreneurs to allow for an overlap consisting of persons who received both these sources of income during the year. Such persons, designated "two-source earners,"[4] were first segregated, by level, from the frequency distributions of all wage-salary earners and all nonfarm entrepreneurs derived in sections 1 and 2, and then distributed by size classes of their combined money earnings from the two sources. The latter distribution was then added to the combined frequency distribution of "single-source" wage-salary earners and nonfarm entrepreneurs to obtain the distribution of all civilian earners (other than members of farm operator families).

SEPARATE SOURCES OF EARNINGS

The frequency distributions of two-source earners by size of their wage-salary earnings and by size of their nonfarm entrepreneurial earnings were segregated from the all-earner distributions on the basis of relationships determined from the census income survey for 1946, supplemented by statistics from income tax returns for the upper income groups.

The census survey provided, for the population exclusive of members of farm operator families, frequency distributions by wage-salary level (a) for all wage-salary earners, and (b) for the two-source group reporting both wages or salaries and nonfarm entrepreneurial income; and corresponding frequency distributions by nonfarm entrepreneurial income level for (c) all nonfarm entrepreneurs, and (d) for the same two-source group.

The procedure for deriving a percentage distribution by wage-salary level of the two-source earners was to determine the relationship between survey distributions (a) and (b), and to apply this relationship to the distribution of all wage-salary earners (exclusive of the farm group) by wage-salary level that had been developed from income tax returns in section 1. This was done by computing the cumulative percentage of frequencies below successive points on the wage-salary scale for the three distributions; relating the sets of percentages for (a) and (b) by plotting them against each other on a chart; and reading from the chart to determine the cumulative percentages of the two-source group that corresponded to the various cumulative percentages for the third distribution. Thus, if the chart indicated that in the census distributions x percent of two-source earners were associated with y percent of all wage-salary earners, on a cumulative basis, it was assumed that x percent of two-source earners were associated with y percent of all wage-salary earners in the distribution developed from income tax returns also.

4. It may be noted that the terms "single source" and "two-source" are used here to distinguish between the group for which all civilian earnings represented either wage-salary income or nonfarm entrepreneurial income and the group of these types of earnings. For instance, a person who received wage-salary income from more than one type of civilian employment and also received supplementary amounts of income other than civilian earnings, such as rents, dividends, interest, and transfer payments, would be classified as a single source earner provided that he did not receive any nonfarm entrepreneurial income.

Exhibit 8.—*Number of individual civilian earners, by type of earnings and by family attachment, by individual civilian money earnings level, 1946*

[Thousands]

Civilian money earnings level (as defined in column headings)	Wage or salary earners by money wage or salary level				Nonfarm entrepreneurs by entrepreneurial net money earnings level			Two-source earners by combined money earnings level	All civilian earners (other than those in farm operator families) (3)+(6)+(8)
	Total	In farm operator families	In nonfarm families or unattached individuals		Total	Single-source earners	Two-source earners		
			Single-source earners	Two-source earners					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Under $500 [1]	9,154	1,408	7,531	215	1,085	622	463	124	8,277
$500–$999	7,605	547	6,828	230	642	410	232	109	7,347
$1,000–$1,499	7,745	434	7,164	147	671	571	100	122	7,857
$1,500–$1,999	7,328	321	6,890	117	496	435	61	121	7,446
$2,000–$2,499	6,629	204	6,332	93	376	344	32	99	6,775
$2,500–$2,999	5,130	109	4,944	77	291	266	25	87	5,297
$3,000–$3,999	5,493	112	5,287	94	475	443	32	128	5,858
$4,000–$4,999	1,787	49	1,703	35	291	272	19	77	2,052
$5,000–$9,999	1,331	31	1,262	38	646	597	49	119	1,978
$10,000–$24,999	274	4	259	11	362	328	34	56	643
$25,000–$49,999	39	(2)	37	2	75	66	9	13	116
$50,000 and over	8	(2)	7	1	23	19	4	5	31
Total	**52,523**	**3,219**	**48,244**	**1,060**	**5,433**	**4,373**	**1,060**	**1,060**	**53,677**
Aggregate civilian money earnings (billions of dollars)	$100.1	$3.4	$94.7	$2.0	$21.0	$18.8	$2.2	$4.2	$117.7
Mean civilian money earnings (dollars)	$1,906	$1,056	$1,963	$1,887	$3,865	$4,299	$2,075	$3,962	$2,193

1. For persons with entrepreneurial money earnings, includes loss.
2. Less than 500.

The procedure for deriving a percentage distribution by nonfarm entrepreneurial earnings level for the two-source earners was similar.

For income classes above $5,000, where the census survey data were not available by size classes of income in the necessary detail, the relationship between the wage-salary distribution of all earners and that of the two-source group was based on information from individual income tax returns. Special tabulations of the tax returns for 1947 were made available showing the frequency distributions, by size classes of wages and salaries, of all returns reporting the receipts of such earnings, and of those returns reporting both wage-salary and sole proprietorship income. Cumulative percentages of frequencies computed from these data were plotted against each other and the resultant curve was used to extend the curve based on the survey data to the higher wage-salary brackets.[5] Similar tabulations of tax returns were used to estimate the upper portion of the distribution by size of nonfarm entrepreneurial income for the two-source earner group.

For 1944 and 1947, percentage distributions of the two-source earners were estimated by applying the relationships between the all-earner and two-source earner distributions developed from the 1946 survey data to the 1944 and 1947 distributions of wage-salary earners and nonfarm entrepreneurs.

The percentage distributions for the two-source earners derived by the above procedures were then applied to the estimated total number of persons receiving both wage-salary and nonfarm entrepreneurial income in each of the 3 years. For 1947 this total was based on the number of persons reporting both types of employment in a census work-experience survey covering that year.[6] The survey figure was adjusted downward to allow for differences in the coverage of the nonfarm entrepreneurial group in that survey and in the entrepreneurial income size distributions (see discussion under "Adjusted Distribution" in section 2). For 1944 and 1946, the two-source earner group were estimated to account for a somewhat smaller percentage of all nonfarm entrepreneurs than was found in 1947.

The frequency distributions of two-source earners and those of single-source earners, obtained by subtraction, are shown, for 1946, in columns 3–7 of exhibit 8.

COMBINED EARNINGS

A tabulation from the 1946 census income survey classified two-source earners (other than in farm operator families) by size of their wage-salary earnings and within each such class by size of their nonfarm entrepreneurial earnings. An examination of this cross-classification indicated that there was little if any relationship between the amount of wage-salary income and nonfarm entrepreneurial income earned by persons who were engaged in both types of employment during the year.[7]

Accordingly, a cross-classification for adding the wage-salary and nonfarm entrepreneurial earnings of the two-source earners was constructed on the assumption of independence between the two kinds of earnings. That is to say, for each of the three years the frequency distributions of the two-source group by size of wages or salaries and by size of nonfarm entrepreneurial earnings that had been derived above were inserted in the two margins of a cross-classification, and the cells were filled in by distributing the one margin by the percentage distribution of the other. In other words, if the percentage of the two-source earners in a given bracket of wages or salaries was p, and the percentage in a given bracket of nonfarm entrepreneurial earnings was q, then the percentage of two-source earners falling in a cell bounded by these two brackets was $p \times q$. The frequency distribution of the two-source group by combined earnings level was then obtained by cross-adding through the derived cross-classification.[8]

The combined earnings distribution of the two-source earners and the distribution of all civilian earners—the sum of the distributions for single- and two-source earners—are shown, for 1946, in the last two columns of exhibit 8.

Analysis of the data indicates that relative income differences as measured by Lorenz curves are much smaller for wages or salaries than for nonfarm entrepreneurial earnings, and smaller when earnings of either type constitute the sole source of earnings than when they are received in conjunction with the other type.

Also, relative income differences are smaller for the combined group of single-source earners than for the two-source earners distributed by combined earnings from both sources. The Lorenz curve for the two-source earners by combined earnings falls between their curves by wage-salary and entrepreneurial earnings separately.[9]

5. Corresponding tabulations of tax returns that were available for 1945 showed relationships between the all- and two-source earner returns that were very similar to those in 1947.

6. "Work Experience of the Population in 1947," Bureau of the Census, Series P–50, No. 8, Table 1.

7. The discrepancies between the observed frequencies in the census cross-tabulation and those expected under the hypothesis of independence were examined by the chi-square test. The value of chi-square was on the borderline of statistical significance but further examination of the direction of the differences between the observed and expected frequencies, cell by cell, revealed no consistent pattern of relationship.

8. See section 1, footnote 9.

9. It may be noted that in instances where the same group of recipient units receive income from several component income categories, the degree of inequality of the combined income distribution cannot exceed that of the most unequal component, but may be less than that of any of the components.

Combination of Earners Into Nonfarm Families

NEXT, the distributions of earners derived in the preceding section were combined into family units classified by size of family civilian money earnings. These units included nonfarm families of two or more persons and unattached individuals.

The combination was made in two steps. First, for each year the distribution of civilian earners (other than in farm operator families) was subdivided into six component distributions, namely, into distributions of earners who were unattached individuals, and of those belonging in families having 1, 2, 3, 4, and 5 earners, respectively. Second, for earners in multiearner families, the earnings distributions of the individual earners were combined to obtain the family earnings distributions for families in each number-of-earners grouping. The five family distributions were then added to obtain the earnings distribution of all nonfarm families.

Earners in Single and Multiearner Families

Special tabulations from the 1946 census income survey referred to in the preceding section were used as a basis for subdividing the all-earner distribution for that year into separate distributions for earners in nonfarm families with 1, 2, 3, 4, and 5 earners, and for earners who were unattached individuals. The tabulations provided a frequency distribution for all civilian earners and component frequency distributions for earners in each number-of-earner category, classified by individual civilian money earnings level.[1] The total number of nonfarm families (and unattached individuals) in each number-of-earner category was also given in the tabulations.

The total number of civilian earners accounted for in the inflated census survey fell short of the total number included in the distribution derived in section 3. Accordingly, as a first step, each of the component census distributions was adjusted so that their sum would account for that number.

An adjusted total number of earners for each component was obtained in the following manner. First, the number of unattached individual earners and the number of nonfarm families reporting one or more earners, as given in the survey, were increased somewhat at the expense of the number of unattached individuals and families reporting no earnings. The number of nonfarm families (and unattached individuals) with one or more earners was then determined by subtracting the nonearning group from the total number of nonfarm families (and unattached individuals) as determined in part 3.

Secondly, a distribution was calculated of the total number of earners as derived in section 3 (less the number of unattached individual earners) by families having various numbers of earners per family. The distribution was obtained by holding constant the relationship shown by the survey data between the cumulative percentage of the total number of earners accounted for by any given cumulative percentage of families ranked by the number of earners per family.[2] This resulted in a decrease in the proportion of families with one earner and an increase in the proportion of multiearner families as compared with the census survey figures.

The adjusted number of earners in each component number-of-earner group was then distributed by individual earnings levels proportionately to the corresponding survey distribution. Since the survey data were not available for the upper earnings levels in the necessary detail, they were extrapolated by use of Pareto curves. These several frequency distributions were then added to obtain a reweighted all-earner census distribution.

The second step was to apply the relationship between each of the component distributions and the reweighted all-earner census distribution against the all-earner distribution derived in section 3. The latter differed from the reweighted

1. Nonfarm families are defined to include all families other than those including a farm operator. The largest number-of-earner classification in the Census tabulations was "4 or more," and separate distributions for earners in families with 4 or 5 earners were derived by extrapolation. Separate account was not taken of families with more than 5 earners because their number was doubtless very small.

2. This required interpolation procedures essentially similar to those involved in changing the mean income of an income distribution while holding its Lorenz curve constant, as described in section 1, footnote 12.

census distribution by showing relatively larger proportions of earners in the earnings brackets above approximately $3,000.

Cumulative percentages of frequencies below successive points on the earnings scale were calculated for the various component census distributions, the reweighted census all-earner distribution, and the section 3 all-earner distribution. The procedure for relating these distributions was similar to that described in section 3 under "Separate Sources of Earnings." For instance, if the census data indicated that on a cumulative basis x percent of all earners in the two-earner family group were associated with y percent of the reweighted census all-earner distribution, it was assumed that x percent of all earners in the two-earner family group would be associated with y percent of the section 3 distribution also.

Simple percentage distributions derived from these cumulative distributions were then applied against the adjusted number of earners in each component group to determine their frequency distribution.

Similar procedures were used to derive the component distributions in 1944 and 1947. The total numbers of earners in the several number-of-earner categories were based on Census survey data for 1944 and 1947, adjusted, as described for 1946, so as to account for the total number of civilian earners in each of the two years obtained in section 3. Since separate percentage distributions by earnings level for earners in the various number-of-earner categories were not available from the surveys for these 2 years, they were obtained by applying 1946 relationships to the all-earner percentage distributions for 1944 and 1947 from section 3, in a manner similar to that described for 1946.

This procedure, it will be noted, is based on the assumption of a stable relationship over this period among the various component distributions as measured by the relative magnitudes of their mean earnings and by the relative magnitudes of the dispersions around these means. The validity of this assumption is strongly suggested by the stability of the Lorenz curves of the all-earner distributions during this period.

The 1946 distributions derived in this way for earners in single and multiearner families are summarized in exhibit 9. Lorenz curves for the earners in the several number-of-earner categories indicate that relative income differences are larger for the lower two-thirds of earners in multiearner families than for the single-earner group. This is closely related to the fact that the distributions for earners in the multiearner family groups include a high proportion of family earners who received only very small amounts during the year. The mean income, for example, of earners in one-earner families was $3,253, as compared with $1,982 for earners in families with two earners and $1,666 for those in the three-or-more-earner category (exhibit 9).

Exhibit 9.—*Number of individual civilian earners in nonfarm families with various numbers of earners, or representing unattached individuals, by individual civilian money earnings levels, 1946*

[Thousands]

Civilian money earnings level	Civilian earners (other than those in farm operator families)					
	Total	In nonfarm families with—				Unattached individuals
		Total	1 earner	2 earners	3 or more earners	
Under $500 [1]	8,277	7,320	788	3,453	3,079	957
$ 500–$999	7,347	6,337	1,113	2,906	2,319	1,010
$1,000–$1,499	7,857	6,848	1,551	2,950	2,347	1,009
$1,500–$1,999	7,446	6,663	1,670	2,761	2,233	783
$2,000–$2,499	6,775	6,086	1,955	2,411	1,720	689
$2,500–$2,999	5,297	4,785	1,840	1,746	1,200	512
$3,000–$3,999	5,858	5,440	2,473	1,872	1,094	418
$4,000–$4,999	2,052	1,945	976	625	344	107
$5,000–$9,999	1,978	1,879	1,098	540	241	99
$10,000–$24,999	643	628	398	172	57	15
$25,000–$49,999	116	115	74	31	10	1
$50,000 and over	31	31	20	9	1	(2)
Total	**53,677**	**48,077**	**13,956**	**19,476**	**14,645**	**5,600**
Aggregate civilian money earnings (billions of dol.)	$117.7	$108.4	$45.4	$38.6	$24.4	$9.3
Mean civilian money earnings (dollars)	$2,193	$2,255	$3,253	$1,982	$1,666	$1,661

1. Includes loss.
2. Less than 500.

It may be noted that when the analysis is restricted to the "principal" family earner, i.e., to the person in the family reporting the largest amount of earnings during the year, the pattern of variation among the number-of-earner categories is quite different. The census survey data indicate that relative income differences in the principal earner distributions decrease as the number of family earners increases.

Combination of Earners in Multiearner Families

For one-earner nonfarm families the frequency distribution of earners by individual civilian earnings level derived above corresponded to the desired distribution of families by family civilian money earnings level. The same was true, of course, of the distribution of earners who were unattached individuals.

For multiearner nonfarm families, however, it was necessary to combine the amounts received by the several earners in the family to derive the required family earnings distribution. This combination was again based on relationships from the 1946 census income survey.

Tabulations from this survey provided, for each number-of-earner category, frequency distributions of (a) the earners by individual earnings level, and (b) the families by family earnings level. For two-earner families it was found, on the basis of these data, that when one earner was selected at random from each of these families there was no relationship between the earnings of the earners so selected and the

earnings of the remaining earners. This fact was established by preparing a cross-classification of earners in two-earner families in which each of the two margins included one-half of the census total number of earners in these families distributed according to the percentage distribution from (a). The cells in this cross-classification were filled in on the assumption of independence, i. e., by distributing the one margin according to the percentage distribution of the other.[3] The family earnings distribution which was obtained by adding through this cross-classification was in close agreement with the actual census family distribution shown by (b).[4]

Similarly, for three-earner families, the census data indicated that the earnings of the several family earners were distributed independently from each other. In this case a cross-classification relating one-third of the census earners to a second third was derived in a manner similar to that described for the two-earner group, and a combined distribution for these two-thirds was obtained from this cross-classification. Next, these combined earners were cross-classified by the remaining one-third of earners, again on the assumption of independence. One margin of this cross-classification represented the frequencies that had been obtained by combining the first and second thirds of the earners, the other margin was derived by distributing the remaining third in proportion to distribution (a), and the cells were filled in by distributing the one margin according to the percentage distribution of the other. The family earnings distribution for the three-earner group that was derived by adding through the cross-classification was also found to agree closely with the corresponding tabulated census distribution from (b).

Exhibit 10.—*Number of nonfarm families with various numbers of earners, by family civilian money earnings level, 1946*

[Thousands]

Family civilian money earnings level	Total	Nonfarm families with—		
		1 earner	2 earners	3 or more earners
$0	1,949			
Under $1,000 [1]	2,553	1,901	603	49
$1,000–$1,999	4,871	3,221	1,460	190
$2,000–$2,999	6,281	3,795	2,062	424
$3,000–$3,999	5,144	2,473	2,016	655
$4,000–$4,999	3,224	976	1,488	760
$5,000–$9,999	4,890	1,098	1,809	1,983
$10,000–$24,999	900	398	252	250
$25,000–$49,999	125	74	38	13
$50,000 and over	33	20	10	3
Total	**29,970**	**13,956**	**9,738**	**4,327**
Aggregate family civilian money earnings (billions of dollars)	$108.4	$45.4	$38.6	$24.4
Mean family civilian money earnings (dollars)	$3,617	$3,253	$3,964	$5,639

1. Includes loss.

Accordingly, this procedure was applied to the distributions of earners in the several multiearner groups that had been derived, as described earlier in this section, by subdividing the all-earner distribution from section 3. For earners in families with 4 and 5 earners, the technique was similar, involving in each case the setting up of an additional cross-tabulation for each additional earner.

The derived frequency distributions of nonfarm families with varying numbers of earners by family civilian money earnings level are summarized, for 1946, in exhibit 10. Lorenz curves for these distributions indicate that the relative income differences shown by the several family curves decrease progressively as the number of earners in the family increases.[5]

3. See discussion in section 3 under "Combined Earnings."

4. For procedures used in adding through the cross-classification, see section 1, footnote 9. The following is a comparison, for 2-earner families, between the percentage distribution tabulated in the 1946 census survey and the distribution derived by applying the method described here directly to the census data for earners in 2-earner families:

Family civilian money earnings level	Percent distribution of 2-earner families	
	Census survey	Derived distribution
Under $1,000	6.3	6.9
$1,000–$1,999	16.1	16.0
$2,000–$2,999	23.5	23.0
$3,000–$3,999	23.8	21.7
$4,000–$4,999	15.9	15.1
$5,000–$7,499	11.1	13.4
$7,500–$9,999	1.7	2.3
$10,000 and over	1.6	1.6
Total	100.0	100.0

5. As the above description of methodology indicates, the patterns of relative income differences for the several number-of-earner groups are taken over from the census survey data. It may be noted that the contrast between the patterns for families and individual earners reflects the independence among the earnings of individual earners as described above. That is, if the distributions of individual earners in families with 1, 2, 3, etc., earners had been such that their coefficients of variation, V, had been equal, it would follow, under independence, that the coefficients of variation of the several derived family earnings distributions would be $V/\sqrt{k}$, where k is the number of earners; the more earners, the smaller the degree of income inequality.

Part 1, Section 5

Nonfarm Families

By Family Personal Income Level

THE frequency distributions derived in the preceding section classified nonfarm families and unattached individuals by size classes of family civilian money earnings, i. e., by the sum of the civilian money wage-salary and nonfarm entrepreneurial income of these family units. The following steps in the procedure refer to the addition to these earnings of the various other types of income that many of these families received, such as dividends, interest, pensions, nonmoney income, etc., to derive the final frequency distributions by size of total family personal income.

This was the most difficult portion of the estimating procedure for nonfarm units because it was in the area of income other than earnings that both of the major sources of data on income size distribution—individual income tax returns and the sample field surveys of family income—differed most from the control totals derived from the personal income series. Certain of these kinds of income, such as social insurance benefits, public assistance, veterans' payments, and income in kind, are not covered on tax returns (with minor exceptions) because they are specifically excluded from taxable income, and others are only incompletely reported, such as dividends, and, particularly, interest and rental income.

Many of these same types of money income are also substantially understated in the field surveys of family income where respondents were most apt to forget minor or irregular sources of income, or to misinterpret, sometimes unintentionally, the full scope of the family income that was being measured. In addition, the recent field surveys of family income exclude income in kind entirely and do not account for certain other types of income that are part of the family personal income concept which underlies the present estimates.

A further difficulty with respect to undercoverage of income is encountered when attention is focused not on amounts of income but on the number of units receiving each of these kinds of income. Unfortunately, a well-defined series on the proportion of the population with income from one or a combination of most kinds of income other than civilian earnings is not available. This constitutes a major difference between these types of income and the civilian earnings that were discussed earlier.

The kinds of income that were added to the civilian money earnings distributions were divided into two groups. The first consisted of the various types of money income other than civilian earnings that were included in the family money income concept used in recent field surveys of family income. The second included the several items of family nonmoney income not covered in these surveys but included in the family personal income series, together with a few adjustments relating to money items that were needed in order to match the income coverage of the personal income series.

The addition of the first set of income items to the civilian earnings distributions yielded annual frequency distributions in which nonfarm families and unattached individuals were classified by size of family money income as defined in the surveys, and the addition of the second set resulted in the final distributions in which these consumer units were classified by size of family personal income. These two steps in the estimating procedure are discussed in turn below.

Distribution by Family Money Income Level

The various items of money income that were added to civilian money earnings in this step were those included in family money income in the recent sample field surveys conducted by the Census Bureau, and, with certain minor exceptions, corresponded also with the income items included in the Federal Reserve Board surveys.

By using this income definition the annual distributions by money income level that were derived by the procedures described below could be compared directly with those from the surveys. The definition had the advantage, furthermore, that it made it possible in constructing the money income size distributions to use directly a number of special cross-tabulations of the survey data without modification for definitional differences.

The additions considered here were grouped into the following three major categories: (1) Property income, consisting of monetary interest, dividends, rents, and fiduciary income received by persons; (2) military income, consisting of money allowances and allotments to the families of members of the armed forces, military money wages or salaries of persons who returned to civilian life during the year, and various types of transfer payments to veterans including military pension, disability, and retirement payments, adjusted compensation benefits, mustering-out payments and terminal leave benefits, readjustment, self-employment and subsistence allowances, and State and local veterans' aid and bonuses; and (3) social insurance benefits, assistance, and miscellaneous money income, including old-age and survivors insurance benefits, State unemployment insurance benefits, railroad retirement and unemployment insurance benefits, Federal, State, and local government civilian pensions, public assistance of various types, compensation of workmen for injuries, net receipts from roomers and boarders in private homes, periodic payments from life insurance companies, and a few minor additional items.

The addition procedure consisted of four main steps. First, estimates were derived, separately for nonfarm families and for unattached individuals, of the total amount of income received from each of these three sources, and of the total number of consumer units receiving each. Second, these control totals of numbers and amounts were distributed among the various family civilian money earnings brackets. The number of nonfarm families receiving each of the possible combinations of the three major categories of money income other than civilian earnings, and the mean and aggregate amount of such income received by each of these groups of families, were also determined for each family money earnings bracket. Third, within each family money earnings bracket, the number of nonfarm families receiving each of these combinations was distributed by size classes of money income other than civilian earnings in order to take account of dispersion around the mean. Fourth, by cross-addition, families were allocated to income brackets representing the sum of their civilian earnings and their other money income. For unattached individuals an abbreviated procedure was used in the second and third steps.

The following description is confined mainly to 1946, the year for which the data available from income tax returns and the field surveys were most adequate for the purpose at hand. In general, the estimates for 1944 and 1947 were derived by similar procedures, based in part on relationships determined here for 1946.

CONTROL TOTALS

Money income other than civilian earnings

The aggregate amounts of monetary property income, military income, and social insurance and miscellaneous income received by families and unattached individuals in each of the years were determined from the personal income series. The latter required adjustment to exclude income of these types flowing to nonprofit institutions or retained by private trust, pension, and welfare funds, and to remove, also, the various items of nonmoney income that were not included in the family money income concept. In addition, some rearrangement of the personal income components and several additions to and subtractions from them were needed to match the family money income definitions.

These several adjustments to the personal income series are shown, for 1946, in exhibit 11. From the derived total for each of the three income categories was subtracted the amount estimated to have been received by farm operator families, whose income size distributions were derived by a different methodology as described in section 6, and the remainder was allocated between nonfarm families and unattached individuals. These several allocations were based on the amounts reported by the three groups of consumer units in the 1946 Census-BAE survey.

Recipients of property income

The total number of nonfarm families receiving dividends and/or interest and the number receiving rents (including royalties) were estimated by combining data from individual income tax returns for 1946 with those from the Census sample field survey for that year. The general procedure was

Exhibit 11.—*Family money income other than civilian earnings derived from personal income series, 1946*

	Billions of dollars
Dividends, interest, rents, and fiduciary income:	
Dividends, interest and rental income as in personal income	19.8
Less: Property income received by nonprofit institutions or retained by fiduciaries [1]	.6
Imputed interest and accrued interest on United States savings bonds [2]	3.6
Imputed net rental value of owner-occupied nonfarm dwellings	2.3
Plus: Net farm rents received by farm operator landlords (exhibit 14)	.6
Equals: Total included in family money income	14.0
Military income:	
Military wages or salaries as in personal income	8.0
Plus: Military transfer payments as in personal income [3]	6.7
Less: Military money wages or salaries of armed forces personnel who had not returned to civilian life by end of year and military nonmoney wages or salaries	3.7
Plus: Miscellaneous items [4]	.6
Equals: Total included in family money income	11.6
Social insurance, assistance and miscellaneous income:	
Transfer payments (except military) and other labor income as in personal income	6.6
Less: Employer contributions to private pension and welfare funds [5]	1.2
Business and Government transfer payments to nonprofit institutions	.4
Plus: Net total of miscellaneous items [6]	.2
Equals: Total included in family money income	5.2
Total family money income other than civilian earnings:	
Sum of items as derived above	30.9
Less: Total to farm operator families	1.6
Equals: Total to nonfarm families and unattached individuals	29.3

1. Property income retained by fiduciaries represents dividends, interest and rental income received by fiduciaries less income received by individuals from fiduciaries.
2. Accrued interest on United States savings bonds excludes interest on bonds redeemed during the year.
3. Includes military pension, disability, and retirement payments, adjusted compensation benefits, mustering out payments and terminal leave benefits, readjustment, self-employment and subsistence allowances, and State and local veterans' aid and bonuses.
4. Includes adjustment to substitute issues for redemptions of terminal leave bonds and to add pay of military reservists.
5. Information was not available on the other types of income of these funds and on the benefit payments made by the funds. It was assumed that these two items were approximately of the same magnitude so that the deduction of employer contributions above was effectively equal to a deduction of the undistributed income of the funds.
6. Includes adjustments to add periodic payments to individuals by life insurance companies and rental income from roomers and boarders in private homes, and to subtract pay of military reservists (footnote 4, above), miscellaneous fees (exhibit 5, footnote 1), business transfer payments other than to nonprofit institutions, lump-sum social insurance benefits, profits of military post exchanges, payments to prisoners of war, and compensation of prison inmates.

to estimate the percentages of units receiving these types of income in the various earnings brackets, based on the tax return and survey statistics, to apply them against the numbers of nonfarm families in the corresponding brackets as determined in section 4, and sum the results over all earnings brackets.

A tabulation of the 1946 tax returns showed the total number of returns, the number reporting dividend income, and the number reporting income from rents and royalties, each by size classes of adjusted gross income. Adjusted gross income represented the sum of all the types of income reported on the return, including not only civilian earnings but also dividends, interests, rents, statutory capital gains or losses, fiduciary income, etc. Before computing percentages from the tabulation, therefore, it was necessary to reclassify the returns by brackets that would more nearly approximate civilian earnings in order to match the size distribution of families from section 4 against which these percentages were to be applied.

The reclassification was based on two cross-tabulations of the 1946 returns, the first of which distributed returns with dividends by size classes of adjusted gross income, and, within each such class, by size classes of dividend receipts, and the second of which distributed returns with rental income in similar fashion. By subtracting through these two cross-distributions [1] the returns with dividends were classified by brackets of adjusted gross income less dividends, and, the returns with rents by brackets of adjusted gross income less rents. The available data did not permit of further adjustment to make the definition of the brackets precisely the same as that in section 4.[2]

The percentages that the number of returns with dividends and the number with rents constituted of the total number of returns in each of these brackets was then computed. At the upper end of the income scale—above approximately $15,000—these percentages were smaller than the percentages for the corresponding brackets of adjusted gross income, and the reverse was the case in the lower brackets.

A separate calculation of this type was not made for interest income mainly because the field survey data which, as will be explained below were used jointly with the tax-return data, showed dividend and interest receipts only on a combined basis. Instead, a partial allowance was made to include interest recipients who did not receive dividends by raising the percentages of dividend recipients in the various brackets that had been derived above. This was done on the basis of an examination of tax-return data for 1945, the latest year for which combined amounts of dividends and interest were reported on returns.

The derived percentages of dividend-interest and rental recipients in the earnings brackets above $5,000 were then smoothed and applied against the total number of nonfarm families in each of the various civilian earnings brackets, from section 4, to derive the numbers receiving dividends and/or interest and the numbers receiving rents. For lower earnings brackets, corresponding percentages were based on a tabulation from the Census survey for 1946 showing the proportion of nonfarm families reporting dividends and/or interest income and the proportion reporting rental income in each family civilian earnings bracket. These were raised by linking them with the percentages based on tax returns at $5,000.

The derived numbers of nonfarm families receiving dividends and/or interest and the numbers receiving rents in all of the family earnings brackets were then raised proportionately so that when the resulting frequencies were multiplied by the corresponding mean amounts per recipient family, which were derived separately as described later in this section, they would account for the control totals of aggregate dividend-interest and rental income received by nonfarm families. It may be noted that this adjustment was relatively small mainly because of the fact that the census survey data on the proportions of property-income recipient units in the various family earnings brackets under $5,000, and on their mean property-income receipts were raised fairly substantially when they were linked at $5,000 to the corresponding figures based on tax returns.

For unattached individuals, the total numbers receiving dividend-interest and rental income were derived in more summary fashion based on the relationship shown in the field survey between the percentages of nonfarm families and of unattached individuals receiving these types of property income.

The resulting totals—some 6.5 million nonfarm families and unattached individuals in 1946 with dividend and/or interest income, and 5 million with rental income—were substantially higher than the number of individual income tax returns reporting receipt of these sources. In 1945, the latest year in which dividends and interest were reported in combination on tax returns, 5 million returns reported dividend and/or interest receipts, and in both 1945 and 1946 somewhat under 4 million returns reported rents and royalties.[3] The totals for dividend-interest and rent recipients were much higher than those reported in the Census field surveys. On the basis of the blown-up 1946 survey data, only some 3 million nonfarm units received dividend and/or interest income; the number with rental receipts was 3.6 million.

The total of 6.5 million nonfarm families and unattached individuals with dividend-interest receipts is approximately 1 million higher than a recent estimate of the number of

1. See section 1, footnote 9.

2. For adjusted gross income brackets above $300,000, the returns were reclassified by earnings brackets, i. e., by the sum of reported wages or salaries and net entrepreneurial income, on the basis of a special tabulation for this small group of returns which made it possible to subtract all of the types of income they received aside from earnings.

3. The disparity between the estimated totals and the numbers reporting on tax returns is larger than these figures indicate since the former is on a family and the latter most nearly on an individual basis. Also, farm operator families with property income are excluded from the estimated totals, but are included to some extent in the tax return totals. It may be noted that not all of the recipients of these types of income are required to file tax returns and that a good many of those who are required to file, but do not do so, would be nontaxable.

families owning stocks in the United States.[4] Since many families with stocks also own some type of interest-yielding assets this total also presumably covers several million interest-recipient families.[5] However, the figure is far short of the total number of families with any amount of monetary interest receipts. For example, some 26 million family units are estimated to have owned savings accounts in early 1952, according to a recent study of the Bookings Institution,[6] and a very large portion of these units doubtless received at least a few dollars of interest income during the year.

The total of 6.5 million was not raised to cover all interest recipients because of lack of data on the total number of units receiving any form of interest income during the year, and on the size distribution of noncovered units, coupled with the fact that the bulk of the noncovered group has such small interest receipts that their distribution by income level would be very little affected by the addition of their interest income. The Federal Reserve Board's 1949 Survey of Consumer Finances, for example, indicates that less than 1 percent of the units owning no stock had liquid assets of more than $5,000, i. e., had interest income from such assets of, say, $150 or more. It may be noted that these figures are only approximately comparable because they include recipients of accrued interest on Series E Government bonds, an item of income that is here excluded from income and added to the distribution at a later stage.

Instead, the total amount of cash dividend-interest income received by nonfarm families and unattached individuals was distributed among the 6.5 million units. Since the excess interest income assigned to this group was relatively small the error resulting from the procedure likewise could be assumed to be small with only a negligible bias due to possible misassignment by family earnings level.

The total number of nonfarm families and unattached individuals receiving property income—approximately 10 million in 1946—was derived by adding the number with dividend-interest and the number with rental income [7] and subtracting an estimate for those receiving both categories. In the absence of tabulations for recent years on the number of tax returns or family units receiving both dividend-interest and rental income, the estimated number in this overlap group was based on relationships shown in special tabulations of 1936 tax returns, the latest year for which such data were available.[8]

Recipients of military income

For the various types of veterans' payments as listed earlier, the number of recipient units in each of the three years was based on data from the Veterans Administration, and for military family dependency allowances and/or allotments of military pay, on statistics on the number of allowance and allotment checks issued by the Army and on relative strength of the various other branches of the armed services from the Department of Defense. The total number of consumer units with military income was obtained as the sum of these figures minus the estimated number receiving both veterans' payments and military family allowances or allotments.

The number in the overlap group, relatively large in 1946 because of the sizable number of military personnel discharged in that year, was based on monthly data on separations returning to civilian life, furnished by the Department of Defense, and on the estimated proportion of separated personnel whose families received allowances and/or allotments. An estimate of the number of farm operator families with military income was subtracted from this total, and the balance was distributed among nonfarm families and unattached individuals, on the basis of the relative importance of these groups among recipients of military income as reported in the Census-BAE income field survey for 1946.

For 1946, this procedure yielded an estimated total of somewhat over 10 million nonfarm families and unattached individuals receiving military income, to a very large extent in the form of veterans' payments. The comparable totals for 1944 and 1947 were 8 million each, with family allowances and allotments constituting the bulk of the military category in the former year and veterans' payments in the latter.

Recipients of social insurance benefits, etc.

For each of the 3 years, the number of consumer units receiving social insurance benefits and assistance was obtained by combining data for the various programs. It should be noted that these totals are subject to greater error than those for the other types of income described above, largely because of the lack of data on the extent of overlap between many of the programs.

Statistics on numbers of recipients for each program were furnished by the Federal Security Agency, Railroad Retirement Board, and Civil Service Commission. For most programs the number of recipients on the rolls at any time during

4. The recent report of the Brookings Institution on "Share Ownership in the United States," prepared by Lewis H. Kimmel, indicates that in early 1952 there were 4¾ million family units with publicly held stocks, and 2⅓ million with privately held stocks (p. 116). Some units own both kinds of stock so that the total figure for stockholding units is probably around 6 million. This includes several hundred thousand farm operator family units owning stocks who are not included in the 6.5 million total above, and some family units whose stocks paid no dividends during the year. The total number of stockholding units, also, was probably somewhat smaller in 1946 than at the present time.

5. An approximation of the minimum number of tax returns with both dividend and interest income can be derived by comparing the statistics for 1945 and 1946. In the former year, when the two sources were reported in combination, 5 million returns reported dividends and/or interest and in the latter 3.3 million reported dividends and 3.6 million interest. If the reports for the two years are comparable in coverage, this would mean that 1.9 million of the 3.6 million returns with interest income also reported dividends.

6. *Op. cit.*, p. 116.

7. It was assumed that the relatively small group of recipients of fiduciary income were covered by these figures, i. e., received one of the other types of property income as well.

8. Tabulations were available for 1936 showing the numbers of returns reporting the receipt of various combinations of income categories, by earnings bracket. (*Statistics of Income Supplement Compiled from Income Tax Returns for 1936, Individual Incomes*, Section III, "Patterns of Income," U. S. Treasury Department, Division of Tax Research in cooperation with the Works Progress Administration, June 1940.)

the calendar year was not directly available but was estimated by summing the number in the continental United States on the rolls at the beginning of the year and estimates of new entries to the rolls during the year. In some of the important programs, e. g., old-age and survivors insurance and the assistance programs, it was possible to lower the figures to allow for cases where there was more than one recipient in the family, or where recipients had died prior to the end of the year and hence were not covered in the income size distribution estimates.

The numbers of recipient units for the various programs were added and an allowance for duplication subtracted. In the case of a few of the social security programs some sample information was available on which to base estimates of the extent of overlap between programs, e. g., between old-age and survivors insurance and the major assistance programs. For the balance of the category the allowance for duplication was arbitrarily estimated at 10 to 15 percent of the sum of the numbers of units receiving the various types of payments.

The Census-BAE survey mentioned earlier was used as a basis for subtracting a small number of farm operator recipient units, for adding a rough estimate of the number of nonfarm families and unattached individuals not included in the social insurance and public assistance category that received miscellaneous types of money income, and for allocating the resulting total between nonfarm families and unattached individuals. The procedure yielded a total of somewhat over 9 million nonfarm families and unattached individuals with social insurance benefits, assistance and/or miscellaneous money income in 1946. In 1944 the comparable total was 5 million, and in 1947, 10 million. In both 1946 and 1947 the number of recipients of unemployment insurance benefits was relatively large.

DISTRIBUTION OF CONTROL TOTALS

Money income other than civilian earnings by family money earnings level

The next step was to distribute the control totals determined above among family civilian money earnings levels, i. e., to determine, for consumer units at each civilian money earnings level, the number receiving income other than civilian earnings and the average and aggregate amount they received.

For nonfarm families, such distributions were derived separately for the three income categories.

In the case of property income, these distributions were based on data from income tax returns and the field surveys. The number of nonfarm families receiving property income at each civilian money earnings level had been derived from these data in the process of determining the control total number of such units, as described earlier under "Recipients of property income."

Estimates of the mean property income per recipient unit were based, for earnings brackets above $5,000, on the same tabulations of 1946 income tax returns that had been used in estimating the numbers of recipient units. The classification of returns with dividends by adjusted gross income less dividend brackets, that had been derived from these tabulations as described above, was available with further breakdowns showing, for each such bracket, the frequency distribution of the returns by size classes of dividend receipts. By assigning means to each size class of dividend receipts the mean dividend income for each of these brackets was estimated. A similar procedure was followed in the case of rents. The average property income per property income recipient family in each of these brackets was a weighted average of the smoothed means for dividends and rents.[9]

Corresponding means for nonfarm families in the earnings brackets under $5,000 were based on data from the 1946 census survey, which were raised by linking at $5,000 with the data from tax returns.[10]

For each of the other two income categories—military income, and social insurance and miscellaneous income—the 1946 census survey furnished information for each family civilian money earnings bracket on the percentage of nonfarm families receiving income of these kinds and on the mean amount they received. When the percentages were applied against the total number of nonfarm families at each level, from section 4, the sum of the results was substantially below the total number of units estimated to have received these types of income, as indicated by a comparison with the control total established earlier. The numbers of recipient families in the various civilian earnings brackets were raised to meet these totals by assuming that nonreporting families were distributed among all earnings brackets but were somewhat more heavily concentrated in the lower brackets than the reporting groups.

Similarly, when these revised frequencies were multiplied by the survey-based average amounts per recipient unit at the various civilian earnings levels, the resulting overall aggregate income receipts for military income and social insurance and miscellaneous income were found to be too low. In adjusting for this factor, the percentage understatement of income was assumed to be somewhat greater in low than in high family earnings brackets.

The above procedure provided estimates, for each civilian earnings bracket, of the number of nonfarm families receiving

9. The weights—i. e., the numbers of families receiving dividend-interest income only, rental income only, and both categories—within each earnings bracket had been derived as described above under "Recipients of property income." The average property income of families receiving both rental and dividend-interest income was assumed to be equal to the sum of the means for the separate income sources. A separate calculation for the average amount of interest receipts was not made, and average dividend receipts were used to represent average combined receipts of dividends, interest, or both. In this manner the average of dividends and interest income combined was probably overstated in the case of those units included among property income recipients in the present estimates that received interest income only, but was understated in instances in which both types of income were received.

10. The survey data covered both dividends and interest income in one category, and net rental income in another. These were averaged as described in footnote 9.

For families with no civilian earnings that had dividend-interest income, average dividend-interest income was based on a tabulation of 1945 tax returns reporting dividends and/or interest as their sole source of income by size classes of such income. A similar tabulation was not available for rental income. It was found that the average size of dividend-interest income for this group of tax returns was similar to that received by returns in the upper portion of the earnings scale. By analogy, the average rental income assigned to family units in the $0 earnings bracket was assumed to be similar to the average rental income of the upper earnings groups.

each of the three categories of money income other than civilian earnings, together with the mean amount of each category of income per recipient unit. Some of the families in each civilian earnings bracket received more than one of these three categories. Hence, in order to allocate the families to their proper total family money income brackets it was necessary to make separate estimates for each of the groups receiving the various possible combinations of the three types of money income other than civilian earnings. That is, the total number of families in each civilian earnings bracket was distributed among three groups receiving only one type of income other than civilian earnings, three groups receiving two types, one receiving all three types, and a residual group receiving no money income other than civilian earnings.

These distributions were derived on the assumption that, within any given family civilian money earnings bracket, the receipt of any one of the three categories of money income other than civilian earnings was independent of the receipt of either of the other two categories. Thus, for any family civilian money earnings bracket, if p represents the proportion of families receiving property income, q the proportion receiving military income, and r the proportion receiving social insurance and miscellaneous income, then the proportion receiving all three types of income in the bracket was calculated as $p\ q\ r$, the proportion receiving property and military income but no social insurance income as $p\ q\ (1-r)$, the proportion receiving property income only as $p\ (1-q)\ (1-r)$, the proportion receiving no income other than civilian money earnings as $(1-p)\ (1-q)\ (1-r)$, etc.

These proportions in each earnings bracket were then applied to the total number of nonfarm families in the bracket. For certain of these combinations, the resulting figures were modified in the light of scattered data available for families receiving various types of social insurance benefits.

The general reasonableness of the basic independence assumption was tested by an analysis of the 1946 census survey data. This survey furnished separate figures, by family civilian money earnings brackets, on the percentages of families reporting (a) property income, (b) military income, and (c) social insurance and miscellaneous income. In addition, the percentages reporting (d) no income other than civilian money earnings were available by earnings brackets. Estimates of (d) for the various earnings brackets, derived from (a), (b), and (c) on the basis of the independence assumption, were found to be in close agreement with the actual percentages in the census tabulations.

The mean amounts per recipient family of property income, military income, and social insurance and miscellaneous income that had been determined for each earnings bracket from the tax return and survey data were assumed to apply to the nonfarm families in the bracket receiving only one of these income categories. For families within each bracket receiving more than one of the three categories the mean amount of money income other than civilian earnings was assumed to be equal to the sum of the means estimated for the several categories in that bracket.

It may be noted that the proportions of families estimated by the above procedure to have received some money income other than civilian earnings within the various civilian earnings brackets were relatively large for both the very low and very high brackets, and smallest in the earnings range between approximately $2,000 and $5,000.[11] For the 1946 distribution as a whole, almost 20 million of the 30 million nonfarm families were estimated to have received money income other than civilian earnings, and 5 million of them received more than one of the three categories distinguished above. A large proportion of the families, however, received relatively small amounts of these several types of income. Based on the dispersion patterns discussed later it is estimated, for example, that in 1946 seven million nonfarm families received small amounts of money income other than civilian earnings ranging under $500. Also, see earlier discussion of the number of recipients of small amounts of interest income.

For unattached individuals, a more summary procedure was used to obtain the numbers receiving money income other than civilian earnings in the various earnings brackets, and the mean amounts they received. For this purpose the frequencies of the seven groups of nonfarm families receiving money income other than civilian earnings within each earnings bracket were added and the sum expressed as a percentage of the total number of nonfarm families in the earnings bracket. The mean money income other than civilian earnings in each earnings bracket was determined by dividing the aggregate of such income in the bracket by the corresponding combined frequency.

Estimated percentages of unattached individuals receiving any money income other than civilian earnings in the various civilian earnings brackets, and mean amounts of such income per recipient individual, were derived by modifying these family patterns. The modifications were based on the relationship between the corresponding figures for unattached individuals and nonfarm families from the 1946 census survey. The modified percentages and means for the various earnings brackets were then adjusted proportionately so that the total number of unattached individuals with money income other than civilian earnings and the aggregate amount of such income they received would agree with estimated control totals.

The control total for the number of unattached individuals receiving any of these types of money income was obtained by adding the numbers receiving each of the three major categories, as previously derived, and subtracting an estimate for the numbers in the several overlap groups.[12] The control total of aggregate money income other than civilian earnings received by unattached individuals was derived from the personal income series as explained earlier.

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11. This U-shaped pattern of the percentages for the various earnings brackets was similar to that shown by the Census survey data. The survey percentages, however, were, in general, substantially smaller than those derived above because, as has been indicated, many families failed to report the receipt of income of these kinds in the field enumeration.

12. The numbers of unattached individuals receiving each of the various possible combinations of the three income categories was derived on the assumption of independence among the recipients of the several categories (see discussion of similar estimates for nonfarm families). This procedure was adopted after it had been tested by applying it to census survey data in a manner similar to that described for nonfarm families.

Dispersion within each family money earnings bracket

In combining civilian money earnings and other money income to obtained a frequency distribution of nonfarm families by size classes of total family money income, the various subgroups receiving the several possible combinations of money income other than civilian earnings were handled separately. This was done to take account of the substantial variation within given earnings brackets in the mean amounts received by the various subgroups, and of the dispersion around these means even within a given subgroup. The latter dispersion was particularly large in the case of property income. The available data indicated, for example, that even in the higher earnings brackets where the mean amounts of property income per property income recipient family were relatively large, substantial proportions of the families received very small amounts of such income.

Dispersion patterns—i. e. percentage distributions by size classes of money income other than civilian earnings—were constructed for each of the seven subgroups within each family civilian earnings bracket.

As indicated earlier, the 1946 tax returns provided the basis for deriving percentage distributions of returns with property income by size of such income for each earnings bracket above $5,000.[13] Special tabulations of the 1946 census survey provided, for nonfarm families, similar distributions of property-income recipient families within the several earnings brackets under $5,000, and, of families receiving each of the other two types of income within each bracket for the entire earnings range.

For families receiving only a single type of money income other than civilian earnings, the dispersion pattern around the mean of this income in any given earnings bracket was assumed to be the same as the dispersion pattern around a mean income of the same type and size as derived from the tax return or survey distributions. For families receiving more than one of the income categories, dispersion patterns for each earnings bracket were constructed by combining the tax return or survey based dispersion patterns for the individual categories on the assumption of independence.[14]

The frequency distributions by size of money income other than civilian earnings derived for the seven family subgroups were then added within each civilian earnings bracket.

In the case of unattached individuals, a single dispersion pattern was derived for each civilian earnings bracket covering all individuals in the bracket receiving any money income other than civilian earnings. These dispersion patterns were selected from those for families having the same mean money income other than civilian earnings.

Addition of money earnings and other money income

The preceding steps provided a single cross-classification for nonfarm families and another for unattached individuals. In each case, the units with money income other than civilian earnings were distributed by brackets of civilian money earnings and, within each such bracket, by size classes of money income other than civilian earnings. By adding through the family cross-classification[15] the units were assigned to brackets of total family money income, i. e. to brackets representing the sum of their civilian earnings and other money income. To this distribution was added that of nonfarm families whose civilian earnings constituted their sole source of income to obtain the all-family distribution. A similar procedure was followed for unattached individuals.

Exhibit 12.—*Family personal income of nonfarm families and unattached individuals, 1946*

	Billions of dollars
Family money income:	
Civilian money wages and salaries (from exhibit 8)	96.7
Nonfarm entrepreneurial income (from exhibit 8)	21.0
Other types of income (from exhibit 11)	29.3
Statistical adjustment [1]	1.5
Total	**148.5**
Nonmoney income:	
Imputed net rental value of owner-occupied nonfarm dwellings	2.3
Imputed interest	3.2
Nonmoney civilian wages and salaries	1.2
Total	**6.7**
Other adjustment items:	
Employee contributions for social insurance	−2.0
Accrued interest on United States savings bonds	.4
Noncorporate nonfarm inventory valuation adjustment	−1.8
Net total of miscellaneous items [2]	−.7
Total	**−4.1**
Equals: Family personal income	**151.1**

1. Includes adjustment to add civilian money wages or salaries not accounted for in size distributions of wage-salary earners (exhibit 5, footnote 3), and to subtract net money nonfarm entrepreneurial income received by farm operator families (exhibit 14) or by fiduciaries.
2. Includes adjustments to add business transfer payments other than to nonprofit institutions, lump sum social insurance benefits, and value of stocks withdrawn by nonfarm proprietors for their own use; to subtract periodic payments to individuals by life insurance companies and rental income from roomers and boarders in private homes; and to substitute redemptions for issues of terminal leave bonds (exhibit 11, footnotes 4 and 6).

The resulting distribution for nonfarm families was then adjusted to add miscellaneous civilian money wages and salaries that had not been covered in the wage-salary distributions of individual earners, and to subtract nonfarm entrepreneurial income received by members of farm operator families (exhibit 12, footnote 1). The first of these adjustments covered wages and salaries not reported on income tax returns that were estimated to have been received in very small amounts by such persons as housewives, students, and others who worked for only short periods during the year (discussed in section 1 under "Adjusted Distribution") and and the second eliminated duplication with the farm operator

13. Tax return and survey data provided the basis for estimating separate dispersion patterns for units receiving dividends and for those receiving rents in each earnings bracket. A third dispersion pattern—for units receiving both dividends and rents—was derived by combining the two dispersion patterns on the assumption of independence. That is to say, it was assumed that within each earnings bracket the dispersion pattern of rental receipts was the same for all size classes of dividend receipts, and vice versa. (It may be noted that independence within each earnings bracket does not imply independence over the entire earnings range. In fact, the results indicated a strong positive relationship of this type between the sizes of the two types of property income receipts.) The combined dispersion pattern for families receiving any property income in each earnings bracket was obtained by weighting the three dispersion patterns for the bracket. The weights were the numbers of families in each bracket receiving dividend-interest income only, rental income only, and both sources of income, as derived earlier under "Recipients of property income."

14. See discussion under "Combined Earnings" in section 3.

15. See section 1, footnote 9.

family distributions (section 6). The net amount of the two adjustments was distributed among nonfarm families in the various income brackets in such a way as to leave the Lorenz curve of the distribution unchanged.[16]

The frequency distributions of nonfarm families and unattached individuals by family money income level obtained by the above procedures are shown for 1946 in exhibit 13. It may be noted that in carrying through the adjustments described above, somewhat finer size classes of income were used than are summarized in the exhibit.[17]

Distribution by Family Personal Income Level

The next step was to add to the money income distributions derived above the various types of nonmoney income accruing to nonfarm families and unattached individuals, and, at the same time, to make several adjustments in the money income figures so that they would reflect the income concept that underlies the personal income series.

Three types of nonmoney income were added, namely, imputed net rental value of owner-occupied nonfarm dwellings, imputed interest, and wages received in kind. The other adjustments consisted of the subtraction of employee contributions for social insurance (which are excluded from wage or salary receipts in the personal income series) and the addition of the nonfarm noncorporate inventory valuation adjustment and of the value of stocks withdrawn by nonfarm proprietors for their own use (both included in the personal income series). A number of other less sizable adjustments were also required, as indicated in exhibit 12 which shows the relation of family money income and family personal income in 1946.

The general procedure was first, to determine, separately for nonfarm families and unattached individuals, the distribution of the total amount of each of these types of income among the various brackets of family money income, and second, to add these amounts to the aggregate family money income in each bracket and thus shift the families and unattached individuals from family money income brackets to family personal income brackets.

NONMONEY INCOME AND OTHER ADJUSTMENTS

Nonmoney income

For the imputed net rental value of owner-occupied nonfarm dwellings, the first step was to estimate the percentage distribution of owner-occupant nonfarm families and unattached individuals, separately, by family money income bracket. Frequency distributions by family money income brackets were available for all nonfarm families (and unattached individuals) and for owner-occupant nonfarm families (and unattached individuals) from the 1946 census income survey. The relationship between the cumulative percentages of frequencies below successive points on the

16. See section 1, footnote 12.

17. An alternative procedure for combining tax-return and field-survey data to obtain a family money income size distribution was carried through for the year 1944 and, as can be seen from the tabulation below, yielded results that were basically similar to those published in this report.

A major difference between the alternative procedure and the one incorporated in the present estimates was that in the former case the tax-return information was combined directly into family units (mainly on the basis of relationships from survey data) whereas in the latter, as explained above, separate distributions of individual wage-salary and nonfarm entrepreneurial earners were calculated as an intermediate step in the procedure. The tax-return tabulations that were used in the alternative procedure were those in which the returns were classified by size of total (adjusted gross) income, whereas in the present report use was made of separate distributions by size of the several major types of income reported on the tax returns.

The alternative procedure also differed from the present one with respect to the method used in adjusting for income understatement in the primary data. In the former case this adjustment was carried through as a final step in the methodology, based on an approximation of the distribution of the reported aggregate family money income by major type of income in each of the various brackets of total family money income. For each major type of income, the nonreported amount was distributed by family money income brackets proportionately to the reported amounts. (Farm-operator families, whose distribution was estimated by the same method described in section 6, were eliminated from the all-family distribution before this adjustment for understatement was made.) In the present report, as has been explained, the adjustments for understatement were applied in the course of the estimating procedure to the several major types of earnings classified by their own size before their combination into family units; and for income other than earnings, separate treatment was given to family units receiving various combinations of these income categories at each family earnings level.

The steps involved in the alternative procedure, other than the adjustments for income understatement, are detailed in an article by Maurice Liebenberg and Hyman Kaitz, "An Income Size Distribution from Income Tax and Survey Date, 1944," Part VII of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

Percent Distribution of Families and Unattached Individuals by Family Money Income Level, 1944

Family money income level	Present estimates	Alternative procedure
Under $1,000	13.2	11.7
$1,000–$1,999	19.8	21.2
$2,000–$2,999	21.2	22.0
$3,000–$3,999	18.7	18.6
$4,000–$4,999	10.3	11.7
$5,000–$7,499	10.9	9.5
$7,500–$9,999	3.1	2.5
$10,000–$14,999	1.6	1.5
$15,000–$19,999	.6	.5
$20,000–$24,999	.2	.2
$25,000–$49,999	.3	.4
$50,000 and over	.1	.2
Total	100.0	100.0

family money income scale of all nonfarm families and of owner-occupant families as shown in the survey data was assumed to hold for the distribution of nonfarm families by family money income bracket that had been derived above.[18] The resulting percentage distributions of owner-occupant families (and unattached individuals) by family money income bracket were applied against the estimated total numbers of such family units in 1946, based mainly on data from the Decennial Housing Censuses and various intercensal housing surveys of the Census Bureau.

Exhibit 13.—*Number of nonfarm families and unattached individuals by family civilian money earnings level, family money income level, and family personal income level, 1946*

[Thousands]

Family income level (as defined in column headings)	Nonfarm families			Unattached individuals		
	By family civilian money earnings level	By family money income level	By family personal income level	By family civilian money earnings level	By family money income level	By family personal income level
$0	1,949			1,870		
Under $1,000 [1]	2,553	809	657	1,967	2,526	2,327
$1,000–$1,999	4,871	3,892	3,660	1,792	2,328	2,467
$2,000–$2,999	6,281	6,104	6,036	1,201	1,521	1,581
$3,000–$3,999	5,144	7,083	7,122	418	654	652
$4,000–$4,999	3,224	4,398	4,581	107	208	208
$5,000–$9,999	4,890	6,168	6,358	99	188	190
$10,000–$24,999	900	1,301	1,341	15	36	36
$25,000–$49,999	125	167	167	1	7	7
$50,000 and over	33	48	48	(2)	2	2
Total	**29,970**	**29,970**	**29,970**	**7,470**	**7,470**	**7,470**
Aggregate income as defined in column headings (billions of dollars)	$108.4	$134.8	$137.1	$9.3	$13.7	$14.0
Mean income as defined in column headings (dollars)	$3,617	$4,498	$4,573	$1,245	$1,834	$1,879

1. Includes loss.
2. Less than 500.

Next, the average net rental value of owner-occupied homes per owner-occupant family at each family money income level was determined. Special tabulations from the 1950 Survey of Consumer Finances of the Federal Reserve Board provided data, by 1949 money income bracket, on the amount of equity in owner-occupied homes, and on the number of owner-occupant units. Total imputed net rental value of such homes in 1949, from the personal income series, was distributed among the several income brackets in proportion to the distribution of equity. Average net rental value was determined for each bracket by dividing through by the number of owner-occupant units.

Estimates of aggregate net rental value in the several money income brackets in 1946 were derived, separately for nonfarm families and unattached individuals, by multiplying mean net rental values based on the 1949 averages by the estimated numbers of owner-occupant nonfarm families (and unattached individuals) in 1946, and then adjusting the results proportionately so that they would account for the 1946 total from the personal income series.

18. The procedure was similar to that described for two source earners in section 3 under "Separate Sources of Earnings."

The imputed interest total included in personal income was allocated in two parts, the first covering the imputed interest income received from life insurance companies, and the second the imputed interest received from financial intermediaries (except life insurance companies). An adjustment to add accrued interest on United States savings bonds, which had not been covered in the family money income distributions, was included with the second of these categories.

For both categories, the distributions by family money income level were based primarily on data from the 1950 Survey of Consumer Finances. This survey provided information, by 1949 money income bracket, on the number of family units with life insurance policies, and on the number with liquid assets in the form of checking accounts, savings accounts or government bonds. These data were used to estimate the corresponding numbers of nonfarm families (or unattached individuals) with these types of assets in 1946, by applying relationships shown by these survey data in a manner similar to that described above for imputed net rental value.

Estimates of the distribution by family money income bracket of the aggregate value of reserves of life insurance companies and of the aggregate liquid asset holdings of family units, based largely on data from the same survey, were provided by the Federal Reserve Board. Imputed interest income derived from life insurance companies as estimated in the personal income series for 1949 was assumed to be distributed proportionately to the first of these series, and imputed interest received from other financial intermediaries plus accrued interest on United States savings bonds proportionately to the second.

Average amounts of these types of income per recipient unit in each money income bracket in 1946, based on the corresponding amounts computed for 1949, were multiplied by the estimated numbers of nonfarm families (or unattached individuals) derived for 1946, and the results adjusted to agree with the aggregate amounts of these types of income for that year included in the personal income series.

For wages received in kind, separate estimates were derived for hired farm laborers, domestic servants, and commercial and civilian government employees. Because of deficiencies in the available data, these estimates represent only very rough approximations.

For each of the three groups, the aggregate amount of wages in kind was available from the personal income series. For farm laborers, this aggregate was distributed by individual earnings level on the basis of the frequency distribution of this group of workers that had been derived earlier,[19] coupled with information from a Bureau of Agricultural Economics report on the "Employment and Wages of the Hired Farm Working Force in 1945," relating to the proportions of laborers receiving nonmoney wages in the various income brackets and the average amounts of such wages they received. The comparable distribution for domestic servants was based on data on the money earnings size distribution of this occupation group based on the 1946

19. See section 1.

census income survey, together with fairly arbitrary assumptions as to the variation among earnings brackets in the proportions receiving income in kind and in the average amount of such income they received. A similar procedure was used in the case of civilian government and commercial employees.

The frequency distributions of the three types of employees with nonmoney wages were added and the totals in each bracket allocated as between family members on the one hand and unattached individuals on the other, on the basis of information on family status for selected occupations from the 1946 census survey. The nonmoney earnings of family members were then allocated to family income brackets. This was done on the basis of a cross-tabulation from the 1946 census survey which related individual and family earnings.

Other adjustments

The personal income series is net of employee contributions for social insurance. It was therefore necessary to subtract this item from the family money income distributions.

Estimates of the amount of wages or salaries subject to deductions for social insurance at each family money income bracket were derived by the following procedure. Based on the 1946 census survey, the number of nonfarm families and unattached individuals, separately, estimated to have received money wages or salaries during the year was obtained for each family money income bracket. This was done on the basis of relationships from the 1946 census survey in a manner similar to that described in the discussion of imputed net rental value of owner-occupied homes, above.

The average amount of wages or salaries subject to contributions for social insurance was derived for each bracket on the basis of cross-tabulations of tax returns for 1946, and of nonfarm families from the 1946 census field survey. In these cross-tabulations the returns (or families) were distributed by size classes of total income and, within each such bracket, by size classes of wages or salaries. Mean wages or salaries were assigned to each wage or salary bracket—except that a figure of $3,000 was assigned to each of the wage-salary brackets above that point[20]—to derive an overall average wage or salary subject to contributions for each total income bracket.

These averages—from the tax return figures for income brackets above $5,000, and from the survey data for lower brackets—were multiplied by the estimated numbers of nonfarm families and of unattached individuals with wages or salaries in the corresponding brackets. Total employee contributions for social insurance, from the personal income series, was distributed among family money income brackets proportionately to these derived aggregates.

In the absence of definitive information, the items of noncorporate nonfarm inventory valuation adjustment and of value of stocks withdrawn by nonfarm proprietors for their own use were distributed among family money income brackets proportionately to the corresponding distribution of entrepreneurial net money income. The latter was based on relationships for the various money income brackets between the total money income and entrepreneurial money income reported in the census surveys.

A single rough adjustment was made for the various other items of definitional difference. The net total of these items was allocated among families and unattached individuals in the several family money income brackets proportionately to the distribution of aggregate family money income.

Addition of adjustment items

On the basis of the available data it was not considered worthwhile to add the several items described above to family money income in a manner similar to that used for the addition of money income other than civilian earnings to family civilian earnings. Instead, the nonfarm families (or unattached individuals) were shifted from their position on the family money income scale to their position on the family personal income scale by the following procedure.

First, an average family personal income was computed for each family money income bracket by dividing the algebraic sum of money income and the additional amounts of nonmoney income and the adjustment items that had been allocated to the bracket by the number of families in the bracket. Next, a smoothed curve was drawn through points plotted for the various family money income brackets relating mean family money income and mean family personal income. Next, the family personal income values corresponding to the limits of the various family money income brackets were read from this curve. Lastly, the frequencies and aggregate family personal income in the usual brackets were calculated by interpolation within these family personal income limits.[21] The procedure assumed that the average additional income at any given point on the family money income scale was received by all families at that point.

This last step in the procedure tended to understate somewhat the relative income differences in the final distribution. However, the error due to this factor was probably small because, unlike the various income items added earlier in converting the distribution from a family earnings to a family money income basis, most of the items taken into account here were relatively minor in amount and, when combined, their dispersion within any given income bracket was probably relatively small.

The final distributions of nonfarm families and unattached individuals by family personal income brackets are shown, for 1946, in exhibit 13 where they are compared with the distributions of these units by size classes of family money income, and of family civilian money earnings.

20. Because of the approximate nature of the calculations no allowance was made for the fact that the $3,000 limit did not apply to all groups of employees making contributions for social insurance.

21. The interpolation procedure used here was not the same as maintaining the Lorenz curve of a distribution as described in section 1, footnote 12. In that instance, every income point was altered by the same percentage, whereas in the present case, different income points were altered by different percentages. However, once the limits of the family personal income brackets corresponding to the limits of the family money income brackets had been read from the smoothed curve, the formulas given in section 1, footnote 12 could be used here to arrive at the numbers of families and the amounts of aggregate family personal income falling in the usual class intervals.

Part 1, Section 6

Farm Operator Families

By Family Personal Income Level

THE income size distributions of farm operator families cover all families containing a person who operated a farm as defined in the 1945 Census of Agriculture.[1]

Farms were defined in that census as places of 3 or more acres on which agricultural operations were conducted, and places of less than 3 acres with agricultural products for home use or for sale with a value of $250 or more.[2] The farm operator on each farm was the person who operated the farm either performing the labor himself or directly supervising it. For rented farms the tenant or cropper was always considered the farm operator in the census enumeration, even though the landlord might supervise his operations.

Farm landlords who were not themselves farm operators (and did not live with a relative who was a farm operator) are included in the nonfarm population in the present estimates.[3] The net income such landlords received from their farm tenants is treated as rental income and is included in the income distributions for nonfarm families and unattached individuals as described in section 5. Farm laborers (other than those living with a farm operator relative) are included among unattached individuals or with nonfarm families rather than with farm operator families.

It should be noted that the farm operator family group distinguished in the distributions is not equivalent to the group of families reported as "living on farms" in the various Censuses of Population. A sizable number of farm resident families are not farm operators. For instance, consumer units of farm laborers and retired persons are not farm operators even though they live on farms. Such units are classified in the present estimates as nonfarm (i. e., other than farm operator) families or unattached individuals. On the other hand, the farm operator family distributions include a small group residing off their farms that are excluded from the "living on farms" category.

Also important to note is the fact that the farm operator families covered in the income size distributions comprise a broader group than would be obtained if the classification were based on major economic activity. In addition to families engaged mainly in farming, the present grouping includes those whose farming operations constituted only a secondary occupation for the family head, or whose net income from farming accounted for only a minor portion of the total income of the family unit.

The decision to include all farm operator families in the farm grouping was based on the fact that the available control totals of aggregate receipts from farming and of aggregate production expenses incurred in connection with farm operations pertained to all farms—and hence to the entire group of farm operator families. The control totals are estimated by the Bureau of Agricultural Economics and incorporated in the personal income series of the Office of Business Economics. The available series do not make it possible to separate out the amounts accruing to "part-time" or "residential" farms and thereby to exclude these groups from the farm operator income distributions.

Deficiencies in the basic data that are available for constructing size distributions are more pronounced for farm operator families that for the nonfarm sector. In the first place, for the 3 years covered here the field surveys of the Census Bureau and Bureau of Agricultural Economics, and, to an even greater extent the income tax return statistics, understated very substantially the independent estimate of total net money farm income prepared by the Bureau of Agricultural Economics. Second, only inadequate data were available on the amount and distribution of money income from sources other than farming received by farm operator families, e. g., wages and salaries, rents, interest, etc. Because of the broad coverage of the farm operator group such off-the-farm income accounted for a very large fraction of the total income of many of these families.

Third, a number of income items accruing to farm operators are not covered in the available basic data for recent years. The distribution of the nonmoney items of farm income, for example, which account for a sizable proportion of the total income of a large number of families in this sector, is not available from income tax return statistics nor from the recent field surveys of family income. Nor is the value of the change in farm inventories between the beginning and end of the year taken into account in determining net farm

1. The farm operator family distributions include, also, a small number of unattached individuals operating farms. It was not considered worthwhile to treat this minor group separately. See discussion of population estimates in part 3.

2. In the 1950 census, places of three or more acres were counted as farms if the value of agricultural products, exclusive of home gardens, for home use or for sale amounted to $150 or more, and places of less than 3 acres were counted if the value of sales amounted to $150 or more. It has been estimated that approximately 200,000 of the 475,000 decrease in the number of farms between 1945 and 1950 was due to the change in definition. (See Census Bureau release, 1950 Census of Agriculture, Series AC50–3 No. 00, November 25, 1951.)

3. In the case of farms operated by farm managers the family income of the owner of the farm was substituted for that of the manager in the farm operator family income distributions.

income in most of the recent statistics on size distribution.

As a result of these deficiencies, the overall gap between total net money income accounted for in the available source material on size distribution and total family personal income received by farm operator families was relatively large. In distributing this control total by income groups it was possible in some instances, e. g., for the several items of nonmoney farm income, to base the estimates on relationships established in earlier field surveys. In the case of the money income components, as is explained below, it was necessary to rely on the assumption that relative income differences were similar to those reported in the 1950 Census of Population for the farm operator family group. As a result, the distributions for farm operator families presented here should be regarded as only a first approximation to the actual situation obtaining in this period.

The procedure for deriving the distributions consisted of three main steps. First, control totals of aggregate income and number of families were derived for the farm operator group for each of the three years. The income totals consisted of what is termed in the surveys "net money farm income" (the difference between gross money receipts from farming and production expenses); money income of farm operators from sources other than farm operations (which when added to net money farm income, yielded family money income of farm operator families); and nonmoney farm income, and the value of change in farm inventories. Second, a frequency distribution of farm operator families by family money income level was obtained by adjusting data for a sample of farm operator families from the 1950 Census of Population (covering family money income in 1949) so as to account for the control totals of aggregate family money income and total number of families for each year. Third, to this distribution was added the value of the change in farm inventories and the several items of nonmoney income received by the farm operator family group, to derive a distribution by family personal income level for each year.

Income and Number of Families

The control totals of money and nonmoney net farm income of farm operators and of the value of inventory change were based on the amounts included in the personal income series under the heading "net income of farm proprietors." These figures, supplied each year to the National Income Division by the Bureau of Agricultural Economics, are described on pages 77–79 of the 1951 *National Income* supplement to the SURVEY OF CURRENT BUSINESS. Adjustments to divide farm income between those components which were and those which were not included under net money farm income are shown for 1946 in exhibit 14.

The money amounts received by farm operator families from sources other than their farm operations were not available from the personal income series, which does not provide a breakdown by type of recipient unit for the various income categories. The total income of this group of families in 1946 from each of these categories, i. e., wages and salaries (from farm and nonfarm employment), nonfarm self-employment income, and each of the three types of income distinguished in section 5—property income, military income, and social insurance benefits, assistance, and miscellaneous income—was taken to be equal to the amount received by the group as shown by the blown-up Bureau of the Census-Bureau of Agricultural Economics field survey data for that year. (See sections 3 and 5 where these amounts were subtracted to determine the control totals for the several income categories for nonfarm families and unattached individuals.)

The main reason for using these figures was that their sum was found to be in close agreement with independent estimates of the total nonfarm income of farm operators, derived from an annual series published by the Bureau of Agricultural Economics on the nonfarm income of farm residents, after adjusting for certain differences in coverage between the two sets of data.[4] For 1944 and 1947, the corresponding totals were based mainly on the 1946 estimates extrapolated by the annual series of the Bureau of Agricultural Economics.

Exhibit 14.—*Family personal income of farm operator families, 1946*

	Billions of dollars
Net money farm income:	
Net farm income of farm proprietors as in personal income	**14.8**
Less: Food and fuel produced and consumed by farm operator families[1]	2.2
Gross rental value of farm dwellings[2]	1.0
Value of change in farm inventories	−.2
Net farm rents received by farm operator landlords (included below under income from other sources)	.6
Equals: Net money farm income	**11.1**
Family money income:	
Net money farm income	11.1
Plus: Wages and salaries (from exhibit 8)	3.4
Nonfarm entrepreneurial income	.5
Other sources (from exhibit 11)	1.6
Equals: Family money income	**16.6**
Family personal income:	
Family money income	16.6
Plus: Value of change in farm inventories	−.2
Nonmoney income of farm operator families	3.2
Equals: Family personal income	**19.6**

1. Represents the gross value of food and fuel produced and consumed on farms minus the value of perquisites furnished to hired farm laborers.
2. Includes owner- and tenant-occupied farm homes.

4. The Bureau of Agricultural Economics estimate covers nonfarm wages and salaries, interest, dividends, net rents, and net nonfarm business income received by persons living on farms. For comparability with the field survey totals it required adjustment to exclude the income of farm residents who were not members of farm operator families and to add several other types of income received by the farm operator family group, such as wages from work on other farms, military family allowances and allotments, veterans' payments, and social insurance benefits and assistance.

As exhibit 14 indicates, the derived figure for off-the-farm income was relatively large—amounting to one-half of the total net money income received from farm operations in 1946. Information was not available to determine whether the actual off-the-farm income received by farm operator families was even greater than this total, i. e., to determine whether the independent estimate of the Bureau of Agricultural Economics and the reports in the field survey for these several kinds of off-the-farm income were both too low. If such understatement existed—and the figures for the nonfarm sector that were discussed in preceding sections indicate that this may have been the case—the income distributions derived below probably overstate the numbers of farm operator families in the lower ranges of the income scale. Off-the-farm income accounts for large fractions of the total income of farm operator families in the low income brackets, where farming in many instances represents only a part-time activity.

The total number of farm operator families in each year was taken to be equal to the number of farms, as estimated annually by the Bureau of Agricultural Economics based on census enumerations (part 3). It was not possible to adjust the totals for definitional differences, such as to exclude corporate and institutional farms and to allow for the relatively small number of instances in which the assumption of one farm operator family per farm did not hold.

Distribution by Family Money Income Level

Frequency distributions of farm operator families by family money income brackets were available for this period from a Bureau of the Census sample survey for 1944, from a joint Bureau of the Census-Bureau of Agricultural Economics survey for 1946, and from unpublished data from the recent Decennial Population Census covering family money incomes in 1949 reported by a sample of the farms included in the Census of Agriculture. Each of the three sets of sample data had been inflated by the agencies conducting the surveys to cover all farms in the respective years.[5]

By calculating means for each family money income bracket, estimates were derived of the size distribution of aggregate family money income for each of the three enumerations.[6] In addition, figures were obtained on the aggregate net money farm income accounted for by each of the inflated sets of data.

A comparison of the three sets of data indicated that the Decennial Population Census provided more reliable basic figures for the farm operator family group than the two earlier surveys. In the first place, the aggregate net money farm income accounted for in the blown-up distributions for 1944 and 1946 represented only some 50 to 60 percent of the corresponding independent annual estimates of the Bureau of Agricultural Economics, whereas the 1950 Population Census covered about 80 percent of the comparable total for 1949. In other words, the likelihood of differential understatement of farm income in the various income brackets seems to be much greater in the two earlier surveys. The farm operator group has always been a difficult one to cover adequately in income surveys and differences in methods of enumeration and sampling were probably responsible in very large part for these and other substantial variations among the three sets of data.

Secondly, and more important, relative income differences as measured by Lorenz curves for the three family money income distributions appeared to be exaggerated in the sample data for 1944 and 1946. The extent of these differences was significantly larger than appeared reasonable either by comparison with the corresponding curves for nonfarm families for the same years, or with similar curves for farm families from prewar sample surveys.[7]

The degree of income inequality was much less marked for the farm operator family group in the 1949 data. Specifically, it was found that the relationship between the Lorenz curve for farm operator families based on those data and the curves for nonfarm families by family money income level developed in the present study was closely in line with corresponding relationships developed in studies for earlier years after the latter had been adjusted insofar as possible to allow for differences in income definition between the prewar and later surveys. The data for 1944 and 1946, on the other hand,

5. A frequency distribution was also available for the "farming" industry from the business schedules of 1947 individual income tax returns and from partnership income tax returns in that industry, by size of net income from farm operations. These data were not used partly because of the difficulties involved in supplementing the tax return tabulations to allow for farm operators who were not included. The blow-up of the tax return sample indicated only some 3.2 million farm entrepreneurs, whereas the sample surveys listed above purported to account for all 5.9 million farms in 1946 (5.4 million in 1950). It may be noted in this connection that some farm operators were not required to file tax returns because their income was less than the legal filing requirement. Other farm operators may have filed returns declaring their other sources of income but omitting or failing to designate clearly their income from farm operations, so that the total number of farm operators filing tax returns was probably larger than the 3.2 million figure.

Another related reason for not utilizing the tax return tabulation was the fact that the total amount of farm income reported was substantially lower than the independent Bureau of Agricultural Economics estimate. The percentage coverage cannot be computed precisely because data are not available for measuring certain of the differences in the definitions of income in the two series. It may be noted, also, that the tax return statistics that were tabulated for the farming industry referred only to amounts of farm income. Information on off-the-farm income received by farm operators could not be derived from the available tabulations of the returns.

6. See section 1, footnote 2.

7. Income understatement in the 1946 survey was similar to that on tax returns in that the bulk of the understatement was in gross farm receipts; reported production expenses in both cases accounted for over 90 percent of the corresponding Bureau of Agricultural Economics estimate. It should be noted, however, that it was not possible to adjust the several series on income and expenses to allow fully for differences in definition.

showed a very much larger spread between the farm operator and nonfarm family curves than existed in the prewar period. There is no reason to believe that this type of change—and, more particularly, a change of the order of magnitude shown by these data—actually occurred.

It was decided, therefore, to use the pattern of relative income differences shown in the Decennial Census data as a basis for the present estimates for the farm operator family group. The procedure was to adjust the 1949 frequency distribution of farm operator families by family money income level in such a way as to account for the control totals for the number of farm operator families and their aggregate family money income, and at the same time hold constant the 1949 Lorenz curve for the distribution of this income.[8] This meant, in effect, that relative income differences in the family money income distribution (though not necessarily in the family personal income distributions described later) were assumed to be constant for the farm operator family group in all three of the years covered here. As indicated above, the several sets of sample data for farm operator families for this period differed so markedly from each other that they could not be used to determine what changes in the Lorenz curves may actually have occurred over the 1944–49 period for this group of families.

8. See section 1, footnote 12.

The derived frequency distribution by family money income level is shown for 1946 in exhibit 15. As was noted earlier, the number of farm operator families in the low family money income brackets may actually be smaller than the frequencies estimated here. This would be true if there had been an appreciable understatement in off-the-farm income reported by respondents in the field survey. Unfortunately, data are not presently available to indicate whether or not this was the case.

Exhibit 15.—*Number of farm operator families by family money income level and family personal income level, 1946*

[Thousands]

Family income level (as defined in column headings)	By family money income level	By family personal income level
Under $500 [1]	738	178
$500–$999	779	664
$1,000–$1,999	1,392	1,479
$2,000–$2,999	1,055	1,174
$3,000–$3,999	709	817
$4,000–$4,999	451	575
$5,000–$7,499	455	616
$7,500–$9,999	154	198
$10,000 and over	157	189
Total	**5,890**	**5,890**
Aggregate income as defined in column headings (billions)	$16.6	$19.6
Mean income as defined in column headings (dollars)	$2,818	$3,332

1. Includes loss.

Distribution by Family Personal Income Level

The definition of family money income in the distributions of farm operator families derived above was based on that used in recent field enumerations. Because of the difficulties and expense involved, these enumerations excluded two major income categories that are included in family personal income—the value of the change in farm inventories of crops and livestock, and the nonmoney items of income in the form of imputed value of home-produced food and fuel and rental value of farm dwellings.

For recent years no breakdown of the aggregate value of inventory change is available by income size groups. Nor was it possible to utilize information available for earlier periods or for special areas to adjust family money income for the value of the change in farm inventories in each net money income bracket.[9]

The method used here was to allocate the total net value of inventory change among family money income brackets, and to shift the families to brackets of family money income plus value of inventory change, on the basis of the assumption that the ratio of inventory change to net money farm income was the same over the entire range of family money income.[10] In other words, a differential effect was not introduced for this item, and the resulting error in the distributions may be fairly significant, particularly in a year like 1947 when inventory change was relatively large.

Distributions of the imputed value of the food and fuel produced and consumed by farm operator families and of the

9. For example, a special study of farms in Illinois for 1946 indicated that the inclusion of inventory change led to a marked reduction in relative income differences in the net money farm income distribution. The statistics for Illinois, however, could not be taken as representative of the country as a whole because they were based on a sample of farms with relatively high incomes and specialized production. Thus, the net total value of farm inventory change in Illinois in 1946 was a positive figure amounting to 60 percent of net money farm income exclusive of farm inventory change, whereas the comparable total for the United States in that year was a negative 2 percent of total net money farm income.

Quite apart from the inapplicability of the Illinois data to the Nation as a whole, no pattern relating income exclusive of inventory change and income inclusive of such change, however representative for a single year, could be made the basis for estimating corresponding relations for other years. There is no reason to believe that such a pattern would be stable over time, nor is information available that would be required to introduce the necessary modifications.

It may be noted that even in 2 years in which inventory change was roughly the same percentage of total income there would be no reason to assume that the distribution of the inventory change by income size groups was the same. The two net inventory changes may have been the sum of widely different increments and decrements whose effects on the size distribution of income may have differed widely.

10. Estimates of the amounts of net money farm income in the several family money income brackets were based on relationships from the 1946 Census-BAE survey.

rental value of farm dwellings among family money income (plus value of inventory change) brackets were based on data for farm operator families collected in the 1941 Survey of Spending and Saving in Wartime by the Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture.[11]

Average amounts per farm operator family for the value of home-produced food and fuel and the rental value of dwellings at each family money income (plus value of inventory change) bracket, based on the corresponding averages reported in the 1941 survey, were multiplied by the numbers of families in the several brackets. The results were then adjusted proportionately so they would account for the aggregate amounts of imputed income from the personal income series (exhibit 14). In the case of home-produced food the survey averages were lowered proportionately before they were incorporated into the present estimates in order to allow for the fact that retail prices were used as a basis of valuation in the survey whereas farm prices are used in valuing farm home consumption in the personal income series.

The rental value category covers the gross rental value of both owner-occupied and tenant-occupied farm homes. For owner-occupants it represents a return on equity plus the expenses incurred in connection with home-ownership (mortgage interest, taxes, insurance, depreciation, etc.). For tenant-occupants it corresponds to the estimated rent paid for rented farm dwellings.

11. *Rural Family Spending and Saving in Wartime*, Misc. Publication No. 520, U. S. Department of Agriculture, 1943, Table 5.

It may be noted that in adding food and fuel produced and consumed by farm operator families to derive family personal income, these items were expressed at their gross value even though the imputed income corresponding to them falls short of that value by the amount of expenses incurred in their production. Addition of gross value yielded the correct amount of combined money and imputed income because, following recent survey practice, the same gross value had been deducted in determining the money income of the farm operator family group (exhibit 14).

In the case of owner-occupied farm homes gross rather than net rental value was added to family money income for a similar reason. Rents paid on tenant-occupied dwellings had to be added because, again following recent survey practice, the money income of tenant farm operators was understated by the amount of such rents, which were treated as a production expense in calculating tenants' net money income.

The amounts of imputed value of home-produced food and fuel and rental value of farm dwellings that had been allocated to the several family money income brackets were then added to family money income, and the farm operator families shifted to family personal income brackets by a procedure similar to that described for nonfarm families at the end of section 5, under "Addition of adjustment items." The derived frequency distribution of farm operator families by family personal income level for 1946 is shown in exhibit 15.

Distributions for All Consumer Units and Family Composition

COMBINED income distributions for all families and for all families plus unattached individuals for 1944, 1946, and 1947 were obtained by adding the appropriate distributions derived in sections 5 and 6. The summary distributions classified by family personal income level are shown in table 2 of this appendix.

Exhibit 16 —*Reconciliation of personal income, family personal income, and family money income, 1946*

	Billions of dollars
Personal income	177.7
Less:	
Civilian wages of persons who entered Armed Forces or died (exhibit 5)	.8
Military money wages or salaries of armed forces personnel who had not returned to civilian life by end of year and military nonmoney wages or salaries (exhibit 11)	3.7
Property income received by nonprofit institutions or retained by fiduciaries (exhibit 11)	.6
Employer contributions to private pension and welfare funds (exhibit 11)	1.2
Business and Government transfer payments to nonprofit institutions (exhibit 11) [1]	.6
Equals: Family personal income	170.7
Less:	
Nonmoney civilian wages or salaries (exhibit 5)	1.2
Imputed interest and accrued interest on United States savings bonds (exhibit 11)	3.6
Imputed net rental value of owner-occupied nonfarm dwellings (exhibit 11)	2.3
Food and fuel produced and consumed by farm operator families (exhibit 14)	2.2
Gross rental value of farm dwellings (exhibit 14)	1.0
Noncorporate nonfarm inventory valuation adjustment (exhibit 7)	−1.8
Value of change in farm inventories (exhibit 14)	−.2
Plus:	
Employee contributions for social insurance (exhibit 5)	2.0
Miscellaneous items [2]	.7
Equals: Family money income	165.1

1. Includes, also, compensation of prison inmates, payments to prisoners of war and profits of military post exchanges (exhibit 11, footnote 6). Data were not available on which to base estimates of the various other types of income received by institutional residents which should also be subtracted here.
2. Includes adjustments to add periodic payments to individuals by life insurance companies and rental income from roomers and boarders in private homes; to subtract business transfer payments other than to nonprofit institutions, lump-sum social insurance benefits, and value of stocks withdrawn by nonfarm proprietors for their own use; and to substitute issues for redemptions of terminal leave bonds (exhibit 11, footnotes 4 and 6).

As has been indicated, these distributions account for the total family personal income in each year, based on the personal income series. Exhibit 16, which summarizes the various adjustments shown for the separate income categories in earlier exhibits, shows the relationship between total family personal income and total personal income in 1946.

In addition to the distributions by family *personal* income level, combined distributions by family *money* income level were prepared by summing the corresponding frequency distributions from sections 5 and 6. These are shown for all families and unattached individuals in exhibit 17 together with preliminary figures for 1950 which were derived as explained in part 2. A summary of the adjustments in the family personal income total to obtain the family money income aggregate is included, for 1946, in exhibit 16.

As was described earlier, consumer units were classified by family money income level in the recent sample field surveys of family income. In exhibit 18 these distributions are compared with those developed in the present report for 1944, 1946, and 1947.

In exhibit 19 the frequencies of families and unattached individuals in the upper ranges of the family money income scale are compared with the number of individual income tax returns in the same brackets of adjusted gross income in those years. Because family income is the sum of the incomes of individual family members the effect of combining tax returns to form families was to shift units to higher levels of income. This accounts in large part for the greater numbers of family units than of tax returns in the exhibit. The adjustments in the tax return statistics to meet the control totals of aggregate income from the personal income series, described in preceding sections of this appendix, also contributed to the difference between the two series. It may be noted that the differences narrow at the very top of the income scale.

Families and unattached individuals were ranked by quintiles of family personal income and the amounts accruing to the several quintiles obtained by using the interpolation procedures described earlier.[1] These figures are shown in table 3 of this appendix.

In addition to the quintile data for all consumer units, estimates were derived of the composition of families in the several quintiles in terms of the average number of persons, children under 18 years of age, and earners per family. These are presented for selected years in exhibit 20 and in chapter 2.

1. See section 1, footnote 12.

Exhibit 17.—*Distributions of families and unattached individuals by family money income level, 1944, 1946, 1947, and 1950*

Family money income level	Number of families and unattached individuals (thousands)				Aggregate family money income (millions of dollars)			
	1944	1946	1947	1950 [1]	1944	1946	1947	1950 [1]
Under $1,000	5,380	4,852	4,849	4,973	2,642	2,297	2,299	2,235
$1,000–$1,999	8,077	7,612	7,280	7,483	12,245	11,420	11,065	11,224
$2,000–$2,999	8,660	8,680	8,370	7,965	21,680	21,662	20,998	19,917
$3,000–$3,999	7,643	8,446	8,291	8,348	26,793	29,427	28,877	29,138
$4,000–$4,999	4,220	5,057	5,532	6,692	18,915	22,549	24,699	29,900
$5,000–$7,499	4,480	5,319	6,410	7,956	26,925	31,933	38,449	47,968
$7,500–$9,999	1,265	1,646	2,056	2,651	10,804	14,070	17,490	22,388
$10,000 and over	1,155	1,718	1,952	2,522	21,515	31,695	35,383	44,070
Total	**40,880**	**43,330**	**44,740**	**48,590**	**141,519**	**165,053**	**179,260**	**206,840**
	Percent distribution							
Under $1,000	13.2	11.2	10.8	10.2	1.9	1.4	1.3	1.1
$1,000–$1,999	19.8	17.6	16.3	15.4	8.7	6.9	6.2	5.4
$2,000–$2,999	21.2	20.0	18.7	16.4	15.3	13.1	11.7	9.6
$3,000–$3,999	18.7	19.5	18.5	17.2	18.9	17.8	16.1	14.1
$4,000–$4,999	10.3	11.7	12.4	13.8	13.4	13.7	13.8	14.5
$5,000–$7,499	10.9	12.3	14.3	16.4	19.0	19.4	21.4	23.2
$7,500–$9,999	3.1	3.8	4.6	5.4	7.6	8.5	9.8	10.8
$10,000 and over	2.8	3.9	4.4	5.2	15.2	19.2	19.7	21.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

1. The derivation of the distribution for 1950 is described in part 2, section 1, of this appendix.

It should be noted that the figures on family composition differ in three respects from the quintile data in table 3. First, the family composition statistics refer to families only, whereas table 3 covers families and unattached individuals. Second, the quintile classification in the family composition tables is based on size of family money income, and in table 3 on size of family personal income. Third, the family composition estimates were derived for the most part directly from data from the sample field surveys of family income, as outlined below, whereas the figures in table 3 were obtained by combining data from individual income tax returns and the field surveys, and adjusting the results so that they would account for income totals determined from the personal income series, as described in preceding sections of this appendix. The tax-return statistics were not available with breakdowns by family composition so that it was not possible to derive estimates for the several quintiles comparable to those in table 3.

The estimates of family composition by quintiles were based on tabulations from the Census Bureau income surveys showing separate frequency distributions by family money income level for families with various numbers of persons, children under 18 years, and earners (i. e., persons who earned $1 or more during the year from wage or salary employment or from farm or nonfarm entrepreneurial activity).[2]

Exhibit 18.—*Comparison of percentage distributions of families and unattached individuals by family money income level with distributions from field surveys of Census Bureau and Federal Reserve Board, 1944, 1946, and 1947* [1]

Family money income level	1944		1946			1947		
	Present estimates	Census survey	Present estimates	Surveys		Present estimates	Surveys	
				Census	FRB		Census	FRB
Under $1,000 [2]	13.2	23.2	11.2	20.4	14.5	10.8	17.6	13.0
$1,000–$1,999	19.8	22.2	17.6	19.8	19.8	16.3	17.8	18.3
$2,000–$2,999	21.2	20.7	20.0	21.9	22.6	18.7	20.8	19.6
$3,000–$3,999	18.7	16.1	19.5	15.8	18.2	18.5	17.3	16.7
$4,000–$4,999	10.3	7.9	11.7	8.9	10.5	12.4	10.0	11.5
$5,000–$9,999	14.0	8.3	16.1	11.3	11.5	18.9	14.1	16.8
$10,000 and over	2.8	1.6	3.9	1.9	2.9	4.4	2.4	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of families and unattached individuals (millions) [3]	40.9	40.8	43.3	44.1	40.8	44.7	45.3	42.6
Aggregate family money income (billions of dollars)	$141.5	$110.6	$165.1	$129.8	$133.8	$179.3	$147.8	$161.0
Mean family money income (dollars)	$3,462	$2,708	$3,809	$2,942	$3,280	$4,007	$3,259	$3,780

1. Census survey distributions and numbers of consumer units from Census Bureau releases Series P–S, No. 22, P–60, No. 5, and unpublished data for 1946 furnished by the Census Bureau. Aggregate incomes for the census surveys derived by multiplying frequencies in each income bracket by estimated mean incomes (see section 1, footnote 2); the mean for the $10,000 and over bracket was based on that developed from income tax returns in the present report. Federal Reserve Board distributions from Part IX of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951; numbers of consumer units from "Income, Selected Investments, and Short-Term Debt of Consumers," *Federal Reserve Bulletin*, September 1952; mean incomes from Federal Reserve Board.
2. Includes loss.
3. The Federal Reserve Board surveys did not cover certain relatively minor groups of families and unattached individuals included in most of the Census Bureau surveys and in the present estimates.

By interpolation, the income limits of the several quintiles for the census all-family distribution in each year were determined, and the numbers of families in each of the family-size classifications falling within these limits obtained. By multiplying the number of 2-person families by 2, 3-person families by 3, etc., the total number of persons was determined for each fifth of families ranked by size of family money income. A similar procedure was followed to obtain the number of children and earners in each quintile.[3] For closer compara-

2. Census Bureau releases Series P–60, Nos. 5, 6 and 7, P–S, No. 22, and unpublished tabulations for 1944.

3. In the case of families with "7 or more" persons the average size of family used for all of the quintiles was derived by subtracting the derived population in all families with less than 7 persons from the total family population (as given in census releases Series P–20, Nos. 21, 26 and 33), and then dividing by the census total number of families with 7 or more persons. A similar procedure was used to estimate the average number of earners in the "3 or more" group in each quintile as a residual (using the total number of earners in families from census releases Series P–60, Nos. 6 and 7, and unpublished data for 1944). For children under 18 years estimates of the average number in the "6 or more" group were also derived similarly by adjusting to the census total number of children in families; in this case, however, it was possible to take into account variations among quintiles in the average number of children in the "and over" group because a frequency distribution of the total number of children under 18 years in families was available, for 1948, by size of family money income (Series P–60 No. 6).

bility with other data in this report, the figures for the number of families, persons, and children in the several quintiles were then adjusted proportionately so that they would total to the corresponding population estimates as of the end of each calendar year, derived as explained in part 3.

The numbers of earners in the various quintiles which are shown in chapter 2 account only for the total number of family earners reported in the blown-up census income surveys. No adjustment was made in view of the large undercount of earners in those surveys and hence the figures are understated for all of the quintiles.[4]

4. The number of persons reporting themselves as earners was substantially smaller in the Census Bureau income surveys than in the "work experience surveys" of that agency. For the undercount in the latter surveys, see section 1, footnote 13.

Exhibit 19.—*Comparison of number of families and unattached individuals by family money income level with number of individual income tax returns by adjusted gross income level, for incomes of $10,000 and over, 1944, 1946, and 1947* [1]

[Thousands]

Income level	1944		1946		1947	
	Families and unattached individuals	Tax returns	Families and unattached individuals	Tax returns	Families and unattached individuals	Tax returns
$10,000–$14,999	663	298	1,017	452	1,155	487
$15,000–$19,999	226	129	320	193	374	201
$20,000–$24,999	100	68	139	100	164	102
$25,000–$49,999	129	100	188	145	205	147
$50,000 and over	37	37	54	50	54	49

1. Number of tax returns from *Statistics of Income, Part 1*, 1944, and preliminary reports for 1946 and 1947, U. S. Treasury Department.

Exhibit 20.—*Number of persons, children under 18 years of age, and adults, in families, for quintiles of families ranked by size of family money income, 1944, and 1947–49* [1]

Quintile	Number (thousands)				Mean number per family			Percent distribution (down)			Percent distribution (across)	
	Families	Persons	Children under 18 years	Adults	Persons	Children under 18 years	Adults	Persons	Children under 18 years	Adults	Children under 18 years	Adults
	1944											
Lowest	6,660	20,661			3.10			17.5				
2	6,660	22,531			3.38			19.1				
3	6,660	24,212			3.64			20.6				
4	6,660	24,906			3.74			21.1				
Highest	6,660	25,500			3.83			21.7				
Total	**33,300**	**117,810**			**3.54**			**100.0**				
	1947											
Lowest	7,405	24,070	8,082	15,988	3.25	1.09	2.16	17.8	18.3	17.6	33.6	66.4
2	7,405	25,951	9,459	16,492	3.50	1.28	2.23	19.2	21.4	18.2	36.4	63.6
3	7,405	26,917	9,691	17,226	3.63	1.31	2.33	20.0	22.0	19.0	36.0	64.0
4	7,405	27,358	8,843	18,515	3.69	1.19	2.50	20.3	20.0	20.4	32.3	67.7
Highest	7,405	30,577	8,100	22,477	4.13	1.09	3.04	22.7	18.3	24.8	26.5	73.5
Total	**37,025**	**134,873**	**44,175**	**90,698**	**3.64**	**1.19**	**2.45**	**100.0**	**100.0**	**100.0**	**32.8**	**67.2**
	1948											
Lowest	7,645	25,171	8,738	16,433	3.29	1.14	2.15	18.3	19.2	17.9	34.7	65.3
2	7,645	26,878	9,840	17,038	3.52	1.29	2.23	19.6	21.6	18.6	36.6	63.4
3	7,645	27,386	9,925	17,461	3.58	1.30	2.28	20.0	21.9	19.0	36.2	63.8
4	7,645	27,678	9,098	18,580	3.62	1.19	2.43	20.2	20.0	20.3	32.9	67.1
Highest	7,645	30,116	7,879	22,237	3.94	1.03	2.91	21.9	17.3	24.2	26.2	73.8
Total	**38,225**	**137,229**	**45,480**	**91,749**	**3.59**	**1.19**	**2.40**	**100.0**	**100.0**	**100.0**	**33.1**	**66.9**
	1949											
Lowest	7,815	25,446	9,246	16,200	3.26	1.18	2.07	18.3	19.7	17.5	36.3	63.7
2	7,815	27,193	9,763	17,430	3.48	1.25	2.23	19.5	20.8	18.8	35.9	64.1
3	7,815	28,218	10,478	17,740	3.61	1.34	2.27	20.2	22.4	19.2	37.1	62.9
4	7,815	28,122	9,530	18,592	3.60	1.22	2.38	20.2	20.3	20.1	33.9	66.1
Highest	7,815	30,428	7,893	22,535	3.89	1.01	2.88	21.8	16.8	24.4	25.9	74.1
Total	**39,075**	**139,407**	**46,910**	**92,497**	**3.57**	**1.20**	**2.37**	**100.0**	**100.0**	**100.0**	**33.6**	**66.4**

1. For sources and for discussion of differences between data in this exhibit and in table 3 of this appendix, see accompanying text.

Part 2

Before- and After-Tax Distributions for 1950

THE income distributions for 1950, unlike those for the earlier years covered in this report, were prepared before data from Federal individual income tax returns were available, so that the estimates by level of before- and after-tax income for this year are to be regarded as preliminary.

The estimates for 1950 presented here include a distribution of families and unattached individuals and of family personal income by size brackets of family personal income, a distribution of Federal individual income tax liability by family personal income level, and a distribution of consumer units and after-tax income by level of income after Federal individual income taxes.

In summary, the before-tax distribution for 1950 was obtained by projecting the corresponding distribution for 1947 that had been derived in part 1. The extrapolation was based mainly on changes between the 2 years shown by statistics from the sample field surveys of family incomes conducted by the Census Bureau and the Federal Reserve Board. Total family personal income accounted for in the 1950 distribution was determined from the personal income series of the Office of Business Economics.

Provisional estimates of taxes were derived for income brackets under $10,000 from sample field survey data, and for higher income brackets mainly from Treasury Department tax rate tables for 1950. The provisional estimates were then adjusted so that they would agree with a control total of Federal individual income tax liability estimated on the basis of Treasury Department data. The after-tax distribution was derived by subtracting Federal individual income taxes from before-tax incomes, and shifting consumer units to after-tax income brackets.

The detailed procedures for obtaining the before-tax distribution for 1950 are described in section 1, and those used in deriving the distribution of Federal individual income tax liability and of after-tax income in that year in section 2.

Distribution by Family Personal Income Level

THE before-tax distribution for 1950 was obtained by constructing a frequency distribution of families and unattached individuals by family money income level, and then converting it to a family personal income classification mainly on the basis of the relationship between the money and personal income distributions in 1947.

The family money income distribution for 1950 was obtained by projecting the corresponding distribution for 1947 derived in part 1. The projection was based on changes between 1947 and 1950 in the Lorenz curve of the distribution of family money income as shown by sample data on family incomes collected by the Census Bureau and by the Survey Research Center of the University of Michigan for the Federal Reserve Board.[1]

First, the aggregate family money income and the total number of families and unattached individuals were determined for 1950. Both were obtained by procedures similar to those for other years—the former by adjusting the personal income series in the way shown for 1946 in exhibit 16, and the latter based on Census Bureau population figures as described in part 3.

Next, Lorenz curves of the distribution of family money income were plotted for 1947 and 1950 for the combined group of families and unattached individuals based on the two sets of survey data.

The curves for the Census Bureau income surveys for the two years were derived from the frequency distributions of families and unattached individuals by family money income level published by that agency.[2] Aggregate money incomes for the several family money income brackets were estimated by assigning mean incomes to each bracket.[3]

Lorenz curves from the Surveys of Consumer Finances of the Federal Reserve Board were plotted from data published by the Board,[4] except that the curve for 1950 was modified to increase somewhat the income accruing to the $10,000 and over income group. This was done in order to bring it closer into line with information for recent years from individual income tax returns. The mean income of tax returns in the $10,000 and over range did not fluctuate greatly during the period 1947-49, and it was assumed, therefore, that the corresponding mean for family units in 1950 was only slightly below that in 1947.[5]

The Lorenz curves for 1947 and 1950 were similar in both pairs of distributions. The main difference between the two years was a slight decline in 1950 in the share of income received by the top quintile, with the census-based data showing less of a drop than the adjusted Federal Reserve Board figures. Accordingly, a Lorenz curve was plotted for 1950 based on that developed in the present report for 1947 that incorporated a slight reduction in relative income differences intermediate between the changes suggested by the two surveys. The 1950 frequency distribution of families and unattached individuals by family money income level (exhibit 17) was then obtained based on this curve and on the estimated total number of consumer units and aggregate family money income in that year.

This distribution was next converted to a family personal income basis. In view of the summary procedure used in deriving the money income distribution and its preliminary character, it was not considered worthwhile to take separate account of each of the items comprising the difference between family money and family personal income.

However, in adjusting for the difference between the two income concepts, separate treatment was given to the three major groups of consumer units—farm operator families, nonfarm families, and unattached individuals. This was done mainly because the aggregate net value of farm inventory change accruing to farm operator families, which was not included in family money income, was a positive amount in 1950 and a large negative amount in 1947. Hence, the ratio of family personal income to family money income was

1. Data on income size distribution which were collected for urban consumer units in 1950 by the Bureau of Labor Statistics were not available at the time these estimates were prepared nor were the results of the 1950 Population Census which referred to the year 1949.

2. "Incomes of Families and Persons in the United States: 1947" and "1950," Census Bureau releases Series P-60, Nos. 5 and 9.

3. The means for closed-end brackets were estimated on the basis of the relative frequencies in the bracket and in adjoining brackets. (See part 1, section 1, footnote 2.) For the $10,000 and over bracket, the mean for 1947 was based on the corresponding figure developed from income tax returns in the present report, and the mean in 1950 was assumed to be slightly lower than in 1947 (see footnote 5).

4. "Distribution of Consumer Income in 1947," Table 6, *Federal Reserve Bulletin*, June 1948, and "Distribution of Consumer Income in 1950," Table 13, *Federal Reserve Bulletin*, August 1951.

5. The mean adjusted gross income of the $10,000 and over class reported on individual income tax returns was $22,400 in 1944, $21,800 in 1946, $21,400 in 1947, $22,100 in 1948, and $21,600 in 1949. These figures are not entirely comparable partly because of the introduction of the split-income provision in 1948, but they serve to indicate the relative stability of the mean in postwar years.

It should be noted that the mean incomes of consumer units in the $10,000 and over class of family personal income are lower than the corresponding figures for tax returns partly because the family statistics exclude net capital gains but mainly because of the larger proportion of family units than of tax returns in the lower ranges of the $10,000 and over class.

much higher in 1950 than in 1947 for these families, in contrast to the relative stability over the period in the corresponding ratios for nonfarm families and unattached individuals. Therefore, a somewhat better allocation of the difference between the two income concepts was obtained by isolating the farm operator family group than by adjusting the all-consumer-unit distribution. Unattached individuals were treated separately because a distribution of this group was needed in deriving the estimates of Federal individual income tax liabilities as described in section 2.

In adjusting to a family personal income basis, the first step was to estimate a separate frequency distribution by family money income level for nonfarm families. This was derived by determining control totals of number of units and aggregate money income for each of the three groups,[6] estimating money income size distributions for farm-operator families and for unattached individuals by holding constant their 1947 money income Lorenz curves, and obtaining the distribution of nonfarm families by subtracting these two distributions from the overall money income distribution of all consumer units as previously derived.

6. Derivation of the total number of units in each group is explained in part 3. Total money income of farm operator familes from farm operations was available from the personal income series, and the other money income of this group was based mainly on a Bureau of Agricultural Economics series on the nonagricultural income received by the farm population (see part 1, section 6). The balance of family money income was allocated between nonfarm families and unattached individuals on the basis of the relationship between the mean incomes of the two groups in 1947.

Next, the net total of the various items comprising the difference between family money and family personal income was determined for each group of consumer units.[7]

For nonfarm families, this total was then allocated among the various family money income brackets on the basis of the corresponding average amounts in 1947. The 1947 averages were transformed to apply to 1950 on the preliminary assumption that they would be the same at income points in the 1947 and 1950 distributions below which identical percentages of nonfarm family units were found. These values were then adjusted proportionately so as to account for the 1950 control total. The frequency distribution of nonfarm families by family personal income brackets was obtained by adding these values to family money income in each bracket and shifting the families by a procedure similar to that described in part 1, section 5, under "Addition of adjustment items."

For farm operator families the sum of the items aggregating to family personal income—money income, value of inventory change, and nonmoney income—was distributed by holding constant the corresponding 1947 Lorenz curve. The same procedure was followed for unattached individuals. The 1950 distribution of all consumer units by family personal income level was obtained by adding the personal income distributions for the three component groups.

7. For farm operator families the items were available directly from the personal income series. In the case of nonfarm families and unattached individuals, the total of the items comprising this difference—determined from the personal income series in a manner similar to that shown for 1946 in exhibit 12, above—was allocated between these two groups on the basis of 1947 relationships.

Distribution of Federal Income Tax and After-Tax Income

This section describes the derivation of the distribution of 1950 Federal individual income tax liability by family personal income level, and the frequency distribution of families and unattached individuals by level of family personal income after Federal individual income taxes in that year. As in the case of the before-tax distributions for 1950, it should be noted that these estimates are preliminary.

Distribution of Tax by Family Personal Income Level

THE distribution of Federal individual income tax liability[1] by family personal income level in 1950 was based to a large extent on data from the Federal Reserve Board field survey of family income for that year in which these liabilities were computed on a family rather than on a tax return basis. Since the before-tax distribution presented in this report differs from the corresponding survey distribution, the survey tax data required adjustment and, at higher income brackets, supplementation by Treasury Department data on tax liabilities and statutory tax rates.[2]

Because of the nature of the survey data on family tax liabilities that were available the distribution of Federal individual income tax liability was first estimated by brackets of family money income. This distribution was then transformed so as to apply to brackets of family personal income.

TAX BY FAMILY MONEY INCOME LEVEL

Federal individual income tax liability by family money income level was estimated in two steps. First, provisional estimates of tax liability in the various family money income brackets were arrived at, based mainly on sample survey data on liabilities which had been derived by applying tax rates to estimated incomes. Second, these estimates were reduced so as to agree with an independent estimate of actual total Federal individual income tax liability on 1950 income.

Provisional estimates

The provisional estimates for families with money incomes under $10,000 were based largely on tax liability data developed in connection with the 1951 Survey of Consumer Finances conducted by the Survey Research Center of the University of Michigan for the Federal Reserve Board. In this survey 1950 tax liability was computed for each family in the sample on the basis of money income before taxes and information on the composition of the family and on the number of dependents not living with the family supplied by respondents in the survey.

The Federal Rerserve Board made available a special tabulation of these data in which families (as defined in this report) were distributed by size classes of family money income and within each such class by size classes of computed tax liability.[3] In addition, the frequencies were further subdivided to show the number of families that shifted to the next lower money income class when their Federal income tax liability was subtracted from their income, and the number that remained in the same class.[4]

As a first step, the mean liability was estimated for each cell of the cross-tabulation within the income range under

1. Federal individual income tax liability was defined to include declared liability reported on 1950 individual income tax returns, plus an allowance for amounts uncovered by subsequent audit, minus estimated liability on net capital gains. In other words, aside from the exclusion of the tax attributable to capital gains, liability as here defined equals receipts covered into the Treasury, except for timing.

2. Data on Federal individual income tax liabilities are published annually by the Bureau of Internal Revenue in *Statistics of Income, Part 1.* Such data were not available for 1950 at the time the present report was prepared. Since the unit of classification and the concept of income underlying the tax return tabulations differ from those underlying the family income size distributions, these data could not have been used directly in any event for allocating Federal individual income tax liabilities among family groups in the various income brackets.

3. The derivation of 1950 tax liabilities in the Survey of Consumer Finances is described in an article "Distribution of Consumer Income in 1950," *Federal Reserve Bulletin,* August 1951. The article includes estimates of mean tax liabilities by income bracket, but since these means pertain to "spending units" rather than to family units (see discussion of the concept of the family unit in chapter 3) they could not be used for the purpose at hand.

4. When conceived of graphically these two groups are separated in the rectangular cells of the primary cross-tabulation by slanting boundary lines, given by $X-Y=L$, where X is income, Y is tax liability and L is the lower limit of the income bracket.

$10,000. Since the tax liability brackets in the tabulation were fairly detailed, the possible error in the calculated averages was small. The calculation of the average tax liability in each cell was further facilitated by the fact that it was possible to estimate with a fair degree of accuracy the distribution of frequencies within each cell.[5]

Next, within each family money income bracket, the averages for the various cells were combined, by weighting by the appropriate survey frequencies, to obtain the average tax liability per family in each family money income bracket in the under $10,000 range. Lastly, these averages were multiplied by the numbers of families in those brackets that had been derived in section 1, to obtain a provisional estimate of the aggregate tax liability of families in each bracket under $10,000.

Because families with money incomes of $10,000 and over were classified in open-end cells in the Federal Reserve Board tabulation the above procedures did not lend themselves to the calculation of average tax liabilities for this group. Moreover, the Federal Reserve Board frequency distribution by brackets of tax liability of this group was not consistent with the before-tax income of the group as estimated in section 1.

As a first step in calculating the provisional estimates of tax liabilities for this group, the number of families at successive selected points on the family money income scale above $10,000 was estimated, based on the assumption that the frequency distribution by size of family money income of families with money incomes of $10,000 and over could be approximated by a Pareto curve fitted to the total number of families in the $10,000 and over money income class and the total money income in that class. Both of these totals had been derived in section 1; but detailed classes such as were utilized for earlier years had not been calculated in the absence of tax return tabulations for 1950.

Next, these frequencies were multiplied by average tax liabilities computed on the basis of 1950 tax rates for the same selected points on the income scale above $10,000.[6] The total tax liability for the entire range of $10,000 and over was then obtained by integrating under a curve of aggregate tax liabilities defined by these points, using approximative methods.[7]

For unattached individuals provisional estimates of average tax liability for money income brackets below $10,000 were derived by the application of statutory tax rates to before-tax incomes. Mean tax liabilities for the various number-of-exemption groups within each money income interval were averaged, with most weight being given to the one-exemption group which constituted the bulk of the total.[8] The provisional estimates of aggregate tax liabilities under $10,000 were derived by multiplying these averages by the numbers of unattached individuals in the corresponding money income classes, as determined in section 1.

The procedure for deriving the provisional estimates of liabilities of unattached individuals in the $10,000 and over class was similar to that for families. In deriving the tax liabilities at the several income points a set of weights for the various exemption groups was used based on the same source as for unattached individuals under $10,000.

The provisional estimates of 1950 tax liabilities of families and unattached individuals were then summed within each money income bracket.

Adjusted estimates

The total of the provisional estimates of 1950 tax liabilities of families and unattached individuals derived above was

5. The determination of the frequency distribution within each cell of the cross-tabulation was facilitated by the fact that, under the assumption of a constant percentage allowance for deductions—an assumption which could be adopted for the present purpose with little chance for error over the lower ranges of incomes—the frequencies at any given income point are concentrated at discrete points of tax liability determined by the number of exemptions claimed. If it is assumed that the tax rate, r, does not change over the small income range covered by any given cell, these discrete concentrations imply that, where only one exemption group falls within a cell, the distribution of families within the cell lies along a straight line $Y=a+rX$, where Y is tax liability, X is income, and a is a constant. Where more than one exemption group falls in the cell there will be more than one such line.

The fact that all frequencies could be assumed to lie along lines of this type limited the range of possible tax liabilities within each cell and accordingly facilitated the calculation of the average tax liability. For cells that contained only a single exemption group, the minimum and maximum tax liabilities were given by the points of intersection of the line $a+rX$ with the boundary lines of the cell, and a reasonably close approximation to the desired mean liability was obtained by averaging the minimum and maximum tax liabilities. In the case of the larger cells this simple average was modified to take into account the distribution of frequencies along this line as suggested by the pattern of densities in adjacent cells. In those cells estimated to contain more than one exemption group, the several averages computed in this way were weighted by the proportions of families in the various exemption groups as estimated from 1950 census survey tabulations relating income to family size.

6. In computing these liabilities it was assumed that only one return was filed per family, that all families availed themselves of the split-income provision in determining their tax liability, and that the average number of exemptions and the average deductions at each income point were the same as the corresponding figures determined from 1948 tax returns for the same point on the adjusted gross income scale. The year 1948 was the latest for which tabulations of data from individual income tax returns were available at the time the present estimates were prepared. For families that did not use the split-income provision, these tax liability computations involved some understatement. On the other hand, for families filing more than one return the estimates overstated the actual liability.

7. Given a tax rate function $r(x)$ and a density function $f(x)$ the total tax liability, T, within any income interval is given by

$$T=\int_{x_1}^{x_2} r(x)xf(x)dx$$

Since the assumed Pareto function $f(x)=avx^{-(v+1)}$ can be written as $f(x)=F_1x_1^{v}vx^{-(v+1)}$, where F_1 is the cumulated number of families above the income point $x_1=\$10{,}000$, and $v=\bar{x}/(\bar{x}-x_1)$ where $\bar{x}$ is the average income in the $10,000 and over class, the above integral becomes

$$T=\int_{x_1}^{x_2} r(x)F_1v\left(\frac{x}{x_1}\right)^{-v}dx$$

Values of $r(x)$ and of $(x/x_1)^{-v}$ were obtained for selected points and the integral was evaluated using Simpson's formula.

The procedure was tested by applying it to 1948 tax returns above $10,000 and found to yield an aggregate tax liability for that income range that was very close to the tabulated figure available for that year.

The procedure was much simpler than an alternative one of estimating tax liabilities for subintervals within the $10,000 and over income class, in which case it would have been necessary to derive estimates for a large number of subintervals in order to avoid substantial error. The present method obviated the need of assuming that all units within any given income subinterval had a tax liability equal to that computed at the average income of the subinterval—an assumption which would result in an underestimate of tax liability unless very narrow subintervals were used.

8. The weights were based on unpublished data prepared by Joseph Pechman in connection with his article in Part IV of *Studies in Income and Wealth*, Vol. 13, National Bureau of Economic Research, New York, 1951.

found to be substantially higher than a control total of liability on that year's income as estimated on the basis of Treasury Department data.[9] The next step, therefore, was to adjust the liabilities for the several family money income brackets so that they would account for the control total.

The adjustment procedure was to derive, first, a distribution by adjusted gross income brackets of the aggregate amount of tax liability that was to be subtracted from the provisional estimates; and second, to transform this distribution so as to apply to family money income brackets. The latter amounts were then subtracted from the provisional estimates of tax liabilities for the various brackets.

The distribution by adjusted gross income level of the total amount of liabilities to be subtracted was based mainly on data from a study of tax changes disclosable by audit for individual income tax returns that was conducted by the Bureau of Internal Revenue as part of its 1948 Audit Control Program.[10] The data on amounts of tax change disclosable by audit were classified for present purposes by type of tax error, as follows: (1) returns with major error in business income, (2) returns with major error in an income item other than business income, and (3) returns with major error in nonincome items, i. e., personal deductions, exemptions, or in arithmetic. Data for each of these groups were available by broad brackets of adjusted gross income. The amounts of income and of tax liability originally reported by taxpayers on their returns (i. e., exclusive of the disclosable tax change) was also provided with the same breakdowns.

The amounts of disclosable tax change for the several adjusted gross income brackets indicated by the Audit Study were raised to allow for the fact that the amounts of income accounted for on individual income tax returns (the sum of the incomes originally reported and the extra incomes estimated to be disclosable by audit) fell short of the comparable totals in the personal income series. Stepped-up amounts of tax change were derived by multiplying the disclosable tax change figures from the Audit Study for the various adjusted gross income brackets, for groups (1) and (2) separately, by ratios of the total amount of business and other income, respectively, not accounted for on tax returns to the corresponding totals disclosable by audit.[11] Before using the aggregates from the personal income series to measure the amounts of income not covered by tax returns, they were adjusted so as to cover the same types of income that were reportable on individual income tax returns.

The stepped-up amounts of tax change for these two groups were then added, by adjusted gross income bracket, to the amounts of disclosable tax change estimated in the Audit Study for the third group listed.

The second step was to reclassify this distribution, in which the basis of size classification was adjusted gross income and the unit of classification the tax return, into brackets of 1950 family money income in which the basic unit was the family or unattached individual.

For this purpose three cumulative percentage distributions were calculated: tax change by adjusted gross income bracket; total tax liability by adjusted gross income bracket (derived as the sum of tax change and originally reported tax liability); and provisional family tax liability by family money income bracket, as derived above.

It was assumed that the relationship between the first two of these distributions could be applied to the third in order to derive the percentage distribution of tax change by family money income brackets. Specifically, it was assumed that changes in tax liability could be associated in the family and the adjusted gross income distributions at points where cumulated percents of tax liabilities were identical.

The percentage distribution of tax change by family money income brackets derived in this manner was then applied against the aggregate amount that was to be subtracted from the provisional estimates of tax liabilities—i. e. to the difference between the provisional and control totals. The resulting amounts were subtracted from the provisional estimates of tax liabilities in the corresponding family money income brackets to arrive at adjusted tax liabilities by family money income brackets.

The adjusted tax liabilities in each family money income bracket were then allocated between families and unattached individuals on the basis of the relative magnitudes of the provisional estimates of the tax liabilities of the two groups in the corresponding income bracket.

As a check on the procedure for adjusting the provisional estimates of tax liabilities for the various family money income brackets, an alternative set of adjustments was

9. The control total used here differs somewhat from an earlier estimate of the Treasury Department (*Federal Income Tax Treatment of Capital Gains and Losses*, U. S. Treasury Department, Tax Advisory Staff of the Secretary, 1951, p. 45) on the one hand because it was adjusted upward to allow for somewhat larger collections than were anticipated when the original estimate was made, and on the other because estimated tax liabilities of fiduciaries and liabilities allocable to net capital gains—which are not included in the definition of family income—were excluded. After the completion of the present estimates, preliminary data from *Statistics of Income* for 1950 were made available which gave the declared tax liabilities for that year. After adjustments to allow for liabilities disclosed by subsequent audit, those of fiduciaries and on net capital gains, this figure was found to be within 2 percent of the estimate used in this report.

10. This study was based on an audit of a sample of returns, with the findings blown up to indicate the amount of tax error of $2 or more per return that probably would be found if all returns filed were thoroughly examined by experienced examining officers. It may be noted that the amount of additional tax liability which would be disclosed by this type of audit is larger than the amount of additional tax liability included in the control total of tax liability, which reflects the more limited audit program actually in force. The data collected in the 1948 Audit Control Program are discussed in some detail by Marius Farioletti in "Some Results from the First Year's Audit Control Program of the Bureau of Internal Revenue," *National Tax Journal*, March 1952.

11. The total amount of income disclosable by audit was not tabulated in the Audit Study. The amounts of business income and other income disclosable by audit were estimated separately by capitalizing the amounts of tax change disclosable by audit on returns "with major error in business income" and "with major error in an income item other than business income," respectively. It may be noted that the amounts thus estimated differed from the desired totals because the tax change figures for both groups of returns excluded tax changes on the given type of income if they were a minor source of tax error, but included tax changes on other types of income and on non-income items, also provided they were a minor source of tax error.

The Audit Study provided a further breakdown for returns "with major error in interest and dividends." This category of returns was combined here with the group "with major error in an income item other than business income" on grounds that, in general, errors in reporting these types of income are not major sources of tax error, and consequently that the distribution of disclosable tax change by income level for returns with major error in interest and dividends was not representative of the pattern of all interest and dividends not covered on tax returns.

derived. These were based on the assumption that the amount of tax liability that was to be subtracted from the provisional estimates was distributed among family money income brackets in the same proportions as the provisional estimates, except that for the income range above $25,000 the amount subtracted was taken to be equal to the tax change disclosable by audit as determined in the Audit Study. In other words, it was assumed that the percentage overstatement of liabilities in the provisional estimates was the same for all income groups, except in very top range of incomes where the results of the Audit Study were accepted without adjustment. As exhibit 21 indicates, the distribution of adjusted tax liabilities by family money income level based on this alternative procedure was similar to that obtained with adjustments based on the Audit Study results.

TAX BY FAMILY PERSONAL INCOME LEVEL

Since Federal individual income tax liabilities by family money income level, as estimated above, accounted for the control total based on the Treasury Department estimate,the change from a money to a personal income classification was accomplished by shifting the given liabilities to the higher levels of personal income.

The procedure was to determine the number of family units in each family money income bracket that shifted to the next higher bracket of family personal income, to estimate the tax liabilities of family units that shifted, and to derive, by subtraction, the tax liabilities of those that remained. The liabilities in the various segments were then recombined to derive tax liabilities in the various brackets of family personal income.

Exhibit 21.—*Percent distribution of Federal individual income tax by family money income level, 1950*

Family money income level	Adjusted estimates	Alternative adjusted estimates
Under $1,000	(1)	(1)
$1,000–$1,999	1.5	1.3
$2,000–$2,999	4.3	3.9
$3,000–$3,999	7.9	7.4
$4,000–$4,999	9.1	8.8
$5,000–$7,499	19.2	19.1
$7,500–$9,999	10.4	10.5
$10,000 and over	47.6	49.0
Total	**100.0**	**100.0**

1. Less than 0.05 percent.

The actual computations were carried through separately for families and unattached individuals. The number of families (or unattached individuals) shifting up from each family money income bracket, and the mean money income of these units, had been derived in section 1 as part of the interpolative procedures used in transforming the several distributions from family money income to family personal income brackets. The mean tax liability of each group of units that shifted was derived by interpolation from a curve of average tax liabilities plotted against family money income.

Distribution of Consumer Units by Level of After-Tax Income

In order to derive the distribution of units by level of after-tax income, Federal individual income tax liabilities were subtracted from family personal income and all units subject to tax were shifted downward along the income scale. Since liabilities differ substantially at any specific income, due primarily to differences in the number of exemptions claimed, the change to an after-tax basis involved some reranking of units.[12]

For families, the first step in the procedure was to determine, for each family personal income bracket, an income point above which no tax liabilities were large enough in relation to income to cause families to shift to the next lower bracket when liabilities were subtracted from income. This "breaking point" was determined on the basis of tax rates applicable to families with maximum tax liabilities, taken here to be those with a minimum number of exemptions. The calculations took into account the fact that tax liabilities are computed more nearly on a family money than on a family personal income basis, and included a correction factor to reduce the computed tax liabilities so that they would account for the control total of 1950 Federal individual income tax liabilities.[13]

12. In the high income ranges variations in deductions (as distinct from exemptions) are, of course, a much more important factor making for differences in tax liability than in lower income brackets. Since the estimates for 1950 did not include breakdowns of the broad $10,000 and over class, however, it was not necessary to deal explicitly with such variations at given income points in determining the after-tax distribution.

13. To obtain the breaking point it was necessary to solve for an income such that the maximum tax liability on that income would just equal the difference between that income and the lower limit of the family personal income bracket. On the assumption that the maximum tax liability was that for a two-exemption family using the split-income provision and taking the standard 10 percent deduction, the formula, for each family personal income bracket, is:

$$X=\frac{L-MR\,[1200+2B]+2MC}{1-.9KMR}$$

where X=the family personal income at the breaking point; L=the lower limit of the family personal income bracket; M=a factor which reduces statutory tax liability in order that the aggregate liability of all units combined would agree with the control total of Federal individual income tax liabilities underlying the estimates; R=the marginal statutory tax rate applicable to families at the breaking point; B=the lower limit of the tax bracket in which such families fall; C=the amount of tax liability below that limit; and K=a factor which reduces family personal income to the associated family money income.

The tax bracket for families at the breaking point, and hence the values of R, B, and C that were inserted in the formula, were first selected tentatively from the tax table, and subsequently checked by ascertaining the actual tax bracket in which families having the computed breaking point income fell. The factor K was determined for points on the family personal income scale by relating points in the money and personal income distributions below which the cumulated number of families was equal. The factor M was obtained for any given income point by dividing the average tax liability for that point, determined on the basis of the adjusted estimates derived earlier in this section, by a computed average liability on the associated family money income. The latter was obtained by weighting computed liabilities for the various number-of-exemption groups by the relative importance of families of different sizes as given in the 1950 census survey.

At or below the breaking point, some but not all of the families shifted to the next lower bracket of after-tax income, depending on the size of their tax liabilities. The next step was to estimate the number of families that shifted based on computed tax liabilities for families with different numbers of exemptions and on census survey data on the relative importance of families in each of these groups. The same data permitted the computation of the aggregate tax liability and aggregate family personal income of the families that shifted to the next lower bracket of after-tax income,[14] and, by subtraction, of their aggregate after-tax income.

The number and after-tax income of families that did not shift were obtained by deducting the group that shifted from the totals that were initially in the bracket. By recombining the frequencies and after-tax income of the various segments the number of families and aggregate after-tax income in each bracket of family personal income after Federal individual income taxes were determined.

For unattached individuals, a similar procedure was used to rerank the units by size of income after Federal individual income taxes. The computation was simplified in this instance by the assumption that a single exemption was claimed by this group of units. Since the weights used earlier in deriving the provisional tax estimates indicated that the bulk of unattached individuals fell in this category the resulting error in the interpolated numbers of individuals shifting was doubtless very small.

14. The number of family units, N, shifting out of any subinterval, with limits x_1 and x_2 (the breaking point) can be written as

$$N=\int_{x_1}^{x_2} f(x)G_x(y)\,dx$$

where $f(x)$ is the density function of family units by before-tax income x, and $G_x(y)$ is the percentage of family units at a given income point x with liabilities larger than $y=x-x_1$.

The sub-intervals were sufficiently small so that $f(x)$ and $G_x(y)$ were computed at only three income points, namely at x_1, x_2, and at an equidistant intermediate point. Values of $G_x(y)$ at the selected income points were obtained by computing tax liabilities for the various number-of-exemption groups, examining the array of liabilities to determine which was large enough to cause the families to shift out of the bracket, and then computing the percent of families with liabilities of that amount or larger using 1950 census data relating income to family size. Values of $f(x)$ at the same points were approximated by either straight line or Pareto functions fitted to the number of units and aggregate income in each of the family personal income brackets. Simpson's formula was used to evaluate the integral.

Similarly, the total amount of tax liability, T, of those that shifted out of the class is given by

$$T=\int_{x_1}^{x_2} f(x)G_x(y)\overline{y}_x dx,$$

where $\overline{y}_x$ is the average liability of units with liabilities larger than $y=x-x_1$. In a like manner the aggregate personal income, A, of those that shifted was obtained from

$$A=\int_{x_1}^{x_2} xf(x)G_x(y)\,dx,$$

This procedure was considered preferable to the alternative of using the initial Federal Reserve Board cross-tabulation described under "Provisional estimates," on grounds that extensive and not too reliable adjustment would have been required in order that the cross-tabulation would apply to a distribution of family personal rather than family money income and would incorporate the correct amounts of before-tax income and of tax liability.

Part 3

Population Estimates

ESTIMATES of the total numbers of families and unattached individuals that were used in constructing the income size distributions refer to the close of the year to which the income data pertain.

Families and unattached individuals are defined in the same way as in recent income field surveys of the Bureau of the Census.[1] The family is a group of two or more persons related by blood, marriage, or adoption, and residing together. The unattached individual ("unrelated individual" in the Census Bureau surveys) is a person, other than an inmate of an institution, who is not living with any relatives. Families and unattached individuals include units living in quasi-households (e. g., large rooming houses or hotels) as well as in households (the usual house or apartment).

In general, members of the Armed Forces living off post or with their families on post were included in the family and unattached individual population, but all other members of the Armed Forces were excluded. College students were included with their families even if they lived away from home while attending school.

For 1947 and 1950, the estimates of the total numbers of families and of unattached individuals, separately, as of December 31 were derived by interpolating between the corresponding Census Bureau figures for April 1947 and April 1948, and for March 1950 and April 1951, respectively.[2] For December 31, 1944 and 1946, similar figures were not available from the Census Bureau and the present series was built up on the basis of various other sets of census estimates, such as the comparable number of families in 1940, the number of "primary" families and unattached individuals as of selected dates between 1940 and 1947, and the population comprising "secondary" families or unattached individuals in 1944 and 1946 as estimated from census data.[3]

The number of farm operator families—the group which is defined, it will be recalled, to include all families operating farms—was taken to be equal to the number of farms as estimated annually by the Bureau of Agricultural Economics, based primarily on census data.[4] Because of their relatively minor importance separate account was not taken of the small group of unattached individuals who were farm operators. The number of nonfarm (i. e., other than farm operator) families was derived by subtracting farm operator families from the all-family estimates obtained above.[5]

In deriving the income distributions for 1944, 1946, and 1947 the total number of nonfarm families in each of those years was further subdivided into groups with 0, 1, 2, 3, 4, and 5 earners, and the total number of unattached individuals into those with 0 and 1 earner. These subdivisions were obtained by adjusting the comparable figures from the Census Bureau income field surveys for those years as described in part 1, section 4.

In addition to the numbers of family units, estimates were also made of the total number of persons in families and of the total number of children under 18 years of age in families, which were used as control totals in deriving the figures on family composition by quintile shown in exhibit 20 and in chapter 2. (For the derivation of the distributions by quintiles, see part 1, section 7.)

For December 31, 1947, and later years, these two population estimates were obtained by interpolating between corresponding Census Bureau figures for the preceding and following March or April.[6] The total population in families or compromising unattached individuals in 1947 and 1950, used in deriving the per capita income figures shown in table 1 of this appendix, was obtained by adding to the estimated family population the number of unattached individuals derived above.

For December 31, 1944 and 1946, the total population in families or comprising unattached individuals was obtained by subtracting the estimated number of institutional residents from Census Bureau figures for the total civilian population,[7] and the number of persons in families was obtained by further subtracting the number of unattached individuals that had been derived above for these 2 years.

1. See, for example, "Income of Families and Persons in the United States: 1949," Census Bureau release Series P–60, No. 7.

2. Census Bureau releases Series P–20, No. 17, and Series P–60, Nos. 5, 7, and 9. For unattached individuals, the Census Bureau figures for all years covered in this report were reduced slightly to exclude certain groups (e. g., residents of monasteries) treated here as members of the institutional population and hence excluded from the income size distributions.

3. For example, Census Bureau releases Series P–20, No. 42, and P–46, No. 4. The population comprising primary families and unattached individuals includes the head of the household and all other persons in the household related to the head; that comprising secondary families and unattached individuals includes lodgers and servants, and their relatives if any, living in households but not related to the head, and persons living in quasi-households (excluding institutions), such as residents of hotels and large rooming houses.

4. *Farm Income Situation*, August–September 1952, page 33, Bureau of Agricultural Economics, U. S. Department of Agriculture (mimeographed).

5. Thus, the nonfarm family totals are slightly understated because of the inclusion in the subtrahend of the minor group of unattached individuals who were farm operators.

6. Census Bureau releases Series P–20, Nos. 17, 21, 26, 33, and 38.

7. Census Bureau release Series P–25, No. 48. It may be noted that the population estimate (and the corresponding numbers of consumer units) derived for these 2 years differ slightly in coverage from the figures for 1947 and later years. All members of the Armed Forces were excluded from the estimates for 1944 and 1946, whereas military personnel living off post or on post with their families were included in the population estimates for the later period.

Statistics of Income Distribution

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Table 1.—*Number of consumer units and persons, and aggregate and average family personal income, 1944, 1946, 1947, and 1950*

	1944	1946	1947	1950
Families and unattached individuals:				
Number of consumer units [1] (millions)	40.9	43.3	44.7	48.6
Number of persons [1] (millions)	125.4	139.4	142.6	149.6
Average number of persons per consumer unit (persons)	3.07	3.22	3.19	3.08
Total family personal income (billions of dol.)	$147.7	$170.7	$184.6	$216.8
Average family personal income:				
Per consumer unit (dollars)	$3,614	$3,940	$4,126	$4,461
Per capita (dollars)	$1,178	$1,225	$1,295	$1,449
Families:				
Number of families [1] (millions)	33.3	35.9	37.0	39.7
Number of persons [1] (millions)	117.8	131.9	134.9	140.7
Average number of persons per family (persons)	3.54	3.68	3.64	3.55
Total family personal income (billions of dol.)	$134.1	$156.7	$169.3	$197.7
Average family personal income:				
Per family (dollars)	$4,027	$4,369	$4,574	$4,981
Per capita (dollars)	$1,138	$1,188	$1,256	$1,405
Unattached individuals:				
Number of individuals [1] (millions)	7.6	7.5	7.7	8.9
Total family personal income (billions of dol.)	$13.6	$14.0	$15.3	$19.1
Per capita family personal income (dollars)	$1,797	$1,879	$1,978	$2,144

1. As of end of calendar year.

Table 2.—*Distribution of consumer units and of family personal income by family personal income level, 1944, 1946, 1947, and 1950*

Family personal income (before income taxes)	Number of families and unattached individuals (thousands)				Aggregate family personal income (millions of dollars)			
	1944	1946	1947	1950	1944	1946	1947	1950
Under $1,000	4,352	3,826	3,748	3,704	2,390	2,017	1,973	1,854
$1,000–$1,999	8,108	7,606	7,370	7,328	12,338	11,570	11,231	11,170
$2,000–$2,999	8,762	8,791	8,459	8,044	21,938	22,007	21,176	20,144
$3,000–$3,999	7,723	8,590	8,628	8,463	26,960	29,906	30,045	29,569
$4,000–$4,999	4,535	5,364	5,725	6,980	20,261	23,956	25,583	31,215
$5,000–$7,499	4,774	5,612	6,625	8,484	28,681	33,558	39,769	51,200
$7,500–$9,999	1,385	1,751	2,170	2,860	11,802	14,905	18,454	24,218
$10,000 and over	1,241	1,790	2,015	2,727	23,351	32,786	36,367	47,388
Total	**40,880**	**43,330**	**44,740**	**48,590**	**147,721**	**170,705**	**184,598**	**216,758**
	Percent distribution							
Under $1,000	10.7	8.8	8.4	7.6	1.6	1.2	1.1	.9
$1,000–$1,999	19.8	17.6	16.5	15.1	8.4	6.8	6.1	5.1
$2,000–$2,999	21.4	20.3	18.9	16.5	14.9	12.9	11.5	9.3
$3,000–$3,999	18.9	19.8	19.3	17.4	18.3	17.5	16.3	13.6
$4,000–$4,999	11.1	12.4	12.8	14.4	13.7	14.0	13.8	14.4
$5,000–$7,499	11.7	13.0	14.8	17.5	19.4	19.7	21.5	23.6
$7,500–$9,999	3.4	4.0	4.8	5.9	8.0	8.7	10.0	11.2
$10,000 and over	3.0	4.1	4.5	5.6	15.7	19.2	19.7	21.9
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 3.—*Distribution of family personal income among quintiles and top 5 percent of consumer units ranked by size of family personal income, 1944, 1946, 1947, and 1950*

Quintile	1944	1946	1947	1950
	Percent distribution of family personal income			
Lowest	4.9	5.0	5.0	4.8
2	10.9	11.1	11.0	11.0
3	16.2	16.0	16.0	16.2
4	22.2	21.8	22.0	22.3
Highest	45.8	46.1	46.0	45.7
Total	**100.0**	**100.0**	**100.0**	**100.0**
Top 5 percent	20.7	21.3	20.9	20.4
	Mean family personal income			
Lowest	$882	$982	$1,023	$1,080
2	1,979	2,178	2,275	2,444
3	2,920	3,156	3,308	3,612
4	4,014	4,290	4,542	4,971
Highest	8,272	9,091	9,483	10,197
All units	**3,614**	**3,940**	**4,126**	**4,461**
Top 5 percent	14,963	16,796	17,226	18,250
	Lower income limit of group [1]			
2	$1,510	$1,660	$1,730	$1,840
3	2,450	2,680	2,800	3,040
4	3,410	3,650	3,830	4,200
Highest	4,800	5,130	5,470	5,960
Top 5 percent	8,240	9,180	9,560	10,500

1. Rounded to nearest $10.

Table 4.—*All consumer units: Distribution of number and of family personal income by family personal income level, 1944*

Family personal income (before income taxes)	Number of families and unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	4,352	2,390	549	10.7	1.6	10.7	1.6
$1,000–$1,999	8,108	12,338	1,522	19.8	8.4	30.5	10.0
$2,000–$2,999	8,762	21,938	2,504	21.4	14.9	51.9	24.9
$3,000–$3,999	7,723	26,960	3,491	18.9	18.3	70.8	43.2
$4,000–$4,999	4,535	20,261	4,467	11.1	13.7	81.9	56.9
$5,000–$7,499	4,774	28,681	6,008	11.7	19.4	93.6	76.3
$7,500–$9,999	1,385	11,802	8,522	3.4	8.0	97.0	84.3
$10,000–$14,999	707	8,483	12,002	1.7	5.7	98.7	90.0
$15,000–$19,999	246	4,215	17,142	.6	2.9	99.3	92.9
$20,000–$24,999	108	2,395	22,199	.3	1.6	99.6	94.5
$25,000–$49,999	140	4,651	33,189	.3	3.1	99.9	97.6
$50,000 and over	40	3,607	88,943	.1	2.4	100.0	100.0
Total	**40,880**	**147,721**	**3,614**	**100.0**	**100.0**		

Table 5.—*All families: Distribution of number and of family personal income by family personal income level, 1944*

Family personal income (before income taxes)	Number of families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	1,859	1,108	596	5.6	0.8	5.6	0.8
$1,000–$1,999	5,453	8,376	1,536	16.4	6.2	22.0	7.0
$2,000–$2,999	7,304	18,377	2,516	21.9	13.7	43.9	20.7
$3,000–$3,999	7,151	25,009	3,498	21.5	18.7	65.4	39.4
$4,000–$4,999	4,348	19,436	4,470	13.0	14.5	78.4	53.9
$5,000–$7,499	4,636	27,864	6,010	13.9	20.8	92.3	74.7
$7,500–$9,999	1,351	11,517	8,523	4.1	8.6	96.4	83.3
$10,000–$14,999	687	8,247	12,004	2.1	6.2	98.5	89.5
$15,000–$19,999	236	4,057	17,144	.7	3.0	99.2	92.5
$20,000–$24,999	102	2,278	22,198	.3	1.7	99.5	94.2
$25,000–$49,999	134	4,437	33,187	.4	3.3	99.9	97.5
$50,000 and over	39	3,396	88,736	.1	2.5	100.0	100.0
Total	**33,300**	**134,102**	**4,027**	**100.0**	**100.0**		

Table 6.—*Nonfarm families: Distribution of number and of family personal income by family personal income level, 1944*

Family personal income (before income taxes)	Number of nonfarm families [1] (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	782	421	538	2.9	0.4	2.9	0.4
$1,000–$1,999	3,842	5,993	1,560	14.0	5.1	16.9	5.5
$2,000–$2,999	6,099	15,401	2,525	22.2	13.2	39.1	18.7
$3,000–$3,999	6,372	22,300	3,500	23.2	19.0	62.3	37.7
$4,000–$4,999	3,873	17,320	4,472	14.1	14.8	76.4	52.5
$5,000–$7,499	4,188	25,179	6,012	15.3	21.5	91.7	74.0
$7,500–$9,999	1,210	10,312	8,520	4.4	8.8	96.1	82.8
$10,000–$14,999	603	7,243	12,014	2.2	6.2	98.3	89.0
$15,000–$19,999	211	3,624	17,150	.8	3.1	99.1	92.1
$20,000–$24,999	92	2,045	22,200	.3	1.7	99.4	93.8
$25,000–$49,999	122	4,044	33,223	.5	3.5	99.9	97.3
$50,000 and over	36	3,160	89,000	.1	2.7	100.0	100.0
Total	**27,430**	**117,042**	**4,267**	**100.0**	**100.0**		

1. Includes all families other than those containing a farm operator. (See part 1, section 6, of this appendix.)

Table 7.—*Farm operator families: Distribution of number and of family personal income by family personal income level, 1944*

Family personal income (before income taxes)	Number of farm operator families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	1,077	688	638	18.4	4.0	18.4	4.0
$1,000–$1,999	1,611	2,382	1,479	27.4	14.0	45.8	18.0
$2,000–$2,999	1,205	2,976	2,471	20.5	17.4	66.3	35.4
$3,000–$3,999	779	2,709	3,478	13.3	15.9	79.6	51.3
$4,000–$4,999	475	2,116	4,458	8.1	12.4	87.7	63.7
$5,000–$7,499	448	2,686	5,991	7.6	15.7	95.3	79.4
$7,500–$9,999	141	1,204	8,544	2.4	7.1	97.7	86.5
$10,000–$14,999	84	1,004	11,934	1.4	5.9	99.1	92.4
$15,000–$19,999	25	433	17,094	.4	2.5	99.5	94.9
$20,000–$24,999	10	233	22,185	.2	1.4	99.7	96.3
$25,000–$49,999	12	393	32,820	.2	2.3	99.9	98.6
$50,000 and over	3	236	85,347	.1	1.4	100.0	100.0
Total	**5,870**	**17,060**	**2,906**	**100.0**	**100.0**		

Table 8.—*Unattached individuals: Distribution of number and of family personal income by family personal income level, 1944*

Family personal income (before income taxes)	Number of unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	2,492	1,281	514	32.9	9.4	32.9	9.4
$1,000–$1,999	2,655	3,962	1,492	35.0	29.1	67.9	38.5
$2,000–$2,999	1,458	3,561	2,443	19.2	26.1	87.1	64.6
$3,000–$3,999	573	1,951	3,407	7.6	14.3	94.7	78.9
$4,000–$4,999	188	825	4,395	2.5	6.1	97.2	85.0
$5,000–$7,499	138	817	5,924	1.8	6.0	99.0	91.0
$7,500–$9,999	34	286	8,500	.4	2.1	99.4	93.1
$10,000–$14,999	20	236	11,950	.3	1.7	99.7	94.8
$15,000–$19,999	9	158	17,100	.1	1.2	99.8	96.0
$20,000–$24,999	5	117	22,200	.1	.9	99.9	96.9
$25,000–$49,999	6	214	33,263	.1	1.6	100.0	98.5
$50,000 and over	2	211	92,419	(1)	1.5	100.0	100.0
Total	**7,580**	**13,619**	**1,797**	**100.0**	**100.0**		

1. Less than 0.05 percent.

Table 9.—*All consumer units: Distribution of number and of family personal income by family personal income level, 1946*

Family personal income (before income taxes)	Number of families and unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	3,826	2,017	527	8.8	1.2	8.8	1.2
$1,000–$1,999	7,606	11,570	1,521	17.6	6.8	26.4	8.0
$2,000–$2,999	8,791	22,007	2,503	20.3	12.9	46.7	20.9
$3,000–$3,999	8,590	29,906	3,481	19.8	17.5	66.5	38.4
$4,000–$4,999	5,364	23,956	4,466	12.4	14.0	78.9	52.4
$5,000–$7,499	5,612	33,558	5,980	13.0	19.7	91.9	72.1
$7,500–$9,999	1,751	14,905	8,513	4.0	8.7	95.9	80.8
$10,000–$14,999	1,070	12,784	11,948	2.5	7.5	98.4	88.3
$15,000–$19,999	332	5,692	17,099	.8	3.3	99.2	91.6
$20,000–$24,999	143	3,165	22,155	.3	1.9	99.5	93.5
$25,000–$49,999	191	6,308	33,210	.4	3.7	99.9	97.2
$50,000 and over	54	4,837	89,236	.1	2.8	100.0	100.0
Total	**43,330**	**170,705**	**3,940**	**100.0**	**100.0**		

Table 10.—*All families: Distribution of number and of family personal income by family personal income level, 1946*

Family personal income (before income taxes)	Number of families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	1,499	852	569	4.2	0.6	4.2	0.6
$1,000–$1,999	5,139	7,895	1,536	14.3	5.0	18.5	5.6
$2,000–$2,999	7,210	18,130	2,514	20.1	11.6	38.6	17.2
$3,000–$3,999	7,939	27,682	3,487	22.1	17.7	60.7	34.9
$4,000–$4,999	5,156	23,044	4,470	14.4	14.7	75.1	49.6
$5,000–$7,499	5,458	32,652	5,982	15.2	20.8	90.3	70.4
$7,500–$9,999	1,714	14,595	8,514	4.8	9.3	95.1	79.7
$10,000–$14,999	1,048	12,525	11,948	2.9	8.0	98.0	87.7
$15,000–$19,999	323	5,533	17,099	.9	3.5	98.9	91.2
$20,000–$24,999	138	3,043	22,154	.4	1.9	99.3	93.1
$25,000–$49,999	184	6,089	33,203	.5	3.9	99.8	97.0
$50,000 and over	52	4,630	89,039	.2	3.0	100.0	100.0
Total	**35,860**	**156,670**	**4,369**	**100.0**	**100.0**		

Table 11.—*Nonfarm families: Distribution of number and of family personal income by family personal income level, 1946*

Family personal income (before income taxes)	Number of nonfarm families [1] (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	657	306	466	2.2	0.2	2.2	0.2
$1,000–$1,999	3,660	5,691	1,555	12.2	4.2	14.4	4.4
$2,000–$2,999	6,036	15,211	2,520	20.1	11.1	34.5	15.5
$3,000–$3,999	7,122	24,855	3,490	23.8	18.1	58.3	33.6
$4,000–$4,999	4,581	20,485	4,472	15.3	15.0	73.6	48.6
$5,000–$7,499	4,842	28,976	5,984	16.2	21.1	89.8	69.7
$7,500–$9,999	1,516	12,903	8,510	5.0	9.4	94.8	79.1
$10,000–$14,999	930	11,115	11,950	3.1	8.1	97.9	87.2
$15,000–$19,999	288	4,928	17,100	1.0	3.6	98.9	90.8
$20,000–$24,999	123	2,718	22,150	.4	2.0	99.3	92.8
$25,000–$49,999	167	5,545	33,243	.5	4.1	99.8	96.9
$50,000 and over	48	4,309	89,358	.2	3.1	100.0	100.0
Total	**29,970**	**137,042**	**4,573**	**100.0**	**100.0**		

1. Includes all families other than those containing a farm operator. (See part 1, section 6, of this appendix.)

Table 12.—*Farm operator families: Distribution of number and of family personal income by family personal income level, 1946*

Family personal income (before income taxes)	Number of farm operator families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	842	546	649	14.3	2.8	14.3	2.8
$1,000–$1,999	1,479	2,204	1,490	25.1	11.2	39.4	14.0
$2,000–$2,999	1,174	2,919	2,485	19.9	14.9	59.3	28.9
$3,000–$3,999	817	2,827	3,461	13.9	14.4	73.2	43.3
$4,000–$4,999	575	2,559	4,450	9.8	13.0	83.0	56.3
$5,000–$7,499	616	3,676	5,968	10.4	18.7	93.4	75.0
$7,500–$9,999	198	1,692	8,541	3.4	8.6	96.8	83.6
$10,000–$14,999	118	1,410	11,931	2.0	7.2	98.8	90.8
$15,000–$19,999	35	605	17,093	.6	3.1	99.4	93.9
$20,000–$24,999	15	325	22,183	.2	1.7	99.6	95.6
$25,000–$49,999	17	544	32,804	.3	2.8	99.9	98.4
$50,000 and over	4	321	84,975	.1	1.6	100.0	100.0
Total	**5,890**	**19,628**	**3,332**	**100.0**	**100.0**		

Table 13.—*Unattached individuals: Distribution of number and of family personal income by family personal income level, 1946*

Family personal income (before income taxes)	Number of unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	2,327	1,164	500	31.1	8.3	31.1	8.3
$1,000–$1,999	2,467	3,674	1,489	33.0	26.2	64.1	34.5
$2,000–$2,999	1,581	3,877	2,453	21.2	27.6	85.3	62.1
$3,000–$3,999	652	2,225	3,412	8.7	15.8	94.0	77.9
$4,000–$4,999	208	912	4,387	2.8	6.5	96.8	84.4
$5,000–$7,499	154	907	5,902	2.1	6.5	98.9	90.9
$7,500–$9,999	36	310	8,500	.5	2.2	99.4	93.1
$10,000–$14,999	22	259	11,950	.3	1.8	99.7	94.9
$15,000–$19,999	9	159	17,100	.1	1.1	99.8	96.0
$20,000–$24,999	5	122	22,200	.1	.9	99.9	96.9
$25,000–$49,999	7	219	33,410	.1	1.6	100.0	98.5
$50,000 and over	2	207	93,854	(1)	1.5	100.0	100.0
Total	**7,470**	**14,035**	**1,879**	**100.0**	**100.0**		

1. Less than 0.05 percent.

Table 14.—*All consumer units: Distribution of number and of family personal income by family personal income level, 1947*

Family personal income (before income taxes)	Number of families and unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	3,748	1,973	526	8.4	1.1	8.4	1.1
$1,000–$1,999	7,370	11,231	1,524	16.5	6.1	24.9	7.2
$2,000–$2,999	8,459	21,176	2,503	18.9	11.5	43.8	18.7
$3,000–$3,999	8,628	30,045	3,482	19.3	16.3	63.1	35.0
$4,000–$4,999	5,725	25,583	4,468	12.8	13.8	75.9	48.8
$5,000–$7,499	6,625	39,769	6,003	14.8	21.5	90.7	70.3
$7,500–$9,999	2,170	18,454	8,505	4.8	10.0	95.5	80.3
$10,000–$14,999	1,199	14,300	11,919	2.7	7.7	98.2	88.0
$15,000–$19,999	386	6,586	17,070	.8	3.6	99.0	91.6
$20,000–$24,999	167	3,700	22,125	.4	2.0	99.4	93.6
$25,000–$49,999	208	6,879	33,092	.5	3.7	99.9	97.3
$50,000 and over	55	4,902	89,795	.1	2.7	100.0	100.0
Total	**44,740**	**184,598**	**4,126**	**100.0**	**100.0**		

Table 15.—*All families: Distribution of number and of family personal income by family personal income level, 1947*

Family personal income (before income taxes)	Number of families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	1,503	837	557	4.1	0.5	4.1	0.5
$1,000–$1,999	4,897	7,551	1,542	13.2	4.5	17.3	5.0
$2,000–$2,999	6,740	16,967	2,517	18.2	10.0	35.5	15.0
$3,000–$3,999	7,889	27,503	3,487	21.3	16.2	56.8	31.2
$4,000–$4,999	5,467	24,444	4,471	14.8	14.4	71.6	45.6
$5,000–$7,499	6,438	38,663	6,005	17.4	22.8	89.0	68.4
$7,500–$9,999	2,126	18,085	8,505	5.8	10.7	94.8	79.1
$10,000–$14,999	1,175	14,009	11,920	3.2	8.3	98.0	87.4
$15,000–$19,999	376	6,411	17,072	1.0	3.8	99.0	91.2
$20,000–$24,999	161	3,568	22,126	.4	2.1	99.4	93.3
$25,000–$49,999	201	6,636	33,088	.5	3.9	99.9	97.2
$50,000 and over	52	4,666	89,533	.1	2.8	100.0	100.0
Total	**37,025**	**169,340**	**4,574**	**100.0**	**100.0**		

Table 16.—*Nonfarm families: Distribution of number and of family personal income by family personal income level, 1947*

Family persona lincome (before income taxes)	Number of nonfarm families [1] (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	785	351	447	2.5	0.2	2.5	0.2
$1,000–$1,999	3,466	5,408	1,560	11.1	3.6	13.6	3.8
$2,000–$2,999	5,567	14,058	2,525	17.9	9.4	31.5	13.2
$3,000–$3,999	7,022	24,505	3,490	22.6	16.5	54.1	29.7
$4,000–$4,999	4,862	21,742	4,472	15.6	14.6	69.7	44.3
$5,000–$7,499	5,761	34,611	6,008	18.5	23.3	88.2	67.6
$7,500–$9,999	1,906	16,204	8,500	6.1	10.9	94.3	78.5
$10,000–$14,999	1,043	12,429	11,920	3.3	8.4	97.6	86.9
$15,000–$19,999	337	5,748	17,070	1.1	3.9	98.7	90.8
$20,000–$24,999	145	3,215	22,120	.5	2.2	99.2	93.0
$25,000–$49,999	183	6,046	33,115	.6	4.1	99.8	97.1
$50,000 and over	48	4,307	89,845	.2	2.9	100.0	100.0
Total	**31,125**	**148,624**	**4,775**	**100.0**	**100.0**		

1. Includes all families other than those containing a farm operator. (See part 1, section 6, of this appendix.)

Table 17.—*Farm operator families: Distribution of number and of family personal income by family personal income level, 1947*

Family personal income (before income taxes)	Number of farm operator families (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	718	486	677	12.2	2.4	12.2	2.4
$1,000–$1,999	1,431	2,143	1,498	24.2	10.3	36.4	12.7
$2,000–$2,999	1,173	2,909	2,480	19.9	14.0	56.3	26.7
$3,000–$3,999	867	2,998	3,459	14.7	14.5	71.0	41.2
$4,000–$4,999	605	2,702	4,464	10.2	13.0	81.2	54.2
$5,000–$7,499	677	4,052	5,983	11.5	19.6	92.7	73.8
$7,500–$9,999	220	1,881	8,545	3.7	9.1	96.4	82.9
$10,000–$14,999	132	1,580	11,917	2.2	7.6	98.6	90.5
$15,000–$19,999	39	663	17,084	.7	3.2	99.3	93.7
$20,000–$24,999	16	353	22,182	.3	1.7	99.6	95.4
$25,000–$49,999	18	590	32,812	.3	2.9	99.9	98.3
$50,000 and over	4	359	85,957	.1	1.7	100.0	100.0
Total	**5,900**	**20,716**	**3,511**	**100.0**	**100.0**		

Table 18.—*Unattached individuals: Distribution of number and of family personal income by family personal income level, 1947*

Family personal income (before income taxes)	Number of unattached individuals (thousands)	Family personal income		Percent distribution			
		Aggregate (millions of dollars)	Average (dollars)	Simple		Cumulative	
				Number	Income	Number	Income
Under $1,000	2,245	1,136	506	29.1	7.4	29.1	7.4
$1,000–$1,999	2,473	3,680	1,488	32.1	24.1	61.2	31.5
$2,000–$2,999	1,719	4,209	2,450	22.3	27.6	83.5	59.1
$3,000–$3,999	740	2,541	3,435	9.6	16.7	93.1	75.8
$4,000–$4,999	258	1,139	4,410	3.3	7.5	96.4	83.3
$5,000–$7,499	187	1,106	5,922	2.4	7.2	98.8	90.5
$7,500–$9,999	43	369	8,500	.6	2.4	99.4	92.9
$10,000–$14,999	24	291	11,900	.3	1.9	99.7	94.8
$15,000–$19,999	10	175	17,000	.1	1.1	99.8	95.9
$20,000–$24,999	6	132	22,100	.1	.9	99.9	96.8
$25,000–$49,999	7	243	33,206	.1	1.6	100.0	98.4
$50,000 and over	3	237	95,276	(1)	1.6	100.0	100.0
Total	**7,715**	**15,258**	**1,978**	**100.0**	**100.0**		

1. Less than 0.05 percent.

Table 19.—*Distribution of consumer units, family personal income, and Federal individual income tax liability, by family personal income level, 1950*

Family personal income (before income taxes)	Number of families and unattached individuals (thousands)	Family personal income		Federal individual income tax liability			Percent distribution		
		Aggregate (millions of dollars)	Average (dollars)	Aggregate (millions of dollars)	Average (dollars)	Tax rate (percent)	Number	Income	Tax liability
Under $1,000	3,704	1,854	501	1	(1)	(2)	7.6	0.9	(2)
$1,000–$1,999	7,328	11,170	1,524	216	29	1.9	15.1	5.1	1.2
$2,000–$2,999	8,044	20,144	2,504	709	88	3.5	16.5	9.3	3.9
$3,000–$3,999	8,463	29,569	3,494	1,353	160	4.6	17.4	13.6	7.4
$4,000–$4,999	6,980	31,215	4,472	1,626	233	5.2	14.4	14.4	8.9
$5,000–$7,499	8,484	51,200	6,035	3,525	415	6.9	17.5	23.6	19.4
$7,500–$9,999	2,860	24,218	8,468	1,960	685	8.1	5.9	11.2	10.8
$10,000 and over	2,727	47,388	17,377	8,810	3,231	18.6	5.6	21.9	48.4
Total	**48,590**	**216,758**	**4,461**	**18,200**	**375**	**8.4**	**100.0**	**100.0**	**100.0**

1. Less than 50 cents.
2. Less than 0.05 percent.

Table 20.—*Distribution of consumer units and of family personal income after Federal individual income tax liability, by level of after-tax income, 1950*

Family personal income after Federal individual income tax liability	Number of families and unattached individuals (thousands)	After-tax family personal income		Percent distribution	
		Aggregate (millions of dollars)	Average (dollars)	Number	After-tax income
Under $1,000	3,737	1,880	503	7.7	1.0
$1,000 to $1,999	7,864	11,999	1,526	16.2	6.0
$2,000 to $2,999	8,709	21,945	2,520	17.9	11.1
$3,000 to $3,999	8,832	30,823	3,490	18.2	15.5
$4,000 to $4,999	6,986	31,164	4,461	14.4	15.7
$5,000 to $7,499	7,952	47,652	5,992	16.3	24.0
$7,500 to $9,999	2,326	19,680	8,461	4.8	9.9
$10,000 and over	2,184	33,415	15,296	4.5	16.8
Total	**48,590**	**198,558**	**4,086**	**100.0**	**100.0**

Table 21.—*Distribution of family personal income and Federal individual income tax liability among quintiles and top 5 percent of consumer units ranked by size of family personal income, 1950*

Quintile	Range of family personal income [1] (before income taxes)	Average (dollars)		Tax rate (percent)	Percent distribution	
		Family personal income	Tax liability		Income (before taxes)	Tax liability
Lowest	Under $1,840	1,080	15	1.4	4.8	0.8
2	$1,840–$3,040	2,444	85	3.5	11.0	4.5
3	$3,040–$4,200	3,612	169	4.7	16.2	9.0
4	$4,200–$5,960	4,971	289	5.8	22.3	15.4
Highest	$5,960 and over	10,197	1,316	12.9	45.7	70.3
Total		**4,461**	**375**	**8.4**	**100.0**	**100.0**
Top 5 percent	$10,500 and over	18,250	3,518	19.3	20.4	47.0

1. Rounded to nearest $10.

Table 22.—*Distribution of family personal income after Federal individual income tax liability among quintiles and top 5 percent of consumer units ranked by size of after-tax income, 1950*

Quintile	Range of after-tax income [1]	Average after-tax income (dollars)	Percent distribution of after-tax income
Lowest	Under $1,780	1,061	5.2
2	$1,780–$2,910	2,359	11.5
3	$2,910–$4,000	3,442	16.9
4	$4,000–$5,550	4,688	22.9
Highest	$5,550 and over	8,881	43.5
Total		**4,086**	**100.0**
Top 5 percent	$9,490 and over	14,737	18.0

1. Rounded to nearest $10.

Table 23.—*Data underlying chart on family personal income in 1929 and 1950*

	1929	1950
Aggregate family personal income (billions of 1950 dollars)	$117.9	$216.8
Number of families and unattached individuals (millions)	35.5	48.6
Mean family personal income per consumer unit (1950 dollars)	$3,320	$4,460

Table 24.—*Data underlying chart on distribution of consumer units by size of family personal income in 1950*

Family personal income (before income taxes)	Percent distribution of—	
	Families and unattached individuals	Family personal income
Under $1,000	7.6	0.9
$1,000–$1,999	15.1	5.1
$2,000–$2,999	16.5	9.3
$3,000–$3,999	17.4	13.6
$4,000–$4,999	14.4	14.4
$5,000–$5,999	9.2	11.3
$6,000–$6,999	6.0	8.7
$7,000–$7,999	4.2	7.0
$8,000–$8,999	2.5	4.7
$9,000–$9,999	1.5	3.1
$10,000 and over	5.6	21.9
Total	**100.0**	**100.0**

Table 25.—*Data underlying chart on percent distribution of family personal income, Federal income tax, and after-tax income in 1950*

Quintile [1]	Percent distribution of—			
	Consumer units	Family personal income (before income taxes)	Federal individual income tax liability	After-tax income
Lowest	20.0	4.8	0.8	5.2
2	20.0	11.0	4.5	11.6
3	20.0	16.2	9.0	16.8
4	20.0	22.3	15.4	22.9
Highest	20.0	45.7	70.3	43.5
Total	**100.0**	**100.0**	**100.0**	**100.0**
Top 5 percent	5.0	20.4	47.0	18.0

1. Families and unattached individuals ranked by size of family personal income (before income taxes).

Table 26.—*Data underlying chart on distribution of family personal income among major types of consumer units in 1947*

	Family personal income		Mean family personal income per consumer unit (dollars)
	Aggregate (billions of dollars)	Percent distribution	
Nonfarm families	148.6	80.5	4,780
Farm operator families	20.7	11.2	3,510
Unattached individuals	15.3	8.3	1,980
Total	**184.6**	**100.0**	**4,130**

Table 27.—*Data underlying chart on percent distribution of major types of consumer units by size of family personal income in 1947*

Family personal income (before income taxes)	Percent distribution of—		
	Nonfarm families	Farm operator families	Unattached individuals
Under $1,000	2.5	12.2	29.1
$1,000–$1,999	11.1	24.2	32.1
$2,000–$2,999	17.9	19.9	22.3
$3,000–$3,999	22.6	14.7	9.6
$4,000–$4,999	15.6	10.2	3.3
$5,000–$5,999	9.6	6.5	1.4
$6,000–$6,999	7.1	3.7	.8
$7,000–$7,999	3.8	2.4	.4
$8,000–$8,999	2.6	1.6	.2
$9,000–$9,999	1.6	1.1	.1
$10,000 and over	5.6	3.5	.7
Total	**100.0**	**100.0**	**100.0**

Table 28.—*Data underlying chart on percent distribution of consumer units by size of family personal income in 1944 and 1950*

Family personal income (before income taxes)	Percent distribution	
	1944	1950
Under $1,000	10.7	7.6
$1,000–$1,999	19.8	15.1
$2,000–$2,999	21.4	16.5
$3,000–$3,999	18.9	17.4
$4,000–$4,999	11.1	14.4
$5,000–$5,999	6.2	9.2
$6,000–$6,999	4.3	6.0
$7,000–$7,999	2.3	4.2
$8,000–$8,999	1.4	2.5
$9,000–$9,999	.9	1.5
$10,000 and over	3.0	5.6
Total	**100.0**	**100.0**

Table 29.—*Data underlying chart on composition of family personal income in 1950*

	Aggregate amounts (billions of dollars)	Percent distribution
Wages and salaries and other labor income	138.6	63.9
Proprietors' and rental income	45.2	20.9
Dividends and interest	18.6	8.6
Transfer payments	14.4	6.6
Total	**216.8**	**100.0**

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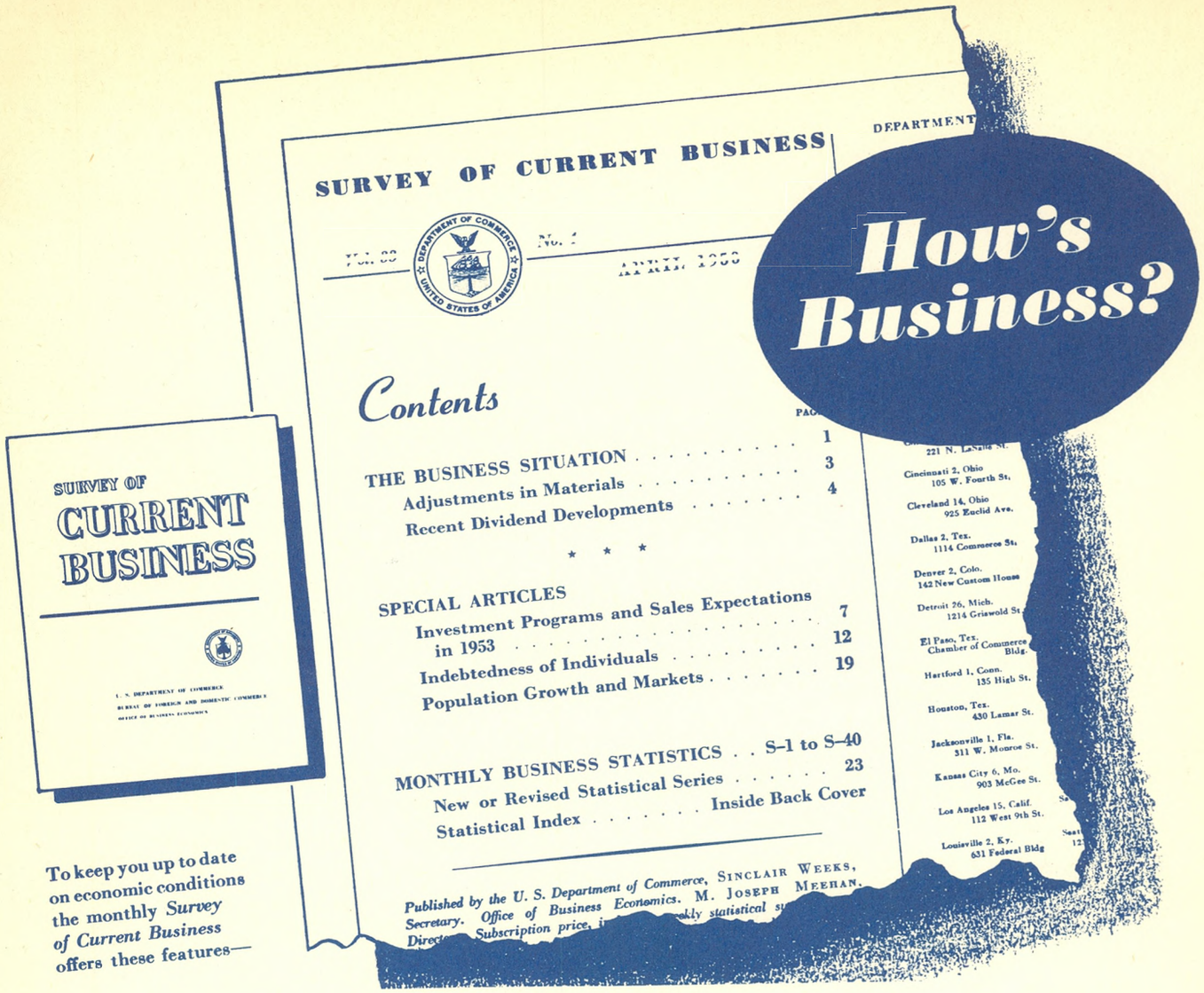

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