Part IV

Distribution of Income

The views expressed in this paper are the author's own. He is grateful to MAURICE LIEBENBERG, HYMAN KAITZ, *and* SELMA GOLDSMITH *for their advice on technical problems of estimation; to several colleagues in the Treasury Department and in other governmental agencies for their helpful criticisms; and to* MILDRED D. FLINN *for making most of the calculations.*

Before and After Federal Income Tax, 1941 and 1947

Joseph A. Pechman
TREASURY DEPARTMENT
TAX ADVISORY STAFF OF THE SECRETARY

MANY, IF NOT MOST, analytical uses for income size distributions require distributions after taxes. For example, analyses of the consumption function generally run in terms of aggregate disposable income, i.e., income after direct tax payments; but our data on family budgets, which are required to explain changes in consumption-saving relations, are generally by income-before-tax classes.[1]

[1] For several purposes distributions after all taxes, direct and indirect, are required. Aside from many practical problems, they involve difficult conceptual problems regarding the incidence of indirect taxes. See Gerhard Colm and Helen Tarasov, *Who Pays the Taxes?*, TNEC Monograph 3 (Washington, D. C., 1941) and Helen Tarasov, 'Who Does Pay the Taxes?', *Social Research*, Supplement IV, 1942.

Distributions of income after taxes are difficult to obtain for two reasons. First, those who conduct income field studies are often reluctant to ask questions about taxes for fear that respondents will be suspicious and refuse to answer other questions.[2] Second, such data on direct tax payments by individuals as do exist, e.g., social security taxes and federal and state personal income taxes, are classified on the basis of the reporting unit and income concepts prescribed by tax statutes. The gap between the various sources of tax data and consumer income distributions has not yet been successfully bridged (see Parts VII and VIII). Until a bridge is constructed, efforts to go from a distribution of income before tax to a disposable income distribution on the basis of secondary sources will entail unsatisfactory compromises and assumptions.

For 1941 and 1947 data are sufficient to take a first step toward estimating the distribution after tax. Albert G. Hart and Julius Lieblein calculated the federal tax liabilities of each nonfarm consumer unit in the 1941 Survey of Family Spending and Saving in Wartime.[3] Similar computations for 1947 were made by the Michigan Survey Research Center for all consumer units in the third Survey of Consumer Finances conducted for the Federal Reserve Board.[4] We present size distributions of income after federal income tax in 1941 and 1947 estimated largely from these tax computations supplemented by data from *Statistics of Income*.[5]

[2] Information on amounts of income paid in direct taxes has been collected in various surveys; e.g., in the large scale Study of Consumer Purchases for 1935–36 and the 1941 Study of Family Spending and Saving in Wartime, conducted by the Bureaus of Labor Statistics and of Human Nutrition and Home Economics, but the tabulations were confined to income-before-tax classes. In several recent studies by the Bureaus of Labor Statistics and of Human Nutrition and Home Economics, the data have been tabulated on an income-after-tax basis. Tax questions have not been asked in recent field surveys of consumer income by the Census Bureau or in the Federal Reserve Board Surveys of Consumer Finances.

[3] 'Family Income and the Income Tax Base', *Studies in Income and Wealth, Volume Eight* (1946), pp. 237–62.

[4] '1948 Survey of Consumer Finances', Part IV, *Federal Reserve Bulletin*, Aug. 1948, pp. 914–32.

[5] The distributions before and after the federal income tax for 1941 in the *Economic Report of the President*, Jan. 1949 (pp. 13–5 and 91–5) were based on Table 1. In the *Economic Report* income not accounted for in the 1941 distribution be-

These estimates do not go the whole way from a size distribution of income before taxes to a distribution after taxes. Taxes not taken into account include social security, sales, property taxes, etc. whose impact differs substantially from that of the federal income tax. Nonetheless, the comparison of the distributions after federal income tax alone for 1941 and 1947 is of considerable interest and significance. 1941 is the last peacetime year before our entry into World War II; by the end of 1947 our conversion from a wartime economy had almost been completed. Between 1941 and 1947 the federal tax structure was altered materially to meet the heavy requirements of war and postwar finance, and the individual income tax emerged as the largest single source of federal revenues. Differences between the distributions of income after federal income tax for these years reflect the combined effect of the greatly strengthened federal income tax and of changes in the amount and relative distribution of income before tax.

A Definitions

Two types of unit are distinguished—families and single consumers. The family is defined as a group of two or more persons living in the same household who are related by blood, marriage, or adoption. Typically, they depend upon a common or pooled income to cover most of their expenditures. Single consumers are individuals who are not related to any other persons in the household, who maintain homes of their own, or who live as roomers in private homes, lodging houses, or hotels. Persons living in institutions and military camps are excluded. The estimates of the total number of families and single consumers are for the end of the calendar year.

Consumer money income before tax includes civilian wages and salaries, military pay and allowances of persons returned to civilian life by the end of the year, net farm and nonfarm entrepreneurial income, interest, dividends, fiduciary income of individuals, net rents, income from roomers and boarders, pay-

fore tax (based on aggregates computed from Department of Commerce data) was allocated proportionately among family units, and the distributions before and after tax were shifted accordingly.

ments to veterans, retirement and unemployment compensation benefits, annuities, pensions, and other minor items.[6]

Total consumer money income before tax for 1941 and 1947 covers only the amount that could be distributed by income classes on the basis of data available from field studies or from *Statistics of Income.* The missing income cannot at present be allocated by income classes without resort to arbitrary procedures.[7]

The estimates of federal income tax, computed from the consumer money income of each family unit, are on a liability basis. They correspond to the taxes reported in *Statistics of Income,* exclusive of the net tax on capital gains and losses.[8] Tax liabilities of fiduciary returns are excluded. The tax estimates are not adjusted for overassessments and deficiencies uncovered later by auditing.[9] Since the estimates are on a liability basis, they differ from the federal income tax figures subtracted by the Department of Commerce from personal income in calculating disposable income.[10]

Consumer money income after federal income tax is the difference between consumer money income before tax and tax liabilities as defined above. Consumer money income before and after tax are subject to the same understatement in dollar amounts.

[6] For a comparison of consumer money income and personal income, as defined by the Department of Commerce, see Part VI.

[7] Estimates of total consumer money income not accounted for, based on Department of Commerce data, are given in Section B below.

[8] The capital gains tax was excluded because the computations from information reported in the field surveys were based on incomes exclusive of capital gains and losses.

[9] Overassessments applicable to 1941 incomes amounted to less than 2 percent and deficiencies to less than 5 percent of tax liabilities reported on Form 1040 returns. The 1947 audits have not been completed.

[10] *Survey of Current Business,* July 1947, Supplement, Table 8, p. 21, and July 1948, Table 8, p. 17. Department of Commerce estimates of taxes are on a payment basis. Prior to 1943 payments lagged almost a full year behind receipt of income; as a consequence, tax liabilities in 1941 exceeded tax payments. In 1947 tax liabilities were smaller than tax payments largely because of overwithholding and overpayments on declarations of estimated tax. Tax payments minus refunds in 1947 are somewhat smaller than 1947 liabilities because year-end payments on declarations and on final returns in 1947, based on 1946 incomes, were smaller than the same payments made in 1948 on 1947 incomes.

B METHODS (see App. A)

For 1941 procedures were devised to yield estimates that would account for the total taxable income and tax liability reported in *Statistics of Income*. Because of underreporting at all income levels, a very substantial underestimate of the average income of high-income family units, and an almost 40 percent underestimate of single consumers, the BLS-BHNHE distribution covered only 86 percent of total consumer money income as determined by adjusting the Department of Commerce estimates of personal income.[11] Before income after tax was distributed the incomes of families above the $5,000 level and a new single consumer distribution, both estimated from *Statistics of Income,* were substituted for the BLS-BHNHE estimates. The remaining portion of the BLS-BHNHE distribution was adjusted proportionately to conform with the latest population estimates.

The adjustments to the 1941 BLS-BHNHE distribution raised total consumer money income to almost 94 percent of the aggregate based on Department of Commerce data. The 6 percent still missing is due to underreporting of income in the field study and *Statistics of Income* or an overestimate of total income by the Department of Commerce, or to a combination of the two.

Federal income tax liabilities of family units in 1941 were estimated for three groups separately. For nonfarm families with incomes of less than $5,000, the Hart and Lieblein tax computations were employed. For farm families with incomes of less than $5,000, tax liabilities were calculated by income classes (before tax) by applying the 1941 tax rates to average incomes minus deductions, exemptions, and nontaxable income; for all families above the $5,000 level and for all single consumers, they were based on *Statistics of Income* averages. The close agreement between the total tax liability estimated in this manner and the *Statistics of Income* figure suggested either that the income distribution for nonfarm families, which was based on the BLS-

[11] The distribution is from BLS *Bulletin 822,* p. 73; total income from Part VI, Table 2. The 86 percent figure refers to the aggregate in the BLS-BHNHE distribution before the adjustment of the average income above the $10,000 level on the basis of the Pareto curve and after the adjustment for refusals (see BLS *Bulletin 822,* pp. 22–8).

BHNHE survey (with a proportionate change for the revised population estimate), was consistent with incomes reported in *Statistics of Income* or that any differences by income levels canceled.[12]

The 1941 distribution of income after tax was based on consumer incomes and tax liabilities as estimated by the procedures just outlined. The reranking of family units due to the tax was estimated and the frequencies and aggregates for the income-after-tax classes were based on the new distribution.

The distribution of consumer money income before tax in 1947 was derived from the FRB Survey of Consumer Finances; relatively minor adjustments were made for families of 2 or more. The single-consumer distribution was adjusted proportionately to include a large number not covered by the FRB Survey.[13]

Tax liabilities of families in 1947 were based on the computations by the Michigan Survey Research Center from the original schedules.[14] Tax liabilities of single consumers were estimated independently on the basis of average incomes before tax in each class and 1947 tax rates and exemptions. The distribution of income after tax for 1947, like the 1941 distribution, takes into account the reranking of family units due to the tax.

Total consumer money income before tax in the 1947 distribution accounts for about 90 percent of the aggregate based on Department of Commerce data. However, tax liabilities are about 7 percent higher than those reported in *Statistics of Income for 1947*,[15] indicating that the adjusted FRB distribution accounts for more income, or is more unequal, than the *Statistics of Income* distribution.[16]

12 Hart and Lieblein reached the same conclusion, op. cit., p. 240.

13 Because of this adjustment for single consumers, the distributions before and after tax in the FRB Survey of Consumer Finances for family units (op. cit., p. 931) are not comparable with our distributions.

14 For the methods of computation, see ibid., pp. 930–2.

15 Tax liabilities for 1947 were $18.1 billion (*Statistics of Income for 1947*, Part 1, preliminary); after adjustment for the tax on capital gains, they are reduced to $17.6 billion. The tax liabilities in Table 3 amount to $18.9 billion, a difference of 7 percent.

16 If total income (after correcting for conceptual differences) is the same in both distributions, the FRB tax liabilities can be larger only if they contain a larger proportion of the total at the top income levels.

For both years, the estimates for single consumers are subject to much wider margins of error than the estimates for families. For 1941 it was assumed that among the taxpayers filing returns as 'single persons' with incomes of $5,000 or more those who were members of families had the same average incomes as those who lived alone. For 1947 more than 2 million single consumers were added to the original distribution provided by the survey data on the basis of the distribution for single consumers covered. As indicated below, comparisons of the changes in the combined distributions of families and single consumers based on the estimates presented here are subject to qualification because of these uncertainties with respect to the single-consumer distribution.

C Changes in the Distributions, 1941–1947

1 *Income Before Tax*

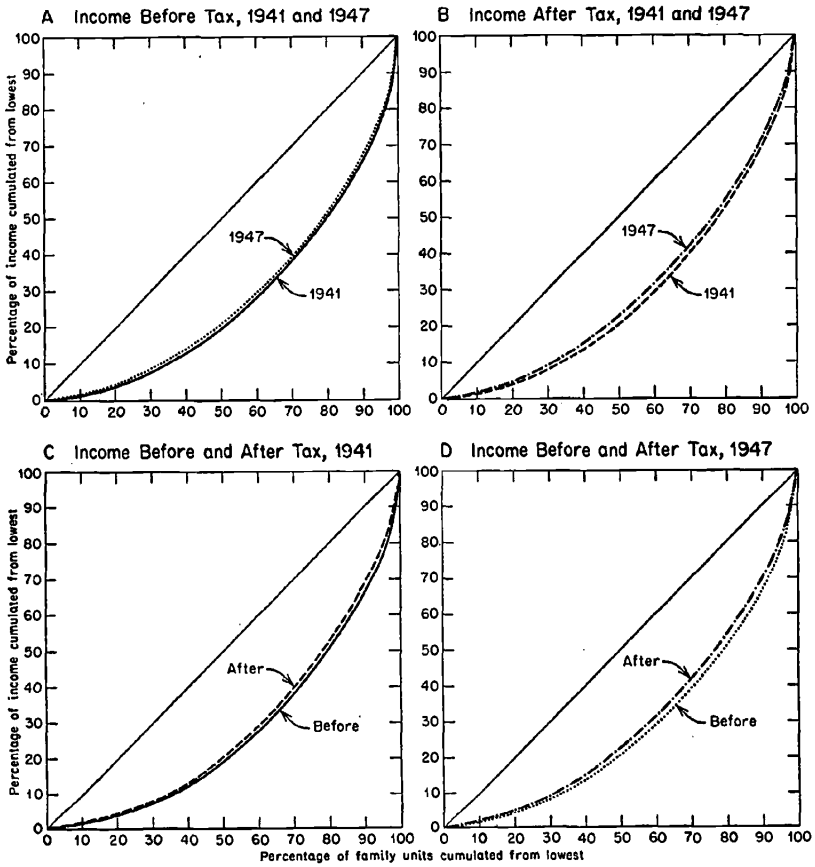
Aggregate consumer money before tax more than doubled between 1941 and 1947. The effect on the distribution of family units by income classes is shown in Table 1. In 1941 almost 16 percent of the families and single consumers reported incomes of less than $500; less than 4 percent had $5,000 or more. By 1947 only 5 percent reported less than $500; the proportion with more than $5,000 had increased to almost 20 percent. The median income rose from about $1,500 to about $2,850; the arithmetic mean, from $1,950 to $3,680.

Table 1
Family Units, Percentage Distribution by Consumer Money Income Before and After Federal Income Tax, 1941 and 1947

Income Class	Income Before Tax		Income After Tax	
	1941	*1947*	*1941*	*1947*
Under $500	15.7	5.1	15.7	5.1
500– 999	17.8	9.6	18.0	9.9
1,000–1,499	16.5	9.2	16.8	9.7
1,500–1,999	15.1	9.7	15.5	11.7
2,000–2,999	20.9	19.5	20.9	21.7
3,000–3,999	7.0	16.1	6.9	16.9
4,000–4,999	3.1	11.0	2.9	9.8
5,000–9,999	3.8	15.9	3.2	12.3
10,000 & over		4.0		2.8
Total	100.0	100.0	100.0	100.0

Because of rounding, percentages may not add to totals.

Lorenz Curves for the Distributions of Consumer Money Income Before and After Federal Income Tax, 1941 and 1947



This pronounced shift of families and single consumers to higher income classes was accompanied by an improvement in over-all equality, as measured by the Lorenz curve. The 1947 curve is closer to the line of equal distribution than the 1941 curve throughout the income scale. Although the distance between the two curves is relatively small, there are sizable differences in relative income changes in the lowest and highest portions of the distributions (Table 2).

Table 2

Average Consumer Money Income Before and After Federal Income Tax, by Quintiles, 1941 and 1947

Family Units Ranked from Lowest to Highest Fifth	Income Before Tax			Income After Tax		
	1941	*1947*	% increase	*1941*	*1947*	% increase
Lowest	$345	$746	116	$345	$737	114
Second	888	1,808	104	886	1,730	95
Third	1,495	2,810	88	1,483	2,624	77
Fourth	2,190	4,051	85	2,157	3,721	73
Highest	4,834	8,975	86	4,411	7,459	69
All family units	1,950	3,678	89	1,856	3,254	75

The income ranges covered by each fifth are given in Appendix Table 3.

Average consumer money income of all families and single consumers increased 89 percent from 1941 to 1947. Had income inequality, as measured by the Lorenz curve, remained unchanged, the rise in average incomes of each quintile of the distribution would have equaled this average increase. While the increases for the top three-fifths were somewhat less than the over-all average increase, 85–88 percent, the increases for the lowest two-fifths were larger, 116 percent for the first fifth and 104 percent for the second fifth.

These figures for families and single consumers combined conceal significant differences in the movement of each distribution. Consumer money income before taxes was more equally distributed among families in 1947 than in 1941. The movement toward equality was, in fact, somewhat greater for the family distribution alone than for the combined distribution. Incomes of single consumers, on the other hand, were apparently less equally distributed in 1947.[17] The over-all increase in equality in the combined distribution reflects the fact that families outnumbered single consumers substantially (almost 4 to 1 in 1941 and

[17] Lorenz curves for families and single consumers separately were not prepared. However, the following comparisons illustrate the differences noted above: the lowest 50 percent of families received 20.6 percent of the total consumer money income before tax of families in 1941 and 22.8 percent in 1947; on the other hand, the lowest 50 percent of single consumers received 19 percent of the total income of single consumers in 1941 and only 17 percent in 1947. (These figures were estimated from the distributions in App. Tables 1 and 3.)

almost 5 to 1 in 1947) and were, therefore, weighted more heavily.

As indicated above, the estimates for single consumers are much less reliable than those for families. The corrections made in the 1941 single consumer distribution from the sample survey by the use of income tax data shifted a substantial number of frequencies from low- to high-income levels (App. A). As single consumers account for 47 percent of the frequencies below $1,000 in 1947 (App. Table 1), an upward shift of some would tend to move the Lorenz curve for families and single consumers combined closer to the line of equal distribution. Since the 1947 distributions are not adjusted to conform with income tax data, the increase in equality between 1941 and 1947 for the combined distribution may well be understated by the Lorenz curves. The adjustment cannot be made for 1947 because *Statistics of Income* for that year combine single persons and heads of families.

Conclusions with respect to 1941–47 changes in income inequality are subject to one further qualification. Based on Department of Commerce estimates of personal income, total consumer money income before tax increased 113 percent, from $86.1 to $183.1 billion (Part VI, Table 1). Consumer money income in our distributions increased 103 percent, from $80.7 to $164.1 billion. The differences in the relative movements of the two sets of aggregates are due to differences in the amount of income not accounted for in the distributions: 7 percent in 1941 and 11 percent in 1947. If those percentages reflect the proportions of missing income accurately (see Sec. B) and the distribution of the missing income by income classes or among the various sources changed significantly between the two years, the chart does not represent precisely the actual changes in income inequality.[18]

[18] The 4 percent increase in the amount not accounted for cannot be interpreted as indicating positively that relatively more income is missing from the distributions in 1941 than in 1947. Conceivably, much of this increase could be due to an overestimate in 1947 by the Department of Commerce.

If Mrs. Goldsmith's estimates are approximately correct, the distribution of the missing income among the various sources is clearly not the same each year (Part VI, Tables 3 and 4). This suggests that the distribution of the missing income by income levels does change; as already indicated, no data are available at present to allocate it even roughly.

2 *Income After Tax*

The proportion of total consumer money income taken by the federal individual income tax increased from almost 5 percent in 1941 to 11.5 percent in 1947,[19] partly because of the general upward movement of incomes, which increased the amount of income subject to higher bracket rates, and partly because of the tax increases at all levels (see App. B). At 1941 rates and exemptions, 1947 tax liabilities would have been reduced no more than 45 percent.[20] This implies that at least 43 percent of the increase in tax liabilities from 1941 to 1947 was due to the higher incomes in the latter year.[21]

The higher taxes caused a substantially larger downward shift of incomes in 1947 than in 1941 at all levels (except the lowest, where family units were not subject to tax). For example, in 1941 only 3 percent of the family units with incomes of $1,500–2,000 before tax had incomes of less than $1,500 after tax; in 1947, 10 percent shifted downward. Of the family units with incomes of $5,000 or more before tax in 1941 one-seventh had less than $5,000 after tax; in 1947 the proportion increased to almost one-quarter.[22]

Despite these marked differences, the effects of the 1941 and 1947 tax structures on income inequality are not greatly different, at least when measured by the Lorenz curve. The curves

19 These percentages were based on total consumer money income accounted for by the distributions in Appendix Table 1. Based on aggregates computed from Department of Commerce estimates of personal income, the federal income tax reduced consumer money income 4.5 percent in 1941 and 10.3 percent in 1947.

20 It is hard to make an accurate computation of this kind because the distribution of family units above $5,000 (the open end class interval in 1941) changed substantially between the two years. The percentage cited above was computed by applying (a) the effective rates of tax at each income level below $5,000 in 1941 (for single consumers and families separately) to the amounts of consumer money income at the same levels in 1947 and (b) an estimated effective rate for 1941 (based on App. Table 5) to the amount of income above $5,000 in 1947. The estimate in step (b) is not much better than a guess, but the percentage given above is believed to be a maximum.

21 Since tax liabilities in 1941 amounted to 21 percent of tax liabilities in 1947, the portion of the increase due to higher incomes is at least $\frac{(1 - .45) - .21}{(1 - .21)} = .43$.

22 These figures were computed from the cross-classifications of family units by before- and after-tax income classes (App. Table 2).

in Panels C and D indicate that the federal income tax had more equalizing effect on the distribution of income in 1947 than in 1941, but the differences appear to be relatively small.[23] As a consequence, the movement of the curve toward the line of equal distribution from 1941 to 1947 is only slightly larger for the after tax distributions than for the before tax distributions (Panel B).

Here, again, the insensitivity of Lorenz curves must be recognized. A movement of the Lorenz curve toward the line of equal distribution of, say, one or two percentage points, though it may look small when plotted on the scale used in the chart, implies a significant improvement in relative incomes of low- vs. high-income recipients (Table 2). For all family units incomes after tax increased 75 percent. For the lowest fifth they increased 114 percent; for the highest fifth, only 69 percent.[24]

The average incomes before and after tax in Table 2 are not for the same groups of family units. If taxes depended only on the amount of consumer money income, family units with a given income would retain the same relative position in the before- and after-tax distributions. However, tax liabilities for families with the same incomes do vary. In the first place, taxes are lower the larger the number of exemptions and the amounts of deductions claimed by the taxpayers in one family and the larger the proportion of income received from nontaxable sources. Secondly, a family with one income recipient may pay a larger tax than one with more than one recipient, since each recipient may file separately. With graduated rates, the tax on the combined family income would equal or exceed the tax paid on

[23] If progressivity is measured in terms of the shift in the Lorenz curve toward the line of equal distribution, the curves indicate that the federal income tax was more progressive in 1947 than in 1941. Other measures of progression may yield different results. For a discussion of various measures of progression, see R. E. Slitor, 'The Measurement of Progressivity and Built-In Flexibility', *Quarterly Journal of Economics*, Feb. 1948, pp. 309–13, and R. A. Musgrave and Tun Thin, 'Income Tax Progression, 1929–48', *Journal of Political Economy*, Dec. 1948, pp. 498–514.

[24] These comparisons, in current dollars, do not take into account the effect of changes in price between the two years. The Lorenz curve would remain the same only if the price deflation factor for all income classes were the same.

the same amount if it were divided among separate returns.[25] In Table 2 average incomes before tax are computed from the distributions of family units ranked in order of increasing incomes before tax; average incomes after tax, from the distributions of family units ranked in order of increasing incomes after tax (App. Table 1).

The 1941 and 1947 average incomes before and after tax of the same family units, both ranked in order of increasing incomes *before* tax, are given in Table 3. This permits the computation of effective rates of tax on consumer money incomes. Family units in the lowest fifth did not pay any federal income tax in 1941; they paid 1 percent in 1947. In the highest fifth, the tax amounted to 9 percent of consumer money income in 1941 and to 17 percent in 1947.[26]

Table 3
Average Consumer Money Income Before and After Federal Income Tax, by Quintiles, Family Units Ranked by Size of Income Before Tax, 1941 and 1947

	1941				*1947*			
Family Units Ranked From Lowest to Highest Fifth	Av. Income Before Tax	Av. Tax	Av. Income After Tax	Effective Tax Rate, %	Av. Income Before Tax	Av. Tax	Av. Income After Tax	Effective Tax Rate, %
Lowest	$345	0	$345	0	$746	$8	$738	1.1
Second	888	$1	887	*	1,808	72	1,736	4.0
Third	1,495	11	1,484	0.7	2,810	172	2,638	6.1
Fourth	2,190	33	2,157	1.5	4,051	345	3,706	8.5
Highest	4,834	424	4,410	8.8	8,975	1,521	7,454	16.9
All family units	1,950	94	1,856	4.8	3,678	424	3,254	11.5

* Less than 0.5 percent.

The effective rates of tax for the highest fifth in both years may seem low in comparison with the very high effective rates at top income levels (App. B). However, since the lowest income in the highest fifth started at about $2,600 in 1941 and at about

25 The income-splitting provision in the Revenue Act of 1948 equalizes taxes among families when only the husband and wife receive income. The income of other family members continues to be reported separately for tax purposes.

26 Average incomes after tax in each quintile for family units ranked on both a before- and after-tax basis are about the same (compare the averages in Tables 2 and 3), although the differences are larger for 1947 than for 1941. The reason is that the extent of reranking was relatively small in both years, but somewhat greater in 1947.

$5,000 in 1947 (App.Table 3), the proportion of total income accounted for by those subject to very high effective rates in the highest fifth is relatively small in both years.

The federal income tax is the chief progressive element of the national tax structure. Except for estate and gift taxes, other direct taxes are largely regressive or proportional, or at best only mildly progressive. For example, at the federal level, the social security tax in 1947 was proportional for wages up to $3,000 and regressive thereafter. Direct taxes at the state and local level (including property, motor vehicle, net and gross income, and poll taxes) may be regressive on balance. It may well be, therefore, that all direct taxes do not equalize the distribution of income by as much as the federal income tax alone. Even less equalization might be expected if indirect taxes were allocated by income levels. Clearly, the nature of the change in income inequality when the effect of all taxes is taken into account is worth intensive investigation.

Appendix

A Methods

Both the 1941 and 1947 distributions of income before federal income tax, and also the 1947 distribution after tax, are refinements of previously published estimates; the after-tax distribution for 1941 is an independent estimate. This appendix describes the adjustments made to the published distributions and the procedures used to estimate the 1941 distribution after tax.

1 *1941*

The 1941 distribution of income before tax for families was based primarily on BLS *Bulletin 822* and Department of Agriculture *Miscellaneous Publication 520*. The single consumer distribution was estimated independently from *Statistics of Income,* since the BLS-BHNHE survey failed to include a substantial number of single consumers.[1]

Tax liabilities of nonfarm families with incomes under $5,000 were computed from information reported in the BLS-BHNHE sur-

[1] See BLS *Bulletin 822,* pp. 41 and 60.

vey. For farm families with less than $5,000 income, taxes were estimated by applying 1941 tax rates to the income before tax in each class, with allowances for exemptions, deductions, and nontaxable income. For farm and nonfarm families having incomes of $5,000 or more and for all single consumers, taxes were taken from *Statistics of Income.*

a *Distribution of income before tax*

As a preliminary step in the estimation procedures for 1941, the data reported on 1941 income tax returns were adjusted to conform as nearly as possible with current definitions of consumer units and consumer income.

1) The net income distribution of Form 1040 returns was adjusted to exclude capital gains and losses.

First, returns reporting gains or losses were deducted from the distributions of all returns, leaving a residual which remained unaffected by this correction.[2]

Second, ordinary net incomes were decreased or increased by the estimated amounts of gains or losses included and the returns were shifted down or up to the appropriate class interval. For net income classes above $5,000, this adjustment was based on a cross-classification of capital gains and losses by net income classes.[3] For net income classes below $5,000, the cross-classifications were extrapolated downward on the basis of the average gains and losses in each class and the relative distributions in the $5,000–6,000 class. The downward or upward corrections applied to the returns in each cell in the cross-classification tables assumed that the returns were concentrated at the cell midpoints.

Third, the corrected distributions were added back to the distribution of returns without capital gains or losses, giving a new net income distribution exclusive of capital gains and losses.[4]

[2] It was necessary to estimate separately distributions for returns with net short term and net long term gains, net short term gains and net long term losses, only net short term gains, only net long term gains, and only net long term losses. It was assumed that net short term gains at each income level were distributed proportionately among returns with and without net long term gains or losses (*Statistics of Income for 1941*, Part 1, Table 7–A, pp. 150–4). Correction for net short term losses was not required since they were not deductible from ordinary net income in 1941.

[3] Ibid., pp. 43–7.

[4] Net corrections to the class frequencies were all relatively small and, in view of the margin of error involved, the refinement for capital gains and losses was hardly necessary.

2) The distributions for joint returns, separate returns, and heads of families filing Form 1040 were corrected for capital gains and losses. In the absence of data on capital gains and losses by marital status, it was necessary to increase or decrease the class frequencies in each distribution in proportion to the correction made in (1) to class frequencies in the distribution for all returns.

3) Net incomes exclusive of capital gains and losses on separate community- and noncommunity-property Form 1040 returns were combined. Separate community-property returns were combined by matching the wife having the highest income with the husband having the highest income, and so on. Separate noncommunity-property returns were combined on the basis of a cross-classification table of husbands' incomes by wives' incomes estimated from 1936 data.[5] The combined distributions for separate returns were added to the joint return and head-of-family distributions. The result was a distribution of ordinary net incomes reported by family heads and their spouses on Form 1040.

4) The ordinary net income distribution from (3) was converted to a total income distribution by increasing each net income by the ratio of deductions to net income.[6] The converted distribution was read off a cumulative distribution plotted on lognormal graph paper.

5) Total incomes on separate community- and noncommunity-property Form 1040A returns were combined and the resulting distributions added to the distributions for joint and head-of-family Form 1040A returns.[7]

6) The distributions from (4) and (5) were combined, yielding a size distribution of the total combined incomes of family heads and their spouses reported on 1941 income tax returns.

The incomes of family members other than the head and spouse are not entered on individual income tax returns. Consequently, the distribution in (6) is the furthest point to which tax return data can be carried by combining returns for family members. A similar dis-

[5] *Statistics of Income Supplement Compiled from Income Tax Returns for 1936*, Section II, Table 2, pp. 4–15. The method of combination is described in *Analysis of Wisconsin Income* (NBER, 1948), pp. 147–51.

[6] *Statistics of Income for 1941*, Part 1, Table 7–A, p. 158. The ratio of deductions to net income included a small correction for estimated tax-exempt interest.

[7] Corrections for capital gains and losses and for deductions were not required for Form 1040A returns because they were classified by total income in *Statistics of Income for 1941*. The total income on Form 1040A returns in 1941 consisted wholly of compensation for personal services, dividends, interest, rent, annuities, and royalties.

tribution estimated independently from information reported in the BLS-BHNHE survey checked to within 2 percent of the number indicated by the distribution estimated from income tax data in all classes above $3,000.[8] Consequently, it was decided that the BLS-BHNHE frequency distribution of families of two or more could not be improved by the use of income tax data.[9]

7) A distribution of the incomes of family members other than heads and spouses, estimated from the BLS-BHNHE survey, was subtracted from the single consumer distribution in *Statistics of Income* (after corrections for capital gains and losses and deductions as described in (1) and (4) above). A few heads of families not eligible for the head-of-family tax exemption and, therefore, included with single persons in the income tax distribution, were also deducted. The resulting distribution had considerably more frequencies at higher income levels than the BLS-BHNHE distribution, even after changes for revised population estimates were made in the latter distribution, indicating either that the BLS-BHNHE single consumer sample was not representative or that the incomes of single consumers who were not sampled were generally higher than of those who were. For this reason, the single-consumer frequencies estimated from income tax data beginning at the $1,000 level were substituted for the BLS-BHNHE frequencies; the remaining number of single consumers was divided between the two classes $0–499 and $500–999 on the basis of the proportions in the BLS-BHNHE distribution.

The total number of families and of single consumers are the revised estimates by the Department of Commerce, National Income Division. The percentage distribution of families by income levels is identical with the BLS-BHNHE distribution (App. Table 1, Part A); this percentage distribution applied to the revised number of families gave the class frequencies.[10]

[8] The BLS-BHNHE estimate was prepared from transcripts of data reported by each family. The transcripts did not contain any information identifying the individual families.

[9] As noted below, the income in the $5,000 and over class was adjusted to conform with income tax data.

[10] BLS *Bulletin 822*, pp. 33–4. The BLS-BHNHE distribution covered only 'full-period' families. A correction for 'part-period' families should have been made, but data were not available to estimate their distribution by income levels. The close correspondence between the BLS-BHNHE distribution and the distribution constructed from income tax data indicates that the effect of part-period families on the distribution was probably small, at least above the $3,000 level.

A division of the frequencies in the $3,000–5,000 class into equal $1,000 intervals was interpolated from a cumulative distribution.

Appendix Table 1
Family Units by Consumer Money Income Before and After Federal Income Tax, 1941 and 1947

INCOME CLASS	NUMBER (THOUSANDS) Total	Families	Single consumers	INCOME ($ MILLIONS) Total	Families	Single consumers
			1941			
	A Distribution by Income Before Tax					
Under $500	6,504	4,136	2,368	1,876	1,237	639
500– 999	7,382	5,336	2,046	5,416	3,933	1,483
1,000–1,499	6,844	5,138	1,706	8,517	6,407	2,110
1,500–1,999	6,266	5,202	1,064	10,896	9,062	1,834
2,000–2,999	8,645	7,675	970	21,113	18,804	2,309
3,000–3,999	2,893	2,770	123	9,894	9,476	418
4,000–4,999	1,267	1,171	96	5,615	5,192	423
5,000 & over	1,569	1,492	77	17,358	16,422	936
Total	41,370	32,920	8,450	80,685	70,533	10,152
			Percentages			
Under $500	15.7	12.6	28.0	2.3	1.8	6.3
500– 999	17.8	16.2	24.2	6.7	5.6	14.6
1,000–1,499	16.5	15.6	20.2	10.6	9.1	20.8
1,500–1,999	15.1	15.8	12.6	13.5	12.8	18.1
2,000–2,999	20.9	23.3	11.5	26.2	26.7	22.7
3,000–3,999	7.0	8.4	1.5	12.3	13.4	4.1
4,000–4,999	3.1	3.6	1.1	7.0	7.4	4.2
5,000 & over	3.8	4.5	0.9	21.5	23.3	9.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
	B Distribution by Income After Tax					
Under $500	6,504	4,136	2,368	1,876	1,237	639
500– 999	7,444	5,336	2,108	5,473	3,933	1,540
1,000–1,499	6,949	5,138	1,811	8,644	6,407	2,237
1,500–1,999	6,415	5,323	1,092	11,174	9,284	1,890
2,000–2,999	8,646	7,842	804	21,068	19,179	1,889
3,000–3,999	2,856	2,720	136	9,778	9,312	466
4,000–4,999	1,213	1,148	65	5,400	5,118	282
5,000 & over	1,343	1,277	66	13,380	12,742	638
Total	41,370	32,920	8,450	76,793	67,212	9,581
			Percentages			
Under $500	15.7	12.6	28.0	2.4	1.8	6.7
500– 999	18.0	16.2	24.9	7.1	5.9	16.1
1,000–1,499	16.8	15.6	21.4	11.3	9.5	23.3
1,500–1,999	15.5	16.2	12.9	14.6	13.8	19.7
2,000–2,999	20.9	23.8	9.5	27.4	28.5	19.7
3,000–3,999	6.9	8.3	1.6	12.7	13.9	4.9
4,000–4,999	2.9	3.5	0.8	7.0	7.6	2.9
5,000 & over	3.2	3.9	0.8	17.4	19.0	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Appendix Table 1 (concl.)

INCOME CLASS	NUMBER (THOUSANDS) Total	Families	Single consumers	INCOME ($ MILLIONS) Total	Families	Single consumers
			1947			
	C Distribution by Income Before Tax					
Under $500	2,285	1,025	1,260	726	327	399
500– 999	4,262	2,458	1,804	3,214	1,866	1,348
1,000–1,499	4,090	3,002	1,088	5,100	3,759	1,341
1,500–1,999	4,309	3,441	868	7,542	6,025	1,517
2,000–2,999	8,712	7,315	1,397	21,440	18,010	3,430
3,000–3,999	7,171	6,658	513	24,568	22,820	1,748
4,000–4,999	4,894	4,623	271	21,561	20,370	1,191
5,000–9,999	7,116	6,866	250	46,190	44,652	1,538
10,000 & over	1,781	1,682	99	33,763	31,189	2,574
Total	44,620	37,070	7,550	164,104	149,018	15,086
			Percentages			
Under $500	5.1	2.8	16.7	0.4	0.2	2.6
500– 999	9.6	6.6	23.9	2.0	1.3	8.9
1,000–1,499	9.2	8.1	14.4	3.1	2.5	8.9
1,500–1,999	9.7	9.3	11.5	4.6	4.0	10.1
2,000–2,999	19.5	19.7	18.5	13.1	12.1	22.7
3,000–3,999	16.1	18.0	6.8	15.0	15.3	11.6
4,000–4,999	11.0	12.5	3.6	13.1	13.7	7.9
5,000–9,999	15.9	18.5	3.3	28.1	30.0	10.2
10,000 & over	4.0	4.5	1.3	20.6	20.9	17.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
	D Distribution by Income After Tax					
Under $500	2,285	1,025	1,260	726	327	399
500– 999	4,421	2,458	1,963	3,345	1,866	1,479
1,000–1,499	4,350	3,147	1,203	5,443	3,948	1,495
1,500–1,999	5,200	4,000	1,200	9,185	7,064	2,121
2,000–2,999	9,704	8,606	1,098	24,253	21,426	2,827
3,000–3,999	7,553	7,137	416	26,449	24,978	1,471
4,000–4,999	4,359	4,179	180	19,530	18,728	802
5,000–9,999	5,506	5,353	153	35,128	34,197	931
10,000 & over	1,242	1,165	77	21,144	19,553	1,591
Total	44,620	37,070	7,550	145,203	132,087	13,116
			Percentages			
Under $500	5.1	2.8	16.7	0.5	0.2	3.0
500– 999	9.9	6.6	26.0	2.3	1.4	11.3
1,000–1,499	9.7	8.5	15.9	3.7	3.0	11.4
1,500–1,999	11.7	10.8	15.9	6.3	5.3	16.2
2,000–2,999	21.7	23.2	14.5	16.7	16.2	21.6
3,000–3,999	16.9	19.3	5.5	18.2	18.9	11.2
4,000–4,999	9.8	11.3	2.4	13.5	14.2	6.1
5,000–9,999	12.3	14.4	2.0	24.2	25.9	7.1
10,000 & over	2.8	3.1	1.0	14.6	14.8	12.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Incomes of families with incomes of less than $5,000 were computed by multiplying the BLS-BHNHE averages (BLS *Bulletin 822,* p. 73) by the class frequencies. For the $5,000 and over class, the income was computed from *Statistics of Income* by adding (a) the net incomes reported by family heads and spouses with net incomes of $5,000 or more, corrected for capital gains and losses, (b) the net incomes, exclusive of capital gains and losses, of family heads, spouses, and other family members filing separate returns with separate net incomes of less than $5,000 and combined total incomes of $5,000 or more,[11] (c) the estimated deductions and tax-exempt interest reported by those in (a) and (b). The estimated average income for the $5,000 and over class computed in this manner exceeded the BLS-BHNHE estimate based largely on a Pareto curve formula by only 1 percent.

The frequency distribution of single consumers in Appendix Table 1, Part A was estimated as described in (7) above. Average incomes for the classes between $1,000 and $5,000 were computed by a formula supplied by Maurice Liebenberg and, for the $5,000 and over class, from *Statistics of Income*;[12] for the classes below $1,000, the BLS-BHNHE averages were used (BLS *Bulletin 822,* p. 71). These averages multiplied by the class frequencies gave total income.

b *Distribution of income after tax*

This distribution is a byproduct of Appendix Table 2. The family units in each income class (before tax) were divided into those who moved down one class after the federal tax was deducted and those who remained in the same class. The number of family units, their income before tax, and tax liabilities were estimated for each group separately. The marginal totals of Appendix Table 2 give the frequency distribution after tax; the amounts of income after tax in each class are the differences between the incomes before tax and the estimated tax liabilities (App. Table 1, Part B).

For nonfarm families with incomes of less than $5,000, estimates

[11] In the absence of more specific data, it was assumed that single persons who were members of families and received incomes of $5,000 or more had the same average incomes as single persons living alone.

[12] The formula is based on a straight line passing through the midpoint of a class, assuming the frequencies are centered at that point, and parallel to a line fitted to the frequencies of the two adjacent classes centered at the midpoints of those classes (see Part VII, App. H). The formula is given for even class intervals in *Consumer Income in the United States* (National Resources Committee, 1938), p. 88.

Allowance was made for single consumers with net incomes of less than $5,000 and total incomes of $5,000 or more.

for the two groups noted above were based on tax liabilities calculated by Hart and Lieblein in connection with their paper. Their worksheets were, fortunately, preserved in the files of the Treasury Department Tax Advisory Staff of the Secretary.

Their figures for tax liabilities were adjusted for the 2 percent overestimate of net taxable income noted in their paper (*Studies in Income and Wealth, Volume Eight,* p. 242). Incomes after tax were computed from these tax liabilities for the sample cases which were divided into the two groups; the application of population weights to the sample results gave aggregate tax liabilities for each group in each class. Sample schedules for nonfarm families with incomes of $5,000 or more and for all single consumers were too few to be used for this purpose.

For single consumers with incomes under $5,000, total tax liabilities are the product of class frequencies and average tax liabilities in each income class (before tax), computed from *Statistics of Income* (weighted averages of the tax liabilities on Forms 1040 and 1040A). The number of single consumers shifted down one class by the tax was estimated by interpolating on a cumulative curve between the lower class limit and the breaking point above which the tax was not large enough to move the income recipient to the next lower class.[13] Average incomes before tax of those shifted down were assumed to be the midpoint between the lower class limit and the breaking point, and average tax liabilities were based upon these midpoints. The number and incomes before and after tax of those remaining in the same class are the difference between the class aggregates and the aggregates for those who moved down.

For farm families with incomes of less than $5,000, tax liabilities were computed for each class (before tax) on the basis of the 1941 tax rates, and the average incomes reported in the BLS-BHNHE study.[14] Tax liabilities of all families and single consumers with incomes of $5,000 or more were estimated from *Statistics of Income*.[15]

[13] Separate breaking points were computed for single consumers; for Form 1040A the breaking points were read off the tax table on the 1941 tax return; for Form 1040 they were based on 1941 tax rates, exemption status, and average deductions reported in each class in *Statistics of Income.*

[14] Exemption status was based on the distribution of families by size in BLS *Bulletin 822,* p. 69. Deductions amounting to 10 percent of total family income were assumed.

[15] This involved tracing the tax liabilities of families with one or more income recipients having incomes under $5,000. The distribution of family heads and their spouses (estimated from income tax returns) and of supplementary earners classified by size of total family income (estimated from BLS-BHNHE schedules) provided the necessary information.

Those whom the tax moved down one class were separated from those who remained in the same class by the method described in connection with the estimate for single consumers.

2 *1947*

The estimates for 1947 are revisions of distributions prepared by the Michigan Survey Research Center in connection with the Survey of Consumer Finances conducted for the Federal Reserve Board. Special tabulations supplied to the Council of Economic Advisers were made available for this purpose.

Two adjustments were made to the FRB distribution of income before tax: revised estimates of the number of families and single consumers in 'private' households were substituted for the FRB figures; and distributions of families and single consumers in 'quasi' households,[16] which were not included in the FRB survey, were added to the distributions for private households. Single consumers and families in quasi-households were assumed to be distributed by income levels in the same proportions as single consumers in private households, since the average income of the two groups in 1947 was almost identical.[17]

The distribution of income before tax in 1947 is given in Appendix Table 1. Average incomes for families are from the FRB percentage distributions of families and their income by income classes converted to absolute figures.[18] For single consumers average incomes below $10,000 were computed by formula (see App. note 12); for the $10,000 and over class, the difference between the FRB aggregate income of all single consumers and the income of single consumers below $10,000 was divided by the frequency. The amounts of income in Appendix Table 1, Part C are the products of these averages and the cell frequencies (after the corrections for revised population weights and for quasi-households noted above).[19]

16 Family units in quasi-households consist mainly of single consumers living in rooming houses and hotels.

17 The average income of family units in quasi-households was $1,972; for single consumers in private households, $2,000. These averages are based upon Mrs. Goldsmith's estimates (see Part VI, App. D, notes to col. 3).

18 Since the percentages in these distributions were rounded, the average incomes may not check with actual FRB averages.

19 The FRB distributions did not divide the $1,000–1,999 class between the two equal $500 classes in Appendix Table 1, Part C. Instead the frequencies in the two classes were interpolated from a cumulative frequency curve; the aggregate incomes are the product of these frequencies and averages computed by formula.

Appendix Table 2

Cross-classification of Family Units by Consumer Money Income Before and After Federal Income Tax, 1941 and 1947

1941

Income Before Tax	Income After Tax: Under $500	$500–999	$1,000–1,499	$1,500–1,999	$2,000–2,999	$3,000–3,999	$4,000–4,999	$5,000 & over	Total
				Number of Family Units (thousands)					
Under $500	6,504	...	...	...	...	...	...	...	6,504
500– 999	...	7,382	...	...	...	...	...	...	7,382
1,000–1,499	...	62	6,782	...	...	...	...	...	6,844
1,500–1,999	...	...	167	6,099	...	...	...	...	6,266
2,000–2,999	...	...	...	316	8,329	...	...	...	8,645
3,000–3,999	...	...	...	...	317	2,576	...	...	2,893
4,000–4,999	...	...	...	...	...	280	987	...	1,267
5,000 & over	...	...	...	...	...	...	226	1,343	1,569
Total	6,504	7,444	6,949	6,415	8,646	2,856	1,213	1,343	41,370
				Percentage Distribution					
Under $500	100.0	...	...	...	...	...	...	...	100.0
500– 999	...	100.0	...	...	...	...	...	...	100.0
1,000–1,499	...	0.9	99.1	...	...	...	...	...	100.0
1,500–1,999	...	...	2.7	97.3	...	...	...	...	100.0
2,000–2,999	...	...	...	3.7	96.3	...	...	...	100.0
3,000–3,999	...	...	...	...	11.0	89.0	...	...	100.0
4,000–4,999	...	...	...	...	...	22.1	77.9	...	100.0
5,00 & over	...	...	...	...	...	...	14.4	85.6	100.0
Total	15.7	18.0	16.8	15.5	20.9	6.9	2.9	3.2	100.0

1947

Income Before Tax	Income After Tax: Under $500	$500 –999	$1,000–1,499	$1,500–1,999	$2,000–2,999	$3,000–3,999	$4,000–4,999	$5,000–9,999	$10,000 & over	Total
					Number of Family Units (thousands)					
Under $500	2,285	...	...	...	...	...	...	...	...	2,285
500– 999	...	4,262	...	...	...	...	...	...	...	4,262
1,000–1,499	...	159	3,931	...	...	...	...	...	...	4,090
1,500–1,999	...	...	419	3,890	...	...	...	...	...	4,309
2,000–2,999	...	...	...	1,310	7,402	...	...	...	...	8,712
3,000–3,999	...	...	...	...	2,302	4,869	...	...	...	7,171
4,000–4,999	...	...	...	...	...	2,684	2,210	...	...	4,894
5,000–9,999	...	...	...	...	...	...	2,149	4,967	...	7,116
10,000 & over	...	...	...	...	...	...	...	539	1,242	1,781
Total	2,285	4,421	4,350	5,200	9,704	7,553	4,359	5,506	1,242	44,620
					Percentage Distribution					
Under $500	100.0	...	...	...	...	...	...	...	...	100.0
500– 999	...	100.0	...	...	...	...	...	...	...	100.0
1,000–1,499	...	3.9	96.1	...	...	...	...	...	...	100.0
1,500–1,999	...	...	9.7	90.3	...	...	...	...	...	100.0
2,000–2,999	...	...	...	15.0	85.0	...	...	...	...	100.0
3,000–3,999	...	...	...	...	32.1	67.9	...	...	...	100.0
4,000–4,999	...	...	...	...	...	54.8	45.2	...	...	100.0
5,000–9,999	...	...	...	...	...	...	30.2	69.8	...	100.0
10,000 & over	...	...	...	...	...	...	...	30.3	69.7	100.0
Total	5.1	9.9	9.7	11.7	21.7	16.9	9.8	12.3	2.8	100.0

The cross-classification of income before and after tax (App. Table 2) was estimated separately for families and single persons. The estimate for families was based directly upon a special tabulation by the Michigan Survey Research Center showing the proportions of families (and their incomes before and after tax) moved down one

class by deduction of the tax and of those who remained in the same class. For single consumers, such a table was not prepared because the sample frequencies in some classes were too small; the method used for the 1941 estimates was applied instead. Appendix Table 1, Part D gives the distribution of income after tax from the marginal totals of the cross-classification table.

3 *Quintile Distributions of Income Before and After Tax*

The 1941 and 1947 distributions of income before and after tax by quintiles (App. Table 3) were estimated by a new technique devised by Maurice Liebenberg, in which an interpolation formula based on the assumption of a straight-line density curve in each absolute income class (e.g., under $500, $500–999) which satisfies the conditions of the known frequencies and aggregate amounts of income in each class, is applied (see Part VII, App. E).

Appendix Table 3

Consumer Money Income Before and After Federal Income Tax, by Quintiles, 1941 and 1947

Family Units Ranked from Lowest to Highest Fifth	Income Range	Average Income	% of Total Income	Cumulative %
	A 1941			
	Income Before Tax			
Lowest	Under $604	$345	3.5	3.5
Second	604–1,186	888	9.1	12.6
Third	1,187–1,810	1,495	15.3	27.9
Fourth	1,811–2,623	2,190	22.5	50.4
Highest	2,624 & over	4,834	49.6	100.0
	Income After Tax			
Lowest	Under $604	$345	3.7	3.7
Second	604–1,178	886	9.5	13.2
Third	1,179–1,793	1,483	16.0	29.2
Fourth	1,794–2,575	2,157	23.3	52.5
Highest	2,576 & over	4,411	47.5	100.0
	B 1947			
	Income Before Tax			
Lowest	Under $1,286	$746	4.1	4.1
Second	1,286–2,284	1,808	9.8	13.9
Third	2,285–3,334	2,810	15.3	29.2
Fourth	3,335–4,986	4,051	22.0	51.2
Highest	4,987 & over	8,975	48.8	100.0
	Income After Tax			
Lowest	Under $1,257	$737	4.5	4.5
Second	1,257–2,163	1,730	10.7	15.2
Third	2,164–3,108	2,624	16.1	31.3
Fourth	3,109–4,470	3,721	22.9	54.2
Highest	4,471 & over	7,459	45.8	100.0

In Appendix Tables 1–3 the percentages are rounded and may not add to totals.

B Federal Individual Income Tax Exemptions and Rates, 1941 and 1947

In 1941 exemptions were $1,500 for married couples and heads of families, $750 for single persons, and $400 for each dependent.[1] In 1947 they were $1,000 for married couples, $500 for single persons, and $500 for each dependent.[2] The minimum taxable levels were higher than these statutory exemptions for many families and single persons because some personal and extraordinary expenses, such as interest payments, charitable contributions, taxes, and losses from fire, theft, and flood, were allowed as deductions in calculating net income.[3]

For taxpayers with incomes of less than $3,000 (plus $400 for each dependent) in 1941 and $5,000 in 1947, a tax table facilitated the computation of the tax. It allowed a standard deduction of less than 2 percent in 1941 and approximately 10 percent in 1947.[4] As taxpayers had the alternative of using the tax table or itemizing their deductions, the minimum taxable levels are those in the tax table. These minimum levels were only $1 higher than statutory exemptions for 1941 but, because of the higher standard deduction, were $50 per capita or more higher than statutory exemptions for 1947.

Minimum Taxable Levels

Marital and Dependency Status	*1941*	*1947*
Single person, no dependents	$751	$550
Single person, one dependent	1,151	1,125
Married couple, no dependents	1,501	1,125
Married couple, one dependent	1,901	1,675
Married couple, two dependents	2,301	2,225
Married couple, three dependents	2,701	2,775

[1] Persons eligible for the head-of-family exemption were not allowed to take the $400 exemption for the first dependent.

[2] Dependents were defined differently in the two years. In 1941 a dependent was a person under 18 years of age, or incapable of self-support because mentally or physically defective, whose chief support was received from the taxpayer. In 1947 a dependent was a close relative of the taxpayer having less than $500 gross income and receiving more than half his support from the taxpayer.

[3] An additional deduction was allowed in 1947 for medical expenses in excess of 5 percent of adjusted gross income, up to a maximum of $1,250 for single persons and $2,500 for married persons filing either separate or joint returns.

[4] A flat $500 standard deduction was allowed in 1947 to taxpayers with incomes of $5,000 or more.

Appendix Table 4
Federal Individual Income Tax Rates, 1941 and 1947 (percentages)

Taxable income ($000)	*1941* [a]	*1947* [b]	Taxable income ($000)	*1941* [a]	*1947* [b]
Under 2	10	19.00	44– 50	59	68.40
2– 4	13	20.90	50– 60	61	71.25
4– 6	17	24.70	60– 70	63	74.10
6– 8	21	28.50	70– 80	65	76.95
8–10	25	32.30	80– 90	67	79.80
10–12	29	36.10	90– 100	68	82.65
12–14	33	40.85	100– 150	69	84.55
14–16	36	44.65	150– 200	70	85.50
16–18	39	47.50	200– 250	71	86.45[c]
18–20	42	50.35	250– 300	73	86.45[c]
20–22	45	53.20	300– 400	75	86.45[c]
22–26	48	56.05	400– 500	76	86.45[c]
26–32	51	58.90	500– 750	77	86.45[c]
32–38	54	61.75	750–1,000	78	86.45[c]
38–44	57	65.55			
			1,000–2,000	79	86.45[c]
			2,000–5,000	80	86.45[c]
			Over 5,000	81	86.45[c]

Includes both the normal tax and the surtax.
[a] Before the earned income credit.
[b] After the tentative tax reduction.
[c] The tax was subject to a maximum effective rate limitation of 85.5 percent in 1947.

Both the 1941 and 1947 taxes consisted of a flat normal tax and a graduated surtax. In 1941 the normal tax was 4 percent. The surtax started at 6 percent on the first $2,000 of surtax net income and rose to 77 percent on surtax net income in excess of $5,000,000. Thus, the combined normal and surtax rate (before the allowance for the earned income credit, amounting to 10 percent of earned net income up to $1,400, which was deducted in calculating the net income subject to normal tax) ranged from 10 to 81 percent.[5]

In 1947 the tax was determined by first computing a tentative tax, then reducing it 5 percent. The tentative tax consisted of a flat 3 percent normal tax and a surtax at rates ranging from 17 percent for the first $2,000 of surtax net income to 88 percent for surtax net income in excess of $200,000. The combined normal and surtax rate,

[5] Earned income was defined as wages, salaries, professional fees, and other amounts received as compensation for personal services actually rendered; and in the case of a taxpayer engaged in trade or business, a reasonable allowance as compensation, not in excess of 20 percent of his share of net profits. The first $3,000 of income was presumed to be earned regardless of source.

after allowing for the 5 percent tentative tax reduction, ranged from 19 to 86.45 percent (App. Table 4), subject to a maximum effective rate limitation of 85.5 percent.

Appendix Table 5 gives the effective rates of tax in the two years for single persons and married persons with two dependents, at selected levels of income before exemptions and deductions.

Appendix Table 5
Federal Individual Income Tax Liabilities, Selected Income Levels, 1941 and 1947

Income before exemptions & deductions	Tax liability, $		Effective tax rate, %	
	1941	*1947*	*1941*	*1947*
		Single Persons		
$750	0	35	0.0	4.7
1,000	18	78	1.8	7.8
1,250	39	121	3.1	9.7
2,000	104	249	5.2	12.5
3,000	197	427	6.6	14.2
5,000	410	798	8.2	16.0
8,000	866	1,492	10.8	18.6
10,000	1,247	2,024	12.5	20.2
15,000	2,494	3,639	16.6	24.3
20,000	4,112	5,653	20.6	28.3
25,000	6,032	7,961	24.1	31.8
50,000	17,932	21,717	35.9	43.4
100,000	46,422	55,290	46.4	55.3
500,000	307,654	364,672	61.5	72.9
1,000,000	655,139	753,697	65.5	75.4
		Married Persons, Two Dependents		
$2,300	0	15	0.0	0.7
2,500	11	50	0.4	2.0
3,000	54	137	1.8	4.6
5,000	208	485	4.2	10.0
8,000	584	1,094	7.3	13.7
10,000	911	1,577	9.1	15.8
15,000	2,014	3,050	13.4	20.3
20,000	3,516	4,940	17.6	24.7
25,000	5,334	7,163	21.3	28.7
50,000	17,043	20,720	34.1	41.4
100,000	45,383	54,093	45.4	54.1
500,000	306,476	363,375	61.3	72.7
1,000,000	653,930	752,400	65.4	75.2

Tax liabilities at the lower income levels were taken from the 1941 and 1947 tax tables. Above the tax table areas, they were computed on the assumption that the taxpayer itemized deductions equal to 10 percent of his total income. For 1941 maximum earned net income was assumed.

Comment

GEORGE GARVY, *Federal Reserve Bank of New York*

In presenting distributions of income after federal income taxes for the last prewar and the first post-reconversion year, Mr. Pechman stresses rightly that many, if not most, analytical uses of income size distributions involve income after taxes.

Income distributions after taxes may be needed, indeed, for three main purposes: to relate spending and savings patterns to given income levels; to measure the degree to which the present tax system is modifying the size distribution of income; to compare levels of welfare.

Contemporary economic analysis is increasingly concerned with behaviorist equations. We want to know how persons at different income levels spend their income and what makes their patterns of spending and saving change. Most students seem to agree that the disposable rather than the total income of the spending unit is the relevant variable. Disposable income excludes all direct taxes—federal, state, and social security. For the lowest income brackets of nonfarm families, social security taxes are probably more relevant than federal income taxes. Since the Great Depression most states have levied income taxes. Philadelphia took the lead in imposing a city income tax in 1940, and several communities throughout the country have followed suit.

Students of welfare economics or of the incidence of taxation are interested primarily in distributions of income after all direct and indirect taxes, which raise numerous intricate problems of allocation and incidence (see, e.g., TNEC Monograph 3). Income distributions after federal income taxes alone are useful since they permit measuring the incidence of the most important single personal income tax. They are an indispensable intermediary step for building distributions of income after all personal income and social security taxes, and finally, after all taxes.

My first question is what kind of a distribution of income after taxes is needed for some of the analytical purposes Mr. Pechman most likely has in mind. His distributions are based on tax liabil-

ities, not on taxes actually paid. In *Income Size Distributions in the United States* (NBER, 1943), Part I, p. 91, the question was raised whether "the tax on, or that paid from, the income should be shown". This was more important before the pay-as-you-go system became effective for federal income taxes.The difference between the income period and the tax payment date is still important for the large groups of recipients whose incomes fluctuate cyclically or even seasonally. Similar problems of timing arise with respect to most state and local income taxes.

Many, possibly most, income receivers do not know what their federal tax liabilities for any given year will ultimately turn out to be. They know only what their deductions currently are. Workers who are unemployed or sick during part of the year pay, when employed, more than they should to cover their tax liabilities on the average amount earned during the year. The same is true for workers who enter or leave the labor market.

Workers who are normally unemployed during part of the year (such as construction or timber workers) expect to receive a refund each year. The main difference between the distributions of income after tax *on* and after tax *from* income arises therefore because of cyclical unemployment. A worker continuously employed during a calendar year following a period of unemployment can offset part of his current tax liabilities from the refund on taxes withheld during the preceding year. Thus income after taxes currently paid tends to be more unequally distributed than income after tax liabilities.

Do consumers generally expect tax refunds in making spending decisions or does the annual over-withholding have the effect of forced saving and the refund of overpayments the next year the effect of windfall receipts? No definite answer is possible, but there are good reasons to suspect that in most cases actual tax payments (for the large majority, withheld taxes) rather than ultimate tax liabilities are the important element in consumer behavior.

A redistribution of income after federal income taxes actually paid during a given year may deviate considerably from the one based on tax liabilities. In 1945 and 1946, balances due at the

time of filing (that is, March 15 of the following year) were larger than overpayments. Balances due probably include a large proportion of final payments of individuals not subject to withholding, while overpayments involve mainly individuals whose withholdings exceeded final liabilities. The magnitudes involved are by no means negligible. In 1946, when total individual income tax liabilities were slightly over $16 billion, overpayments were nearly $2 billion.[1] On returns with adjusted gross income under $5,000 (including nontaxable returns), however, refunds were nearly $1.5 billion, almost twice as large as balances due at the time of filing. But for the higher income brackets (over $5,000) overpayments were less than a fourth of the balances due and about 5 percent of the total tax liability. The picture was very much the same in 1945.

If the provisions now in force are not modified, we may expect that each year sizeable groups of income receivers in the lower tax brackets of the nonfarm population will pay more than their tax liabilities. For them, income minus income tax liability will always be relatively larger than income minus withheld taxes.

In 1941, when the withholding provision was not in effect, the taxes actually paid were on 1940 incomes at substantially lower rates and with higher exemptions. Over-collection in the lower income brackets in 1947, however, was probably not much lower than in 1945 or 1946. It is therefore likely that the shift to the tax-from-income basis would affect Pechman's distribution for 1947 more than that for 1941.

While average tax liabilities by income brackets can be computed from tax schedules and the estimated average number of dependents, taxes currently paid by families in the various income brackets could probably be obtained only by questionnaires or a cross-classification of refunds by size of tax liabilities. Techniques such as those developed by Liebenberg and Kaitz could then be applied to make the transition from Pechman's distribution of income after federal tax liabilities to the actual tax payment basis.

While Pechman's distributions cover money income only,

[1] *Statistics of Income for 1946,* Part 1 (Preliminary Release S–1015, March 9, 1949).

distribution of total income after taxes is likely to be more relevant for studies of consumer behavior. Again, double-entry tables could be constructed to transform the distribution of money income into a distribution of total income after taxes.

Second, I wonder how the less equal distribution of single consumers' incomes in 1947 than in 1941 can be explained, provided it still holds when final estimates are made after the *1947 Statistics of Income* is published. While for families differences in distribution reflect primarily, as Pechman points out, the effect of the greatly strengthened federal income tax and of changes in the amount and proportionate distribution before taxes, additional factors seem to be present in the case of single individuals. The number of families increased from 32.9 to 37.1 million, the number of single consumers declined from 8.5 to 7.6 million (App. Table 1). Money income of families more than doubled, that of single consumers increased less than 50 percent. It would be interesting to know to what extent this absolute decline of the single population and the relative decline of its income reflect temporary postwar factors, such as a higher marriage rate and the large number of veterans completing their education under the G.I. Bill of Rights instead of entering the labor force.

My final point concerns the use of Lorenz curves for a comparison of inequality in two years. Several references may be found in recent literature to difficulties arising from the comparison of two income distributions, particularly when the Lorenz curves intersect. The difference in the areas between the Lorenz curves and the line of equal distribution, expressed in percentage points, is in most cases extremely small. It is often concluded that the underlying shift toward or away from complete equality was almost imperceptible.

Pechman joins many other critics in pointing to the insensitivity of the Lorenz curve. He shows in Table 2 that quite a considerable redistribution of income after taxes between 1941 and 1947 is reflected by a very slight shift in the Lorenz curve.

I would like to suggest that, as a base for the Lorenz curve, the line of equal distribution has a mathematical rather than economic meaning. Even if we accept as the ideal standard the com-

pletely equalitarian distribution of income after taxes among gainfully engaged individuals, we ought to allow for such factors as family supplementary income recipients, labor force turnover, and the lower income levels of the inactive (retired) population. If we assume, for instance, that 10 percent of the population enter or leave the labor force during the year (including students taking summer jobs), that another 10 percent are retired on an income equal to a third of that of the active population employed during the year, and that 30 percent of families have one, but not more, supplementary income receiver,[2] we obtain a less abstract reference curve of 'economic equitability' between the diagonal and the Lorenz curve. In Pechman's chart, Panel B, the area under the Lorenz curve for 1947 is only 6 percent smaller than that for 1941. Measured, however, not from the diagonal, but from the suggested curve, the shift toward equitability (measured by the reduction of the area between the Lorenz curve and the curve of equitable distribution) is nearly 15 percent.

2 These assumptions, made for illustrative purposes only, are rather conservative in the light of the data presented in Parts VII and X.