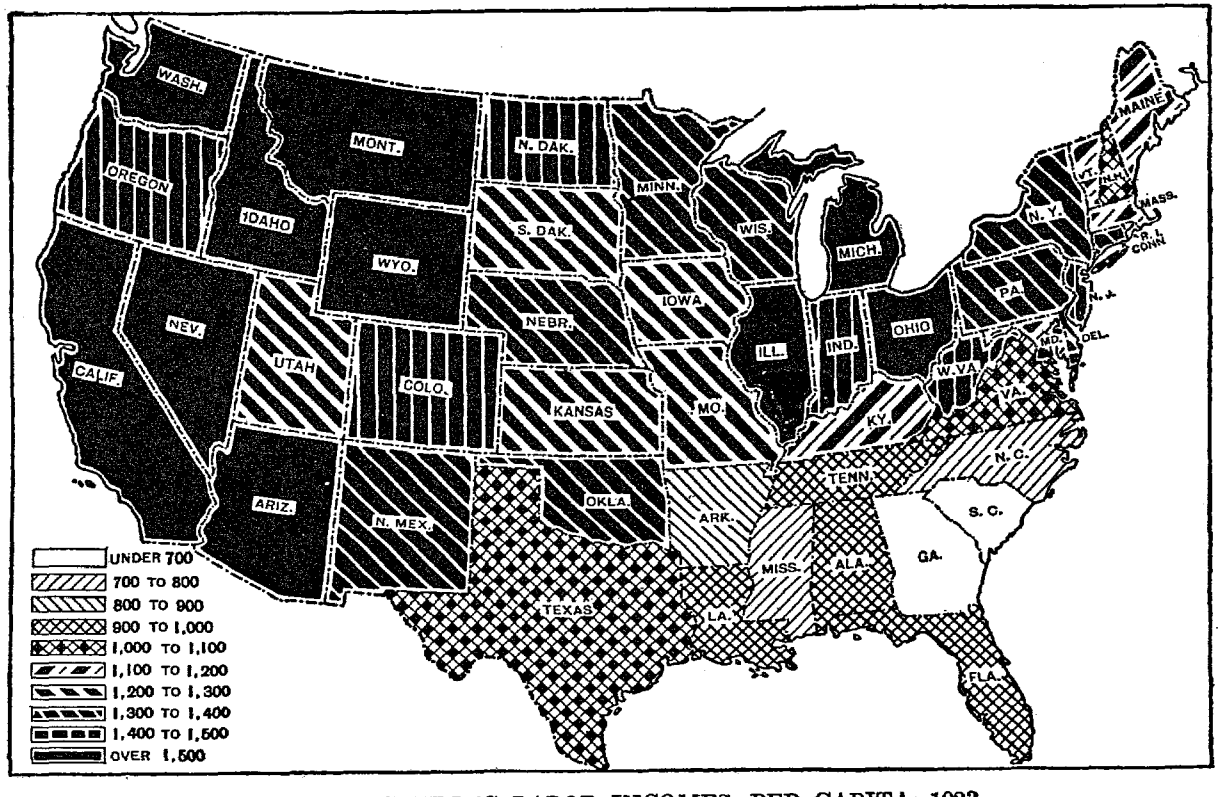
PART I

INTRODUCTORY



MANUFACTURING LABOR INCOMES, PER CAPITA, 1923

CHAPTER I

INTRODUCTION

The purpose of this monograph is a threefold one: To measure the *relative fluctuations* in the per capita earnings of manufacturing wage earners since the beginning of this century; to make as close an approximation as possible to the per capita *amounts* of earnings received in the successive years of the period; and to ascertain the degree and direction of any change which may have taken place since 1899 in the variability of earnings. A position of first importance is given to relative changes in earnings, because the available data are much more adequate to the production of dependable results than they are for the attainment of reliable estimates of the amounts of earnings. The data for the calculation of variability are also probably less adequate for their purpose than the data underlying calculation of per capita changes are to their purpose. In respect to all three objectives mentioned, the important qualification should be made at the outset that we are necessarily limited to a report of per capita changes, per capita amounts, and per capita estimates of variability.

The estimates which are given in the following pages are based primarily upon the results of the manufactures censuses of the United States for the census years 1899, 1904, 1909, 1914, 1919, 1921, 1923, and 1925. Although the analysis is built upon and around census material, it is by no means confined to census data, as other government agencies and at least one nongovernmental agency are drawn upon rather heavily for data, and these data play an important part in our calculations. Among the agencies whose statistical product is utilized in connection with the basic census material are: The United States Bureau of Labor Statistics, the Federal Reserve Bank of New York, the New York State Industrial Commission, the Massachusetts Department of Labor and Industries, and the Wisconsin Industrial Commission. Considerable reliance has been placed upon materials from authoritative private or semiprivate agencies, the chief of these being the National Bureau of Economic Research. The general character of the wage statistics, not only those published by the Bureau of the Census, but also the statistics of the other agencies drawn upon in this book, is discussed in some detail in Part V.

WAGES AND EARNINGS

The term "wages" is used somewhat loosely in reference to several different concepts. Perhaps the most common use of the term is to signify the rate of wages—that is to say, the amount per hour, per day, or per week paid for labor—or the rate paid for labor by unit quantity of work done. The connotation which the term seems generally to have is that of a *rate* of some kind, whether it be time or piece. Naturally, too, the word "wages" carries with it the notion of money amounts, and this means usually the money amounts of time or piece rates. The word wages is also used very generally in the sense of earnings—the aggregate amount received in his pay envelope by the wage earner during a week, month, or year.

It is, of course, a commonplace of the business world that prices undergo wide and often erratic fluctuations. This is true of the prices of things the wage earner has to buy, and being true of these things it means that rates per hour, assuming that they be rates actually paid and not merely offered rates, mean something very different in a year when prices are at a given level from what they mean in another year when the prices of the things the laborer has to buy are 50 per cent higher. The purchasing power of the wage earners' income, in order to be as great in the period of high retail prices as it was in the period of low retail prices also must be increased in its money amount by 50 per cent. Fluctuations in money earnings, in view of the often wide fluctuations in the cost of living, throw little or no light upon changes in "real" earnings. Similarly, absolute amounts of earnings, expressed in current dollars, may vary greatly from the corresponding amounts expressed in dollars of uniform purchasing power.

Wages are often spoken of as the prices of labor. It is to be remembered, however, that it is wage rates rather than wages in the sense of earnings, that are to be compared with prices; that is to say, we pay so much a pound or a peck for food and other commodities, we even pay a price for elapsed time for the hire of an automobile, and, similarly, we pay for a certain amount of labor power, or wages, measured either by the amount produced by that labor, or flatly by the time during which we command it. The rates per piece and, much less precisely, the rates per unit of elapsed time, are wage rates or prices.

Strictly speaking, rates of pay scheduled and paid on the time basis are not prices, except in so far as it is possible accurately to report the amount and kind of work done during each time unit. The price quotations over a period of time for butter, per pound of a given grade, faithfully reflect price amounts and changes and are strictly comparable from week to week. The same thing is true of

the piece rates (often called "prices") paid to workers for the production of definitely standardized commodity units. But with time rates of wages the situation is entirely different. Unskilled labor was paid, we will say, 25 cents per hour in 1914 and 50 cents per hour in 1925. But the unskilled laborer probably was more efficient in 1914 than in 1925; if so, the change in the *price* of an hour's labor of a given kind and quality is not accurately reflected by the increase from 25 to 50 cents per hour. If we could be sure that the amount and quality of work done in an hour remained uniform, then, even without exact knowledge of the amount and quality of the work, we might say, with some assurance, that changes in time rates of wages reflected changes in the prices of labor of that special kind. But to get the actual prices, not merely the changes in prices, of labor paid on the time basis, we should have to know not only that there was uniformity in the amount and quality of labor, we should also have to know that amount and be able accurately to estimate that quality. Until, therefore, we can get time wage rates which are based upon standard units of human effort, it is pointless to speak, indiscriminately, of wages as prices.

Rates of wages per hour, day, ton, yard, etc., to the extent that the wage earner has employment are translated from time rates and piece prices to accumulated earnings; the latter represent not the unit price of a certain amount of labor, but the total sum received by the wage earner during any given time for the work that he actually does or for the time during which he actually is employed. He may work long hours throughout the period at low rates and so accumulate earnings larger than a fellow worker who is employed at much higher rates but only for a part of the same period. It is of course the earnings rather than the rates which (prices being equal, or price inequalities accounted for) measure the economic welfare of the wage earner. The following formal definitions will indicate the meanings attached to certain expressions which have frequent use in these pages:

"*Hypothetical full-time annual earnings:*" What is probably a rough approximation to a time rate of wages and generally used in this monograph in reference to yearly periods.[1] The amounts of hypothetical full-time earnings are calculated by multiplying full-time weekly earnings (hypothetical, also, but within narrower margins) by the number of weeks in a full-time working year (assumed for the purpose of this monograph to be 51).

"*Money (or nominal) earnings:*" Amount of earnings estimated actually to have been received in dollars of current purchasing power.

[1] It should be noted that these "hypothetical full-time (annual) earnings" will prove to be genuine rates only in so far as the scale of rates remains throughout the year at or very near to the rate paid in the week from which the "hypothetical full-time earnings" estimate was derived. (See Ch. XIV.)

"*Real (or commodity) earnings:*" Amount of earnings estimated actually to have been received, but expressed in dollars of constant purchasing power—commodity dollars.

"*Census average wage:*"[2] The quotient obtained by dividing the published census "amount paid in wages" by the published census "average number of wage earners." The result is, formally, an average or mean amount of full-time wages; actually it is an average which seems wide of the mark in revealing *amounts* of income, although the *relative* magnitudes of these means appear to reflect *changes* in per capita full-time earnings very accurately.

'*Income:*"[3] Total personal earnings (wages) plus such other receipts as—

(1) Rent equivalent from homes owned by those occupying them.
(2) Profits from investments.
(3) Pensions.
(4) Earnings of wife and children.
(5) Receipts from—
  (a) Lodgers.
  (b) Gardens, poultry, etc.
  (c) Gifts.

It is with the economic welfare of manufacturing wage earners that this analysis is chiefly concerned. Upon this subject amounts of earnings, changes in earnings, and the variability of earnings all throw light. It is hoped that the results set out in these pages may throw some light on these two questions: How well off are manufacturing wage earners in different industries and different parts of the country? And a somewhat less difficult question, How much better or worse off have they been at one time than another? The *relatives* (or index numbers) of per capita earnings, showing the direction and degree of change in average earnings, are intended to bear upon the second question. The estimated, absolute dollar *amounts* of earnings have been computed with the first, and far more difficult question, in mind. Because of the greater importance, for present purposes, of real earnings, they are given more attention than money earnings, and while it has been necessary to make estimates of full-time yearly earnings (which are substantially equivalent to annual wage *rates*) these estimates have been used for the most part only as means to ends. A few figures are given, however, showing the changes in these "yearly rates" in the form of index numbers of both current money amounts and the purchasing power of these amounts. The trend of the latter would seem to indicate what changes would take place in the purchasing power of the worker's earnings if he suffered no lost time because of unemployment, underemployment, or sickness.

[2] The expression "census average wage" does not refer to any statistical term now published by the Bureau of the Census; it is used throughout this monograph to identify the quotient obtained by dividing the amount paid in wages by the average number of wage earners, both these latter terms being regularly published by the Census Bureau.

[3] The expression "labor income" is used in these pages as synonomous with earnings.

It is evident from the foregoing definitions of earnings and income that, in reporting the total earnings of manufacturing wage earners, we are not reporting their total income. Other items of income than wages appear among the receipts of large numbers of wage earners. Some of these additional items may be catalogued as "unearned income," but others, like the income from a vegetable garden, although they are not labor incomes of wage earners as such, are, nevertheless, earned incomes. The National Bureau of Economic Research estimated that the "average ratio between wages (labor income) and total income for persons having incomes of less than $2,000 was 1 : 1.095."[4] The investigations of the United States Bureau of Labor Statistics (on which, indeed, the national bureau's estimates are partly based) brought out similar proportions. The Federal bureau's investigation of the cost of living among wage earners and low-salaried people in industrial centers in 1918–19, included an inquiry into the sources and amounts of family incomes in one year. The results of the inquiry, which included 12,096 families, showed that the total average income in one year from the earnings of the husband ($1,349) was 89.2 per cent of the total average *income* per family ($1,513); that the total average *earnings* per family ($1,455), including, i. e., earnings of wife and children, was 96.1 per cent of the total average income per family.[5] We may conclude then that the total actual per capita earnings of manufacturing wage earners constitute at least 90 per cent of their total incomes. The addition of 10 per cent to the amounts of earnings reported in these pages certainly will not result in underestimates of total incomes. The National Bureau of Economic Research added "6 per cent to personal earnings in order to arrive at the total income" of persons having incomes under $2,000,[6] and that would probably be a more accurate ratio of increase for application to the results reported in this monograph.

MANUFACTURING INDUSTRY IN THE UNITED STATES

According to the census of 1920, there were in that year 41,614,248 persons engaged in gainful occupations in the United States. These gainfully employed persons are distributed among four main occupational divisions: Manufacturing and mechanical industries; mining and quarrying; agricultural; and miscellaneous gainful occupations. Leaving out of consideration the nonmanual groups, such as domestic and personal service; public and professional service; clerical; and wholesale and retail trade, the four important industrial groups into which gainfully employed labor is divided are manufacturing, transportation, mining, and agriculture. The largest of these four

[4] National Bureau of Economic Research. Income by States in 1919, p. 6. See also the National Bureau's Income in the United States, Vol. II, ch. 23.
[5] U. S. Bureau of Labor Statistics Bull., 357, Cost of Living in the United States, p. 4. See also 9 Monthly Labor Review, pp. 1704–5 (December, 1919).
[6] Income in the United States, Vol. II, p. 296.

groups is that of manufacturing industries,which employed, in 1920, 12,813,000 persons, constituting 30.8 per cent of all gainfully employed in the United States. Among these major industrial groups the only near competitor of manufacturing is agriculture, which employed, in 1920, 10,951,000, or 26.4 per cent of all gainfully employed persons. The next and third largest group is transportation, which, in 1920, employed slightly over 3,000,000 persons, or 7.4 per cent of all the gainfully employed. In the extraction of minerals 1,090,223 persons were engaged in 1920, or 2.6 per cent of the gainfully employed. The manufactures census for 1919 reports a total of 10,812,736 persons employed in manufacturing industries. An examination of the statistics of the gainfully employed back to the beginning of the present century shows that manufacturing has grown in importance relatively to other groups of gainfully employed persons; in 1900 it constituted 23 per cent, in 1910, 28 per cent, and in 1920, 31 per cent of the gainfully employed population.

We are dealing, however, not with *all* persons gainfully employed in manufacturing industries, but only with the group classified by the census as wage earners, from which are excluded proprietors or firm members, and all salaried employees, such as officers of corporations, superintendents, managers, clerks, etc. These excluded groups make up only a very small proportion of those gainfully employed in manufactures. The number of persons in each of the groups mentioned and the proportions that they form of the total of all gainfully employed in manufacturing for each census year from and including 1909 are given in Table 1.[7]

TABLE 1.—NUMBER AND PERCENTAGE DISTRIBUTION OF PERSONS ENGAGED IN MANUFACTURING INDUSTRIES: 1909–1925

CLASS	1909	1914	1919	1921	1923	1925
	NUMBER					
Total	7,678,578	8,263,063	10,812,736	8,265,821	10,282,306	9,857,697
Proprietors and firm members	273,265	262,599	269,137	172,871	148,421	133,054
Salaried employees	790,267	964,217	1,447,227	[a]1,146,380	[a]1,355,729	[a]1,340,382
Officers of corporations	80,735	92,671	132,467	----	----	----
Superintendents, managers, clerks, etc.	709,532	871,546	1,314,760	----	----	----
Wage earners (average number)	6,615,046	7,036,247	9,096,372	6,946,570	8,778,156	8,384,261
	PER CENT DISTRIBUTION					
Total	100.0	100.0	100.0	100.0	100.0	100.0
Proprietors and firm members	3.6	3.2	2.5	2.1	1.4	1.3
Salaried employees	10.3	11.7	13.4	13.9	13.2	13.6
Officers of corporations	1.1	1.1	1.2	----	----	----
Superintendents, managers, clerks, etc.	9.2	10.5	12.2	----	----	----
Wage earners (average number)	86.1	85.1	84.1	84.0	85.4	85.1

[a] Salaried officers and employees.

[7] Comparable data for the census years 1899 and 1904 are not available.

It appears from the figures of this table that the wage-earning group which is the subject of this monograph constituted, for the greater part of the period at any rate, between 84 and 86 per cent of all persons gainfully employed in manufacturing. Salaried employees make up of course most of the remainder of the total gainfully employed, constituting, as they did in 1909, 10 per cent; in 1914, 11 per cent; in 1919, 13 per cent; and in 1923, 13 per cent of all gainfully employed in manufacturing. The average number of wage earners has very nearly doubled since 1899. The number in 1899 was 4,712,763, and in the most recent census year, 1927, it was 8,351,257.

TABLE 2.—NUMBER OF ESTABLISHMENTS, WAGE EARNERS, WAGES, AND VALUE ADDED BY MANUFACTURE: 1899–1927 [1]

CENSUS YEAR	Number of establishments	Wage earners (average number)	Wages	Value added by manufacture
			Expressed in thousands	
	ABSOLUTE AMOUNTS			
1899	(2)	[3] 4,712,763	[3] $2,008,361	[3] $4,831,075
1904	[4] 145,018	[5] 5,362,017	[6] 2,569,503	[5] 6,293,695
1909	175,142	6,472,616	3,427,038	8,385,015
1914	**177,110**	**6,896,190**	**4,067,719**	**9,709,527**
1919	214,383	9,000,059	10,461,787	24,809,093
1921	196,267	6,946,570	8,200,324	18,316,666
1923	195,714	8,778,156	10,985,895	25,853,151
1925	187,390	8,334,261	10,729,969	26,778,066
1927 [7]	191,832	8,351,257	10,848,782	27,585,793
	RELATIVES: 1914=100			
1899		68	49	50
1904	82	78	63	65
1909	99	94	84	86
1914	**100**	**100**	**100**	**100**
1919	121	131	257	256
1921	111	101	202	188
1923	111	127	270	266
1925	106	122	264	276
1927 [7]	108	121	267	284

[1] Except where otherwise indicated, only those establishments are included whose products were valued at over $5,000.

[2] Number of establishments having value of products less than $5,000 not shown separately; number of establishments including those having value of products less than $5,000 was 200,105 for 1899.

[3] Including establishments having value of products less than $5,000 and more than $500. Comparability of statistics not materially affected.

[4] Exclusive of 71,162 (32.9 per cent) establishments in which value of products was less than $5,000.

[5] Exclusive of 106,366 wage earners (1.9 per cent) in establishments in which value of products was less than $5,000.

[6] Exclusive of $40,941,804 paid in wages (1.6 per cent) in establishments in which value of products was less than $5,000.

[7] Data for 1925 from Department of Commerce news release dated Feb. 28, 1929. The figures are subject to revision. They are not strictly comparable with those of 1925, since no statistics for the coffee-roasting and spice-grinding industry were tabulated at the 1925 census. The difference caused by the elimination from the earlier censuses of the figures for this industry is not considerable; for example: The figures for 1923, with and without this industry, are as follows:

ITEM	Coffee roasting and spice grinding	
	Excluded	Included
Number of establishments	195,580	195,714
Wage earners (average number)	8,768,491	8,778,156
Wages (thousands of dollars)	$10,999,282	$10,985,895
Value added (thousands of dollars)	$25,777,615	$25,853,151

The growth in the numbers of establishments, wage earners, amounts paid in wages, and "value added by manufacture" is reported by the census for each manufactures census year from 1899 to 1927.[8] These items and corresponding index numbers on the 1914 base are given in Table 2.

The sex and age distribution of persons engaged in manufacturing industries is shown in Table 3. In view of the importance of homogeneous material in estimating changes from census year to census year, it is worthy of note that for all industries combined, at any rate, there has been no appreciable change in the proportions of the wage earners who are women, nor has there been any appreciable change in respect to the proportion of male wage earners over 16 years of age. There has been a small though distinctly appreciable diminution in the proportion of gainfully employed children, since the beginning of the century.

TABLE 3.—EMPLOYEES IN MANUFACTURING INDUSTRIES:[1] 1904–1925

CLASS	1904	1909	1914	1919	1921	1923	1925
Superintendents, managers, clerks, and other subordinate salaried employees, total	459,509	709,532	871,546	1,314,760	[2] 1,146,380	[2] 1,355,729	[2] 1,340,382
Males, number	381,181	567,360	680,290	930,722	(3)	(3)	(3)
Per cent of total	83.0	80.0	78.1	70.8			
Females, number	78,328	142,172	191,256	384,038	(3)	(3)	(3)
Per cent of total	17.0	20.0	21.9	29.2			
Wage earners, total number	5,468,383	6,615,046	7,036,247	9,096,372	6,946,570	8,778,156	[4] 8,384,261
Males 16 years of age and over	4,242,643	5,163,104	5,525,108	7,202,529	(3)	(3)	(3)
Per cent of total	77.6	78.1	78.5	79.2			
Females 16 years of age and over	1,065,855	1,290,380	1,389,366	1,772,924	(3)	(3)	(3)
Per cent of total	19.5	19.5	19.7	19.5			
Children under 16 years	159,885	161,493	121,773	120,919	(3)	(3)	(3)
Per cent of total	2.9	2.4	1.7	1.3			

[1] See Abstract of the Census of Manufactures, 1919, p. 393, for 1904 to 1919 and Biennial Census of Manufactures, 1925, p. 14, for 1921 and 1923.
[2] Includes salaried officers of corporations.
[3] No data.
[4] Not including wage earners employed in the coffee-roasting and spice-grinding industry.

A summary showing the distribution of establishments, wage earners, and amounts paid in wages, in each of the three main geographic divisions of the country is given in Table 4. These figures reflect in very striking fashion the predominant concentration of manufacturing industries in the Northeast section of the country. In that section in 1919 we find more than three times the number of establishments found in the next most important region (the South), five times the number of wage earners, and more than six times the amount paid in wages. The West lags very materially behind even the South as a center of manufacturing industry, there being in that

[8] The manufactures censuses whose results are embodied in this monograph are those of 1899, 1904, 1909, 1914, 1919, 1921, 1923, 1925, and 1927.

region only one-half as many establishments as in the South, not much more than one-third as many wage earners, and only a little more than one-half the amount paid out in wages. Rates of increase as shown at the bottom of the table would indicate that the southern and western regions are growing in importance as compared with the Northeast, the rates of increase in establishments, wage earners, and wages in those sections having generally exceeded those of the Northeast, the greatest increases of all having taken place in the West. It is partly for this reason that in the following pages we have been at some pains to show regional as well as industrial differences in earnings.

TABLE 4.—COMPARATIVE SUMMARY—NORTH, SOUTH, AND WEST: 1904–1923 [1]

SECTION	Number of establishments	Wage earners (average number)	Wages (expressed in thousands)	SECTION	PER CENT OF INCREASE [2]		
					Number of establishments	Wage earners	Wages
The North:				The North:			
1904	163,224	4,364,206	$2,138,081	1904–1909	18.8	19.1	29.6
1909	193,850	5,197,138	2,772,143	1909–1914	2.0	6.9	19.3
1914	197,754	5,558,049	3,306,549	1914–1919	3.4	28.1	155.3
1919	204,386	7,120,295	8,440,471	1919–1921	−28.0	−24.0	−21.5
1921	147,123	5,413,539	6,622,481	1921–1923	−1.0	25.7	35.4
1923	145,671	6,805,297	8,966,089	The South:			
The South:				1904–1909	46.3	27.3	36.0
1904	38,154	887,310	326,530	1909–1914	−0.1	2.9	18.7
1909	55,808	1,129,307	444,215	1914–1919	5.0	23.3	159.8
1914	55,752	1,161,570	527,178	1919–1921	−45.7	−20.7	−24.9
1919	58,540	1,431,682	1,369,759	1921–1923	2.2	27.4	27.0
1921	31,794	1,135,012	1,028,307	The West:			
1923	32,509	1,446,327	1,305,544	1904–1909	27.2	33.1	45.1
The West:				1909–1914	18.3	9.7	16.1
1904	14,802	216,867	145,234	1914–1919	22.0	71.9	195.6
1909	18,833	288,601	210,680	1919–1921	−36.2	−26.9	−23.7
1914	22,285	316,628	244,605	1921–1923	4.5	32.5	33.9
1919	27,179	544,395	723,170				
1921	17,350	393,019	551,536				
1923	18,120	527,326	738,665				

[1] See Abstract of the Census of Manufactures, 1919, p. 283, for 1904 to 1919. Figures for 1921 and 1923 compiled from Table I, pp. 1211–15, Census of Manufactures, 1923.
[2] A minus sign (−) denotes decrease.

CHARACTER OF CENSUS DATA UTILIZED

The analysis contained in the following chapters rests primarily upon two pay-roll items published in the reports of the census of manufactures: The aggregate amount paid in wages during the census year in manufacturing establishments, and the average number of wage earners employed during the year by those establishments, this average being obtained by adding together the numbers of persons on pay rolls at the middle of each month[9] and dividing the sum by 12. The form in which these items are reported to the census is indicated in the Appendix, where we have reproduced those parts of the manufactures census schedules which have to do with

[9] In 1899 and 1904 enumerators were instructed to report the "number employed during each month."

wages and earnings.[10] The manner in which these two items, the amount paid in wages and the average number of wage earners, are treated is explained elsewhere. In so far as *changes* in average earnings are concerned, these two items are the only census figures which enter in any vital way into our calculations; but in order to estimate *amounts* of per capita earnings, we have leaned very heavily upon the reported amounts of average weekly earnings for 1904, published in Census Bulletin 93, under the title "Earnings of Wage Earners, 1904". This bulletin is a supplement to the first regular quinquennial census of manufactures. For our estimates of amounts of earnings, these 1904 averages of weekly earnings have been used in conjunction with index numbers obtained, as elsewhere explained, directly from the figures representing amounts paid in wages and number of wage earners. The 1904 data on average weekly earnings, however, have had no part whatever to play in the estimates of changes in earnings. Any deficiency, therefore, which may inhere in them or any error introduced by utilization of them to show amounts of earnings, has no effect whatever upon the validity of our estimates of changes in earnings. These latter estimates, doubtless, have their own sources of error, but these have nothing to do with the utilization of the 1904 data on average weekly earnings for estimation of amounts of earnings. Considerable use has been made in a supplementary way of census figures on prevailing weekly hours of labor, but these figures have not played any part in the main analysis.

The census figures for wage payments and for numbers of wage earners are, then, the points of departure for the calculation of relative changes in earnings. These same two items used in conjunction with census items on average weekly earnings in 1904 are used as points of departure for the calculation of amounts of earnings. But in the case of both the calculation of relatives and the calculation of amounts, we would have been able to get nowhere in the quest of *actual* earnings, without the assistance of additional statistical data. The most important of the supplementary statistical material consists of two series of figures: (1) Statistics of employment, entering into an employment index, which, in conjunction with corresponding estimates of the *amount* of unemployment, we have used for the derivation (from estimated full-time earnings), of estimates of earnings for time actually worked ("actual earnings"); (2) index numbers of the cost of living from the United States Bureau of Labor Statistics, for the deflation of money earnings to show "real" earnings—i. e., earnings expressed in dollars having uniform purchasing power from year to year. The employment index is derived primarily from figures on the physical volume of production

[10] The form in which they appear in the published census reports is indicated in the second and third columns of Table 2.

published by the Harvard Committee on Economic Research. The estimates of actual amounts of unemployment, which are used as bench marks in connection with the employment index, depend largely upon estimates made by the National Bureau of Economic Research in its report on "Employment, Hours, and Earnings in Prosperity and Depression."

A full discussion of the census items lying at the base of the present analysis and also of the nature and limitations of the material taken from outside sources is given in Part V.[11] That aspect of the problem, therefore, requires no further discussion at this point. But at the very outset the fact must be emphasized that, of necessity, we are here moving in the somewhat nebulous atmosphere of averages. That necessity makes the results much less satisfactory than if we were able to present frequency distributions of the individual workers according to the annual sums actually received by them. The average, none the less, has distinct advantages. One of its merits is that it indicates in very brief compass the trend of a very large number of items. The average, moreover, is less likely to cause apprehension when the material entering into it is fairly homogeneous and when it shows a fairly pronounced tendency to concentrate at typical points. The material here dealt with is none too homogeneous, but, as pointed out elsewhere, it is probably more consistent throughout the period here surveyed than is generally supposed to be true of manufacturing industry. The data that underlie this analysis do show a pretty pronounced tendency toward concentration around the average, although that tendency is less pronounced in some parts of the period than in others.

The census of manufactures now presents separate figures for wage earners and wages for no less than 356 industries, and a considerable number of these are in turn still further subdivided. It has been necessary, therefore, for the purpose of this analysis, to select certain of the more important industries and to attempt to estimate earnings in individual industries only for those selected. In Table 5 is a list of the 41 industries which have been selected for separate estimation of earnings. Alongside the name of the industry, in the third classification column, is given its census classification number for 1919.

The industries, it will be noted, are arranged in 14 groups of industries which, in turn, are combined into 6 industrial divisions. The industry groups are the 14 which are used by the census in its published reports.[12] The 6 grand divisions are essentially those used

[11] A list of sources used or cited in this monograph is given in Appendix IV.

[12] In reporting the Biennial Census of Manufactures for 1923 a rearrangement was made and the industries assembled into 16 groups (Biennial Census of Manufactures, 1923, pp. 19–28). For the purposes of this analysis, however, the fourteen-fold grouping has been retained throughout.

by the National Bureau of Economic Research in its report on Employment, Hours, and Earnings, mentioned above.

TABLE 5.—FORTY-ONE SELECTED INDUSTRIES, BY INDUSTRY GROUPS, WITH CLASSIFICATION LETTERS AND NUMBERS

A.—FOOD, TOBACCO, AND BEVERAGES

I.—Food and kindred products:
36. Bread and other bakery products.
122. Flour-mill and gristmill products.
80(*a*). Confectionery.[1]
286, 287. Slaughtering and meat packing.

VII.—Liquors and beverages:
189. Liquors, malt.
205. Mineral and soda waters.

XI.—Tobacco manufactures:
320. Tobacco, cigars and cigarettes.

B.—TEXTILES, GARMENTS, AND LEATHER

II.—Textiles and their products:
49. Carpets and rugs, other than rag.
281. Shirts.
70. Clothing, men's.
72. Clothing, women's.
87, 88, 89. Cotton manufactures.
97. Dyeing and finishing textiles, exclusive of that done in textile mills.
176. Knit goods.
284. Silk goods.
355, 356. Woolen and worsted goods.

V.—Leather and its finished products:
30. Boots and shoes, not including rubber boots and shoes.
185. Leather, tanned, curried, and finished.

C.—LUMBER AND ITS REMANUFACTURES

IV.—Lumber and its remanufactures:
129. Furniture.
195. Lumber and timber products.
196. Lumber, planing-mill products, not including planing mills connected with sawmills.

D.—PAPER AND PRINTING

VI.—Paper and printing:
230. Paper and wood pulp.
253. Printing and publishing, book and job.
255. Printing and publishing, newspapers and periodicals.

E.—STONE, CLAY, GLASS, AND CHEMICALS

VIII.—Chemicals and allied products:
62. Chemicals.
241. Petroleum, refining.

IX.—Stone, clay, and glass products:
37, 251. Brick and tile, pottery, terra-cotta, and fire-clay products.
135. Glass.

F.—METALS, VEHICLES, RAILROAD CARS, AND MISCELLANEOUS

III.—Iron and steel and their products:
163. Iron and steel, blast furnaces.
164. Iron and steel, steel works and rolling mills.
124. Foundry and machine-shop products.

X.—Metals and metal products, other than iron and steel:
289, 290, 292. Smelting and refining, copper, lead, and zinc.

XII.—Vehicles for land transportation:
10. Automobile bodies and parts.
11. Automobiles.
57. Cars, steam-railroad, not including operations of railroad companies.

XIII.—Railroad repair shops:
54. Electric-railroad repair shops.
55. Steam-railroad repair shops.

XIV.—Miscellaneous:
2. Agricultural implements.
265. Rubber tires, tubes, and rubber goods, not elsewhere specified.
279. Shipbuilding, steel.
99. Electrical machinery, apparatus, and supplies.

[1] Including, for 1899, 1904, and 1909, industries 80(*b*), ice cream, and 63, chewing gum.

Not all of the 41 selected industries are synonomous with the individual industries as reported by the census. Such cases are indicated by the appearance of two or more classification numbers in Table 5; thus the two census industries described as "Slaughtering, wholesale, not including meat packing," and "Slaughtering and meat packing, wholesale," are combined in the present list and constitute an industry which is described as "Slaughtering and meat packing." Similar consolidations have been made in other cases: Cotton goods, cotton lace, and cotton small wares have been combined to form the cotton manufactures industry; woolen goods and worsted goods are combined to form the woolen and worsted goods industry; brick and

tile, terra-cotta, and fire-clay products are combined with pottery to form the industry indicated by the title "Brick and tile, pottery, terra-cotta, and fire-clay products;" smelting and refining of copper, lead, and zinc, respectively, have been consolidated into one industry.

REPRESENTATIVENESS OF THE SELECTED INDUSTRIES

Since we are reporting separately only 41 of the 356 industries shown in the census of manufactures, it is necessary to provide some clue to the importance of these 41 industries in manufacturing industry as a whole. It is important not only to make certain that the selected industries form a large and representative sample of manufacturing industry, but also to be assured that all through the 27-year period covered, these 41 industries and each of them have constituted sizable fractions of the groups which they are in a measure used to represent. Table 6 summarizes the situation so far as concerns the proportions between the wage earners employed in the 41 selected industries and the total number employed in the groups and divisions to which they belong. Of the 4,712,763 wage earners employed in manufacturing industries in 1899, there were 3,337,685, or 70.8 per cent, employed in the 41 selected industries; of the 9,096,372 employed in manufacturing industries in 1919, there were 6,210,033, or 68.3 per cent, employed in the selected industries. The corresponding percentages for the other census years are: 74 per cent in 1904, 75 per cent in 1909, 69 per cent in 1921, 70 per cent in 1923, and 69 per cent in 1925.[13] As regards all industries combined, therefore, the wage earners which are reported here by separate industries constituted, throughout the period covered, more than two-thirds of all manufacturing wage earners. The proportions of all wage earners included in the 6 industrial divisions and 14 industry groups, represented by the wage earners in those of the 41 selected industries coming within the group or division, are shown in the two percentage columns of Table 6. For example, in the division "Food, beverages, and tobacco," the 7 selected industries belonging therein employed both in 1899 and 1919 just 69 per cent of all of the wage earners in that division. The industry, "Tobacco, cigars and cigarettes," employed in 1899, 78 per cent and in 1919, 89 per cent of all wage earners in the tobacco manufactures group. With the single exception of the stone, clay, glass, and chemicals division, wage earners in the selected industries amounted in no case to less than 60 per cent of the entire number, employed in the several divisions. In the case of the stone, clay, glass, and chemicals division the wage earners employed in the selected industries belonging to it constituted,

[13] For further details, see Table K, p. 408. In 1899 and 1925 there have been available for separate analysis only 39 industries; data were unavailable in 1899 for "Automobile bodies and parts" and for "Chemicals," and in 1925 for "Liquors, malt," and "Mineral and soda waters."

in 1899, 43 per cent and in 1919, 40 per cent of all wage earners in the division. The most poorly represented *group* is that of chemicals and allied products, the two selected industries in that group (chemicals, and petroleum refining) having employed, in 1899, 14 per cent and in 1919, 27 per cent of all the wage earners in the group. It will be noted that both of the two industries which the census reports under the group "Railroad repair shops" have been included among the selected industries; the wage earners therein constitute, therefore, 100 per cent of all the wage earners in the group. In Table 14, on page 43, there are given the numbers of wage earners (these being in each case the census "average number") employed in each of the 41 selected industries in 1899 and in 1919, together with the percentage they constitute of the number in all manufacturing industries.

TABLE 6.—PROPORTIONS OF THE NUMBER OF WAGE EARNERS IN ALL MANUFACTURING INDUSTRIES, IN EACH OF THE 6 INDUSTRIAL DIVISIONS AND IN EACH OF THE 14 INDUSTRY GROUPS, BORNE BY THE WAGE EARNERS IN THE 41 SELECTED INDUSTRIES: 1899 AND 1919

INDUSTRIAL DIVISION AND GROUP	NUMBER OF WAGE EARNERS		PROPORTION OF THESE EMPLOYED IN THE SELECTED INDUSTRIES BELONGING IN THE GROUP (PER CENT)	
	1899	1919	1899	1919
All industries	4,712,763	9,096,372	71	68
FOOD, TOBACCO, AND BEVERAGES	489,514	897,211	69	69
Food and kindred products	301,868	684,672	62	62
Liquors and beverages	55,120	55,442	87	93
Tobacco manufactures	132,526	157,097	78	89
TEXTILES, GARMENTS, AND LEATHER	1,277,332	1,960,671	83	84
Textiles and their products	1,028,706	1,611,309	86	85
Leather and its finished products	248,626	349,362	77	81
LUMBER AND TIMBER PRODUCTS	671,696	839,008	85	84
Lumber and timber products	671,696	839,008	85	84
PAPER AND PRINTING	298,744	509,875	71	70
Paper and printing	298,744	509,875	71	70
STONE, CLAY, GLASS, AND CHEMICALS	428,254	725,667	43	40
Chemicals and allied products	196,538	427,008	14	27
Stone, clay, and glass products	231,716	298,659	68	61
METALS, VEHICLES, RAILROAD CARS, AND MISCELLANEOUS	1,547,223	4,163,940	60	59
Iron and steel and their products	745,235	1,585,712	77	57
Metals and metal products, other than iron and steel	161,403	339,469	15	11
Vehicles for land transportation	133,663	495,939	28	80
Railroad repair shops	180,620	515,709	100	100
Miscellaneous	326,242	1,227,111	43	60

REPRESENTATIVENESS OF CENSUS STATISTICS ON AVERAGE WEEKLY EARNINGS IN 1904

Since the present estimates of absolute amounts of earnings depend in a large part upon the accuracy and representativeness of average weekly earnings figures given in Census Bulletin 93, it is necessary to

inquire into the extent to which those earnings figures were representative of manufacturing industry in that year, and also to give some idea of the proportions borne by the wage earners covered by those special figures to the average number of wage earners in corresponding selected industries in 1919. The significant percentages are given in columns A and B of Table 14 on pages 42 and 43.[14] The first column (A) indicates the percentage borne by the number of wage earners employed in the selected establishments in the week reported for earnings in 1904 to the greatest number employed in all establishments at any one time in 1904. The second column (B) gives the percentages borne by the same numbers of wage earners to the average number employed in all establishments in 1919. This relationship, put concretely and using, for illustration, the data for all industries combined, means that the wage earners employed in the establishments which reported earnings in 1904, numbered in the week for which earnings were reported, 47 per cent of the largest number employed at any one time in the year 1904 in all industries combined. The percentage for bread and bakery products means, similarly, that the wage earners covered by the figures for average weekly earnings in the busiest week of 1904 constituted 65 per cent of the largest number of wage earners reported by the census for bread and bakery products in that year. The figures for the other selected industries indicate that in most cases the average earnings data for 1904 are derived from reports from establishments employing quite large proportions of all wage earners in manufacturing industry. The lowest proportion is 27 per cent in women's clothing; the highest is 86 per cent in the manufacture of steam-railroad cars. In column B of Table 14, the percentages indicate the ratio between the number of wage earners employed in the specified busiest week of 1904 in the establishments reporting earnings, to the average number employed in the whole of that same industry in 1919. These figures are given to dispose of any lurking suspicion that although the samples covered in the census statistics for weekly earnings are adequate samples for 1904, they may not have been large enough to constitute sizable proportions of the generally much larger numbers to which the work forces of most of the industries expanded between 1904 and 1919. The figures in column B are reassuring on that score. The proportions, as would be expected, are somewhat smaller than the figures for 1904, but there are only a few cases where less than one-fourth of all wage earners in the industry are represented by the statistics of earnings. For all industries combined, the number of wage earners covered in the special report on earnings in 1904 is 36 per cent of the average number of wage earners for all manufacturing industries in 1919. The only industries, indeed, where the percent-

[14] See also Table 130, p. 289.

ages are really too small to constitute an adequate sample are steel shipbuilding, automobiles, automobile bodies and parts, and, possibly, rubber goods, the percentages in these industries being 7, 5, 1, and 14 per cent, respectively. The 47 per cent for "all industries" represents 3,297,819 wage earners out of a total of 7,017,138 employed in 1904.

This analysis involves no sampling of the wage-earning population. In the case of each selected industry the figures cover *all* of the wage earners in the industry. The test of representativeness, therefore, does not need to be applied to the separate figures for any of the selected industries. Nor does it need to be applied to figures for the groups and divisions shown in Table 5, nor to the data for geographic divisions. The figures—that is to say, for the industrial groups and divisions—are figures for all employees—and all establishments—in those groups and divisions.[15] The same thing is true of the regional classifications. Averages are not made for the group "Leather and its finished products," by constructing a weighted average of our results for "Boots and shoes" and "Leather, tanned, curried, and finished." The average for leather and its finished products is obtained directly from the census figures reporting the aggregate average number of wage earners in that group and the total amount paid to wage earners in that group. Nor are averages for the division, "Textiles, garments, and leather," constructed by averaging the results for the two groups within that division—textiles and leather. The average for the group is obtained by adding together the aggregates of amounts paid in wages in each of the two groups, and by adding together also the numbers of wage earners in the two groups, dividing the first number by the second, and using the quotient (the census average wage) as the primary basis for the analysis. Similarly, the results for "All manufacturing industries" combined are directly based upon census aggregates for all of the 356 industries reported by the census.

Although we have not been obliged to resort to the somewhat doubtful device of averaging averages to get our results for larger regional and industrial groups, we have stooped to that procedure in the case of certain summary tables based on an ordinal arrangement of the 41 selected industries and the 48 States. Some of these appear in the latter part of this chapter. In these summaries, however, we do not essay to work out arithmetic means built upon other arithmetic means, but averages of a different sort—medians and decils. We have, for example, an arrangement of the average real earnings in each of the 41 selected industries in order of the magnitude of that average and showing the midmost, or median, average and above or

[15] But the Census Bureau has always excluded certain very small manufacturing establishments: In each census year from 1899 to 1919, inclusive, wage statistics were not collected from establishments having products valued at less than $500; in the censuses of 1921, 1923, 1925, and 1927 no reports on wages were collected from establishments whose products were valued at less than $5,000.

below that median average, the decil and extreme averages. This device has been utilized to make it possible the more easily to grasp the general trend in earnings and to find out how far there has been uniformity among States and among industries in respect to the typical or average wages paid.

SPECIAL ANALYSIS OF THE 1919 RETURNS

Because of the necessity we have been under of confining ourselves so entirely to a single average derived from the census items of amount paid in wages, and average number of wage earners, it was thought desirable to attempt a special examination of the original establishments schedules in certain industries and cities for the year 1919. Our purpose in doing this has been to throw some light upon the degree of variation in earnings above or below the average. The industries covered are indicated in Table 7 following.

TABLE 7.—LIST OF INDUSTRIES INCLUDED IN SPECIAL ANALYSIS OF 10,374 ESTABLISHMENTS IN 1919

INDUSTRY AND 1919 CENSUS CLASSIFICATION NUMBER	
Boots and shoes, not including rubber boots and shoes (30).	Iron and steel, steel works and rolling mills (164).
Tobacco, cigars and cigarettes (320).	Furniture (129).
Agricultural implements (2).	Petroleum refining (241).
Cotton goods (87).	Slaughtering, wholesale, not including meat packing (287).
Glass (135).	Flour-mill and gristmill products (122).
Brass, bronze, and copper products (35).	Mineral and soda waters (205).
Steam-railroad repair shops (55).	Foundry and machine-shop products (124).
Clothing, women's (72).	Printing and publishing, newspapers and periodicals (255).
Rubber tires, tubes, and rubber goods, not elsewhere specified (265).[1]	Lumber and timber products (195).
Automobiles (11).	Paper and wood pulp (230).

[1] This industry was designated prior to the 1919 census as "Rubber goods, not elsewhere specified." In the 1921 and 1923 census the industry was divided into two parts, "Rubber tires and inner tubes" and "Rubber goods, not elsewhere specified."

The method of procedure and other details are fully described in Chapter XX; here it is only necessary to explain briefly the scope of the analysis and make some general comment on its limitations and significance.

The special analysis for 1919 is confined to 20 industries and even these 20 industries are not completely covered; that is to say, we have included only such establishments in those industries as are located in one or another of the following cities: Boston, Chicago, Cleveland, Detroit, New York, Pittsburgh, San Francisco, and St. Louis. That part of the analysis which presents separate returns by cities includes the 8 cities above mentioned. It was expected in the first place to include the wage earners in the 20 selected industries who were employed in Chicago as well as those in the other cities, but Chicago was inadvertantly omitted from the tabulation of the 20 selected industries. The 10,368 establishments included in the 20 selected

industries constitute, as indicated in Table 114 on page 230, 10 per cent of all the establishments in those 20 industries in the whole of the United States, and the 426,989 wage earners employed in those establishments constituted in 1919, 11 per cent of the wage earners employed in the 20 industries in the whole country. This is a fair sample for all industries combined, but as pointed out in Chapter X, some of the industries are represented by quite inadequate samples and for this reason only 12 of the 20 industries are separately reported. All of the 20, however, are reported in the figures for the group as a whole. It should be added also, that the 20 industries selected for this special analysis included in 1919, in the country as a whole, 42 per cent of the wage earners in all industries.

So far as the cities are concerned, it is believed that the samples are uniformly adequate, the number of wage earners in the 20 industries in the 8 cities constituting 31 per cent of all wage earners in those cities and the number of establishments 21 per cent of all establishments in those 8 cities. Perhaps a more serious limitation upon this special analysis is the fact that it is based upon the very same census items that underlie the main part of our analysis—namely, the amount paid in wages and the average number of wage earners; it is based upon these two items in the same form in which they are utilized in other parts of this monograph—that is to say, in the form of quotients obtained by dividing the wage sum by the average number of wage earners. This quotient, of course, is an average. This average, therefore, constitutes the unit in a series of classified wage tables and in a series of arrays of establishments in the different cities and industries in the order of size of the census average wage quotient. This is another occasion then, and undoubtedly a more serious occasion, where we have been forced to the use of a method which really involves the averaging of averages. And again in this special 1919 analysis this averaging of averages takes the form of setting up medians and decils. The results, of course, do not necessarily indicate the variation between individual wage earners as to the amount of wages received; that is concealed in the establishment average which is the unit of the frequency distributions. What the figures do show directly is the variation between individual establishments in respect to the average wages paid by them. In so far as establishment averages furnish a clue to the level of individual earnings within the plant, we may infer a variation among individual wage earners having some resemblance to the variation among establishments. If there be wide variation among establishments in respect to average wages, we may infer from that a variation at least equally wide among the wage earners represented by the various establishment averages. But this proposition is subject to important qualification. Certainly in any given establishment some of the wage earners

will receive earnings higher than the average—higher, probably, than some of the averages in other plants where average earnings are considerably higher than in the plant where they are employed. The most that can be said is that there is a strong presumption that, in an establishment reporting a high census average wage, a larger proportion of the employees must have received wages around that high average than was likely to have been the case in an establishment reporting a much lower average wage. Yet it is conceivable that an establishment paying a low average wage, might have, concealed in that average, one group of skilled wage earners receiving extraordinarily high earnings, higher even than in the establishment first mentioned, and another group receiving extraordinarily low earnings, lower even than in other establishments where the average wage is lower.

ARRANGEMENT

The following chapters are arranged in six groups, designated as Parts I to VI. So far as possible the discussion of the technique of calculation, method of precedure, etc., has been put in Part V. Part II contains the estimates of absolute *amounts* of per capita earnings; Chapter III dealing with full-time money earnings and with a comparison between full-time and actual money earnings; Chapter IV with actual money earnings (i. e., money earnings reduced in proportion to estimated time lost); Chapter V with actual, "real," earnings (i. e., actual money earnings deflated with a cost of living index); and Chapter VI with a comparison between actual and full-time earnings in respect to purchasing power. *Relative* fluctuations in earnings are discussed in Part III, Chapter VII dealing with changes in full-time earnings, Chapter VIII with changes in actual money earnings, and Chapter IX with changes in the purchasing power of money earnings. Part IV deals with the results of the special inquiry into variability of earnings made on the basis of establishment schedules from the 1919 census. The results for the year 1919 are presented in Chapter X, and in Chapter XI a comparison is made with estimates of variability for the years 1899 and 1904.

Because of limitations in the classifications reported in Census Bulletin 93 it has not been possible to make estimates of *amounts* of earnings for the 14 groups of industries and the 6 industrial divisions, already referred to, nor has it been possible to make approximations of amounts of earnings for the different cities. Amounts are given, however, for each of the 41 selected industries for the different geographic divisions and for certain industries for which earnings are shown separately for 2 of the States in which these industries are most strongly represented. In the case of the 41 selected industries, the amounts are given, not for all sex and age groups combined, but

for men alone, or (in those industries in which an appreciable proportion of women are employed) separately for both men and women. In the other classifications the figures are for all sex and age groups combined.

Changes in earnings are not shown separately for sex and age groups. Since the census does not report separately the amounts of wages paid to different sex and age groups, we seem forced to rely upon the somewhat dubious assumption that the degree and direction of change in earnings is the same for women as for men and probably very nearly the same for children. *Amounts* of average weekly earnings in 1904 are shown separately, however, for men, women, and children in Census Bulletin 93, and it has been possible to make separate estimates of the *amounts* of average earnings of the different sex and age groups. *Relative* per capita earnings (or index numbers) are shown for each of the 41 industries for all sex and age groups combined; for each of the 14 industrial groups and 6 industrial divisions; and for each of a limited number of selected industries for 2 leading States. Index numbers of earnings are also shown for geographic divisions and States, and for the more important cities.

OUTLINE OF PROCEDURE

As was indicated at the outset of this chapter, the estimates of the dollar *amounts* of earnings per capita are subject to a margin of error which is probably much wider than is the case with the index numbers of per capita earnings. The principal source of whatever error may exist in the estimated dollar sums undoubtedly lies in the correction which we have applied to the estimated full-time amounts of earnings in order to take account of unemployment. A less serious source of error, but yet one which, probably, is of some moment, is involved in the rather long and somewhat precarious jump from the amounts of average weekly earnings for different industries and regions, and for men and women, in the week of 1904 covered by the returns of Census Bulletin 93, to the estimated full-time yearly earnings for the same year. The method of making the correction for unemployment is explained in detail in Chapters XV and XVI. The method used in the estimation of amounts of full-time annual money earnings from the weekly averages for 1904 is described in Chapter XIV.

In order to give the setting for the whole problem so that this discussion of the limitations on the data involved in the methods used may be made somewhat clearer, a brief statement of the procedure, as described in detail in Part V, may not be inappropriate. Relative or index numbers of earnings are worked out as follows: [16]

[16] See Appendix II for a sample work sheet illustrative of this procedure.

(1) Index numbers, on the 1914 base, are computed from the census average wage items, which have been derived by dividing wages by wage earners. As explained elsewhere, the census average wage items themselves do not exactly represent average amounts of full-time earnings.[17] The index numbers derived therefrom, however, do appear to reflect very closely *changes* in full-time money earnings, and these index numbers, therefore, are considered to be relatives of *full-time* money earnings, or annual money *rates* of wages. (2) These relatives are then divided by index numbers of the cost of living. The resulting relatives are index numbers of the purchasing power of annual rates of wages. These index numbers, and to a less degree those of full-time money earnings, are of distinctly secondary importance in this study inasmuch as we are dealing primarily with actual rather than full-time earnings. However, some use is made of them as indicating the maximum amounts toward which earnings may climb in years of unusually steady employment. (3) Relatives of actual money earnings are obtained by multiplying the relatives of full-time money earnings by the ratios of actual to full employment. These are indexes which reflect changes in earnings in the proper meaning of that term. (4) These relatives of actual annual earnings per capita are then divided by the index of the cost of living, already mentioned, to obtain index numbers of the purchasing power of actual annual earnings. It will be noticed that none of these steps involves the utilization of data from the special census investigation of average weekly earnings in 1904. Indeed the only outside figures brought into the calculation of relative earnings are the indexes of the cost of living and the data involved in the construction of the ratios of actual full employment.

It seems quite unlikely, aside from the calculation of the employment ratios, that there is any serious source of error involved in this procedure. The possibilities of error in connection with the correction for unemployment probably are not serious, at any rate for all industries combined. For some of the separate industries it undoubtedly involves considerable error, just how much it is not easy to say.

The derivation of estimated *absolute amounts* of earnings is somewhat more intricate. It is impossible at this point to do more than roughly sketch the principal steps involved.[18] The real point of origin is the amount in dollars and cents of average weekly earnings in the busiest week of 1904 (reported in Census Bulletin 93). These amounts are separately reported, of course, for different industries, geographic regions, and sex and age groups. (1) The first step involves the expansion of these average weekly earnings, which are not

[17] See Chap. XIII and Biennial Census of Manufactures, 1923, p. 6.
[18] The procedure is illustrated by a sample work sheet in Appendix I.

full-time earnings but earnings actually received in the busiest week, to estimated full-time weekly earnings.[19] The source and method of construction of this expansion ratio are described in Chapter XIV. (2) The full-time weekly earnings for the specified week of 1904 are next multiplied by the yearly relatives of per capita full-time money earnings already mentioned in connection with the method of calculation of relative earnings. The results show, for each census year and, by interpolation [20] for intercensal years as well, estimated amounts of full-time weekly earnings corresponding to the 1904 estimates. This second operation relies of course upon the validity of the assumption that the relative magnitudes of census average wage amounts for successsive years are closely indicative of changes in per capita full-time earnings.[21] It should be noted additionally that it is assumed, perhaps less justifiably, that these relatives, derived from the census average wage, reflect also changes in the full-time earnings of men and women separately. (3) The estimated amounts of full-time weekly earnings for the different years are then multiplied by 51 and the result in round dollars represents our estimated amounts of full-time yearly money earnings per capita. This full-time annual item is not desired for its own sake, but there has appeared to be no more satisfactory method of arriving at the desired estimates of actual earnings. (4) The fourth step consists in multiplying the full-time items just mentioned by the estimated ratios of actual to full employment, derived as explained in Chapters XV and XVI. The result is the estimated amount of actual annual money earnings per capita. (5) These items of actual money earnings, finally, are divided by the index of the cost of living for the year which they respectively represent, giving as quotients dollar amounts representing the purchasing power at the 1914 price level of the actual annual money earnings per capita. This completes all of the procedure of primary importance, but one further step is taken in order to arrive at the purchasing power of *full-time* yearly earnings. This step, of course, involves no new principle but involves simply the division of full-time yearly earnings by the cost of living index to secure dollar sums representing the purchasing power at the 1914 price level of full-time yearly earnings, or, more briefly, real annual wage rates.

[19] It is taken for granted that earnings in even the busiest week were not full-time earnings. In some industries they came very close to being full-time earnings, and it goes without saying that some wage earners undoubtedly worked full time and more than full time, but it is to be remembered that we are dealing with average earnings of wage earners. Furthermore, in 1904 figures are not invariably for the busiest week; the enumerators were instructed in cases where they could not get earnings for the busiest week to get those averages for a normal or representative week, and it is all the more true, of course, that earnings in a representative week would fall short of full-time earnings. Finally, it is to be remembered that 1904 was a rather poor year in manufacturing industry.

[20] For method of interpolation, see Ch. XIX.

[21] Careful distinction should be made between changes in per capita earnings and per capita changes in earnings; with the latter sort of change we have nothing to do. See Mitchell, W. C., "Methods of presenting statistics of wages," 9 Quarterly Publication, American Statistical Association, pp. 325-343 (Dec. 1905).

The two series of steps which have just been described underlie the great bulk of the analysis herein contained. The procedure involved in Part IV, which deals with the variability of wages, is entirely different and need not be discussed here except to remark that it also has its origin in the census average wage item. In the variability analysis, however, this item is an establishment, not an industry, item. A supplementary bit of construction is involved in the interpolation, for intercensal years, of amounts and relatives corresponding to those just enumerated. This interpolation procedure is described in Chapter XIX.

The estimates of amounts and index numbers of actual yearly earnings, it is highly important to note, are *per capita of all wage earners attached to industry* and not per capita of employed wage earners.[22] An important exception is Table 22, where the figures are per capita of wage earners employed.

MARGINS OF ERROR IN ESTIMATES OF AMOUNTS OF EARNINGS

We now return to the discussion of possible sources of error, particularly in the computation of absolute money amounts of earnings. As already suggested, the step which involved the most serious liability to error is the one involving the multiplication of full-time yearly earnings by estimated fractions of full employment. In attempting to arrive at reliable estimates of the fractions of full employment for the different industries and for all industries combined, two different series of ratios were finally worked out. They are referred to in Chapters XV and XVI as Methods A and B, respectively. As explained in those chapters, the final set of ratios utilized in our analysis estimate is the result of striking an average between the two series. It is believed that this is the most acceptable way out of the difficulty, especially since the methods involved in working out the ratios by Method B are such as to justify the belief that the resulting ratios represent a maximum above which the volume of employment could hardly have gone, and since the results of Method A (because of the method of its construction and because of the assumptions relied upon in working it out) seem to represent minimum points below which employment could hardly have fallen. The arithmetic mean of the two estimates was therefore taken as the one which most closely measured the proportion of full time lost by unemployment, underemployment, sickness, etc. The margin between the final estimate and the maximum and minimum estimates of Methods A and B, respectively, may furnish some clew to the margin of possible error in the final estimated amounts

[22] "Generally speaking, the average number of workers actually employed in an industry is from 3 per cent to 10 per cent less than the numbers of persons attached to the industry." (National Bureau of Economic Research, 2 Income in the United States, 271. See also ibid., p. 39.)

of earnings. For all industries combined, the amount derived through Method A is 9 per cent lower than the amount derived from the ratio finally adopted; the estimate derived from Method B is 9 per cent higher than that derived from the final series of ratios. What this means as to spread between the final estimate and the two extreme estimates is indicated in Table 13 on page 42. For all industries combined, it appears that the true amounts of actual annual money earnings, per capita, in 1899 must have been, in all probability, between $406 and $486; in 1919 between $1,103 and $1,321; in 1923 between $1,198 and $1,436. The table also shows for 14 selected industries the corresponding maximum and minimum amounts and the percentage by which they vary from the final estimates. These 14 selected industries represent pretty completely the range of variation involved in all of our 41 selected industries. No one of the 41 industries has a range of variation greater than 17 per cent, which appears in the agricultural implement industry.[23]

It is evident from the figures of Table 13 that there is a very wide range in the degree of variation as between different industries; thus in printing and publishing, book and job, it would appear that our estimate of the actual amount of money earnings must be much closer to the truth than in the case of tobacco, cigars and cigarettes, and still more in the case of agricultural implements. For the latter industry our final estimate of actual earnings is $1,259 per capita for 1923, the maximum and minimum estimates are $1,473 and $1,045, respectively.

Less important as a source of error than the employment ratios, but not by any means negligible, in all probability, is the first step in the process of estimating absolute amounts of earnings, a step which involves the expansion of the average (actual) weekly earnings in 1904 to estimated full-time weekly earnings for the same week in that year. In the case of this particular part of the process the writer does not know of any way precisely to indicate the degree of error—he does not know what the degree of error is—but there seems to be every justification for the conclusion that it is small compared with the error involved in making correction for unemployment. It certainly can not be great for all industries combined; it may possibly be serious in the case of a few of the individual industries.

The question of the reliability of the relative amounts of earnings shown in Part III is important but is certainly a less serious one than in the case for amounts of earnings. It has been remarked that the relative amounts of the census average items are believed to represent quite accurately changes in per capita full-time earnings; in Table 8 are presented some comparative figures of which it may

[23] The percentage of deviation for each of the 41 selected industries and for each industrial group and division is given in Table 152, p. 337.

TABLE 8.—TEST OF ADEQUACY OF INDEXES OF CENSUS AVERAGE WAGES TO MEASURE CHANGES IN AVERAGE FULL-TIME EARNINGS, EACH YEAR: 1899–1918

[1904=100]

YEAR	U. S. Bureau of Labor Statistics relatives [1]	Indexes of census average wages	YEAR	U. S. Bureau of Labor Statistics relatives [1]	Indexes of census average wages
1899	90.8	89.0	1909	110.4	109.0
1900	93.0	92.2	1910	112.5	110.9
1901	94.0	93.7	1911	114.8	112.4
1902	97.0	96.0	1912	117.7	116.1
1903	99.6	98.3	1913	120.2	120.8
1904	100.0	100.0	1914	122.5	122.0
1905	101.7	102.1	1915	[2] 120.5	124.1
1906	105.3	106.1	1916	128.9	143.4
1907	110.0	110.3	1917	[2] 130.8	166.2
1908	109.4	109.0	1918	167.0	217.8

[1] Average of relatives of 10 industries. See footnote 1 to Table 9.
[2] Average of relatives of 7 industries, since United States Bureau of Labor Statistics did not collect data for "Woolen," "Cotton," and "Boots and shoes" for this year.

be said that while they are not entirely calculated to confirm this belief yet at the same time they do not entirely uproot it. The figures show in parallel columns the United States Bureau of Labor Statistics relatives of full-time weekly earnings, and the indexes which we have used as relatives of full-time (annual) earnings, the figures used in both columns being those for all manufacturing industries. They are not published in this form by the Bureau of Labor Statistics, but were brought together by two writers in the *American Economic Review*.[24] The figures they present have been shifted from the 1890–1899 base to the 1904 base. It will be seen that the two series parallel each other very closely for each year of the period up to the year 1914. In 1915 the difference is somewhat greater and in the following three years it is very considerable. For two of these years, however, it is to be noted that the Bureau of Labor Statistics' indexes are based upon only 7 industries, indeed the whole series of the bureau's indexes rests upon a much smaller industrial basis than the indexes here derived from the census average wage, the number of industries used by the Bureau of Labor Statistics being in no instance more than 10. The industries omitted in 1915 and 1917, moreover, are of major importance. The divergence in the last four years despite these considerations is somewhat disturbing, but it seems fair to conclude that it is not flatly destructive of the structure of the present analysis. Indeed, for the greater part of the period it appears to support it. In Table 9 similar comparisons are made for each of 7 different industries. Here again there are some wide variations between the two sets of figures, but the correspondence seems, on the whole, to be sufficiently close to justify us in using census average wage as we have done.

[24] "The Movement of Real Wages, 1890–1918," by Paul H. Douglas and Frances Lamberson. [*11 American Economic Review*, 409–426 (September, 1921).]

TABLE 9.—TEST OF ADEQUACY OF INDEXES OF CENSUS AVERAGE WAGES TO MEASURE CHANGES IN AVERAGE FULL-TIME EARNINGS, SEVEN SELECTED INDUSTRIES: 1899–1924 [1]

[1904=100]

YEAR	WOOLEN AND WORSTED GOODS ("WOOLEN")		COTTON MANUFACTURES ("COTTON GOODS")		BOOTS AND SHOES	
	U. S. Bureau of Labor Statistics	Census	U. S. Bureau of Labor Statistics	Census	U. S. Bureau of Labor Statistics	Census
1899	91	92	83	94	90	89
1904	100	100	100	100	100	100
1909	112	110	119	115	110	108
1914	126	123	135	127	120	119
1915		119		123		114
1916	145	148	149	143	123	128
1917		184		172		160
1918	236	228	226	246	152	220
1919		260		270		216
1920	386	330	395	330	235	245
1921		278		202		242
1922	293	289	263	249	214	233
1923		311		289		240
1924	332	308	297	280	221	229

YEAR	LUMBER, PLANING-MILL PRODUCTS ("MILLWORK")		FOUNDRY AND MACHINE-SHOP PRODUCTS		PRINTING AND PUBLISHING, BOOK AND JOB		PRINTING AND PUBLISHING, NEWSPAPERS AND PERIODICALS	
	U. S. Bureau of Labor Statistics	Census	U. S. Bureau of Labor Statistics	Census	U. S. Bureau of Labor Statistics	Census	U. S. Bureau of Labor Statistics	Census
1899	91	85	91	91	91	89	95	86
1904	100	100	100	100	100	100	100	100
1909	107	110	109	110	110	110	109	110
1914	116	124	121	118	122	124	118	125

[1] U. S. Bureau of Labor Statistics indexes 1899 to 1918 are from Douglas and Lamberson, "Movement of real wages, 1890–1918," 11 American Economic Review, 417 (September, 1921), the 1890–1899 base used by Douglas and Lamberson being shifted to 1904; after 1918 from various bulletins of the U. S. Bureau of Labor Statistics, where the figures are generally on the 1913 base.

The assertion has been made in reference to the relatives derived from the census average wage [25] items that these relatives reflect with equal reliability the wages of different sex and age groups. This is largely guesswork. Yet there is some evidence which appears to give it sufficient confirmation to justify its provisional acceptance. The confirmatory data referred to are presented in Table 10. They are the index numbers of average weekly earnings for classified groups of labor for 23 industries combined, published by the National Industrial Conference Board.

The table shows in parallel columns the index numbers of average weekly earnings of skilled and unskilled male workers and of female workers, irrespective of skill, for certain months of the period since 1914. It is true that the board's figure is for average actual weekly earnings; that is to say, they are not full-time weekly earnings. Yet

[25] See initial paragraph, Chap. XIII, p. 269.

the presumption is a fair one that if the actual weekly earnings of men and women fluctuate fairly closely together, the full-time earnings also will fluctuate together. Moreover, average weekly earnings much more closely approximate full-time weekly earnings than average yearly earnings approximate full-time yearly earnings. In other words, the shorter the time period for which actual earnings are reported, the more closely do those earnings approximate full-time earnings. The relatives in the table, despite appreciable differences, evidence a fairly close correspondence between changes in men's earnings and changes in women's earnings.

TABLE 10.—INDEX NUMBERS OF AVERAGE WEEKLY EARNINGS FOR COMPOSITE AND CLASSIFIED GROUPS OF LABOR; 23 INDUSTRIES [1]

	MEN		Women		MEN		Women
	Unskilled	Skilled			Unskilled	Skilled	
1914—July	100	100	100	1923—January	197	201	214
				February	198	202	214
1920—June	256	239	243	March	201	208	218
December	239	223	218	April	211	215	222
1921—January	220	208	205	May	217	220	231
March	202	194	206	June	216	218	229
May	193	186	208	July	215	216	222
August	182	183	204	August	215	214	226
October	183	182	205				
December	179	182	204	September	216	215	226
				October	218	217	225
1922—July	184	185	196	November	214	216	225
August	185	190	195	December	214	214	220
September	190	192	202				
October	195	197	207	1924—January	215	215	222
November	196	199	211				
December	199	201	213				

[1] Reprinted by permission from Wages, Hours, and Employment in American Manufacturing Industries, July, 1914–January, 1924 (Research Report No. 69. New York: National Industrial Conference Board, p. 15).

There is available in the census reports only the scantiest of material that can be made to throw light upon the parallelism here assumed to exist between the income fluctuations of male and female wage earners, respectively; there is nothing at all available there subsequent to the 1905 census of manufactures. In 1890, 1899, and 1904 the Census Bureau reported the amounts paid in wages to each sex and age group separately; since 1905 it has reported only the single item of amount of wages paid to male, female, and child wage earners lumped together. In the census years when the wage payment item was subdivided the percentages of change in average yearly earnings for the two intervals spanned were as follows, for all industries combined:

SEX AND AGE GROUP	PERCENTAGES OF CHANGE	
	1890–1899	1899–1904
Men	−1.6	+9
Women	+2.0	+9
Children	+10.0	+15

Examination of corresponding figures for separate industries makes it quite certain that there are appreciable differences between the sex and age groups in respect to the direction and degree of change in average earnings. This situation is not calculated to give any material support to the assumption that has been made of parallel series of fluctuations in the earnings of men and women. It produces, indeed, a serious imperfection in the present analysis in so far as it attempts to set forth, separately, the earnings of women and of children.

Yet there is evidence that the ratio of the average earnings of male workers to the average earnings of female workers is likely to remain fairly constant over considerable periods. The special census investigation of 1904 showed that, for all manufacturing industries combined, the ratio of men's average weekly earnings to women's was for that year, 1.8. The National Bureau of Economic Research reports that "a survey of a number of industries for which data are available for more recent years indicates that the ratio of the earnings of males to those of females, in the case of wage earners at least, has not changed materially since 1905." [26] It may well be, therefore, that for any period within which the proportions of the work force made up of men and women, respectively, do not materially change, the ratio of men's earnings to women's will remain practically constant. To the degree that this is true changes in men's earnings will reflect changes in women's earnings, or changes in the earnings of mixed groups will reflect changes in the earnings of either sex.

In reporting changes in average earnings it is extremely important to be assured of the homogeneous character of the group for which changes are reported. Failing this assurance, it is imperative, if the group be not homogeneous, that that fact should have proper consideration in the interpretation of the results. The misleading possibilities of a change in the proportions of women and of children or of highly skilled wage earners between one year and another have been mentioned. It is particularly necessary in the circumstances of the present analysis to be cognizant of any changes in its composition that may have affected the homogeneity of the wage-earning group. It is, of course, important to earmark those industries where there has been no marked change in the composition of the body of workers. This is particularly desirable because of the fact that it is impossible to report actual earnings received by individual wage earners in those sorts of groups which are ideally calculated to reveal earnings of definite kinds of labor—namely, *occupational* groups. Since we have to deal with industrial groups which merge all sorts of occupations, degrees of skill, different sexes and ages, and since in addition to all

[26] Income in the Various States, p. 79.

this we are obliged to depend upon averages, it is of prime importance that we have before us whatever may be available to throw light upon this question of homogeneity.

In Part VI there appear two tables which are designed to supply some of this necessary information. Table F indicates the proportions for the years 1910 and 1920 of skilled, semiskilled, and unskilled workers, respectively, who were employed in the different industries listed. It is possible from this table to ascertain whether or not, in the case of any particular industry (unfortunately data are not available for all of our selected industries), there has been a change in the proportion of skilled, unskilled, or semiskilled workers. An examination of the table indicates that in a number of industries there have been rather considerable changes in respect to the proportions of employees of different degrees of skill. These figures are but rough approximations, since the percentages were calculated by means of a somewhat anomalous process of division. The numbers of skilled, semiskilled, and unskilled workers were taken from the decennial census of occupations, and the total number of wage earners in the different groups were taken from the manufactures census. The result is that at best the figures are fragmentary and only roughly indicative of the changes which have taken place. In later discussions of the results for different industries, the writer has attempted adequately to take into consideration such changes as appear to be indicated by the figures of Table F and comments are made in connection with different industries where they seem to be called for.

In Table G are given similar comparative percentages of the proportions of women and children employed in each of the selected industries for each manufactures census year since 1899. It appears that so far as sex and age groups are concerned there has been little change in the character of the work force during the period with which we are dealing. For all industries combined all the way through the period from 1899 to 1919, inclusive, the proportion of women has been 20 per cent; the proportion of children has altered slightly, starting with 3 per cent in 1899 and dropping to 1 per cent in 1919. This change, however, is not sufficient materially to affect our results. In the individual industries, there are for the most part not enough sizable shifts in the proportions to cause any trouble whatever. Yet in certain cases our results should be discounted in view of the changes in proportions shown. For example, in tobacco, cigars and cigarettes, the proportion of women increased between 1899 and 1919 from 37 per cent to 58 per cent. In the per capita earnings shown in later pages for that industry there seems to have been a particularly heavy fall between 1899 and 1923. Assuming that the work force in the industry remained uniform in its character throughout the period, we would say that there has been considerable

drop in per capita earnings in that industry. But has this really been the case? The introduction of a considerably larger proportion of women will of course reduce the per capita average for the industry. It is shown in the series of index numbers of real earnings for all industries combined, by sex and age groups, that the average money earnings for women were $627 in 1921, whereas the corresponding figure for men is $1,170. Coming closer home, in the tobacco industry itself our estimates of amounts of money earnings per capita in that year are $898 for men and only $499 for women. The earnings of women have probably fallen in that industry, so also perhaps have those of men, but have the earnings he gets fallen as rapidly as would appear from the figures shown in Part III? Probably not. In men's clothing there is an appreciable change in the proportion of women, although it is not as great as in the case of tobacco; in this case the change is in the opposite direction, however. We should expect it to show, as a result, an increase in earnings in that industry greater than the increases which actually have taken place. The results of the present analysis do show for the men's clothing industry somewhat more rapid increase in earnings than has prevailed for all industries combined, and a part of this gain is no doubt a fictitious result of the diminished proportion of women employed in the industry. The only other industries which indicate that there have been shifts in sex proportions of disturbing size are the dyeing and finishing of textiles, the manufacture of paper and wood pulp, and of glass.

Still another important factor which affects wages is the extent of union organization. The figures of course are not made fictitious because of the fact that a certain definite group of wage earners performing certain definite kinds of work is organized into a union. That may have the effect of raising their wages and that increase ought to be reflected in our figures. The results are made spurious when the change is something more than a change from unorganized to organized status. The kind of change that makes our results misleading is the double change involved in unionizing a factory by substituting for unskilled, unorganized workers, skilled, organized ones. Now, very often increases in the proportion of organized workers really involve increases in the proportion of those who are skilled. The organization of a factory may introduce more highly skilled workers, so that figures indicating proportions organized in different industries in successive years furnish important clews to changes in the composition of the body of wage earners. What scattered figures seem to be available in regard to the proportion of wage earners organized are presented in Table 11. The percentages are obtained by dividing Mr. G. E. Barnett's figures for the number of trade-unionists in different industries in census years, by the number of wage earners in those industries. It is clear that in a few industries,

notably women's clothing, boots and shoes, leather, electric-railroad repair shops, and electrical machinery, there have been considerable increases in the proportions of organized wage earners. Contrariwise, there seem to have been declines in these proportions in the furniture industry. In the others for which we have data, there appears to have been no very large change. Figures indicate a considerable increase in the iron and steel industry, but it is doubtful whether the increase is as great as is indicated in the table. In Table 12 a comparison is made between 1910 and 1920 in respect to the degree of organization in the various industries. The figures confirm in a general way the analogous data of Table 11.

TABLE 11.—APPROXIMATE PROPORTIONS OF UNION WAGE EARNERS IN THE SELECTED INDUSTRIES, CENSUS YEARS:[1] 1899–1919

INDUSTRY	PER CENT OF THE WAGE EARNERS IN THE INDUSTRY WHO WERE ORGANIZED IN—				
	1899	1904	1909	1914	1919
Bread and other bakery products		20	11	13	15
Flour-mill and gristmill products		5	2		
Liquors, malt	22	52	67	87	77
Mineral and soda waters					
Clothing, women's	5	41	36	77	82
Boots and shoes, not including rubber boots and shoes	3	21	17	28	36
Leather, tanned, curried, and finished	2	12	8	3	9
Furniture	15	39	10	4	6
Lumber and timber products				3	1
Lumber, planing-mill products, not including planing mills connected with sawmills					
Paper and wood pulp		20	3	9	12
Printing and publishing, book and job	26	42	37	45	55
Printing and publishing, newspapers and periodicals					
Petroleum refining		2			8
Glass	21	26	39	37	30
Iron and steel, blast furnaces	7	16	8	8	25
Iron and steel, steel works and rolling mills					
Foundry and machine-shop products				47	92
Cars, steam-railroad	1	10	6	9	18
Railroad repair shops—electric					
Railroad repair shops—steam					
Electrical machinery, apparatus, and supplies	5	35	16	26	62

[1] Adapted from Barnett, G. E., 30 Quarterly Journal of Economics, 838, and 12 American Economic Review, 52 (March, 1922, supplement), "Growth of labor organization in the United States."

The question of how far these changes in organization have meant changes in the character of labor—that is to say, in how far they have meant the infusion of skilled and more highly paid labor into a lower-paid group—is difficult to answer and the best we can do, perhaps, is simply to call attention to the fact that here at least are facts of record which ought to be taken into consideration in interpreting those results.

THE SIGNIFICANCE OF THE AVERAGES

In order to provide some means for evaluating the industry averages reported in the following pages, and to make as clearly evident as possible the large amount of variation between industries and still more as between establishments within the different industries, and

TABLE 12.—PERCENTAGE OF WAGE EARNERS ORGANIZED IN 1910 AND 1920,[1] BY INDUSTRY GROUPS

INDUSTRY	1910		1920	
	Male	Female	Male	Female
Bread and other bakery products	19.6		24.7	
Flour-mill and gristmill products	.8		2.1	
Slaughtering and meat packing, wholesale	6.7		50.7	42.6
Slaughtering, wholesale, not including meat packing				
Liquors, malt	69.1	24.4		21.5
Mineral and soda waters				
Tobacco, cigars and cigarettes	42.4	8.0	47.7	13.5
Clothing, men's	21.9	11.2	76.6	46.0
Clothing, women's				
Cotton manufactures	4.8	2.6	8.3	11.5
Dyeing and finishing textiles, exclusive of that done in textile mills				
Knit goods				
Silk goods				
Woolen goods				
Worsted goods				
Carpets and rugs				
Boots and shoes, not including rubber boots and shoes	24.4	8.9	32.1	44.6
Leather, tanned, curried, and finished	5.4	.3	12.1	28.6
Furniture	10.5	2.1	19.1	
Lumber and timber products				
Lumber, planing-mill products, not including planing mills connected with sawmills				
Paper and wood pulp	3.5	.8	10.3	1.3
Printing and publishing, book and job	39.8	11.6	55.4	25.0
Printing and publishing, newspapers and periodicals				
Chemicals (and allied industries)	1.5		.2	
Glass	36.4		31.6	
Brick and tile, terra-cotta, and fire-clay products	3.9		9.1	
Pottery	26.7		28.2	
Iron and steel, blast furnaces	10.5		28.7	
Iron and steel, steel works and rolling mills				
Smelting and refining, copper, lead, and zinc (metals, except iron and steel)	7.3		15.6	
Rubber tires, tubes, and rubber goods, not elsewhere specified	.1			

[1] Percentages from Appendix Tables VI and VII, in Growth of American Trade Unions, 1880 to 1923. New York: National Bureau of Economic Research, 1924.

finally, by implication, the variation in earnings as between individual wage earners, which is undoubtedly no less than the variation between establishments, three charts are introduced at this point. Figure 1 [27] shows the 41 selected industries arrayed in the order of increasing per capita money earnings in the year 1919, in the United States as a whole. The width of each bar is made proportionate to the average number of wage earners employed in 1919 in the industry which the bar represents. The estimate of per capita yearly earnings for the United States as a whole and for all industries combined for the year 1919 is $1,212. This sum is based upon all manufacturing industries covered by the census. It is not an average of the averages for our 41 selected industries. It will be seen from the chart that the median industry shows a per capita money earnings sum of $1,223, slightly higher than the sum derived from the whole of manufacturing industry, reflecting, as already pointed out, the fact that our 41 selected industries probably represent higher earnings than the more than 300 other relatively small and unimportant industries not sepa-

[27] Drawn from the data of Table 38, on p. 96, and Table K, on p. 408.

rately reported in this book. The median industry shown in the chart, an industry having a per capita earnings figure of $1,223, happens to be the one described by the census as "Leather, tanned, curried, and finished." The chart makes it very evident that there are large and important industries in which the per capita money earnings received in 1919 were vastly lower than the per capita amount for all industries combined. It also makes it equally clear that there are other large and important industries in which the per capita earnings were higher by wide margins than they were for the median industry, or even for a number of smaller industries near the median. For example, down among the low industry averages are the lumber and timber products industry, employing, in 1919, 5.29 per cent of all manufacturing wage earners, and the cotton manufacturing industry employing in the same year 4.91 per cent of all manufacturing wage earners. Among the higher industry averages are steam-railroad repair shops, employing 5.33 per cent of all manufacturing wage earners, and foundry and machine-shop products, employing 5.31 per cent of all manufacturing wage earners. The lowest per capita earnings in 1919 appear to have been received in the mineral and soda water industry, where the average per capita earnings were $866 a year. The maximum industry is the blast-furnace division of the iron and steel industry, where per capita earnings for 1919 were $1,777.

It has been remarked that there must necessarily be within each of these industries, although in each in a varying degree, wide differences between establishments as to per capita earnings received in them, in addition to wide fluctuations within the establishments among individual wage earners.[28] As an example of what is concealed by the per capita sums represented by the bars of Figure 1 the automobile industry is used, and in Figure 2 are shown the per capita amounts of money earnings for each of the 59 automobile manufacturing establishments which happen to be included in the special study of variability reported in Chapters X and XI. The chart is drawn from the data of Table 169. It should be remarked that the 59 establishments represented in this chart constitute 19 per cent of the automobile establishments in the United States and that the wage earners employed in the 59 establishments make up 22 per cent of all wage earners in the automobile industry in the United States. The bars are constructed on the same principle as are those of Figure 1. The width of the bars is proportionate to the average number of wage earners employed in the establishment which the bar represents. For each establishment the length of the bar represents the estimated

[28] For example, the earnings of unskilled factory workers (of whom there are at least a few in almost all factories, and considerable numbers in many factories) are much lower than those of their skilled fellow workers. Cf. article on Low Earnings of Unskilled Labor in the United States in 25 Monthly Labor Review, 225-7 (August, 1927).

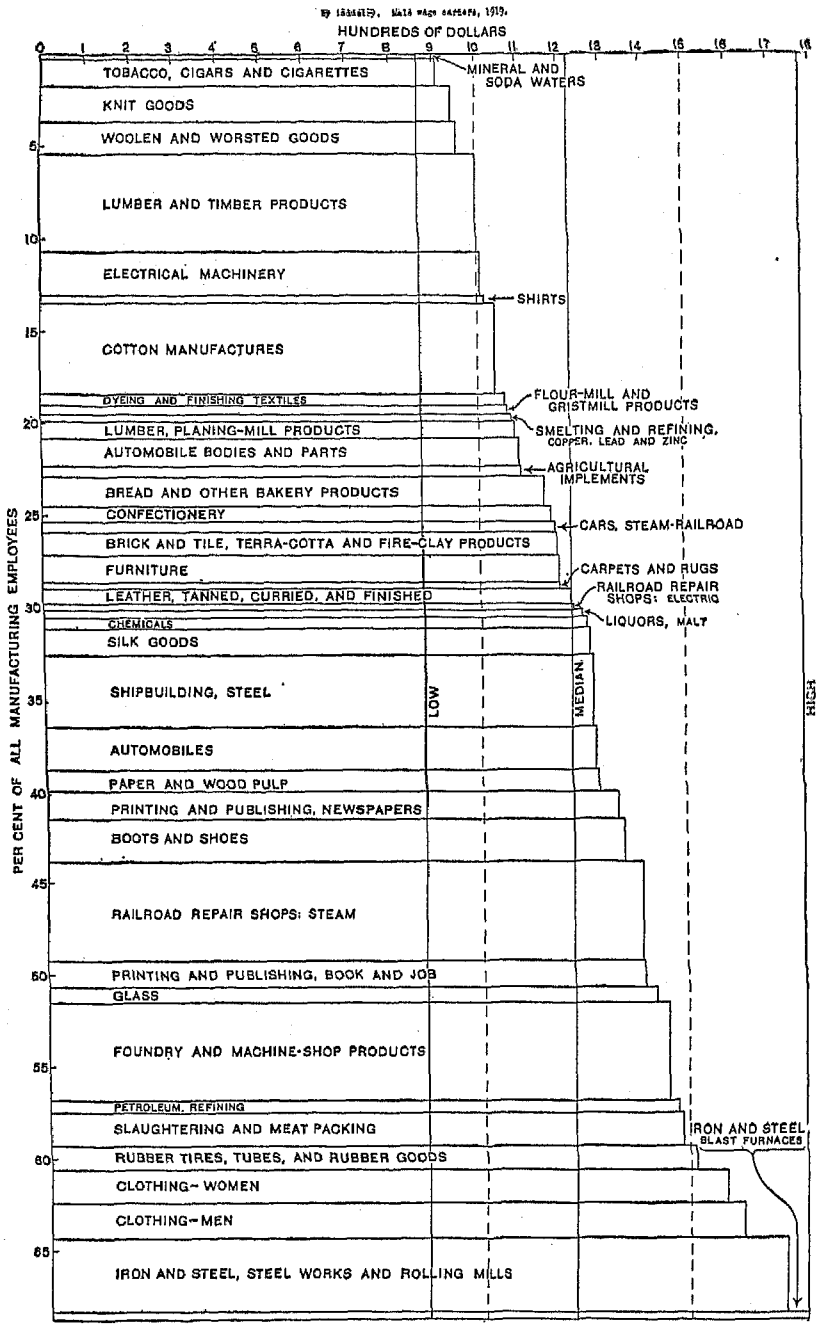


FIG. 1.—SIZE OF WORK FORCE AND AMOUNTS OF ACTUAL MONEY EARNINGS, PER CAPITA, BY INDUSTRY—MALE WAGE EARNERS: 1919

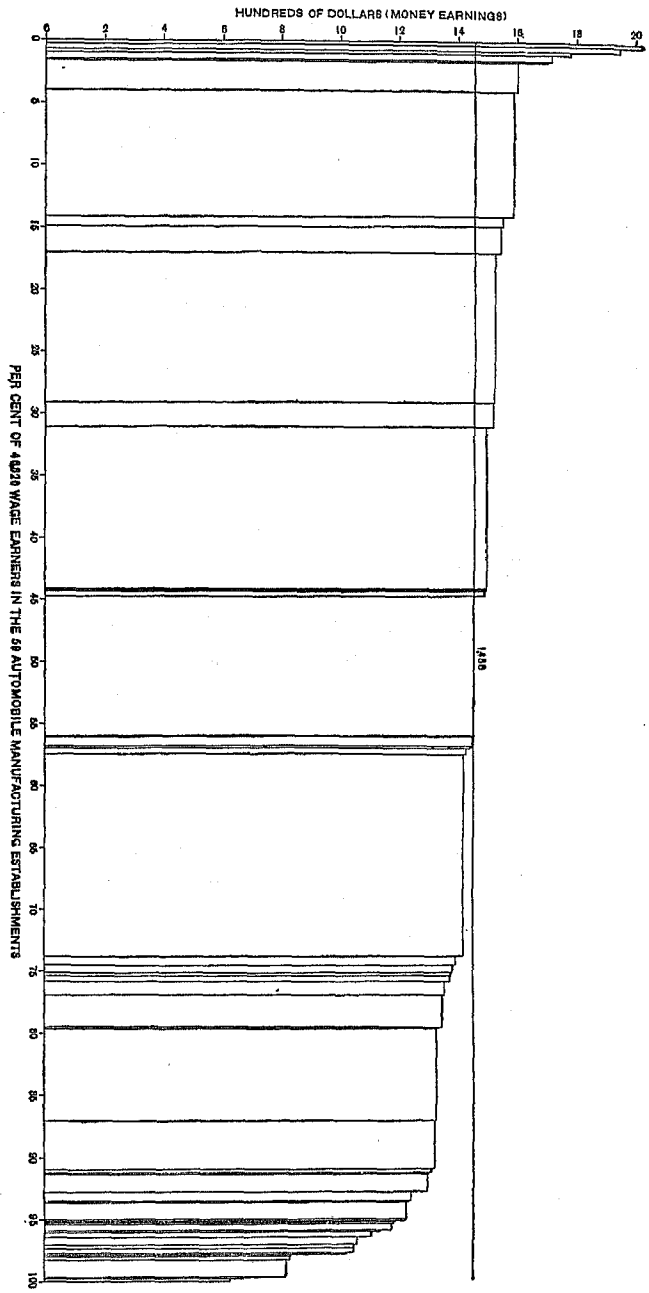


FIG. 2.—AVERAGE EARNINGS AND SIZE OF WORK FORCE IN 59 AUTOMOBILE ESTABLISHMENTS: 1919

annual money earnings per capita received by its employees in the year 1919. This estimated average is worked out from the census average wage as a starting point, following the procedure described in Chapter XX. The automobile industry is one in which the degree of variation of earnings is unusually slight; that is to say, in this industry there is a pronounced tendency for the bulk of the establishments, especially the large establishments, to pay the same yearly amounts of wages that are paid in the median establishment. The relative position of the automobile industry as compared with other industries in respect to variation in earnings may be ascertained by inspection of Figure 1. Its position is fixed more exactly in Table 122, where it is shown that the standard deviation of earnings from average earnings in the automobile industry is $170, as compared with $427 for 20 important industries combined, and that the coefficient of variation for the automobile industry is 11.7 per cent as compared with 33.6 per cent for the 20 industries combined. Bearing in mind this relatively higher degree of uniformity of earnings in the automobile industry as compared with other industries, it will be easy to appreciate the tremendous range of variation which must be concealed by the industry averages of Figure 1. Even in this industry of relatively uniform earnings, there are a number of establishments, relatively small it is true, in which the per capita earnings received range from $635 to $1,200 per year; and a smaller group (also of relatively small establishments) in which the per capita earnings received range from $1,700 to $2,262 a year. The average for the 59 firms is $1,016. We can infer then what must be the extent of variation in such industries as women's clothing and newspaper printing and publishing, where the coefficients of variation are 44 per cent and 83 per cent, respectively.

A more adequate idea of this range of variation between establishments may be had from Figure 3 (based on Table 117), which shows in the form of a somewhat rough approximation the range of variation in respect to per capita earnings in individual establishments within 11 of the industries covered in the special inquiry into variability. The point from which the lines diverge at the top of the chart represents the amount of money earnings per capita in 1919 for all manufacturing industries combined—the amount being $1,212. The amounts are measured from the left along the scale of money earnings per capita, at the top of the chart. The 11 perpendicular lines below the point representing the median industry are connected to that point by diagonal lines and represent by their distance from the left side of the chart, the per capita money earnings received in each of the 11 industries shown in the chart. In order to prevent the spread within each industry blurring the corresponding spreads within the other industries, each of the 11 lines is dropped

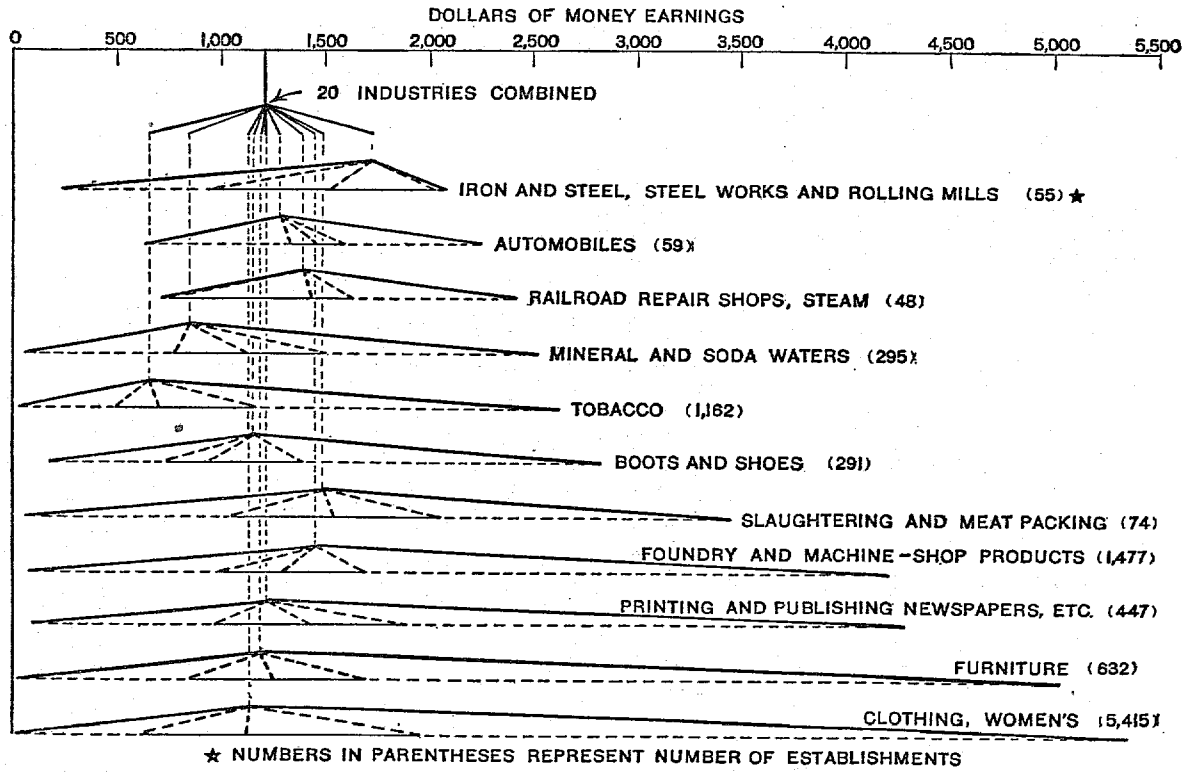


FIG. 3.—RANGE OF ESTABLISHMENT AVERAGES OF PER CAPITA MONEY EARNINGS IN CERTAIN SELECTED INDUSTRIES: 1919

down a space below the industry represented by the line to the left. From the ends of each of these descending industry lines radiate diagonal lines drawn to the scale at the top of the chart to indicate the range in earnings between establishments where wage earners received the lowest per capita earnings in the particular industry, and the establishments where the highest per capita earnings were paid. For example, in the case of the mineral and soda water industry, in that 1 of the 295 establishments reported for the industry in which per capita earnings were lowest, those earnings were $59 a year. In that 1 of the 295 establishments in which the per capita earnings received were highest, those earnings were $2,515 per year. Corresponding ranges in other industries from lowest establishment to highest establishment are from $172 to $2,825 in boots and shoes; $229 to $2,079 in iron and steel, steel works; and from $715 to $2,419 in steam-railroad repair shops. Obviously, these extreme items are not only unrepresentative cases; they are to a certain extent spurious cases, representing perhaps establishments having only one or two employees, and in operation for, possibly, only a week or two during the year. These extreme cases really should be ignored. The lowest and highest tenths are, therefore, segregated on the chart by diagonal lines drawn in such a way as to include within their arc all establishment averages between the upper one-tenth or the lower one-tenth of the establishments represented. We have taken, in other words, the per capita earnings received in that establishment which marks off the highest one-tenth of all establishments reporting their per capita earnings, and at the other end of the scale the establishment which marks off the lowest one-tenth of all the establishments, or in statistical terminology, we have indicated the first and ninth deciles of per capita money earnings for each industry. It is evident that the throwing out of the upper and lower tenths eliminates, in the case of nearly all of our 11 industries, all or nearly all of the extreme and wildly unrepresentative items. Thus, in mineral and soda waters, instead of the range between the high and low establishment averages, which runs from $59 to $2,515, we have the range between the first and ninth deciles, which runs from $777 to $1,499. Now this range, it is to be remembered, includes eight-tenths of the 295 establishments in this industry. The lower end of the middle diagonal dotted line in the case of each industry spread represents the per capita earnings of the median plant of the 295 plants in the industry for which we have worked out separate establishment figures. The upper end of this same line represents, by its distance from the zero line at the left, the mean earnings, per capita, for all of the establishments in this industry throughout the country. The per capita amounts of earnings in every case are of course represented by the distance from the ends of the diagonal lines to the base line at the left of the chart.

We may get also from this chart a confirmation of what has been said about the relative degree of uniformity in the automobile industry as compared with other industries. While the range from the lowest establishment to the very highest in the automobile industry is $628 to $2,240, most of this range is taken up by those extreme cases which are distinctly unrepresentative. Eight-tenths of the factories in the automobile industry evidently employ wage earners whose per capita earnings range between $1,326 and $1,590.[29] Figures in parenthesis opposite the names of industries indicate the number of establishments included in the data from which the chart is made.

It is noteworthy that in spite of these very wide fluctuations among the different industries in respect to the amounts of earnings in separate establishments within them,[30] the results of the special inquiry into variability of earnings (as shown by establishment averages in 1919) demonstrate that the averages for the different industries as a whole are pretty faithfully representative of the style in wages in the different establishments. Our average for all industries combined, based on all industries covered by the census, is $1,212 per capita; money earnings in the median industry are $1,223 per capita. The median establishments within separate industries show high degrees of correspondence and give us a good deal more confidence in the averages which are derived from the census average wage items. Not only the fair degree of correspondence, shown in Table 16, p. 47, between the medians of the special inquiry for 1919 and the estimated averages based upon the whole of the census returns, but also the tendency toward concentration around the median, illustrated in Figure 3, unite to give us greater confidence in our results. Possibly we can say still more: if the fluctuations among individual wage earners in a given establishment are not greater, and it is not believed that they generally are greater, than the range of variation of establishments within the industries, we shall have more reason to accept our industry averages as reasonably close indicators of the typical earnings actually received by individual wage earners.[31] It seems quite reasonable to conclude that,

[29] These figures are undoubtedly high for the automobile industry, since the average in the main part of this analysis derived from the whole automobile industry is $1,278. The higher earnings shown for the establishments in the 8 large cities covered in the special variability inquiry are probably the result of the higher wages generally prevailing in larger cities and possibly also in some measure the result of inadquate size of samples.

[30] Fluctuations so wide that in some low-wage industries like mineral and soda waters, and tobacco, there is a considerable proportion of establishments in which average earnings are higher than the average earnings in several other industries which rank in respect to per capita earnings much higher than either of the two industries mentioned.

[31] The ranges shown in the voluminous classified wage tables in Mr. Davis R. Dewey's census report on Employees and Wages, published in 1904, reveal very wide variations both in weekly rates and weekly earnings, but those ranges do not seem to exceed the ranges among establishments, which we have illustrated in fig. 3, and the range in variation in respect to earnings does not seem to be any wider than that in respect to rates. If Mr. Dewey's data had been for yearly earnings, it is probable that the range of variation would be considerably greater for earnings than for rates, but being on a weekly basis, it is not surprising that there are no greater differences between the ranges shown for rates and earnings, respectively.

to the degree that any given industry average is fairly reflective of the wages paid in different establishments, it will be reflective of the wages received by the greater part of the wage earners within those establishments, if there is no greater fluctuation among wage earners in relation to the establishment than in establishments in relation to the industry.

TABLE 13.—HIGH, LOW, AND FINAL ESTIMATES OF MONEY EARNINGS, PER CAPITA, IN THE UNITED STATES, FOR CERTAIN SELECTED INDUSTRIES, CENSUS YEARS: 1899–1923 [1]

[Male wage earners only, except for "all industries," where all sex and age groups are included]

INDUSTRY	Method used to compute fraction of full employment	Estimate	1899	1904	1909	1914	1919	1921	1923
All industries	B	Max. 9% higher	$486	$526	$607	$628	$1,321	$1,141	$1,436
	Average	Final	446	483	557	576	1,212	1,047	1,317
	A	Min. 9% lower	406	440	507	524	1,100	953	1,198
Bread and other bakery products.	B	Max. 3% higher	443	564	634	609	1,192	1,302	1,327
	Average	Final	430	548	616	591	1,157	1,264	1,282
	A	Min. 3% lower	417	532	598	573	1,122	1,226	1,250
Slaughtering and meat packing.	B	Max. 7% higher	525	615	632	656	1,588	1,367	1,550
	Average	Final	491	575	591	613	1,484	1,278	1,451
	A	Min. 7% lower	457	535	550	570	1,380	1,189	1,348
Tobacco, cigars and cigarettes	B	Max. 10% higher	485	515	527	582	998	988	1,042
	Average	Final	441	468	479	529	907	898	947
	A	Min. 10% lower	397	421	431	476	816	808	852
Clothing, men's	A	Max. 2% higher	566	618	730	758	1,656	1,717	1,894
	Average	Final	555	606	716	743	1,624	1,683	1,857
	B	Min. 2% lower	544	594	702	728	1,592	1,649	1,820
Leather, tanned, curried, and finished.	A	Max. 6% higher	453	480	553	564	1,296	1,105	1,601
	Average	Final	427	453	522	532	1,223	1,042	1,510
	B	Min. 6% lower	401	426	491	500	1,150	979	1,419
Lumber and planing-mill products, not including planing mills connected with sawmills.	B	Max. 3% higher	462	541	608	643	1,121	1,200	1,562
	Average	Final	449	525	590	624	1,088	1,165	1,517
	A	Min. 3% lower	436	509	572	605	1,055	1,130	1,471
Printing and publishing, book and job.	A	Max. 1% higher	693	645	746	788	1,412	1,789	2,032
	Average	Final	587	639	739	780	1,398	1,771	2,012
	B	Min. 1% lower	581	633	732	772	1,384	1,753	1,992
Petroleum refining	A	Max. 7% higher	703	627	718	803	1,576	1,433	1,718
	Average	Final	657	586	671	750	1,473	1,339	1,606
	B	Min. 7% lower	611	545	624	698	1,370	1,245	1,494
Glass	A	Max. 3% higher	654	716	656	826	1,463	1,381	1,714
	Average	Final	635	695	637	802	1,420	1,341	1,664
	B	Min. 3% lower	616	674	618	778	1,377	1,301	1,614
Iron and steel, steel works and rolling mills.	B	Max. 13% higher	644	633	802	760	1,953	1,162	2,072
	Average	Final	570	560	710	673	1,728	1,028	1,834
	A	Min. 13% lower	496	487	618	586	1,503	894	1,596
Smelting and refining, copper, lead, and zinc.	B	Max. 8% higher	550	622	665	669	1,171	801	1,344
	Average	Final	509	576	616	619	1,084	742	1,244
	A	Min. 8% lower	468	530	567	569	997	683	1,144
Automobiles	B	Max. 4% higher	529	518	606	766	1,329	1,017	1,657
	Average	Final	509	498	583	737	1,278	978	1,593
	A	Min. 4% lower	489	478	560	708	1,227	939	1,529
Railroad repair shops, steam	B	Max. 10% higher	585	613	716	705	1,533	1,285	1,753
	Average	Final	532	557	651	641	1,394	1,168	1,594
	A	Min. 10% lower	479	501	586	577	1,255	1,051	1,435
Agricultural implements	B	Max. 17% higher	483	508	605	686	1,288	1,101	1,473
	Average	Final	413	434	517	586	1,101	992	1,259
	A	Min. 17% lower	343	360	429	486	914	823	1,045

[1] See also Table 34, in which corresponding high, low, and final estimates are shown for intercensal years.

TABLE 14.—RATIOS SHOWING, FOR 1904 AND 1919, THE REPRESENTATIVENESS OF THE ESTABLISHMENTS SPECIALLY REPORTED FOR WEEKLY EARNINGS IN 1904, WITH NUMBER AND PERCENTAGE DISTRIBUTION IN 1899 AND 1919 OF WAGE EARNERS IN THE 41 SELECTED INDUSTRIES

SELECTED INDUSTRY	PERCENTAGES BORNE BY THE NUMBER OF WAGE EARNERS EMPLOYED IN SELECTED ESTABLISHMENTS, IN SPECIFIED WEEK[1] OF 1904, TO—		AGGREGATE AVERAGE NUMBER OF WAGE EARNERS		PERCENTAGES OF ALL MANUFACTURING WAGE EARNERS	
	The greatest number employed at any one time in all establishments in— 1904[2] A	The average number in all establishments in— 1919 B	1899 C	1919 D	1899 E	1919 F
All industries	47	36	4,712,763	9,096,372	100.00	100.00
Forty-one selected industries			3,337,685	6,210,033	70.82	68.27
Bread and other bakery products	65	42	60,192	141,592	1.28	1.56
Flour-mill and gristmill products	64	68	32,226	45,481	.68	.50
Confectionery	[3] 43	21	[3] 26,866	76,493	[3] .57	.84
Slaughtering and meat packing	40	22	68,386	160,996	1.45	1.78
Liquors, malt	52	83	39,459	34,259	.84	.38
Mineral and soda waters	65	55	8,788	17,440	.19	.19
Tobacco, cigars and cigarettes	51	61	103,365	138,773	2.19	1.53
Carpets and rugs, other than rag	29	35	28,411	22,933	.60	.25
Shirts	30	42	36,622	39,603	.78	.44
Clothing, men's	30	27	120,927	175,270	2.57	1.93
Clothing, women's	27	24	83,739	165,649	1.78	1.82
Cotton manufactures	[4] 58	47	302,861	446,852	6.42	4.91
Dyeing and finishing textiles, exclusive of that done in textile mills	51	36	29,776	55,985	.63	.62
Knit goods	39	26	83,691	172,572	1.78	1.90
Silk goods, including throwsters	34	24	65,416	126,782	1.39	1.39
Woolen and worsted goods	63	54	125,901	166,787	2.67	1.83
Boots and shoes, not including rubber boots and shoes	53	44	141,830	211,049	3.01	2.32
Leather, tanned, curried, and finished	50	56	52,109	72,476	1.11	.80
Furniture	44	41	87,262	138,331	1.85	1.52
Lumber and timber products	28	37	413,267	490,945	8.77	5.29
Lumber, planing-mill products, not including planing mills connected with sawmills	42	58	73,510	86,956	1.56	.96
Paper and wood pulp	51	34	49,646	113,759	1.05	1.25
Printing and publishing, book and job	50	43	67,610	123,005	1.43	1.35
Printing and publishing, newspapers and periodicals	58	54	94,604	120,381	2.01	1.32
Chemicals	51	21	15,163	55,586	.32	.61
Petroleum refining	78	26	12,199	58,889	.26	.65
Brick and tile, terra-cotta, and fireclay products	37	63	105,693	104,849	2.24	1.15
Glass	42	48	52,818	77,520	1.12	.85

[1] Namely, week for which earnings are reported in Census Bull. 93.
[2] Census Bull. 93, pp. 17, 98.
[3] "Confectionery and ice cream."
[4] "Cotton goods."

TABLE 14.—RATIOS SHOWING, FOR 1904 AND 1919, THE REPRESENTATIVENESS OF THE ESTABLISHMENTS SPECIALLY REPORTED FOR WEEKLY EARNINGS IN 1904, WITH NUMBER AND PERCENTAGE DISTRIBUTION IN 1899 AND 1919 OF WAGE EARNERS IN THE 41 SELECTED INDUSTRIES—Continued

SELECTED INDUSTRY	PERCENTAGES BORNE BY THE NUMBER OF WAGE EARNERS EMPLOYED IN SELECTED ESTABLISHMENTS, IN SPECIFIED WEEK OF 1904, TO—		AGGREGATE AVERAGE NUMBER OF WAGE EARNERS		PERCENTAGES OF ALL MANUFACTURING WAGE EARNERS	
	The greatest number employed at any one time in all establishments in— 1904 A	The average number in all establishments in— 1919 B	1899 C	1919 D	1899 E	1919 F
Iron and steel, blast furnaces	50	57	39,241	41,660	.83	.46
Iron and steel, steel works and rolling mills	47	32	183,249	375,088	3.89	4.12
Foundry and machine-shop products	58	51	350,327	482,767	7.43	5.31
Smelting and refining, copper, lead, and zinc	[5] 42	36	24,512	37,579	.52	.41
Automobile bodies and parts	30	1	[6] 1,810	132,556	.04	1.46
Automobiles	74	5	2,241	210,559	.05	2.31
Cars, steam-railroad, not including operations of railroad companies	86	90	33,453	52,298	.71	.57
Electric railroad repair shops	54	22	7,025	31,272	.15	.34
Steam-railroad repair shops	67	38	173,595	484,437	3.68	5.33
Agricultural implements	49	57	46,582	54,368	.99	.60
Rubber goods, not elsewhere specified	[7] 66	[8] 14	20,404	119,848	.43	1.32
Shipbuilding, steel	47	7	30,906	344,014	.66	3.78
Electrical machinery, apparatus, and supplies	47	17	42,013	212,374	.89	2.33

[5] Unweighted average of percentages given in Census Bull. 93, for smelting and refining of copper, lead, and zinc, respectively.
[6] For 1904, earliest date reported by the census.
[7] "Rubber and elastic goods."
[8] Per cent borne by employees in "rubber and elastic goods" in specified week of 1904 to average number in "rubber goods, not elsewhere specified," in 1919.

CHAPTER II

GENERAL SUMMARY

Before we attempt to present in summary form the general results of the analysis, there are given in Table 15 certain estimates of the amounts of per capita earnings, derived from different parts of the analysis and which, therefore, serve to some extent as mutual checks upon the accuracy of all of the results. These results can not be taken as exact to the decimal place. They are careful estimates—no more—and, especially in the case of the estimates of *amounts* of earnings, they are subject to some margin of error. The unavoidable dependence upon averages (even, in a few cases, upon averages of averages) and the necessity of resort to the device of interpolation to bridge intercensal gaps in the data—both militate against accuracy. Over against these untoward factors in the analysis must be set circumstances which, it is believed, go far to offset them, the great comprehensiveness of the basal census data, already reflected in the figures presented in the preceding chapter, and the close correlation which appears to exist between the results reached in this monograph and such authoritative unofficial reports on wages in manufacturing industries as are shortly to be brought in for comparison.

The figures given in the first column of Table 15 are amounts of per capita money earnings for all industries combined in each census year from 1899 to 1925, inclusive. These are the sums arrived at by methods elsewhere described and which are presented in greater detail in Chapter IV. In the next column are given the median industry

TABLE 15.—COMPARISON OF ESTIMATED PER CAPITA AMOUNTS OF EARNINGS (NOMINAL AND REAL), FOR ALL INDUSTRIES COMBINED, WITH THE MEDIAN INDUSTRY AVERAGES AND MEDIAN STATE AVERAGES, BY CENSUS YEARS: 1899–1925

CENSUS YEAR	MONEY EARNINGS			REAL EARNINGS [1]		
	Per capita, all industries combined	Median industry average	Median State average	Per capita, all industries combined	Median industry average	Median State average
1899	$446	$461	$449	$603	$623	$607
1904	483	504	492	582	600	593
1909	557	583	573	640	670	659
1914	576	616	592	576	616	717
1919	1,212	1,223	1,283	677	683	591
1921	1,047	1,103	1,041	595	627	772
1923	1,317	1,504	1,297	830	890	----------
1925	1,402	1,448	----------	823	852	----------

[1] Expressed in dollars of 1914 purchasing power.

averages spotted in ordinal arrays of the 41 selected industries. The figures in the first column, of course, include all of the industries reported by the census, some 356 industries. The corresponding figures for the median industry of the 41 selected industries constitute, however, an average (in this case a median) not for all industries reported by the census but only for the 41 selected industries which include, as has been noted, about 70 per cent of the wage earners in all manufacturing industries. It will be observed, in comparing the first two columns, that per capita money earnings for the median industries in each year since 1899 are higher than the per capita earnings for all industries combined. The inference seems to be warranted that the small and relatively unimportant industries, 300 in number, which are not reported separately in this survey and which employ only 30 per cent of all wage earners, pay somewhat lower wages, or provide less regular employment than the large industries, with the result that the wage earners in them receive lower earnings than wage earners in our selected industries. In other words, the selected industries are, on the whole, the higher paid industries. In the third column are given the median State averages. These averages include all of the States, and, of course, within each State, all industries. As is to be expected, the State medians, because of their greater industrial inclusiveness, generally are lower than the industry medians. In the right-hand part of the table are the same three series of figures for real earnings.

A comparison is made in Table 16 of the results obtained in the main part of the survey and the corresponding results obtained from the special study (reported in Part IV) of original establishment schedules in 20 industries and 8 cities. The more important figures are, of course, those for actual money earnings on the right-hand side of the table. The results in Part IV, it should be remembered, are based upon a sample and any case of doubt therefore will have to be resolved in favor of the estimates which emerge from the main analysis, if for no other reason than that the latter rest upon a broader statistical base. There is for all industries combined a difference of a little over $100 between the per capita average for all the manufacturing industries reported by the census and the corresponding median based upon analysis of 10,372 individual firms. If, instead of the median, the arithmetic mean is used, the difference is somewhat less. In the case of the corresponding figures for each of the 20 industries for which samples were large enough to warrant a separate showing, there is greater difficulty in measuring the difference, because the individual industry figures in Part II are presented for men and women separately. However, taking into account the naturally higher wages of men, there is a fairly close correspondence in the case of most of the industries listed.

TABLE 16.—COMPARISON OF RESULTS OBTAINED IN MAIN PART OF ANALYSIS WITH THOSE OBTAINED IN SPECIAL STUDY OF VARIABILITY, 1919

INDUSTRY	FULL-TIME MONEY EARNINGS PER CAPITA			ACTUAL MONEY EARNINGS PER CAPITA			
	Part II—Estimated average		Part IV—Median [1]	Part II—Estimated average		Part IV—	
						Median [2]	Weighted arithmetic mean
All industries [3]	$1,433		$1,377	$1,212		$1,316	$1,272
	Male	*Female*	*Male and female*	*Male*	*Female*	*Male and female*	*Male and female*
Slaughtering and meat packing [4]	1,627	----------	1,541	1,484	----------	1,541	1,544
Iron and steel, steel works and rolling mills	2,155	----------	1,644	1,728	----------	1,521	1,526
Automobiles	1,739	----------	1,499	1,278	----------	1,456	1,456
Car and general construction and repairs, steam-railroad repair shops	1,797	----------	1,433	1,394	----------	1,433	1,392
Printing and publishing, newspapers and periodicals	1,442	650	1,453	1,330	599	1,423	1,466
Foundry and machine-shop products	1,828	----------	1,360	1,450	----------	1,289	1,322
Brass, bronze, and copper products	----------	----------	1,322	----------	----------	1,240	1,202
Furniture	1,454	----------	1,292	1,192	----------	1,244	1,253
Mineral and soda waters	975	495	1,154	866	440	1,121	1,160
Clothing, women's [5]	1,970	1,041	1,214	1,586	838	1,120	1,227
Boots and shoes, other than rubber	1,505	963	963	1,342	859	949	1,016
Tobacco, cigars and cigarettes	1,094	608	832	907	504	704	758

[1] Per capita full-time amount for establishment employing median wage earners.
[2] Per capita amount paid in establishment employing median wage earners; this is not the same, necessarily, as the median establishment.
[3] "All industries" in variation study includes only 20 industries in 8 cities.
[4] Industry used in variation study: "Slaughtering, wholesale, not including meat packing."
[5] Large differences possibly due to fact that Chicago was not included in variation analysis.

COMPARISON OF CENSUS RESULTS WITH OTHER ESTIMATES OF EARNINGS

A comparison of the results reached in this book with those arrived at by the National Bureau of Economic Research and, for two isolated years, by the National Industrial Conference Board, are presented in Table 17. The figures from the National Bureau of Economic Research are per capita annual earnings in manufacturing industries, excluding clerical and salaried employees.[1] A comparison of the national bureau's figures with those in the preceding column, which contains the estimates made in this monograph for actual earnings per capita, is reassuring as to the approximate accuracy of the present estimates of amounts of earnings. In the second column of the table are presented adjusted census estimates of *full-time* per capita earnings and, as is to be expected, these latter in all years are higher than the national bureau's figures for actual earnings.

In the first column of Table 17 is the series of census average wage[2] items. It is included here in order to indicate how inadequate they

[1] The original figures include salaried workers, but the bureau has kindly permitted us to use its unpublished estimates, from which salaried workers are excluded.
[2] See initial paragraph, Chap. XIII, p. 269.

would prove to be if one were to assume that they represented either rates of full-time earnings or actual earnings.

It might be supposed, at first blush, that sufficiently accurate estimates of amounts of actual per capita earnings might be made by direct multiplication of the estimated fractions of full employment by the census average wage—this latter item being taken to measure very closely the amounts of "full-time per capita earnings." Unfortunately, this relatively simple and direct procedure does not appear to produce as reliable results as those arrived at by the more complicated analysis which has been used in this monograph. Illustrative figures of the more direct method are given in column B, Table 17. The resulting sums are much lower than any of the other

TABLE 17.—COMPARISON OF VARIOUS ESTIMATES OF ANNUAL MONEY EARNINGS, PER CAPITA

YEAR	Census average wage A	"A" × ratio actual to full employment B	Hypothetical "full-time earnings" C	Estimated actual per capita earnings ("C" × employment ratio) D	National Bureau of Economic Research (factories, excluding clerical and salaried) [1] E	National Industrial Conference Board, weekly earnings figures × 51 (23 industries) [2] F	Other estimates G
1909	$518	$449	$643	$557	$499	----------	----------
1910	529	451	654	559	548	----------	----------
1911	536	430	662	534	521	----------	----------
1912	554	477	684	592	569	----------	----------
1913	576	497	712	617	600	----------	----------
1914	580	464	719	576	539	$640	----------
1915	592	490	732	608	589	----------	----------
1916	684	619	846	768	727	----------	----------
1917	793	693	980	860	836	----------	----------
1918	1,039	887	1,284	1,104	1,007	----------	[3] $1,349
1919	1,158	975	1,433	1,212	1,081	----------	----------
1920	1,393	1,200	1,722	1,488	1,409	1,498	[4] 1,503
1921	1,180	846	1,462	1,047	916	1,204	[4] 1,027
1922	1,152	----------	1,424	1,171	----------	1,226	----------
1923	1,267	----------	1,566	1,317	----------	1,354	----------

[1] National Bureau of Economic Research, unpublished manuscript. These figures have been kindly placed at the disposal of the writer by the directors of the national bureau.

[2] Reprinted by permission. National Industrial Conference Board, Wages in the United States (New York, 1926), p. 36. The figures given in column F are derived from the board's weekly earnings figures, shown quarterly, except that for 1920 and 1922 only the third and fourth quarters are reported and for 1914 data are given only for the month of July.

[3] Bureau of Labor Statistics Bull. 357, p. 4: Average earnings income of husbands in 12,096 (wage earning and low or medium salaried) families in 92 cities in the United States.

[4] National Bureau of Economic Research: Employment, Hours, and Earnings in Prosperity and Depression, p. 110. Figures represent earnings per capita of wage earners attached to industry. Salaried employees are included.

estimates given in the table; too low, in the writer's opinion, to be considered seriously.[3] The difference between the amounts of the census average wage and the national bureau's estimates of actual earnings, on the one hand, and the present estimates of full-time

[3] The direct products are 20 per cent lower than the estimates shown in column D; the census average wage item itself, moreover, is 20 per cent lower than the present revised estimate of full-time annual earnings shown in column C.

earnings, on the other hand, is so great as to confirm the statement already made, that these census average wage figures, as absolute sums, mean little or nothing, and that they can be used only in the form of full-time relatives to aid in the estimation of amounts of earnings and as a stepping stone to the calculation of relatives of actual earnings. In the last two columns of Table 17 are presented some fragmentary figures from the National Industrial Conference Board's published wage statistics and from the report on "Employment, Hours, and Earnings," published by the National Bureau of Economic Research. The figures given in the column headed "National Industrial Conference Board" are obtained by multiplying that organization's weekly earnings figures by 51. The figures for 1920 and 1921 in the last column are in the form in which they appear in the national bureau's report. The correspondence, especially in 1920 and 1921, between the conference board's and the national bureau's figures, and those of this monograph, is quite close.

In Table 18 there is a comparison for the year 1921 containing separate estimates for the three geographic regions of the country,

TABLE 18.—COMPARISON OF CENSUS RESULTS FOR THREE GEOGRAPHIC REGIONS WITH RESULTS OBTAINED BY NATIONAL BUREAU OF ECONOMIC RESEARCH: 1921

REGION	CENSUS RESULTS			NATIONAL BUREAU'S ESTIMATE	
	Census average wage	Full-time earnings per capita	Actual earnings per capita [1]	Actual earnings per capita [2]	Per capita of employees on pay rolls [3]
United States	$1,180	$1,462	$1,047	$1,027	$1,355
Northeast	1,223	1,521	1,053	1,029	1,358
South	906	1,100	768	903	1,191
West	1,386	1,685	1,249	1,213	1,600

[1] Of all wage earners attached to industry, excluding salaried employees.
[2] Of all wage earners attached to industry. Figure for United States as a whole from National Bureau of Economic Research, Employment, Hours, and Earnings. Corresponding figures for the 3 regions calculated from figures in last column on the basis of the ratio between 1,027 and 1,355.
[3] Including salaried employees. Computed from figures on number of employees and corresponding figures on quarterly wages and salaries kindly furnished the writer by the National Bureau of Economic Research, which did not publish in its report per capita earnings by geographic divisions. Figures given are the aggregates of the 4 quarterly quotients obtained by dividing the amount paid out in wages and salaries in each quarter of the year by the number of employees on the pay roll in that quarter.

between our own estimates of per capita earnings and those published by the National Bureau of Economic Research in its report on "Employment, Hours, and Earnings," already referred to. It must be remembered that the national bureau's estimates include clerical and salaried employees. The last two columns of the table are based upon two types of estimates. The next to the last column contains the national bureau's estimate of the actual money earnings per capita of all manufacturing wage earners *attached to the various manufacturing industries*. The figures for the United States as a whole are given in the form reported by the national bureau. The

figures for the three geographic regions are interpolated from the figures in the last column, on the basis of the ratios between the amount for the United States as a whole ($1,355) and the three regional amounts shown below it. The national bureau's figures for the United States as a whole are obtained by dividing the quarterly amounts paid out in wages by the number of employees on pay rolls in the peak quarter of the period which its investigation covered, this being, for factories, the third quarter of 1920. Its second estimate, shown in the last column, reports estimated money earnings per capita of employees on pay rolls. This latter number of employees is, of course, smaller than the number attached to the industry, and the resulting quotient represents, therefore, higher money earnings received per capita. These figures are obtained by dividing the total quarterly amounts paid in wages and salaries in concerns reported in the national bureau's investigation by the number of employees on the pay roll in the same quarterly period.[4] The figures shown in Table 18 are, of course, the aggregate of the four quarterly quotients which the national bureau derived from the returns received in its investigation.

TABLE 19.—COMPARISON OF INDEXES OF RATES OF WAGES, PER CAPITA, OF UNSKILLED LABORERS IN MANUFACTURING INDUSTRIES WITH INDEXES OF EARNINGS FOR ALL MANUFACTURING WAGE EARNERS: 1899–1924

[1914=100]

YEAR	INDEX NUMBERS OF ANNUAL MONEY WAGES		YEAR	INDEX NUMBERS OF ANNUAL MONEY WAGES	
	Wage rates, unskilled manufacturing laborers [1]	Earnings, all manufacturing wage earners		Wage rates, unskilled manufacturing laborers [1]	Earnings, all manufacturing wage earners
1899	81.3	77	1912	95.5	103
1900	82.4	78	1913	100.2	107
1901	84.5	82	1914	100.0	100
1902	86.4	86	1915	100.4	106
1903	89.0	86	1916	122.0	133
1904	89.8	84	1917	151.0	149
1905	90.6	93	1918	188.0	192
1906	94.5	99	1919	217.6	210
1907	98.2	101	1920	247.0	258
1908	93.2	86	1921	191.2	182
1909	94.4	97	1922	188.3	203
1910	96.9	97	1923	206.8	229
1911	93.7	93	1924	207.0	227

[1] Reproduced by permission of the author from Coombs, Whitney, Wages of Unskilled Labor in Manufacturing Industries in the United States, 1890–1924. (New York: Columbia University Press: 1926), p. 99. Mr. Coombs' 1913 base is here shifted to 1914

A comparison of the results of an independent analysis of the wages of unskilled manufacturing laborers with the index of money earnings developed in these pages is made in Table 19. A close correspondence

[4] The figures used are from data kindly furnished the writer by the directors of the National Bureau of Economic Research. They are not weighted (as are the published figures for the United States as a whole) with the numbers in the different industries reported by the census. The published results of the bureau's investigation do not include any report of per capita earnings by geographic regions.

in the fluctuations—especially in respect to timing—is to be observed. The narrower amplitude of fluctuation in the index for unskilled labor, is no doubt, chiefly attributable to the fact that it is based on wage rates, whereas the present study rests on earnings.

EARNINGS FOR ALL INDUSTRIES COMBINED

Figures which indicate the final results obtained, both for the United States as a whole and for all industries combined, and which also indicate in a general way the process by which the final figures are arrived at, are given in Table 20. The table includes not only the manufactures census years, but also estimates for intercensal years which have been interpolated after the manner explained in Chapter XIX. Figures in column 1 are census average[5] amounts obtained for the census years by dividing the amount paid in wages by the number of wage earners as reported by the census. The second column contains estimated amounts of "full-time earnings" for corresponding years and derived from the census averages by way of the amounts of average weekly earnings in 1904, reported in Census Bulletin 93. In the third column are given the estimated ratios of actual to full employment which when multiplied by figures in the preceding column produce the estimated amounts of actual money earnings per capita shown in column D. In the fourth column (E) is the index of the cost of living, which is constructed as explained in Chapter XVII and which, when divided into the actual money earnings of column D, produces the estimated amounts of the purchasing power of money earnings, in 1914 dollars, as shown in column F. The figures in the last column, showing the estimated per capita amount of gain or loss in the purchasing power for each year since 1899, will be discussed presently.

The figures of columns A, B, C, and D of Table 20 are plotted in graphic form in Figure 4, which shows by the length of the bars the amounts of per capita earnings in all industries. The crosses on the bars indicate the amounts of the census average wage for each year. In most of the years it is evident that this simple census average is very close to the quantity described as "actual money earnings." But in some years, indeed, in most of the years since 1915, there is a very wide margin between these items. The disparity between them is, on the whole, so great as to make the census average wage,[5] per se, entirely unsatisfactory as a measure of labor incomes. Nor is the relationship between the census average wage and the amounts of *full-time* money earnings (the full length of the bars in fig. 4) without significance. The wide margin between them certainly indicates, if there be any validity in the method by which "full-time earnings"

[5] See initial paragraph, Chap. XIII, p. 269.

are calculated in this monograph, that the census average wage can not be used as a measure of absolute amounts of "full-time earnings." An inspection of Figure 4 will show that, although a wide margin in absolute dollar sums exists between the census average wage and

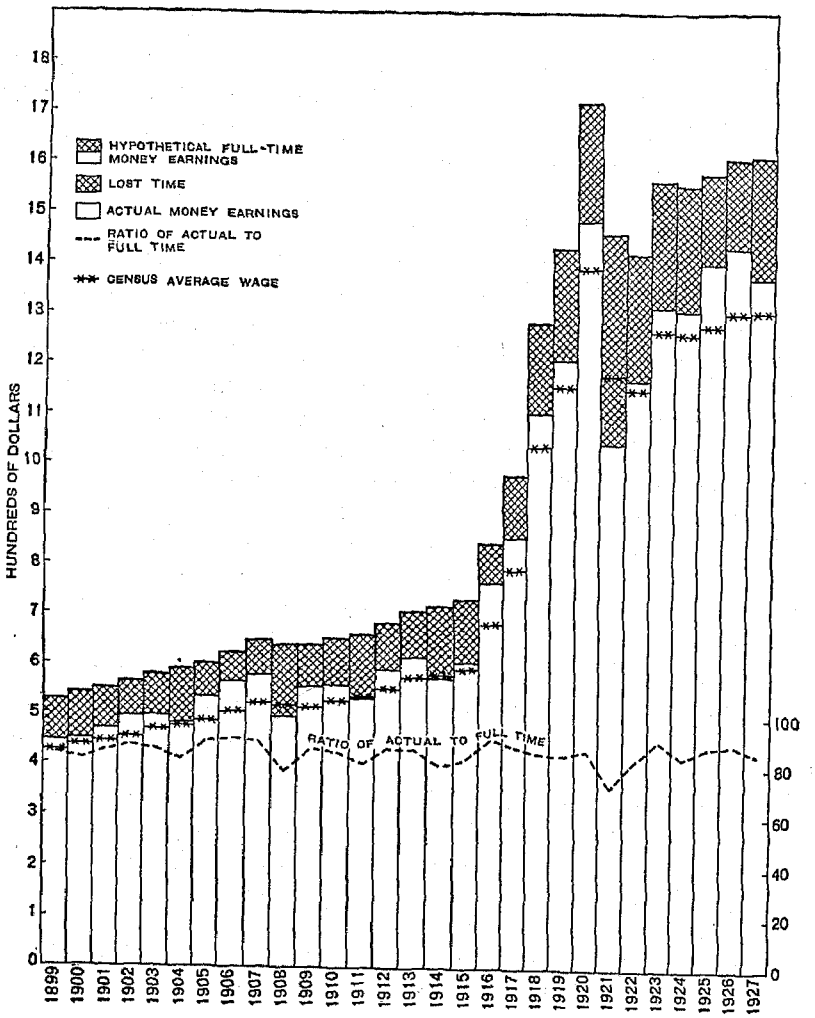


FIG. 4.—ILLUSTRATION OF THE PRINCIPAL STEPS IN THE DERIVATION OF MONEY EARNINGS FROM CENSUS AVERAGE WAGE, ALL INDUSTRIES: 1899–1927

full-time earnings, there is, nevertheless, a fairly constant relationship between them; the former item is 20 per cent lower than the latter, and this relationship holds good throughout the 29-year period. If the two series were plotted as line curves on a ratio chart, they would be parallel. It follows that *changes* in the census average wage amounts faithfully reflect *changes* in "full-time earnings."

This being so, the index number of the census average wage figures are relied upon in following chapters as points of departure for the estimation of index numbers of both actual money earnings and actual real earnings.

TABLE 20.—CHIEF STEPS IN DERIVATION OF ESTIMATES OF REAL EARNINGS FROM THE CENSUS AVERAGE—UNITED STATES, ALL INDUSTRIES COMBINED

YEAR	Census average wage A	Estimated full-time money earnings B	Estimated ratio, actual to full employment C	Actual money earnings D	Index of cost of living 1914=1000 E	Purchasing power of money earnings in 1914 dollars F
1899	$426	$525	0.849	$446	0.74	$603
1900	440	544	.825	449	.76	591
1901	447	552	.854	471	.78	604
1902	458	566	.878	497	.80	621
1903	469	579	.860	498	.84	593
1904	477	590	.819	483	.83	582
1905	487	602	.801	536	.83	646
1906	506	626	.908	568	.86	660
1907	526	650	.891	579	.91	636
1908	520	643	.772	496	.87	570
1909	518	643	.866	557	.87	640
1910	529	654	.854	559	.92	608
1911	536	662	.807	534	.95	562
1912	554	684	.866	592	.96	617
1913	576	712	.866	617	.99	623
1914	580	719	.801	576	1.00	576
1915	592	732	.831	608	.98	620
1916	684	846	.908	768	1.07	718
1917	793	980	.878	860	1.29	667
1918	1,039	1,284	.860	1,104	1.57	703
1919	1,158	1,433	.846	1,212	1.79	677
1920	1,303	1,722	.864	1,488	2.05	726
1921	1,180	1,462	.716	1,047	1.76	595
1922	1,152	1,424	.822	1,171	1.66	705
1923	1,267	1,566	.905	1,317	1.69	839
1924	1,262	1,560	.840	1,310	1.69	776
1925	1,280	1,582	.886	1,402	1.70	825
1926	1,302	1,610	.892	1,436	1.73	830
1927 [1]	1,304	1,612	.852	1,373	1.71	805

[1] The figures for 1927, in this and other tables of earnings for all industries combined, have been exterpolated from the estimates for 1925, with the aid of the indexes of employment and of pay roll published by the United States Bureau of Labor Statistics. Official census data on wage earners and wages for "All industries" for 1927 (in press release for Feb. 28, 1929) were not available until after these calculations had been made and page proof reached. The census average wage calculated from these preliminary official figures is $1,299.

The purpose of Figure 4 is not to throw light on amounts of earnings only. It may be made to serve as well as would a line chart based upon index numbers, for a discussion of the question of gains and losses in purchasing power. As to amounts of earnings, we can only draw conclusions as between different years on the basis of the lengths of bars drawn to the scale of deflated—that is to say, real—earnings. It appears from these magnitudes that in terms of dollars having the purchasing power of dollars in 1914, earnings have ranged in per capita amount between $562 and $839 a year. The several causes of successive ups and downs in purchasing power during the 29-year period need not be discussed here, inasmuch as they are con-

sidered in some detail in Chapter IX. The 29-year period concludes with a rise in purchasing power that is more precipitate than in any of the previous years in the period studied. It would appear, in so far as we can rely upon the figures upon which the chart is based, that the manufacturing wage earner was in 1925 far better off than he had been during any earlier part of the twentieth century. His real earnings in 1925 were 37 per cent higher than his real earnings of 1899 and 43 per cent higher than 1914. In 1927 the buying power of his earnings was 34 per cent above 1899 and 40 per cent above 1914. Since 1899 his real earnings have increased at an average rate of about 1 per cent a year. However, the wage earner has had to live and bring up his family not only in 1925; he has had to buy food and clothing and shelter from week to week throughout each year of the 29 years reported. And, generally speaking, he has had to buy those things with the earnings of the current year, so that it may often have happened that he had in a year of high-purchasing power, to spend a part of that purchasing power in the payment of debts contracted in a preceding year of very low purchasing power. It is important, therefore, to endeavor to ascertain to what extent gains or losses in purchasing power in certain years are gains or losses net. The year 1899 was not a year of marked business depression. It was on the contrary rather prosperous, yet not so prosperous a business year as to make it entirely inappropriate to consider it as approximating a normal year. At any rate it is distinctly more representative a year from which to measure approximate gains and losses than the extremely low year 1914. It furthermore has the advantage of being the first year covered by the present analysis.

If, then, the purchasing-power level of 1899, estimated at $603, is projected through the 29-year period to the end of 1927, as indicated by the line across Figure 5 (based on columns D, E, and F of Table 20), we mark off the years in which wage earners have received in earnings a larger purchasing power, and those years in which they received a smaller purchasing power than they received in 1899. The progress made by wage earners in respect to their real earnings then would be measured rather by a comparison of the area above and below this line than by reference to the relation between what is, very possibly, a temporary high peak in 1925 and the level of 1899. There were evidently only seven years in which the average wage earner lost ground in respect to the purchasing power of his money earnings *as compared with 1899*. But, reckoning from year to year, it appears that he suffered losses in real wages in 13 years out of 29. Now, of course, it would be absurd to pretend that these estimates are statistically accurate to the last dollar, or even to the last few dollars. They are not at all accurate in that sense; yet it is believed that the general picture which they form does not seriously misrepresent the actual

situation. It is not forgotten, either, that we are speaking of *average* wage earners, who have a merely hypothetical existence. It is of course true that, despite the implications of the foregoing statements, there were many wage earners who did not achieve any net gain in purchasing power during the 29-year period, and it is equally true that there were many wage earners who achieved even greater net

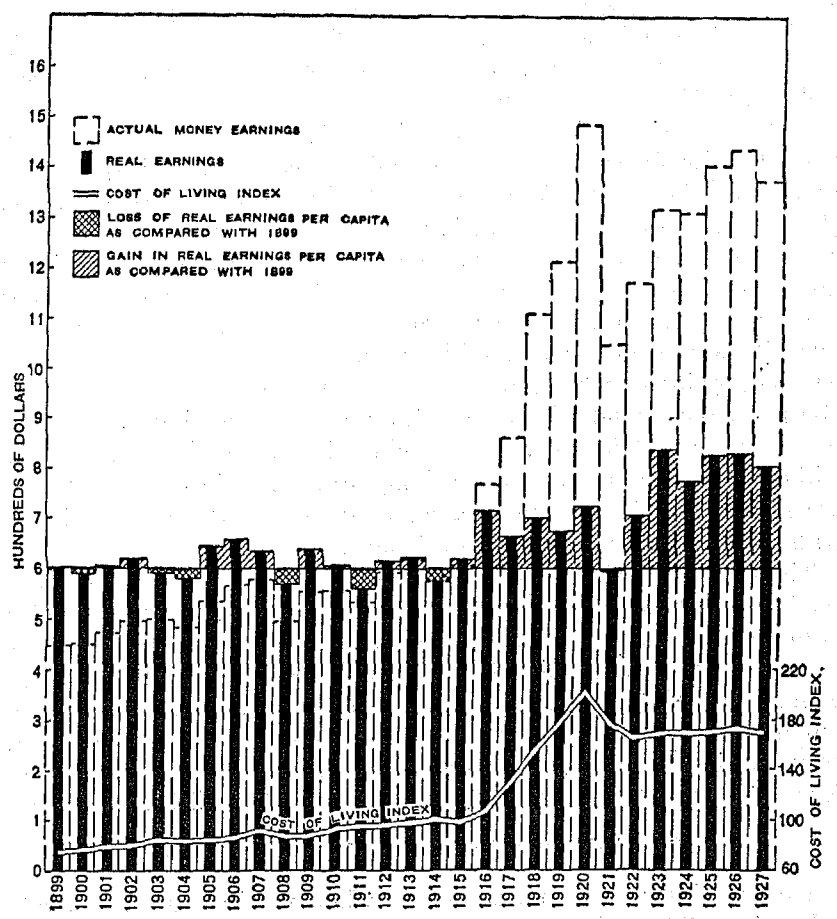


FIG. 5.—ILLUSTRATION OF PRINCIPAL STEPS IN THE DERIVATION OF REAL EARNINGS FROM CENSUS AVERAGE WAGE, ALL INDUSTRIES: 1899-1927

gains in purchasing power than are indicated here. It seems altogether likely that, as to a very large proportion of the manufacturing wage earners in the United States, the balance of loss and gain is fairly close to that indicated in the chart.

It would seem that on surveying the pre-war part of the period that the American wage earner did not make any gains in real earnings which were not in a large measure canceled out, in effect, by losses in

real earnings in other years of the period. The years following the war tell a different story: Only once—in 1921—have real earnings fallen below their level of 1899; in every other postwar year they were much higher than in 1899. It seems quite certain that the manufacturing wage earner has achieved permanently higher levels of real wages. History probably will record the last decade as the one to witness quite unprecedented gains in the purchasing power of wage earners. The gain between 1914 and 1927 was at the rate of nearly 4 per cent a year. But it must not be forgotten that the 15 years following 1899 saw practically no gains.

It is realized, of course, that this analysis of the problem oversimplifies the situation. We have to deal not simply with the cost of living; standards of life have also to be reckoned with. These standards, in our manufacturing communities as elsewhere, have risen considerably since 1899. This means that, if progressively improving standards of life are to be maintained, the wage earner must be able to do more than earn enough in 1927 to buy the same quantity and kind of commodities he bought in 1899. He must be enabled, by his money earnings, to get more and better commodities, else his higher standards of life will crumble. The above discussion of net gains and losses in real earnings has proceeded deliberately without reference to changes in living standards, in order to try to ascertain in how far earnings have served to meet the costs of living, with standards assumed to be stationary.

The figures (as charted in fig. 4 and elsewhere) do show that since the low-purchasing power year 1914 there have been enormous gains in purchasing power (which are net, so far as the past decade is concerned). And these gains have made it possible for many wage earners to make up deficits hanging over from the previous decade, but also to purchase the larger volume of better and more varied commodities, which represent those elevated standards of life which, for many wage earners, actually have been made realities since 1914.

NET BALANCES IN INDIVIDUAL INDUSTRIES

We get closer to actual situations when we deal with separate industries. Then, despite the fact that we are dealing with nebulous averages, we are probably nearer to the actual sums concealed by those averages. Fortunately there are 12 of the selected industries for which we can show the estimated amounts of real earnings for the intercensal as well as the census years. In Figures 6A and 6B the results for these industries are given in graphic form, the figures for the chart being based upon Table 63, on page 144.

It is evident, as we should expect, that there are wide differences among these 12 industries in respect to purchasing power variations

from the buying power of the wage earners in those industries in 1899.

Not all of these industries brought to their workers slumps in purchasing power in 1921; all of them, however, with the single exception of the silk industry, in which there was no change experienced gains in purchasing power from 1922 to 1923. Most of them reached new high levels in 1923. The tobacco industry is notable for the fact that in nearly every year for which we have record since 1899 the purchasing power of per capita earnings has been lower than it was in 1899. All of the 12 industries, except automobile manufacturing, suffered losses in real earnings per capita from 1923 to 1924; these losses, however, in 6 of the industries were pretty largely canceled by gains between 1924 and 1925. Among the 12 industries the only one in which annual real earnings per capita never once, during the years from 1900 to 1927, declined again to a point as low as that at which they stood in 1899 is the woolen industry. Such gains are needed in this industry if they are needed anywhere; it was, and despite its gains still remains, a low-wage industry. In 1899 its average was by far the lowest of the 12 industries now being discussed. The tobacco industry which since 1899 has been witnessing an almost continuously declining average of real wages, in 1899 was safely above the bottom of the list; it has the poorest record of all the 41 industries included in this analysis. It is the only industry of the 12 for which annual data are reported in these pages to come to the year 1927 with a real wage below that of 1899. Even among the 41 industries there is no industry, except tobacco, that shows a lower real wage level in 1923 than in 1899.

THE INDEX NUMBERS

Almost without exception the index numbers published in this monograph are put upon the 1914 base. This procedure has been dictated by practical considerations and carries no assumption that 1914, more than any other year, has special significance as a standard from which to calculate losses and gains in real earnings. Indeed, we have just used the year 1899 as a point of departure without intending to make any assumption as to whether real earnings were adequate or inadequate at that time.

The relative numbers corresponding to the absolute dollar amounts shown in Table 20 are given in Table 21, which lists in parallel columns index numbers of "full-time money earnings," factory employment, actual money earnings, the cost of living, and real earnings. The data of the first three columns are plotted in Figure 7.

In order not to distort the degrees of change the data have been plotted on a logarithmic scale—that is to say, a scale in which equal percentages of change either up or down—are shown by the

ESTIMATED AVERAGE AMOUNTS OF REAL LABOR INCOME IN 12 SELECTED

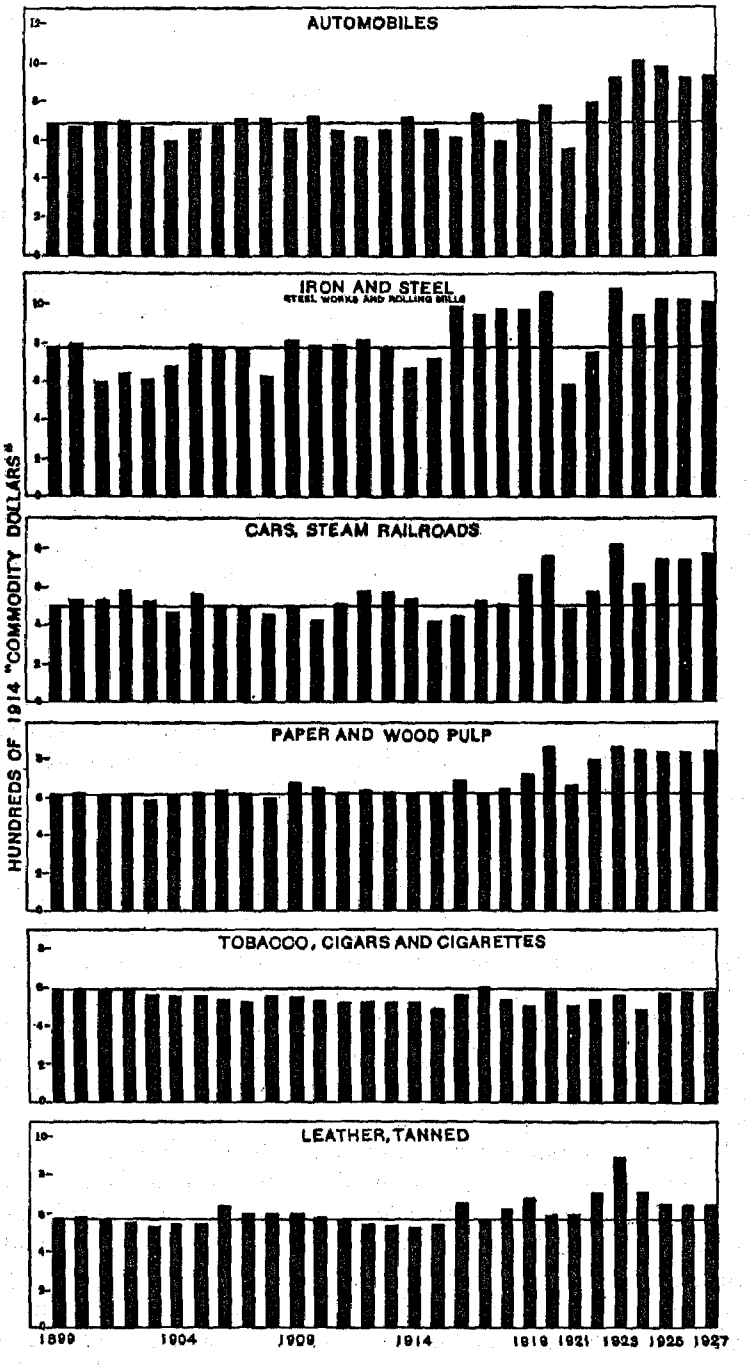


FIG. 6A

INDUSTRIES,1899–1927. (UNIT: DOLLAR OF 1914 PURCHASING POWER.)

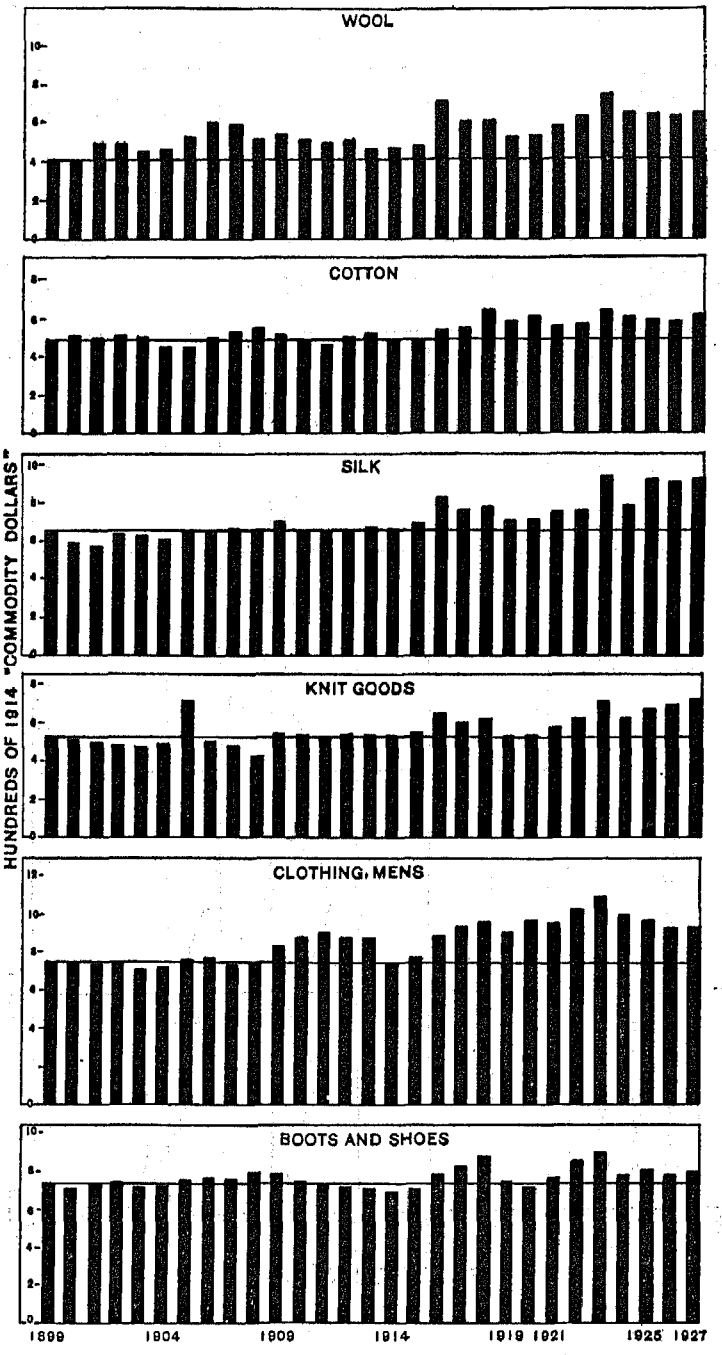


FIG. 6B

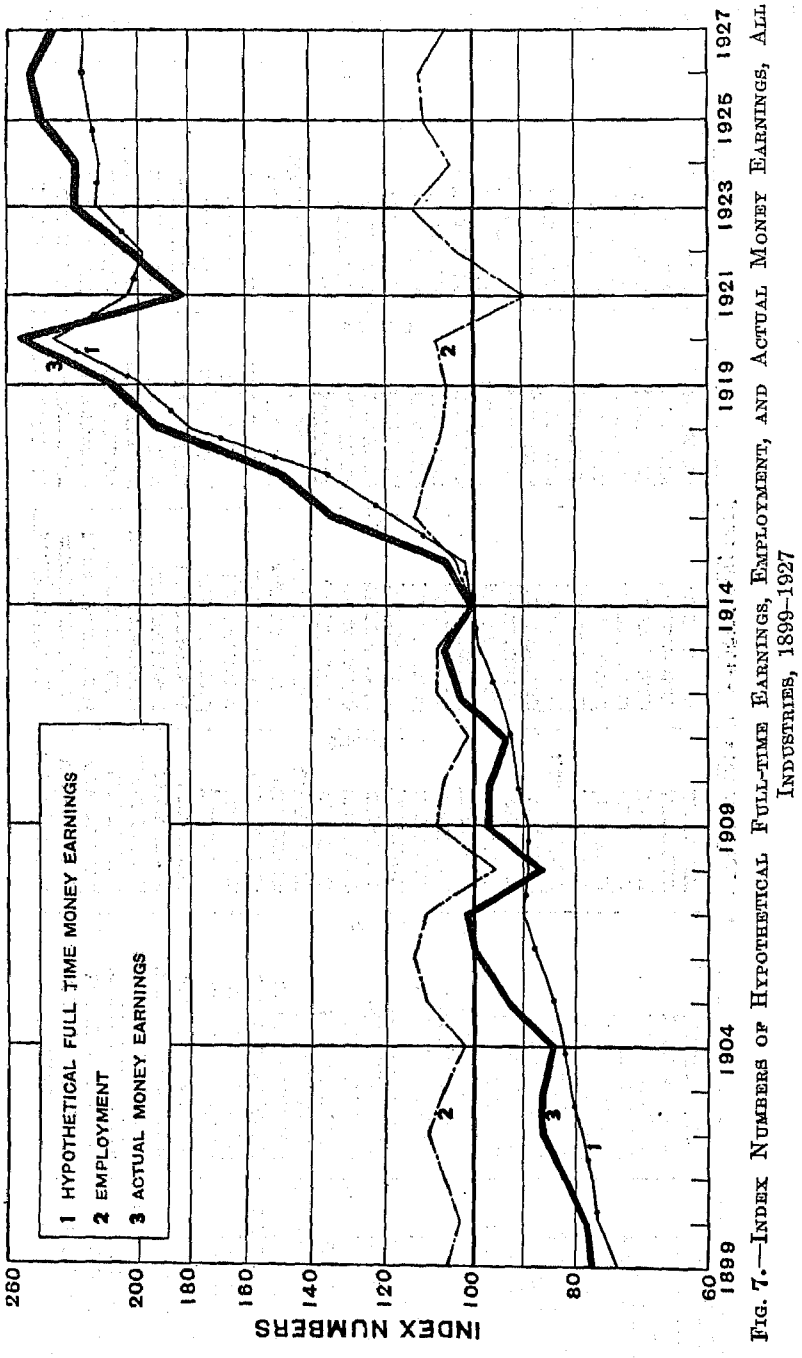


FIG. 7.—INDEX NUMBERS OF HYPOTHETICAL FULL-TIME EARNINGS, EMPLOYMENT, AND ACTUAL MONEY EARNINGS, ALL INDUSTRIES, 1899–1927

traversing of equal distances up or down on the chart. On this chart are shown the prime factors affecting money earnings. The solid line representing "hypothetical full-time earnings," or annual rates of wages, is naturally smoother than the line representing actual money income, because full-time earnings, unlike actual earnings, are not affected by fluctuations in employment. The actual money earnings (or labor incomes) of factory wage earners depend upon both wage rates and the amount of employment. Real earnings

TABLE 21.—INDEX NUMBERS OF (1) HYPOTHETICAL FULL-TIME MONEY EARNINGS; (2) EMPLOYMENT; (3) ACTUAL MONEY EARNINGS; (4) THE COST OF LIVING; AND (5) THE PURCHASING POWER OF ACTUAL MONEY EARNINGS, IN THE UNITED STATES, ALL INDUSTRIES, EACH YEAR: 1899–1927

YEAR	INDEX NUMBERS OF—					Link relatives of change in real earnings from preceding year
	Hypothetical full-time money "earnings"	Employment	Money earnings, actual	The cost of living	Real earnings	
1899	73	106	77	74	105	
1900	76	103	78	76	103	−2.0
1901	77	107	82	78	105	2.2
1902	79	110	86	80	108	2.8
1903	81	107	86	84	103	−4.5
1904	82	102	84	83	101	−1.9
1905	84	111	93	83	112	11.0
1906	87	113	99	86	115	2.2
1907	90	111	101	91	110	−3.6
1908	89	96	86	87	99	−10.4
1909	89	108	97	87	111	12.3
1910	91	107	97	92	106	−5.0
1911	92	101	93	95	98	−7.6
1912	95	108	103	96	107	9.8
1913	99	108	107	99	108	1.0
1914	100	100	100	100	100	−7.5
1915	102	104	106	98	108	7.6
1916	118	113	133	107	125	15.8
1917	136	110	149	129	116	−7.1
1918	179	107	192	157	122	5.4
1919	199	106	210	179	118	−3.7
1920	239	108	258	205	126	7.2
1921	204	89	182	176	103	−18.0
1922	198	103	203	166	122	18.5
1923	218	113	229	169	146	17.0
1924	217	105	227	169	135	−7.5
1925	220	111	243	170	143	6.0
1926	224	112	249	173	144	1.0
1927	224	106	238	171	140	−2.5

depend in part upon changes in the cost of living, in part upon wage rates, the equivalents of which are here reported, on an annual basis, as hypothetical full-time earnings, and finally, not least, upon the extent of unemployment.

The final factor of deflation is not introduced in Figure 7, because to do so would unduly crowd the picture. In Figure 8 the money income curve shown in Figure 7 is plotted along with the curve of "real" income obtained by deflating the nominal dollar amounts to

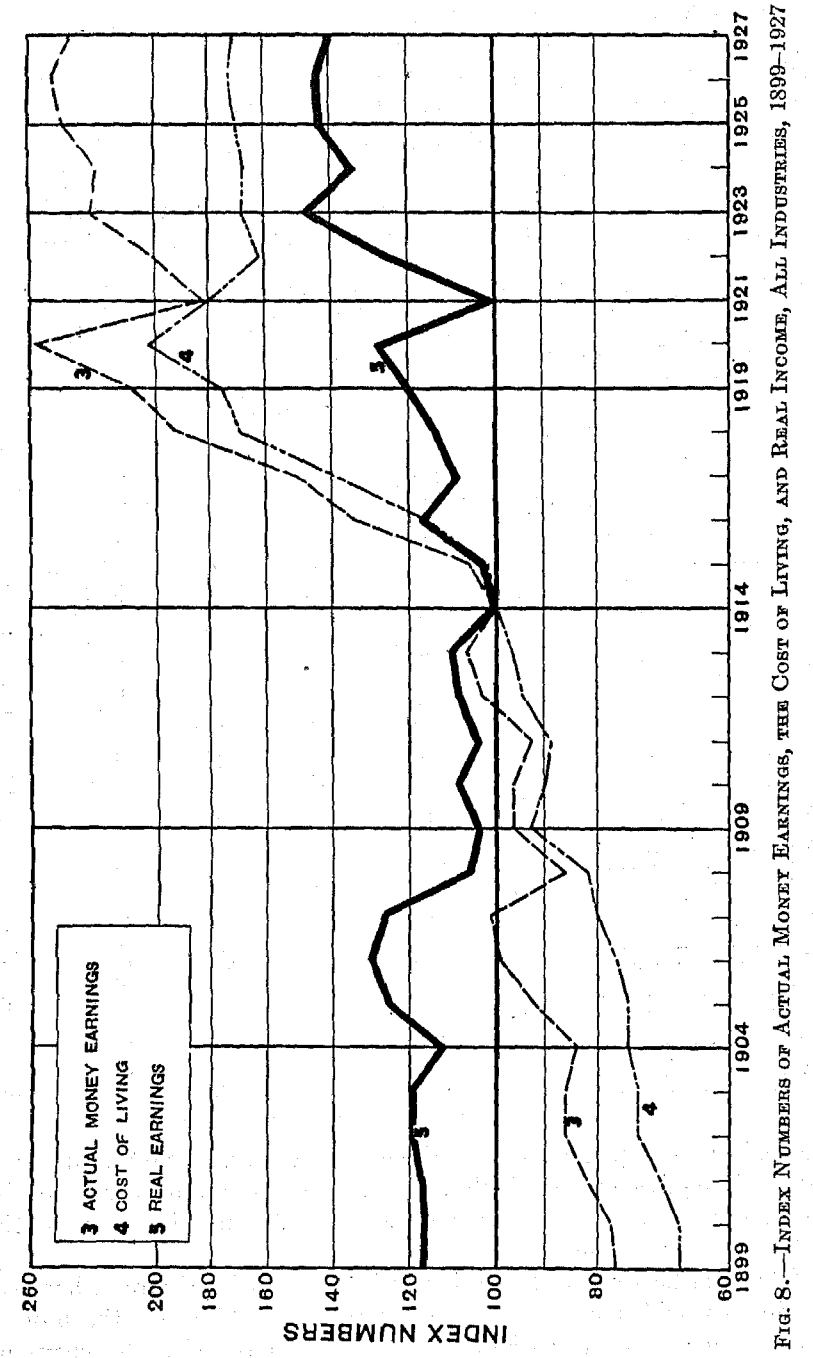


FIG. 8.—INDEX NUMBERS OF ACTUAL MONEY EARNINGS, THE COST OF LIVING, AND REAL INCOME, ALL INDUSTRIES, 1899–1927

:he uniform purchasing-power basis of 1914. The index numbers of :he cost of living, which are used in the process of deflation, are also)lotted on the chart. The curve of real income shows the same gen-)ral drift disclosed in Figure 5, where the absolute amounts of earn-ngs are shown.

MONTHLY FLUCTUATIONS IN MONEY EARNINGS

A monthly index of the purchasing power of annual earnings, per :apita of employed wage earners is given in Table 22. The index s derived with the aid of figures published by the United States 3ureau of Labor Statistics reporting changes in the cost of living ınd in per capita earnings. The latter data have been reported nonthly, first for 13 and later for as many as 53 manufac-uring industries. Their utilization in combination with the annual igures shown in the preceding pages has rested upon the assumption hat the desired relatives representing monthly fluctuations in the .nnual rate of (labor) income, per capita, must stand in the same)ositions, relative to the already computed annual rates for the year .s a whole, as do the bureau's monthly relatives to the yearly average truck from them. For the years 1915 to 1924, inclusive, the Federal)ureau's data were utilized in the form of the chain relatives calcu-ated by the Federal Reserve Bank of New York. For the years 924 to 1928, inclusive, the bureau's monthly index of total pay roll ?as divided by its index of employment, the quotient being assumed o represent relative changes in per capita earnings and so applied, s above explained, to the annual census estimates to produce the elatives in the first column of Table 22.

The annual data for intercensal years are interpolated by the ıethod described in Chapter XIX. The resulting continuous series f annual data for the period 1915–1928 is thus made the point of .eparture for the calculation of the index numbers in the first column f Table 22. The figures of the second column, showing, for each ıonth, the estimated annual labor income rate, are derived from the nnual estimates [6] by applying to them the percentages of change ıdicated by the relatives of the first column.

The cost of living index in the middle column of Table 22 is derived :om the reports of the United States Bureau of Labor Statistics on hanges in the total cost of living in the United States. The starred ;ems are the months for which the bureau has reported the cost of ving, the base, however, being shifted to 1914. The indexes for the ıtervening months have been interpolated along a smooth curve, and re assumed to represent the most probable monthly trend of the ost of living. The cost of living index, divided into the index of

[6] From column D of Table 20.

money income in the first column, gives us an index of monthly changes in the annual rate of real earnings. From this, in the same fashion as for money income, are derived the monthly estimates (in the last column) of the annual rate of real earnings. The dollar amounts shown in Table 22 are plotted in Figure 9.[7]

TABLE 22.—MONTHLY FLUCTUATIONS IN MANUFACTURING LABOR INCOMES, PER CAPITA, OF EMPLOYED WAGE EARNERS, JANUARY, 1915, TO DECEMBER, 1928

MONTH	ESTIMATED MONEY EARNINGS PER CAPITA		Cost of living (1914=100)	ESTIMATED REAL EARNINGS PER CAPITA		ESTIMATED MONEY EARNINGS PER CAPITA		Cost of living (1914=100)	ESTIMATED REAL EARNINGS PER CAPITA	
	Indexes (1914=100)	Annual rate (dollars)		Indexes (1914=100)	Annual rate at 1914 prices	Indexes (1914=100)	Annual rate (dollars)		Indexes (1914=100)	Annual rate at 1914 prices
	A	B	C	D	E	A	B	C	D	E
	1915					1916				
January	103	591	1.009	102	589	124	716	1.031	120	692
February	103	591	1.010	102	589	131	757	1.042	126	727
March	105	602	1.011	104	600	131	757	1.052	124	715
April	104	596	1.012	103	594	131	757	1.063	123	710
May	105	602	1.013	103	594	135	780	1.074	125	721
June	106	608	1.014	104	600	135	780	1.085	124	715
July	105	602	1.015	103	594	126	728	1.096	115	664
August	107	614	1.016	105	606	134	775	1.106	121	698
September	106	608	1.017	104	600	135	780	1.117	121	698
October	110	631	1.018	108	623	135	780	1.128	120	692
November	112	642	1.019	110	635	139	803	1.139	122	704
December	112	642	*1.020	110	635	145	838	*1.150	126	727
	1917					1918				
January	136	785	1.169	117	676	160	923	1.406	114	658
February	136	785	1.188	115	664	161	926	1.432	112	646
March	140	808	1.207	116	669	177	1,018	1.459	121	698
April	136	785	1.226	111	640	181	1,041	1.485	122	704
May	147	848	1.245	118	681	191	1,098	1.511	126	727
June	149	860	1.264	118	681	193	1,110	1.538	125	721
July	145	838	1.283	113	652	199	1,144	1.564	127	733
August	149	860	1.303	112	646	204	1,173	1.591	128	739
September	151	871	1.322	114	658	206	1,185	1.617	127	733
October	160	923	1.342	119	687	207	1,190	1.644	126	727
November	169	975	1.361	124	715	201	1,156	1.672	120	692
December	171	987	*1.380	124	715	225	1,294	*1.700	132	762
	1919					1920				
January	199	1,144	1.703	115	664	257	1,483	1.970	130	750
February	189	1,091	1.707	111	640	250	1,443	2.000	125	721
March	192	1,104	1.710	112	646	263	1,518	2.030	129	744
April	195	1,124	1.714	114	658	260	1,492	2.058	126	727
May	199	1,144	1.717	116	669	265	1,529	2.088	127	733
June	209	1,206	*1.720	121	698	270	1,558	*2.110	128	739
July	210	1,212	1.756	119	687	262	1,512	2.083	125	721
August	216	1,246	1.792	120	692	268	1,546	2.056	130	750
September	226	1,297	1.828	124	715	267	1,541	2.029	131	756
October	226	1,297	1.864	121	698	253	1,452	2.002	128	739
November	230	1,320	1.902	121	698	246	1,419	1.976	125	721
December	249	1,437	*1.940	128	739	244	1,408	*1.950	125	721

* Asterisks mark months for which cost of living indexes are reported by Bureau of Labor Statistics.

[7] The index numbers are plotted in fig. 24 on p. 194.

TABLE 22.—MONTHLY FLUCTUATIONS IN MANUFACTURING LABOR INCOMES, PER CAPITA, JANUARY, 1915, to DECEMBER, 1928—Continued

MONTH	ESTIMATED MONEY EARNINGS PER CAPITA		Cost of living (1914=100)	ESTIMATED REAL EARNINGS PER CAPITA		ESTIMATED MONEY EARNINGS PER CAPITA		Cost of living (1914=100)	ESTIMATED REAL EARNINGS PER CAPITA	
	Indexes (1914=100)	Annual rate (dollars)		Indexes (1914=100)	Annual rate at 1914 prices	Indexes (1914=100)	Annual rate (dollars)		Indexes (1914=100)	Annual rate at 1914 prices
	A	B	C	D	E	A	B	C	D	E
	1921					1922				
January	187	1,079	1.910	98	565	195	1,124	1.667	117	676
February	189	1,091	1.870	101	583	200	1,154	1.644	121	698
March	192	1,104	1.830	105	606	197	1,137	*1.620	121	698
April	191	1,098	1.790	107	617	192	1,104	1.617	119	687
May	188	1,085	*1.750	107	617	197	1,137	1.614	122	704
June	188	1,085	1.743	108	623	203	1,171	*1.610	126	727
July	178	1,027	1.736	102	589	189	1,091	1.610	117	676
August	180	1,039	1.728	104	600	201	1,156	1.610	125	721
September	176	1,016	*1.720	102	589	204	1,173	*1.610	126	727
October	170	981	1.710	99	571	206	1,185	1.623	127	733
November	168	969	1.700	99	571	211	1,217	1.637	129	744
December	178	1,027	*1.690	105	606	214	1,235	*1.650	130	750
	1923					1924				
January	230	1,320	1.647	139	802	225	1,294	1.682	134	769
February	234	1,347	1.643	141	814	233	1,344	1.683	139	802
March	241	1,391	*1.640	146	842	228	1,308	*1.684	136	785
April	241	1,391	1.643	146	842	224	1,292	1.680	133	767
May	251	1,448	1.647	151	871	221	1,275	1.675	132	762
June	251	1,448	*1.650	151	871	218	1,251	*1.671	131	756
July	242	1,396	1.657	145	837	208	1,200	1.676	124	715
August	243	1,402	1.664	145	837	219	1,257	1.681	130	750
September	245	1,414	*1.670	146	842	221	1,275	*1.686	131	756
October	250	1,443	1.673	149	860	229	1,314	1.692	136	785
November	245	1,414	1.676	146	842	223	1,285	1.698	132	762
December	250	1,443	*1.680	148	854	229	1,314	*1.704	135	779
	1925					1926				
January	249	1,437	1.707	146	842	253	1,452	1.744	145	837
February	259	1,486	1.709	152	878	261	1,498	1.734	151	871
March	261	1,498	1.712	153	884	263	1,518	1.725	152	878
April	253	1,452	1.714	148	854	260	1,492	1.715	152	878
May	259	1,486	1.717	151	871	260	1,492	1.706	152	878
June	253	1,452	*1.719	147	848	260	1,492	*1.697	153	884
July	249	1,437	1.725	144	832	253	1,452	1.699	149	860
August	253	1,462	1.730	146	842	260	1,492	1.700	153	884
September	246	1,419	1.736	142	820	256	1,469	1.701	151	871
October	259	1,486	1.742	149	860	265	1,529	1.703	156	900
November	259	1,486	1.748	148	854	260	1,492	1.704	153	884
December	261	1,498	*1.753	149	860	262	1,512	*1.705	154	889
	1927					1928				
January	253	1,460	1.722	147	848	253	1,460	1.687	150	865
February	263	1,518	1.718	153	884	261	1,506	1.684	155	900
March	266	1,535	1.715	155	895	264	1,530	1.680	157	910
April	265	1,529	1.711	155	894	261	1,506	1.677	155	900
May	265	1,529	1.708	155	895	261	1,506	1.674	156	905
June	260	1,500	1.704	153	880	261	1,506	*1.670	156	905
July	254	1,466	1.702	149	861	256	1,480	1.672	153	884
August	259	1,495	1.700	152	879	259	1,497	1,673	155	900
September	255	1,472	1.697	150	867	259	1,497	1.675	154	888
October	259	1,495	1.695	153	882	267	1,550	1.677	159	919
November	254	1,466	1.692	150	866	259	1,495	1.678	154	888
December	260	1,500	1.690	154	888	264	1,530	*1.680	157	910

*Asterisks mark months for which cost of living indexes are reported by Bureau of Labor Statistics.

FIG. 9.—ESTIMATED ANNUAL RATES OF MANUFACTURING LABOR INCOME, PER CAPITA, BY MONTHS, JANUARY, 1915, TO DECEMBER, 1927

SUMMARIES FOR CENSUS YEARS

The remainder of the summary tables presented in this chapter contain data for census years only. Table 23 gives us a very brief summary of per capita annual earnings through the period covered in this monograph. It includes for the sake of comparison, not only the items which are for us of real importance—that is to say, the amounts and relatives of actual earnings—but it also includes amount and relatives of full-time earnings, both nominal and real. The purchasing power of full-time earnings is a concept only a shade less nebulous than that of nominal full-time earnings, which are doubly metaphysical. About full-time real earnings, at least this may be said: They represent the maximum point to which the purchasing power of given wage rates may rise when those wage rates are paid on a yearly basis

TABLE 23.—SUMMARY OF ESTIMATED ANNUAL EARNINGS, PER CAPITA, IN MANUFACTURING INDUSTRIES: 1899–1927

YEAR	ESTIMATED ANNUAL EARNINGS IN DOLLARS OF—				INDEX NUMBERS OF ESTIMATED ANNUAL EARNINGS			
	Purchasing power of the given year		1914 purchasing power		In current dollars		1914 purchasing power	
	Full-time	Actual	Full-time	Actual	Full-time	Actual	Full-time	Actual
	Absolute amounts				1914=100			
1899	$525	$446	$787	$669	$73	$77	$109	$116
1904	590	483	792	648	82	84	110	112
1909	643	557	690	598	89	97	96	104
1914	719	576	719	576	100	100	100	100
1919	1,433	1,212	818	692	199	210	114	120
1921	1,462	1,047	814	583	204	182	113	101
1923	1,566	1,317	927	839	218	229	129	146
1925	1,582	1,402	931	825	220	243	130	143
1927 [1]	1,612	1,373	943	805	224	238	131	140

[1] The complete results of the biennial census of manufactures for 1927 are not yet available. The figures are preliminary estimates constructed as explained on p. 413.

or there is virtually no unemployment. In such circumstances fluctuations in full-time real earnings come close to representing changes in earnings actually received. But it is with the second and fourth columns that we are primarily concerned and in those two columns, let it be repeated, it is the relatives (in the lower part of the table) rather than the absolute amounts that can be accepted with the most confidence.

In Table 24 a comparison is made between the nominal and real amounts both of earnings per capita and of the per capita value added by manufacture. This monograph is concerned primarily with earnings. No attempt is made to make comparisons between the estimated earnings derived from the census data and other and supplementary material, such as the census data on capital invested,

value of products, value added by manufacture, etc. The census figures for the amounts of value added by manufacture are obtained by subtracting from the value of products as reported by the establishments the cost of materials used in the fabrication of those products. The figures thus obtained are those which the census reports as "value added by manufacture." In Table 24 the amounts of value added by manufacture reported for the different census years are divided by the average number of wage earners in those years; the result is the money "value added" per capita of wage earners, as shown in the fourth column. We can get the most significant comparison by deflating not only money earnings but also money amounts of value added. The latter, however, have not been deflated by the index of the cost of living, but by the index of wholesale prices of manufactured products given in the next to the last

TABLE 24.—PER CAPITA EARNINGS AND PER CAPITA VALUE ADDED BY MANUFACTURE, UNITED STATES, ALL INDUSTRIES: 1899–1925

CENSUS YEAR	ABSOLUTE AMOUNTS				RELATIVES (1914=100)					
	Money earnings	"Real" earnings (at 1914 price level)	Money "value added"[1]	"Real" value added[2] (1914 price level)	Money earnings	Cost of living	"Real" earnings (at 1914 price level)	Money "value added"	Wholesale price index[3]	"Real" value added[2] (1914 price level)
1899	$446	$603	$1,025	$1,319	77	0.74	105	73	0.777	94
1904	483	582	1,151	1,346	84	.83	101	82	.855	96
1909	557	640	1,289	1,332	97	.87	111	92	.968	95
1914	576	576	1,404	1,404	100	1.00	100	100	1.000	100
1919	1,212	677	2,757	1,297	210	1.79	118	196	2.125	92
1921	1,047	595	2,639	1,805	182	1.76	103	188	1.462	129
1923	1,317	839	2,945	2,009	229	1.69	146	210	1.466	143
1925	1,402	825	3,194	2,022	243	1.70	143	227	1.580	131

[1] Per capita of manufacturing wage earners.
[2] Figures are quotients obtained by dividing amounts of value added by manufacture by average number of wage earners. Census of Manufactures, 1923, p. 14.
[3] Per capita of manufacturing wage earners. Deflation is by wholesale-price index. U. S. Bureau of Labor Statistics Index of Wholesale Prices of Manufactured Products (70 price series); 1913 base shifted to 1914. Bull. 440, p. 29.

column of the table. The resulting figures in the last column are described as indicating real value added per capita and they are now in form for fair comparison with figures in the third column for real earnings per capita. The comparison is most easily made between the index numbers for these two series in the right-hand section of the table.

VARIATION BETWEEN INDUSTRIES

We have already seen something of the relations among the different industries as to the amounts of per capita earnings, particularly in connection with the discussion of Figure 1. The facts depicted on that chart, however, had to do entirely with the year 1919 and with money earnings. In Table 25 are given the median, decil, and extreme industry averages of real earnings in each census year from

1899 to 1925. The figures are based upon arrays of the 41 selected industries, made separately for each year according to the per capita amounts of real earnings in the industries. Thus, for 1899 the figure $888 is the per capita amount of earnings in the industry which had the highest per capita earnings; $414, at the other end of the scale, represents the per capita amount of earnings received in the industry where the per capita real earnings were lower than in any other industry. In the industry in which the median amount of earnings were received, those earnings amounted to $623 per capita. The decil amounts represent the per capita figures for those industries which divide their whole number of industries into 10 equal parts. If the decil amounts closely approximate the median, that fact is pre-

TABLE 25.—MEDIAN, DECIL,[1] AND EXTREME INDUSTRY—AVERAGES OF REAL EARNINGS, CENSUS YEARS: 1899–1925

[For male wage earners]

	REAL EARNINGS (IN "COMMODITY DOLLARS" OF 1914)							
	1899 [2]	1904	1909	1914	1919	1921	1923	1925 [3]
Highest average	$888	$837	$862	$802	$993	$1,006	$1,191	$1,242
Ninth decil	808	728	817	758	845	773	1,085	1,054
Eighth decil	770	706	771	695	793	753	984	984
Seventh decil	719	671	732	603	743	704	946	954
Sixth decil	658	624	702	641	706	662	898	892
Median	623	600	670	616	683	627	890	852
Fourth decil	604	582	652	591	660	599	810	806
Third decil	581	560	617	552	614	583	759	739
Second decil	551	523	593	532	597	559	740	676
First decil	493	483	549	511	559	497	663	642
Lowest average	414	458	490	458	484	422	560	575
All industries	603	582	640	576	677	595	839	825

[1] The deciles are those points in the percentage scale of rise or fall in earnings which divide the whole number of recorded changes in earnings for each year into 10 equal groups.
[2] Only 39 industries used in 1899. "Automobiles, bodies and parts," and "Chemicals," not included.
[3] Only 39 industries used in 1925, "Mineral and soda waters" and "Liquors, malt," not being included.

sumptive evidence of a correspondingly high degree of uniformity in earnings among the industries. It is *conclusive* evidence only of a degree of uniformity among industries in respect to *average* earnings. That the degree of uniformity (or variability) in individual wage earners' incomes is measures by the concentration of decil averages about the median average certainly is not arguable unconditionally. Other things equal, the greater the concentration of decil about median averages, the greater the presumable uniformity in earnings.[8]

Thus we should interpret the figures for 1919 as follows: The wage earners in eight-tenths of the industries were employed by establishments in which the per capita earnings ranged between $559 and $845 per capita; the wage earners in four-tenths of the industries were em-

[8] See below, Ch. X.

ployed by establishments in which the per capita earnings ranged between $614 and $743. In 1925 the wage earners in four-tenths of the establishments received earnings ranging between $739 and $954. The series of medians running through from 1899 to 1925 of course constitutes another series of averages which indicate in a general way the trend of real earnings through the period. The general drift in respect to concentration of industries about the median industry is shown in Figure 10.

The industries occupying the high, low, and median positions in respect to per capita real earnings, in the several census years are as follows:

Census year	High	Median	Low
1899	Petroleum refining	Confectionery	Woolen and worsted goods.
1904	Glass	Brick and tile, terra-cotta, pottery, and fire-clay products.	Cotton manufacturers.
1909	Printing and publishing, newspapers and periodicals.	Automobiles	Lumber and timber products.
1914	Glass	Furniture	Do.
1919	Iron and steel, blast furnaces	Leather, tanned, curried and finished.	Mineral and soda waters.
1921	Printing and publishing, book and job.	Foundry and machine-shop products.	Smelting and refining, copper, lead, and zinc.
1923	do	Brick and tile, terra-cotta, pottery, and fire-clay products.	Tobacco, cigars, and cigarettes.
1925	Printing and publishing, newspapers and periodicals.	Confectionery	Do.

A similar arrangement of our data on the relative fluctuations in real earnings is made the basis of Table 26, which shows the medians and deciles of change in real earnings per capita from one census year to the next.

It appears from the figures that in the interval between 1899 and 1904 the median change was a decline in real earnings per capita of 4.8 per cent. Between 1904 and 1909 they rose 10.3 per cent; between 1909 and 1914 they declined 8.2 per cent; between 1914 and 1919 they rose 9.3 per cent; between 1919 and 1921 they fell 4.1 per cent; between 1921 and 1923 they rose 30.9 per cent; and between 1923 and 1925 they fell 0.7 per cent. But the maximum, minimum, and decil figures above and below the median for each intercensal interval show how widely different was the behavior of real earnings in different industries. The period from 1919 to 1921 for manufacturing industries generally marked a serious decline, a decline which would be still more pronounced if we had annual census figures and could show the change from 1920 to 1921.[9] In this period the industry

[9] For interpolated annual estimates, see Table 109, p. 219.

in which there was the greatest fall in per capita earnings, the iron and steel industry, experienced a fall in such earnings of 39.5 per cent; yet in this same period there was evidently one industry (newspaper printing and publishing) which prospered sufficiently, so far as its wage earners were concerned, to show an increase of 33.4 per cent in real earnings, and in five industries per capita earnings increased in

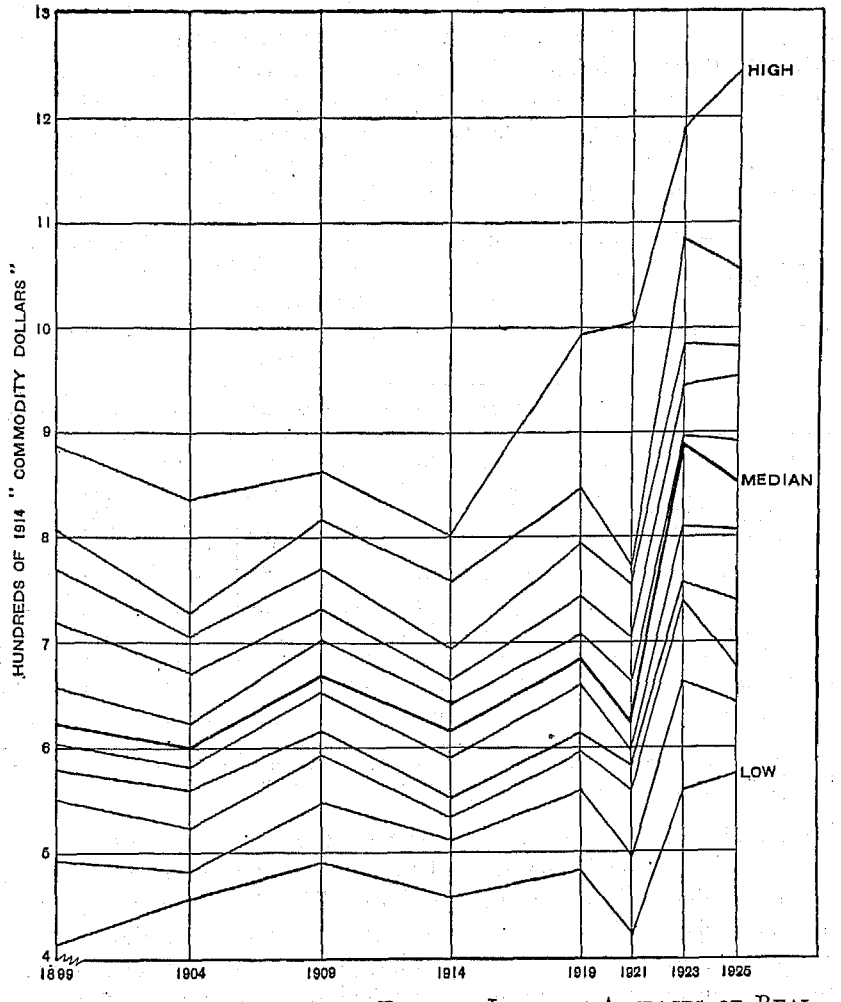


FIG. 10.—MEDIAN, DECIL, AND EXTREME INDUSTRY AVERAGES OF REAL INCOME PER CAPITA, 1899–1925

this period of depression, in proportions running between 11.1 per cent and 33.4 per cent. However, the tendency of the bulk of manufacturing industries in 1919–1921 is indicated by the statement that the wage earners in six-tenths of the industries experienced changes in real earnings ranging between increases of 8.4 per cent and declines of 19.2 per cent. Unfortunately, the changes indicated in this table

are somewhat inconclusive, because they represent not continuous but intermittent time series. The change in each case is not a net change; that is to say, changes between 1899 and 1900, 1900 and 1901, 1901 and 1902, 1902 and 1903, 1903 and 1904, may belie the apparent drift of census-year-to-census-year change indicated in the table for the 5-year period 1899–1904. That such year-to-year changes do alter the situation to some extent is evident from the data showing the year-to-year variability of the 12 separate industries for which intercensal estimates could be made.[10] Nevertheless, the picture given of the changes from census year to census year in Table 26 is not misleading in any serious way; it shows the general drift of change in earnings and the range of difference between industries in respect to that change. The data of the table are put in graphic form in

TABLE 26.—MEDIANS AND DECILS[1] OF CENSUS YEAR TO CENSUS YEAR INDUSTRY CHANGES IN PURCHASING POWER OF ACTUAL ANNUAL EARNINGS, PER CAPITA: 1899–1925

[Based on arrays of the 41 selected industries]

	PER CENT						
	1899–1904	1904–1909	1909–1914	1914–1919	1919–1921	1921–1923	1923–1925
Greatest rise	21.7	27.6	10.0	46.0	33.4	85.8	8.3
Ninth decil	12.0	16.8	2.2	28.6	11.1	66.2	6.6
Eighth decil	1.6	13.8	−1.7	22.1	8.4	50.8	3.8
Seventh decil	−.3	12.9	−3.8	17.4	5.7	42.0	.9
Sixth decil	−2.6	11.7	−6.5	11.8	2.6	35.6	−.6
Median	−4.8	10.3	−8.2	9.3	−4.1	30.9	−1.6
Fourth decil	−6.3	9.5	−9.7	7.9	−7.8	26.7	−3.8
Third decil	−7.1	7.3	−10.5	2.2	−14.2	20.7	−5.8
Second decil	−8.4	3.3	−12.6	−1.1	−19.2	18.1	−9.1
First decil	−12.3	−2.3	−14.7	−4.1	−22.6	15.0	−11.5
Greatest fall[2]	−20.5	−12.5	−17.5	−12.1	−39.5	3.9	−27.3
All industries (average)	−3.5	10.0	−10.0	17.5	−12.1	41.0	−2.1

[1] The decils are those points in the percentage scale of rise or fall in earnings which divide the whole number of recorded changes in earnings for each year into 10 equal groups.
[2] Or, as between 1921 and 1923, the smallest rise.

Figure 11. The diverging lines for each census year are drawn on a semilogarithmic scale, so that their slope is proportionate to the degree of change indicated by the data. The dots marking the ends of each series of diverging lines mark the median, decil, high and low industry cases of change in real earnings, so that the segment between the extreme points of each of the vertical lines represents the whole number of industries covered. The smaller segment between the two sloping lines, respectively, just above and just below the median line marks off the degrees of change experienced by two-tenths of the industries. In 8 of the 41 industries, in other words, real earnings changed by percentages which Table 26 shows to have been, for 1921–

[10] See Table 109 and fig. 28, based thereon.

1923, between plus 26.7 and plus 35.6. Similarly, the dots next but one to the top and bottom mark off changes in real earnings experienced by the wage earners in eight-tenths of the industries. In other words, using the period 1904 to 1909, for example, wage earners in three-tenths of the industries worked in establishments where per capita earnings underwent increases of between 12.9 and 27.6 per cent; in half of the 41 industries the wage earners experienced per capita changes in earnings ranging between increases of 10.3 per cent and declines of 12.5 per cent and another half of them benefited by increases in real earnings ranging between 10.3 and 27.6 per cent.

The industries occupying the high, median, and low positions in respect to percentage changes in per capita real earnings in the several census periods are as follows:

Census period	Greatest rise	Median change	Greatest fall (or least rise)
1899–1904	Brick and tile, terra-cotta, pottery, and fire-clay products.	Cars, steam-railroad, not including operations of railroad companies.	Petroleum refining.
1904–1909	Rubber tires and inner tubes, and rubber goods, not elsewhere specified.	Brick and tile, terra-cotta, pottery, and fire-clay products.	Glass.
1909–1914	Automobiles	Paper and wood pulp	Foundry and machine-shop products.
1914–1919	Iron and steel, blast furnaces	Bread and other bakery products.	Liquors, malt.
1919–1921	Printing and publishing, newspapers and periodicals.	Cotton manufactures	Iron and steel, steel works and rolling mills.
1921–1923	Iron and steel, steel works and rolling mills.	Paper and wood pulp	Flour-mill and gristmill products.
1923–1925	Automobile bodies and parts.	Shipbuilding, steel	Leather, tanned, curried, and finished.

The data of Figure 11, it should be noted, are plotted on a semi-logarithmic scale without fixed base and in each case the point of departure for measuring the change from one census year to the next is taken to be the median for the earlier year.[11]

Changes in per capita real earnings among the selected industries during the whole 27-year period, the pre-war part of the period and the war and postwar parts of the period are shown in Table 27. In order to facilitate the interpretation of these changes, two additional columns of data are thrown alongside. They show (in 1914 commodity dollars) the estimated average amounts of real earnings of male wage earners, in the first and last years, respectively, of the 27-year period. Those among the industry averages which are higher than the corresponding averages for all manufacturing industries combined are set in bold-faced type. The industries are arranged in this table in the order of the degree of change in per capita real earnings between 1899 and 1925, beginning with the industry which

[11] In the construction of this chart and the table upon which it is based, and in the construction of similar tables in a later chapter, the writer has in general followed the method used by W. C. Mitchell in portraying fluctuations in general prices. United States Bureau of Labor Statistics Bull. 284. Index numbers of wholesale prices in the United States and Foreign countries, pp. 14 to 16.

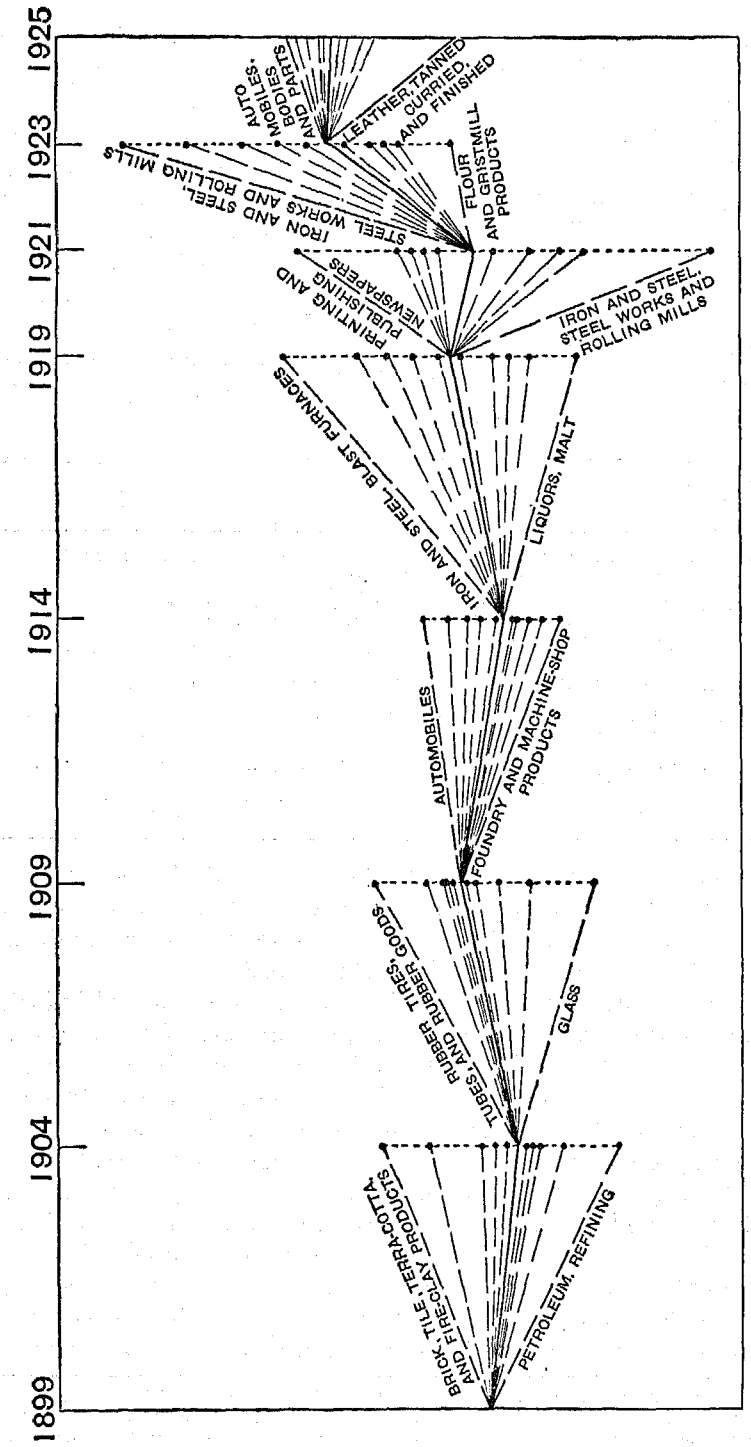


FIG. 11.—CONSPECTUS OF CENSUS YEAR TO CENSUS YEAR INDUSTRY CHANGES IN REAL INCOME, PER CAPITA, 1899–1925

shows the maximum change. It does not appear from these percentages that the greatest increases in real earnings have occurred, in industries which, in 1899, had levels of average earnings which were low compared with manufacturing industry as a whole. Yet there are a few striking exceptions, notably the brick, tile, and terra-cotta industry, and the automobile bodies and parts industry. The former shows the largest increase in (real) earnings of all the 41 industries—an increase of 80 per cent—and, in respect to the absolute level of its average real earnings, it stood, in 1899, almost at the bottom of the list. It will be noticed also that these two industries achieved large gains in the pre-war period as well as during the years following 1914; in this latter period more than half of the industries suffered losses in real earnings. In sharp contrast with this pre-war record is that of the decade beginning with the year 1914. Thirty-nine of the 41 industries achieved gains in per capita real earnings, the gains ranging from 2 to 80 per cent. The shirt industry stood in 1925 exactly where it was in 1899; smelting and refining dropped 1 per cent.

It is not without significance that most of the industries at the bottom of the list in Table 27, industries which experienced either net declines or very small gains in real earnings over the 27-year period, are manufacturing groups in which wage levels were relatively high in 1899. There are a few exceptions—mineral and soda waters, flour and grist mill products and, most noticeable of all, tobacco. The last-named industry showed an increase of only 2 per cent in real earnings, and yet its level of real earnings in 1899 was low—$596 as compared with $603 for all manufacturing combined. The result of tobacco's heavy decline from an initial (1899) level already low has been to bring the industry in 1925 quite to the bottom of the list.[12]

It appears from an examination of the dollar amounts in Table 27 that in respect to their earnings *rank* in 1899 and 1925 nearly half of the industries remained stationary or nearly so.[13] In this stationary group, if an industry ranked high in 1899 in respect to its level of average earnings, it ranked high in 1925. It is obvious that there may be considerable changes in earnings in an industry and, concurrently, little or no change in rank. Thus, in lumber and timber products average real earnings increased from $468 in 1899 to $662 in 1925, 41 per cent; the industry's *rank* in respect to earnings was, in 1899, fortieth, in 1923, thirty-sixth, in the list of 41 industries. It is also obvious that an industry in which occurred little or no change in earnings in the quarter-century is likely to have fallen considerably in its earnings rank.

[12] It is to be remembered that the dollar sums referred to in this discussion of the data of Table 27 represent estimates of the earnings of male wage earners only, expressed in dollars of the same purchasing power as the dollar of 1914.

[13] In the stationary group have been included all the industries whose rank was the same in 1925 as in 1899, or within 5 points of the same position.

TABLE 27.—CHANGES IN PURCHASING POWER OF MANUFACTURING LABOR INCOMES, PER CAPITA,[1] BY INDUSTRIES, 1899–1925, 1914–1925, 1899–1914; AND CORRESPONDING PER CAPITA AMOUNTS, 1899 AND 1925.

[Male wage earners]

ESTIMATED AMOUNTS OF REAL EARNINGS, PER CAPITA (DOLLARS)		INDUSTRY	PER CENT OF CHANGE IN REAL EARNINGS		
1899	1925		1899–1925	1914–1925	1899–1914
493	884	Brick and tile, terra-cotta, and fire-clay products	80	56	15
591	1,054	Rubber tires and inner tubes, and rubber goods, not elsewhere specified	78	60	11
688	1,219	Automobiles (motor vehicles)	77	65	7
[2] 507	877	Automobiles, bodies and parts	[3] 73	45	[3] 19
634	1,020	*Furniture*	61	66	−3
777	1,242	Printing and publishing, newspapers and periodicals	60	56	3
607	954	Lumber and planing-mill products	57	53	3
793	1,202	Printing and publishing, book and job	52	54	−2
414	615	Woolen and worsted goods	49	29	15
604	887	Paper and wood pulp	47	44	2
646	948	Iron and steel, blast furnaces	47	39	5
731	1,074	Clothing, women's	47	42	4
612	895	Carpets and rugs, other than rag	46	64	−11
750	1,074	Clothing, men's	43	45	−1
468	662	Lumber and timber products	41	45	−2
770	1,074	Iron and steel, steel works and rolling mills	39	60	−13
658	915	*Silk goods*	39	38	1
528	730	Knit goods	38	37	1
603	825	All industries	37	43	−4
623	852	Confectionery	37	33	3
493	671	Cars, steam-railroad	36	25	9
547	745	Shipbuilding, steel	36	34	2
562	748	Electrical machinery, apparatus, and supplies	33	46	−9
581	764	Bread and other bakery products	32	29	2
558	724	Agricultural implements	30	24	5
495	642	Cotton manufactures	30	29	0
797	1,013	Foundry and machine-shop products	27	50	−15
[2] 643	813	Chemicals	[3] 26	27	0
577	712	Leather, tanned, curried, and finished	24	34	−8
664	825	Slaughtering and meat packing	24	35	−8
719	875	Railroad repair shops—steam	22	37	−11
551	[4] 663	Mineral and soda waters	[5] 20	[5] 30	−7
623	720	Dyeing and finishing, textiles	16	30½	−11
808	[4] 924	Liquors, malt	[5] 14	[5] 16	−2
858	971	Glass	13	21	−7
811	892	Railroad-repair shops—electric	10	36	−18
584	639	Flour-mill and gristmill products	9	16	−6
888	957	Petroleum refining	8	28	−16
742	788	Boots and shoes, not including rubber boots and shoes	6	13	−8
596	606	Tobacco, cigars and cigarettes	2	15	−11
643	642	Shirts	0	8	−8
688	682	Smelting and refining, copper, lead, and zinc	1	10	−10

[1] That is, average, per male wage earner attached to the respective industries.
[2] 1904.
[3] From 1904.
[4] 1923.
[5] To 1923.

VARIATIONS BETWEEN STATES

State changes in real earnings from census year to census year are indicated in Table 28, which is constructed in the same way as Table 26. Its data are put into graphic form in Figure 12. It is evident that there has been scarcely less variation with respect to fluctua-

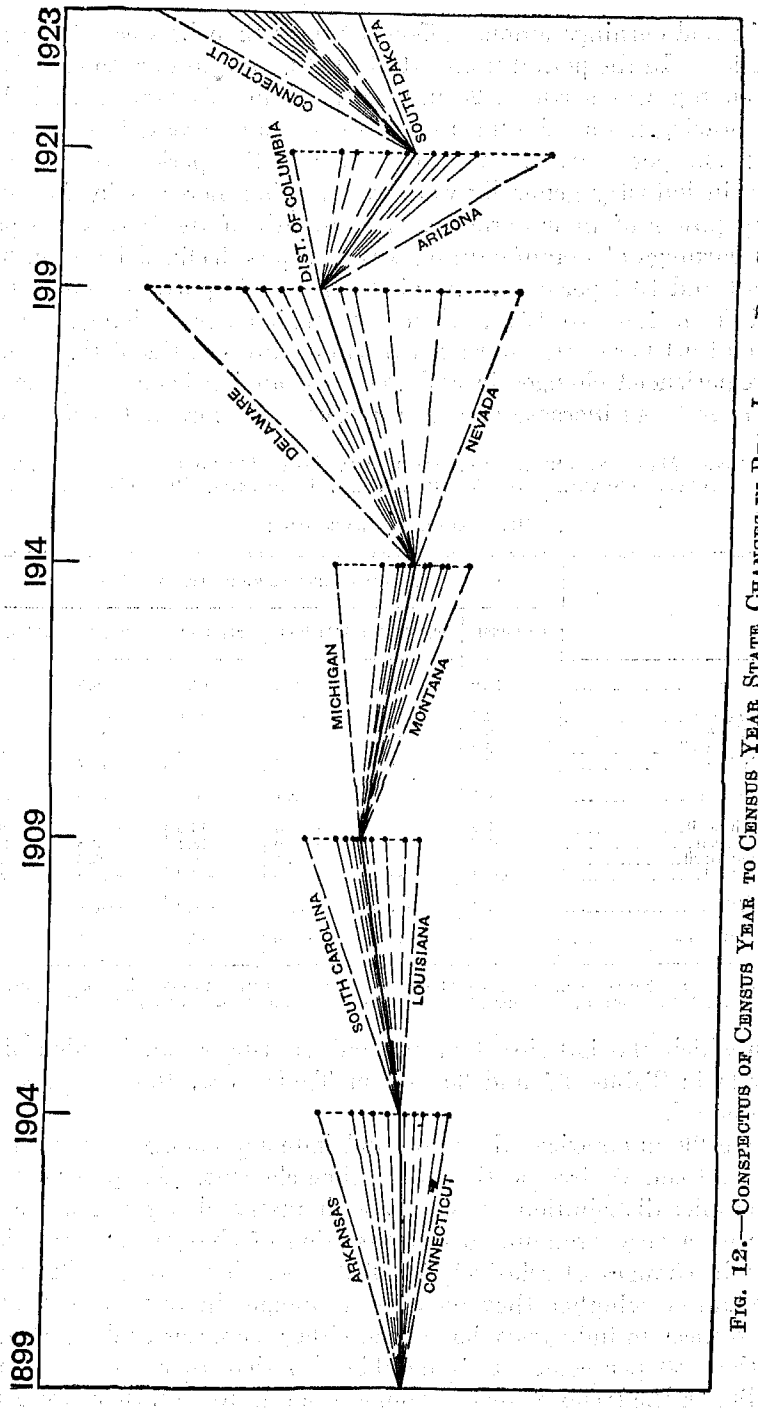


FIG. 12.—CONSPECTUS OF CENSUS YEAR TO CENSUS YEAR STATE CHANGES IN REAL INCOME PER CAPITA: 1899–1923

tions in real earnings among different States than between different industries. In the period from 1914 to 1919, for example, the median State change was a rise of 20 per cent, but in this same period the State showing the maximum rise experienced an increase in real earnings of 63.2 per cent. At the same time, in this period, when wage earners in industry generally were experiencing increases in the purchasing power of their earnings, in one-tenth of the States the per capita earnings of manufacturing wage earners declined between 3.3 per cent and 16.4 per cent. Nor is the fact unimportant that in the period from 1909 to 1914, when the median State change was a decline of 9.4 per cent, the wage earners in three-tenths of the industries experienced changes in real earnings ranging from a decline of 7 per cent to an increase of 6.2 per cent. A more detailed show-

TABLE 28.—MEDIAN, DECIL, AND HIGH AND LOW (CENSUS YEAR TO CENSUS YEAR) STATE CHANGES IN ANNUAL REAL EARNINGS, PER CAPITA: 1899–1923

[Based on arrays of the 49 States]

	PER CENT OF INCREASE OR DECREASE (−)					
	1899–1904	1904–1909	1909–1914	1914–1919	1919–1921	1921–1923
Greatest rise [1]	18.0	20.5	6.2	63.2	6.9	61.9
Ninth decil	10.5	13.6	−3.2	37.6	−1.4	42.6
Eighth decil	8.9	11.8	−6.0	32.6	−6.7	39.3
Seventh decil	6.3	10.7	−7.0	29.2	−13.3	36.4
Sixth decil	3.6	9.0	−8.4	24.6	−17.5	33.2
Median change	1.5	8.7	−9.4	20.0	−19.5	31.8
Fourth decil	1.2	8.1	−11.0	15.9	−22.4	30.6
Third decil	−1.0	7.0	−12.0	13.1	−23.8	28.4
Second decil	−2.3	3.9	14.1	6.8	−25.5	22.6
First decil	−5.1	−.1	−15.0	−3.3	−29.3	22.0
Greatest fall [2]	−7.1	−2.3	−18.7	−16.4	−40.6	12.6
United States (average)	−3.5	10.0	−10.0	17.5	−12.1	41.0

[1] Greatest rise: Arkansas, South Carolina, Michigan, Delaware, District of Columbia, Connecticut.
[2] Greatest fall: Connecticut, Montana (1904–1909 and 1909–1914), Nevada, Arizona, South Dakota.

ing in which the individual States and industries can be identified is made in Tables 27 and 30 and in Tables 103, 106, and 108 in Chapter IX.

Table 29 summarizes the State and industry changes reported in Tables 26 and 28, irrespective of the time element. It appears from the parallel distribution of State and industry changes, that there has been a very pronounced concentration of change in purchasing power in changes of relatively small degree. The great bulk of all the changes, whether they have been changes in respect to States or in respect to industries, have been either increases or decreases of less than 10 per cent. It is notable also that there is very little stability in the trend of real earnings—that is to say, there were no cases in which there was no change in real earnings between census

year and census year. This no doubt is partly due to the fact that series is an intermittent one; in Table 109 in Chapter IX, which reports year-to-year changes for 12 industries, several instances of no change in real earnings from one year to the next are in evidence.

Changes in the purchasing power of manufacturing labor income in the 48 States and the District of Columbia from 1899 to 1923, from 1914 to 1923, and from 1899 to 1914 are indicated in Table 30. This table presents data on real earnings in a form analogous to that used for the 41 industries in Table 27, on page 76, above. As in the industry table, the present one supplements the figures on percentages of change with figures showing for each of the 49 States the estimated amounts of per capita real earnings in 1899 and 1923. In the present table, however, these averages are for wage earners of all sex and age groups combined. All of the figures are based on the purchasing power of the dollar of 1914. Those among the State

TABLE 29.—COMPARISON OF 294 CASES OF STATE CHANGE IN "REAL" EARNINGS PER CAPITA WITH 283 CASES OF INDUSTRY CHANGE: 1899–1923

PER CENT OF CHANGE FROM PER CAPITA REAL EARNINGS OF PRECEDING CENSUS YEAR	DISTRIBUTION OF—		PER CENT OF CHANGE FROM PER CAPITA REAL EARNINGS OF PRECEDING CENSUS YEAR	DISTRIBUTION OF—	
	Industry changes	State changes		Industry changes	State changes
Total cases	283	294	Increases—Continued.		
Increases:			20-24.9	13	7
85-89.9	1		15-19.9	17	11
80-84.9			10-14.9	23	14
75-79.9			5- 9.9	36	17
70-74.9	2		Under 5	31	27
65-69.9	2		Decreases:		
60-64.9	1		Under 5	40	46
55-59.9	1	1	5- 9.9	45	53
50-54.9	2		10-14.9	26	16
45-49.9	2	6	15-19.9	7	13
40-44.9	5	10	20-24.9	5	14
35-39.9	4	16	25-29.9	2	11
30-34.9	5	14	30-34.9	2	1
25-29.9	10	15	35-39.9	1	1
			40-44.9		1

averages which are higher than the corresponding averages for the United States as a whole are set in bold-faced type. The States are arranged in the order of the degree of change in real labor incomes, per capita, between 1899 and 1923, beginning at the top with the State in which the greatest increase occurred.

It appears from these percentages that the largest increases in real earnings have occurred, almost without exception, in States which, in 1899, had levels of average earnings which were very low compared with the average for the whole country. The most impressive illustrations of this tendency are North Carolina and South Carolina, which are among the four leading States in respect to the degree of improvement in real earnings. It appears from the figures on the right that when the States are arranged in the order of diminishing *amounts* of per capita real earnings in 1899 these two States

trail all the rest. Possible exceptions to the tendency illustrated by the Carolinas are Michigan, Ohio, and the District of Columbia. Michigan's 1899 average, although slightly below that for the United States, overtops all of the other jurisdictions in the upper part of the table except Ohio and the District of Columbia. Michigan and Ohio, moreover, are the only States of major industrial importance that have achieved increases in real earnings, over the whole 25-year period, of more than 40 per cent. The 1899 average for the District of Columbia was slightly above the average for all States combined; from the fairly high per capita level represented by $607 the District experienced an increase of 42 per cent in the 25 years following, having a per capita level of 862 in the year 1923. No less than 23 of the States suffered declines in per capita earnings during the 15 years prior to the war. In marked contrast to this pre-war record is that of the decade 1914–1923; in this period each of the 49 States made gains in per capita real earnings, the increases ranging from 4 per cent in Arizona to 47 per cent in North Carolina. For the whole 25-year period, it will be noticed, there were two States—Arizona and Montana—which saw more or less serious declines in average labor incomes.

Turning to the large group of States in the lower section of the table, States which experienced less-than-average gains over the 25-year period, it is apparent that the 1899 per capita averages for the majority of them were well above the average for all States combined. This is most strikingly true of the States which, between 1899 and 1923, either suffered declines or made gains of 11 per cent or less. Of the 3 States at the foot of the list, Colorado made a gain of 1 per cent, the other 2 sustained losses of 5 and 10 per cent, respectively; these losses were the net resultant of the considerable losses between 1899 and 1914 and the less considerable gains between 1914 and 1923 made by both of them. There are some exceptions, States with quite low levels of per capita earnings in 1899, which yet failed to score any considerable gains. Virtually all of them are Southern States—Texas, Louisiana, Mississippi.

It appears from an examination of the dollar *amounts* in Table 30 that in respect to their earnings *rank* in 1899 and 1923 the majority of the States remained stationary, or nearly so. In other words, if a State ranked high in 1899 in respect to its level of average earnings, it is more than likely to be found in about the same rank in 1923.

Tables 31 and 32 present a synopsis of the amounts and relatives of hypothetical full-time, as well as actual, earnings classified according to large regional or industrial divisions. Table 31 gives the results for the Northeast, South, and West regions of the country; Table 32 for each of the six industrial divisions. The table, based on geographic divisions, shows very clearly the wide difference between

the Northeast, South, and West in regard to earnings, these amounts being much higher in the West and Northeast than in the South, and somewhat higher in the West than in the Northeast. As to relative changes in earnings, the situation is in general reversed; there has been more rapid change in the South than in the other divisions; the next most rapid change has occurred in the Northeast and the least rapid in the West. The South appears to be the only one of the three regions wherein there was a net increase in real

TABLE 30.—CHANGES IN THE PURCHASING POWER OF MANUFACTURING LABOR INCOMES, PER CAPITA, BY STATES, 1899–1923, 1914–1923, AND 1899–1914; AND CORRESPONDING PER CAPITA AMOUNTS, 1899 AND 1923

STATE	PER CENT OF CHANGE			ESTIMATED AMOUNTS OF REAL EARNINGS PER CAPITA		STATE	PER CENT OF CHANGE			ESTIMATED AMOUNTS OF REAL EARNINGS PER CAPITA	
	1899–1923	1914–1923	1899–1914	1899	1923		1899–1923	1914–1923	1899–1914	1899	1923
North Carolina	77	47	21	$247	$436	Delaware	29	44	−10	550	711
Michigan	72	41	22	577	991	California	29	26	3	750	971
Oklahoma	62	38	18	504	814	Tennessee	26	30	−3	427	539
South Carolina	61	32	22	249	401	Vermont	25	24	2	522	655
West Virginia	57	39	13	531	834	Rhode Island	25	35	−8	543	678
Alabama	44	35	7	409	591	New Hampshire	24	28	−3	522	646
Virginia	44	44	0	432	620	Idaho	24	11	12	818	1,017
Ohio	43	41	2	632	904	Arkansas	24	15	7	388	480
Dist. Columbia	42	47	−3	607	862	Florida	22	21	1	474	580
Kentucky	41	45	−3	489	689	Kansas	21	26	−4	636	767
United States	39	46	−5	603	839	Nebraska	21	17	3	641	773
						Minnesota	21	19	1	647	782
Maryland	38	36	1	493	679	Massachusetts	21	33	−9	584	704
Indiana	36	33	2	622	844	Washington	21	22	−1	793	960
New Jersey	36	50	−9	622	843	Missouri	20	23	−3	611	731
Maine	35	30	4	507	685						
Iowa	34	19	13	570	763	Texas	16	22	−5	561	648
						Mississippi	16	20	−3	401	467
Wyoming	33	45	−8	947	1,259	Louisiana	15	16	−1	485	555
Illinois	33	32	1	678	904	New Mexico	15	12	3	673	772
New York	33	43	−7	615	818	Utah	13	6	7	676	704
North Dakota	32	21	8	670	882						
Wisconsin	32	29	2	589	780	Nevada	11	14	−3	1,018	1,133
						South Dakota	7	8	−1	704	753
Georgia	31	23	7	316	414	Colorado	1	17	−14	870	878
Pennsylvania	31	44	−8	627	824	Montana	−5	9	−12	1,005	955
Oregon	30	21	7	677	877	Arizona	−10	4	−14	1,007	902
Connecticut	30	50	−13	631	821						

earnings between 1899 and 1921. But if 1923 be compared with 1899, net gains are shown in all three regions.

The figures in Table 32, which reports for the six industrial divisions the index numbers of nominal and real full-time earnings and of nominal and real actual earnings, show less marked differences than are evident between the three geographic regions. The two lower sections of the table are, of course, the more important, the lowest section, showing changes in actual, "real" earnings (i. e., purchasing power of actual earnings), being from the point of view of this monograph the most important of all. Comparing 1899 and

1919 it appears that in the metals and metal-products division, a gain of 10 points in real earnings was made during the 20-year period; there was an even larger increase in lumber and lumber products, the gain in this case being 13 points; and still greater gain in stone, glass, and chemicals, viz, 16 points, and in paper and printing 57 points. In textiles and leather there was a gain of 9 per cent; in food,

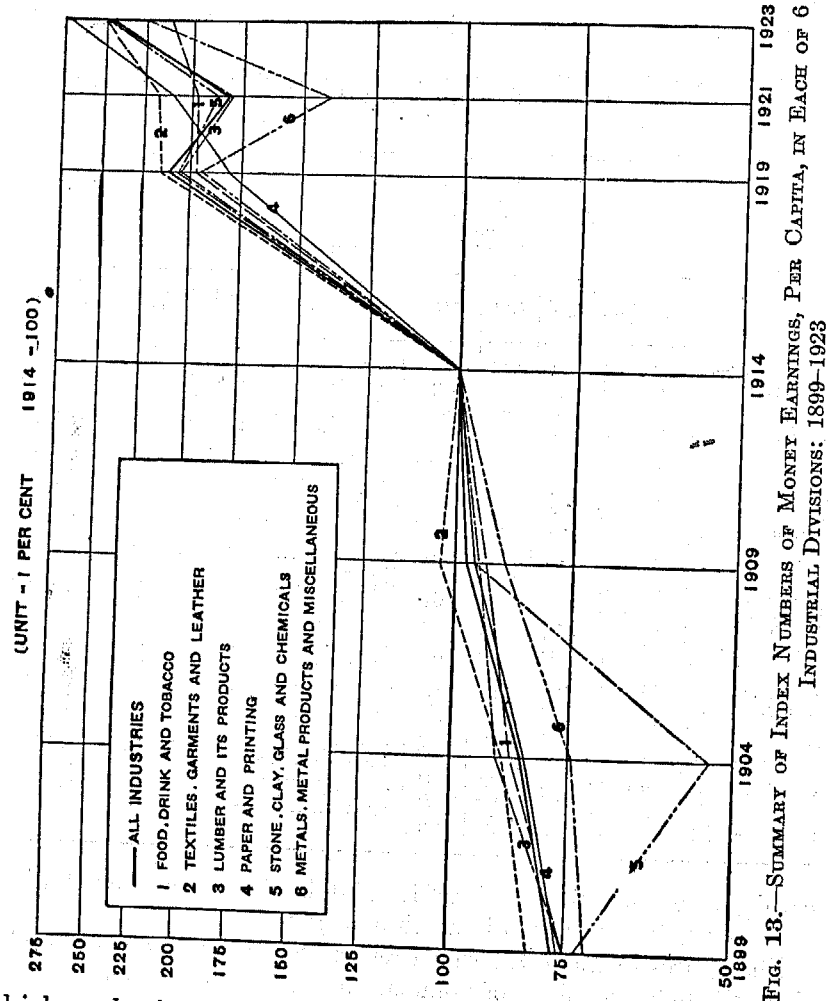


FIG. 13.—SUMMARY OF INDEX NUMBERS OF MONEY EARNINGS, PER CAPITA, IN EACH OF 6 INDUSTRIAL DIVISIONS: 1899–1923

drink, and tobacco one of 8 per cent; in paper and printing there was a net loss between 1899 and 1919 of 2 per cent, but in this case there was considerable recovery by 1921. Each of the six industrial divisions shows unprecedented gains between 1921 and 1923.

The index numbers of actual money earnings in Table 32 are plotted on a logarithmic scale in Figure 13. Again we note rather marked differences between industry groups, with an apparent tendency to wider variation in periods of depression.

A summary for sex and age groups of nominal and real, full-time and actual earnings is contained in Table 33. The most important feature here is the wide margins by which the earnings of women and children fall short of the earnings of men.

TABLE 31.—SUMMARY OF ANNUAL EARNINGS, PER CAPITA, IN MANUFACTURING INDUSTRIES, BY GEOGRAPHIC REGIONS: 1899–1923

CENSUS YEAR	ESTIMATED ANNUAL EARNINGS PER CAPITA					
	Hypothetical full-time			Actual time		
	Northeast	South	West	Northeast	South	West
	MONEY EARNINGS: AMOUNTS					
1899	$554	$371	$659	$457	$307	$579
1904	608	447	814	497	357	690
1909	663	478	887	572	403	795
1914	**742**	**550**	**936**	**597**	**430**	**776**
1919	1,472	1,163	1,612	1,385	959	1,412
1921	1,521	1,100	1,685	1,053	768	1,249
1923	1,692	1,105	1,701	1,431	975	1,594
	MONEY EARNINGS: RELATIVES					
1899	75	67	70	77	71	75
1904	82	81	87	83	83	89
1909	89	87	95	96	94	102
1914	**100**	**100**	**100**	**100**	**100**	**100**
1919	198	211	172	232	223	182
1921	205	200	180	176	179	161
1923	228	201	182	240	227	205
	"REAL" EARNINGS: AMOUNTS					
1899	749	501	891	618	415	782
1904	733	539	981	599	430	831
1909	762	549	1,020	657	463	914
1914	**742**	**550**	**936**	**597**	**430**	**776**
1919	822	650	901	774	536	789
1921	864	625	957	598	436	710
1923	1,001	654	1,007	847	577	943
	"REAL" EARNINGS: RELATIVES					
1899	101	91	95	104	47	101
1904	99	98	105	100	100	107
1909	103	100	109	110	108	118
1914	**100**	**100**	**100**	**100**	**100**	**100**
1919	111	118	163	130	175	102
1921	116	113	102	100	101	91
1923	135	119	108	142	134	122

VARIATION WITHIN SELECTED INDUSTRIES

Little need be said here concerning the results of the special examination of the 1919 establishment schedules in 20 industries, the results of which are reported in Chapters X and XI. The purpose was to ascertain the range of variation within each of the industries, if possible, and in the whole group of industries combined. The variation is expressed in brief form by the standard deviation,

which is the square root of the mean square of the deviations of the individual establishment per capita amounts of earnings from the corresponding per capita amounts for the industry. The standard

TABLE 32.—SUMMARY OF RELATIVES OF ESTIMATED ANNUAL MONEY EARNINGS, PER CAPITA, BY INDUSTRIAL DIVISIONS AND CENSUS YEARS: 1899–1923

[Index numbers for base year in bold-faced type]

CENSUS YEAR	All industries	Food, drink, and tobacco	Lumber and its products	Metals and metal products, including miscellaneous	Paper and printing	Stone, clay, glass, and chemicals, "mineral"	Textiles, garments, and leather
	INDEX NUMBERS OF ANNUAL PER CAPITA EARNINGS						
	HYPOTHETICAL FULL-TIME ("ANNUAL WAGE RATES"): NOMINAL						
1899	73	76	71	68	72	72	82
1904	82	84	86	74	81	80	90
1909	89	91	88	81	89	89	100
1914	**100**	**100**	**100**	**100**	**100**	**100**	**100**
1919	199	183	191	179	169	193	221
1921	204	199	185	180	208	207	235
1923	216	197	200	193	215	216	243
	HYPOTHETICAL FULL-TIME ("ANNUAL WAGE RATES"): "REAL"						
1899	99	103	96	92	97	97	111
1904	99	101	104	89	98	60	108
1909	103	105	101	93	102	102	115
1914	**100**	**100**	**100**	**100**	**100**	**100**	**100**
1919	111	102	107	100	94	108	123
1921	116	113	105	102	118	118	134
1923	129	117	118	114	127	128	144
	ACTUAL TIME: NOMINAL						
1899	77	75	75	71	76	73	82
1904	84	86	89	74	83	53	88
1909	97	92	94	88	95	95	103
1914	**100**	**100**	**100**	**100**	**100**	**100**	**100**
1919	210	196	204	190	181	205	214
1921	182	197	181	140	208	186	219
1923	243	209	244	224	271	244	250
	ACTUAL TIME: "REAL"						
1899	105	101	101	96	103	99	111
1904	101	104	107	89	100	64	106
1909	111	106	108	101	109	109	118
1914	**100**	**100**	**100**	**100**	**100**	**100**	**100**
1919	118	109	114	106	101	115	120
1921	103	112	103	80	118	106	124
1923	146	124	144	133	160	144	148

deviation measures the concentration of the group about the average, indicating what is for any industry the typical deviation. When this typical deviation, which in the present case is a sum of money in dollars, is divided by the average earnings the ratio so obtained (the coefficient of variation) indicates in a form which makes it com-

parable with similar coefficients for other industries, the degree of variation of wages in the several industries. The coefficient of variation, in other words, is the ratio of the standard deviation in earnings to the average earnings, multiplied by 100.

The coefficient of variation for the 20 industries selected as samples was 33.6. The standard deviation from the average of $1,272 for the 20 industries combined is $427. The range of variation among the 12 industries for which it was worked out separately is exceedingly wide, running from a minimum to 11.7, the coefficient for the automobile industry, to 89.3, the coefficient of the newspaper

TABLE 33.—SUMMARY OF ESTIMATED AMOUNTS OF EARNINGS, PER CAPITA, IN THE UNITED STATES, ALL INDUSTRIES COMBINED, BY SEX AND AGE GROUPS, CENSUS YEARS: 1899–1923

SEX, AGE GROUP, AND TYPE OF PER CAPITA EARNINGS	1899	1904	1909	1914	1919	1921	1923
All groups:							
Full-time earnings—							
Nominal	$525	$590	$643	$719	$1,433	$1,462	$1,548
Real	710	711	739	719	801	831	927
Actual earnings—							
Nominal	446	483	557	576	1,212	1,047	1,401
Real	603	582	640	576	677	595	839
Men:							
Full-time earnings—							
Nominal	587	659	729	804	1,601	1,634	1,726
Real	793	794	838	804	894	928	1,021
Actual earnings—							
Nominal	498	540	631	644	1,354	1,170	1,562
Real	673	651	725	644	756	665	924
Women:							
Full-time earnings—							
Nominal	314	353	391	430	858	875	925
Real	424	425	449	430	479	497	547
Actual earnings—							
Nominal	267	289	339	344	726	627	837
Real	361	348	390	344	406	356	495
Children:							
Full-time earnings—							
Nominal	179	200	222	244	487	497	525
Real	242	241	255	244	272	282	311
Actual earnings—							
Nominal	152	164	192	195	412	356	475
Real	205	198	221	195	195	230	281

printing and publishing industry. Between the eight cities included in the inquiry there were wide differences in the degree of variation in earnings; but it is distinctly less as between industries. The cities wherein the coefficient of variation was lowest was Detroit, where the coefficient was 20.3, this low variation being undoubtedly due to the predominance of the automobile industry—an industry which has apparently an unusually high degree of uniformity in earnings.

The city having the greatest variation in earnings is New York, where the coefficient is 40.1. The comparisons made in Chapter XI between the variability of wages in 1899 and 1919 indicate a decline in variability. The 1899 figures are taken from Mr. Henry L. Moore's

study [14] which is in turn based on Mr. Davis R. Dewey's census report on Employees and Wages.[15] Mr. Moore's coefficient of variation for 30 industries in 1899 is 43.5, a coefficient which, it should be noted, is based on variation in rates and not on variation in earnings, as compared with the present coefficient of 33.6 for 1919, based on earnings in 20 industries in seven large cities. Mr. Moore found there had been a slight decrease in variability between 1890 and 1900. The change since the latter date, however, has evidently not been one of continuous decline.[16] The coefficient of variation based on earnings in 33 industries reported in the special investigation of average weekly earnings in 1904 indicated that there had been an increase in the rate of decline in variability between 1899 and 1904, the coefficient for the latter year being 30.6. It would appear, then, that since 1904 there has been a slight but appreciable increase in the variability of earnings. However, the smallness of the basis on which the 1919 coefficients have been calculated is probably sufficient reason for declining to take the 1919 results as more than tentative estimates.

[14] "The variability of wages" 22 Political Science Quarterly, 67 (1907).
[15] Employees and Wages, by Davis R. Dewey. Special reports of the Twelfth Census.
[16] See Table 125, p. 248.