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Volume Author/Editor: Hanna, Frank A., Joseph A. Pechman, and Sidney M. Lerner

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Chapter Author: Frank A. Hanna, Joseph A. Pechman, Sidney M. Lerner

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Chapter 4

Composition and Distribution of Income

It would be misleading to use the distributions of tax returns by income levels for 1929, 1934, 1935, and 1936 in conjunction with composition of income data to establish a relation between changes in the distribution and composition of income. Each year many persons who are not taxable file returns. Since their number and occupational distribution vary from year to year, depending upon the practices of tax assessors, the data are not comparable from year to year.

Some idea of the amount of income not reported on returns may be gained by comparing the economic income reported with aggregate income payments to all individuals in Wisconsin, as estimated by the Department of Commerce, even though the income concepts are not identical.[1] Economic income reported did not exceed 56.2 percent in any year, and the percentage declined continuously from 1929 to 1936 (Table 12). In other words, almost one-half of the incomes of Wisconsin residents are not reported on tax returns. Since changes in the distribution of unreported incomes cannot be allowed for, it would be hazardous

[1] Income payments to individuals include only entrepreneurial withdrawals, while economic income includes 'net' entrepreneurial incomes. In addition, the Department of Commerce estimates for states of items such as rent, royalties, fiduciary income, and pensions are subject to wide margins of error. See Robert R. Nathan, Some Problems Involved in Allocating Incomes by States, *Studies in Income and Wealth*, Vol. Three, Part Six.

TABLE 12

Economic Income Reported on Tax Returns and Aggregate Income Payments to all Individuals, 1929, 1934-36

	1929	*1934*	*1935*	*1936*
Income Tax Returns				
Number	476,173	417,831	425,481	443,350
Economic income[a] ($ mil.)	1,039	586	651	762
Aggregate income payments to all individuals[b] ($ mil.)	1,849	1,081	1,258	1,482
Economic income reported as % of aggregate income payments	56.2	54.2	51.7	51.4

[a] Frank A. Hanna, *A Critical Analysis of Wisconsin Individual Income Tax Statistics* (Madison, 1939), p. 107.

[b] Unpublished data of the Department of Commerce.

to assume that changes in the distribution of all incomes in the state are the same as the changes indicated by tax data.

The relation between changes in the size distribution and composition of all incomes may, however, be ascertained indirectly. A simple example will illustrate the logic behind the indirect method. Assume wages are 75 percent of the income of the individuals in Group A and 50 percent in Group B. The two percentages can be combined only if each is weighted by the aggregate income it represents.

INCOME GROUP	AGGREGATE INCOME	WEIGHTS	WAGES AS % OF AGGREGATE INCOME	WEIGHTED AV. %
A	$1,000,000	2	75	66.67
B	500,000	1	50	

The same result can be computed in another manner. By applying the wage percentage to the corresponding group income aggregates, wages in each group are ascertained. The sum of wages divided by the sum of the income aggregates in the two groups yields the ratio of wages to aggregate income.

INCOME GROUP	AGGREGATE INCOME	WAGES AS % OF AGGREGATE INCOME	WAGES
A	$1,000,000	75	$750,000
B	500,000	50	250,000
Total	$1,500,000		$1,000,000

Total wages as a percentage of aggregate income: $\frac{\$1,000,000}{\$1,500,000} = 66.67$

In like manner, the composition of all incomes may be considered a weighted average of the compositions at the several income levels, the weights being the aggregate incomes of the

individuals in each group, i.e., the distribution of aggregate income by income groups. Changes in the composition of all incomes are due to two related factors: the composition of income in each group and the distribution of income by income groups.

To determine their relative importance, the changes from 1935 to 1936 in the composition of the income of persons filing tax returns may be used as an illustration (Table 14). The method consisted of two steps: (1) The 1936 composition of income at each level was applied to the income reported at the various levels in 1935 (see Table 13). This shows what the composition

TABLE 13

Distribution of Total Income
by Economic Income Bracket, 1935-1936

ECONOMIC INCOME BRACKET	TOTAL INCOME ($000)		% DISTRIBUTION	
	1935	*1936*	*1935*	*1936*
Deficit	3,488	1,813	0.51	0.22
$0- 499	15,917	12,287	2.32	1.52
500- 999	94,522	83,676	13.80	10.33
1,000- 1,499	146,442	152,489	21.39	18.82
1,500- 1,999	135,142	160,547	19.73	19.80
2,000- 2,499	76,517	102,043	11.17	12.59
2,500- 2,999	41,518	53,710	6.06	6.63
3,000- 3,499	26,911	33,469	3.93	4.13
3,500- 3,999	17,532	22,257	2.56	2.75
4,000- 4,999	13,217	17,105	1.93	2.11
4,500- 4,999	11,048	13,818	1.61	1.71
5,000- 5,999	15,850	20,048	2.31	2.47
6,000- 6,999	11,465	15,683	1.67	1.94
7,000- 7,999	8,857	11,921	1.29	1.47
8,000- 8,999	7,184	9,331	1.05	1.15
9,000- 9,999	5,869	8,015	0.86	0.99
10,000-14,999	18,109	25,375	2.64	3.13
15,000-19,999	8,843	14,294	1.29	1.76
20,000-24,999	5,799	8,516	0.85	1.05
25,000 & over	20,770	44,016	3.03	5.43
Total	685,002	810,413	100.00	100.00

Wisconsin Individual Income Tax Statistics, 1935, I, A8; *1936*, I, A8.

of aggregate income would have been in 1936 had the 1935 income distribution continued. (2) The procedure was reversed; the 1935 composition at each income level was applied to the income reported at the various levels in 1936. This shows what the composition of aggregate income would have been in 1936 had the 1935 composition continued.

TABLE 14

Analysis of the Change in the Composition of Income, 1935-1936 (percentages)

	WAGES & SALARIES	INTEREST	DIVIDENDS	BUSINESS & PARTNERSHIP PROFITS	NET RENT	CAPITAL GAINS	OTHER SOURCES
1 Composition, 1935	71.39	4.44	4.25	13.20	2.25	1.98	2.49
Change in composition reflected by changes in:							
2 Composition at absolute income levels	+0.11	−0.91	+0.60	−0.10	−0.03	+0.48	−0.07
3 Distribution	−1.65	+0.36	+1.24	+0.08	−0.21	+0.29	−0.09
4 Computed composition, 1936	69.85	3.89	6.09	13.18	2.01	2.75	2.33
5 Actual composition, 1936	69.77	3.63	6.23	13.17	2.06	2.75	2.39
6 Net change not explained by sum of lines 2 & 3	−0.08	−0.26	+0.14	−0.01	+0.05		+0.06

LINE

1 Based on data in *Wisconsin Individual Income Tax Statistics, 1935*, Table 2, pp. A8-13.
2 Obtained by applying the distribution of total income in 1935 (see Table 13) to the composition of income at specific income levels in 1936 (see Chart 2).
3 Obtained by applying the distribution of total income in 1936 (see Table 13) to the composition of income at specific income levels in 1935 (see Chart 2).
4 Sum of lines 1, 2, and 3.
5 See Table 1.
6 Line 5 − line 4.

To illustrate the calculations, assume that in a given year 2,000 individuals are distributed equally between two income groups, $1-100 and $100-200, and that in the first, wages are 80 percent of aggregate income and in the second, 70 percent.

INCOME GROUP	NO. OF INDIVIDUALS	AGGREGATE INCOME	WAGES AS % OF AGGREGATE INCOME	WAGES
$1-100	1,000	$50,000	80	$40,000
100-200	1,000	150,000	70	105,000
Total	2,000	200,000		145,000

This gives a weighted average percentage for wages of $\frac{\$145,000}{\$200,000} = 72.5$.

Now if we assume that next year the wage percentage is reduced from 70 to 69 in the $100-200 group, but the distribution is not changed, the average wage percentage is $\frac{\$143,500}{\$200,000} = 71.75$.

INCOME GROUP	NO. OF INDIVIDUALS	AGGREGATE INCOME	WAGES AS % OF AGGREGATE INCOME	WAGES
$1-100	1,000	$50,000	80	$40,000
100-200	1,000	150,000	69	103,500
Total	2,000	200,000		143,500

If 500 people are shifted to the $100-200 group, but the wage percentages in each group are not changed, the average wage percentage is $\frac{\$177,500}{\$250,000} = 71.0$.

INCOME GROUP	NO. OF INDIVIDUALS	AGGREGATE INCOME	WAGES AS % OF AGGREGATE INCOME	WAGES
$1-100	500	$25,000	80	$20,000
100-200	1,500	225,000	70	157,500
Total	2,000	250,000		177,500

Thus the wage percentage of all incomes decreases from 72.5 to 71.75 (0.75) because of the change in the composition of income and to 71.0 (1.5) because of the change in distribution. When added, the total change appears to be 2.25 percent (0.75 + 1.5) or from 72.5 to 70.25. But, when the effects of the two changes are computed simultaneously, the average wage percentage in the second year is $\frac{\$175,250}{\$250,000} = 70.1$.

INCOME GROUP	NO. OF INDIVIDUALS	AGGREGATE INCOME	WAGES AS % OF AGGREGATE INCOME	WAGES
$1-100	500	$25,000	80	$20,000
100-200	1,500	225,000	69	155,250
Total	2,000	250,000		175,250

There is, therefore, an additional decrease of 0.15 percent (from the theoretical 70.25 percent to the actual 70.1 percent) due to the greater relative weight given an income group in which the wage percentages had been decreased by the shift in the distribution.

Income was more heavily concentrated below the $1,500 level in 1935 than in 1936 (see Table 13). The change in the distribution of income (established by the second computation) affected the shares of aggregate income going to wages and dividends most. Had the composition at specific income levels not changed, wages as a percentage of aggregate income would have decreased 1.65 percent and dividends increased 1.24 percent because the 1936 distribution gave greater weight to high incomes. Above the $2,000 level, the shape of the composition of income curve for wages is steeply downward while for dividends it is steeply upward (Chart 2, Panels A and B). Since the slopes of the composition of income curves for the other five receipts are not as steep, the shift in the distribution affects their shares less.[2]

[2] Interest is a smaller share at all levels as the shares of all other receipts rise (Ch. 3), and the change in the distribution apparently fails to overcome this tendency. Capital gains, on the other hand, constitute a larger share at each economic income level because they are not included in the concept used to classify individuals by size of income (Ch. 3).

A Effect of Changes in the Aggregate and Distribution of Income on its Composition

If the share of wages rises and that of dividends falls, income has probably become more concentrated in the low groups, and vice versa. Has the distribution of total income consequently become more equal in the former case and less equal in the latter?

Before this question can be considered, equality must be clearly defined. When national income increases, most individual incomes also increase. If the percentage distributions of recipients by income groups are plotted in histogram form, the increase will be reflected in a shift of the entire histogram toward the right. For lack of a better description, the histogram may be said to depict the *absolute* distribution of income, because it gives the percentage of all individuals at each dollar income level.

By distribution of income, however, *relative* distribution is usually meant. Relative distribution can be presented graphically in several ways, but here only one is used—the Lorenz curve. Different absolute distributions may have the same relative distribution; that is, although the histograms for two distributions may be different, the Lorenz curves for them may be the same.[3] If more income is reported at higher income levels in one year than in another, for example, the relative distribution may have become more equal, less equal, or remained the same.

The probable changes in the composition of income due to changes in the absolute and relative distributions may be illustrated by two sets of computations. The first set shows the effects of changes in absolute distribution upon composition. To what degree would the composition of the income of 1936 filers be altered if each income were increased 25 or 50 percent, while the 1936 income composition at each income level was held constant? Since the hypothetical change in the income is distributed as an equal percentage increase to every individual, the total share of each receipt changes because the individuals are shifted to higher brackets, whose income characteristics they are assumed to adopt. The second set is analagous, showing the effect of changes in the

[3] On the other hand, two distributions with the same histogram must have the same Lorenz curve (assuming the average income in each group interval is the same in both cases).

relative distribution of income upon composition, aggregate income being held constant. The hypothetically constant income is redistributed in such a way that the Lorenz curve based upon the distribution of incomes reported in 1936 is shifted 25 or 50 percent closer to the line of equal distribution, i.e., each individual's income is moved 25 or 50 percent closer to the mean income. Composition at the several income levels is again kept the same as in 1936. The change in the total and in the share of each receipt will be due to the shifting of individuals with less than the 1936 mean income to a higher income level, and of individuals with more than the 1936 mean income to a lower.

The validity of these computations depends upon the assumption that composition at each income level remains the same when aggregate income is increased proportionately and when the relative distribution of income becomes more equal. The first assumption seems reasonable in the light of the analysis in the preceding chapter of the stability of income composition at given income levels.

There is no evidence, however, to support the assumption that composition at specific income levels remains the same when the Lorenz curve of total income is shifted 25 or 50 percent closer to the line of equal distribution. However, data now available indicate that shifts in Lorenz curves of total income as large as 25 or 50 percent probably have not occurred in recent years.[4] As large percentages serve to magnify the effect, the resultant changes in composition can be seen more easily.

The details of the computations are given in Appendix B.[5] Briefly, the effect of changes in the absolute distribution of income upon its composition was computed as follows: (1) The 1936 frequency distribution of income of filers was so translated as to increase the income of each person 25 or 50 percent.[6] This translation gave new aggregate incomes at each income level. (2) These new amounts were distributed among the seven re-

[4] This statement is based upon the analysis of changes in the distribution of the incomes of 13,184 identical taxpaying families; see Part III.

[5] The methods used were adaptations of methods developed in *Consumer Expenditures in the United States* (National Resources Committee, Washington, D. C., 1939) pp. 164-95.

[6] Since all incomes were increased proportionately, there was no change in the Lorenz curve. However, the increase in incomes shifted the histogram to the right.

ceipts according to the composition of the income of each group (Table 1). (3) The sum of the receipts in each group resulting from step (2) gave a new composition of aggregate income.

The steps taken to show the effects of changes in the relative distribution of income were the same, except that in step (1) aggregate 1936 income was so redistributed as to move the Lorenz curve uniformly 25 or 50 percent toward the line of equal distribution.

Despite the large changes in aggregate income and its distribution, the changes in its composition are not large (Tables 15 and 16). The largest were in the share of wages, which decreased from 70 to 65 percent when aggregate income was increased 50 percent, and increased to 77 percent when the relative distribution was shifted 50 percent toward the line of equal distribution. The other receipts did not change more than 1 or 2 percentage points in either direction.

The differences in the slopes of the composition of income curves (Chart 2) explain the changes in the shares of each receipt. When aggregate income is increased proportionately 25 or 50 percent (keeping the composition of each income group constant) individuals are shifted to higher income groups. This shift gives greater weight to the composition of the income of groups at the upper end of the income scale. The more aggregate income is increased, the greater the weight given to the income of groups in which wages are smaller and dividends and capital gains are larger percentages of aggregate income. Interest and business incomes also constitute a larger share as aggregate income is increased (Table 16). The behavior of interest is explained by the assumption that composition at all levels is constant—which is contrary to its behavior in Chart 2, Panel E—but the effect is small because interest does not account for a large proportion of aggregate income. The behavior of business income is explained by the shape of its curve (Chart 2, Panel D) which rises to about the $4,000 level and falls only after a fairly high level is reached. Since almost half of all individuals are in the income groups below $2,000, the relative concentration in the groups where business incomes bulk largest is intensified when a 25 or a 50 percent increase in aggregate income is distributed proportionately.

TABLE 15

Computed Changes in the 1936 Composition of Income as Total Income is Increased Proportionately 25 and 50 Percent

	TOTAL INCOME	WAGES & SALARIES	INTEREST	DIVIDENDS	BUSINESS & PARTNERSHIP PROFITS	NET RENT	CAPITAL GAINS	OTHER SOURCES
	THOUSANDS OF DOLLARS							
1 Amounts reported in 1936*	812,194	567,572	29,422	50,813	106,296	16,708	22,381	19,001
Computed amounts when total income is increased proportionately:								
2 25%	1,015,242	683,332	38,421	73,726	143,007	20,060	33,261	23,436
3 50%	1,218,290	787,047	49,355	100,729	182,479	24,053	46,354	28,273
	PERCENTAGES							
4 Composition of reported income 1936 (based on line 1)	100.00	69.88	3.62	6.26	13.09	2.06	2.75	2.34
Computed composition of income when total income is increased proportionately:								
5 25% (based on line 2)	100.00	67.31	3.78	7.26	14.09	1.97	3.28	2.31
6 50% (based on line 3)	100.00	64.60	4.05	8.27	14.98	1.97	3.81	2.32
% increase between computed & reported amounts when total income is increased proportionately:								
7 25% (based on lines 1 and 2)	25.00	20.40	30.59	45.09	34.54	20.06	49.61	23.34
8 50% (based on lines 1 and 3)	50.00	38.67	67.75	98.23	71.67	43.96	107.11	48.80

* To maintain consistency in the calculations, the aggregate amounts of each receipt in 1936 were recomputed within each total income class on the basis of the composition of income data in Table 1. They differ slightly from the actual amounts reported in 1936 (see *Wisconsin Individual Income Tax Statistics, 1936,* I, A8-13) because the percentages in Table 1 are rounded.

TABLE 16

Computed Changes in the 1936 Composition of Income due to Shifting the Lorenz Curve for Total Income 25 and 50 Percent Closer to the Line of Equal Distribution

	TOTAL INCOME	WAGES & SALARIES	INTEREST	DIVIDENDS	BUSINESS & PARTNERSHIP PROFITS	NET RENT	CAPITAL GAINS	OTHER SOURCES
	THOUSANDS OF DOLLARS							
1 Amounts reported in 1936*	812,194	567,572	29,422	50,813	106,296	16,708	22,381	19,001
Computed amounts when Lorenz curve is shifted toward line of equal distribution								
2 25%	812,194	597,612	25,584	37,036	102,012	15,919	16,082	17,949
3 50%	812,194	626,608	21,686	24,853	96,732	14,944	10,396	16,975
	PERCENTAGES							
4 Composition of reported income, 1936 (based on line 1)	100.00	69.88	3.62	6.26	13.09	2.06	2.75	2.34
Computed composition of income when Lorenz curve is shifted toward line of equal distribution								
5 25% (based on line 2)	100.00	73.58	3.15	4.56	12.56	1.96	1.98	2.21
6 50% (based on line 3)	100.00	77.15	2.67	3.06	11.91	1.84	1.28	2.09
% change between computed & reported amounts when Lorenz curve is shifted toward line of equal distribution								
7 25% (based on lines 1 and 2)		+5.29	−13.04	−27.11	−4.03	−4.72	−28.14	−5.54
8 50% (based on lines 1 and 3)		+10.40	−26.29	−51.09	−9.00	−10.56	−53.55	−10.66

* See note to Table 15.

When the relative distribution of income becomes more equal, persons with low incomes are shifted upward, and those with high incomes downward, toward the mean of $1,840. Since wages dominate the incomes of persons in the groups near the mean, equalization enhances the share of wages at the expense of each of the other receipts. Of the receipts other than wages, dividends and capital gains are affected most by equalization.

The changes in the composition of income due to a shift in the absolute distribution may be in a direction opposite to those due to a shift in the relative distribution. If aggregate income increased, and the relative distribution did not change, the percentage of income received in the form of wages would decline, and the percentages of income received in the form of dividends and capital gains would increase. If aggregate income remained the same, and the relative distribution became more equal, the share of wages would increase, and the shares of dividends and capital gains decline. Wages tend to fall as a percentage of aggregate income when it increases or when it is less equally distributed, and conversely.

Consequently, changes in the relative distribution of income cannot be inferred from a decline in the share of wages accompanied by a rise in aggregate income, or from a rise in the share of wages accompanied by a decline in aggregate income. But if a decline in the wage share accompanies a decline in aggregate income, it is likely that the relative distribution of income has become less equal, for the wage share would have increased had the relative distribution remained unchanged or become more equal. Similarly, if a rise in the wage share accompanies an increase in aggregate income, it is likely that the relative distribution of income has become more equal. Reverse conclusions can be inferred from increases or decreases in the share of dividends.