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Part I

The Changing Industrial Distribution  
of Gainful Workers:  
Comments on the Decennial  
Statistics, 1820-1940

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Changes in the  
Industrial Composition of Manpower  
since the Civil War

Daniel Carson  
*Railroad Retirement Board*

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CHANGES AND CONTRASTS in the industrial structures of countries interest most social scientists. Industrial structure they take to be a significant characteristic of a society, worth study if not for itself then for revealing the forces and conditions bearing on other, more important, matters. The concept is prominent in the description of economic development in general, and in particular in the discussion of such episodes as the industrial revolution; it appears in many policies prescribed to further the wealth of nations; it plays a role in interpretations of political currents. All uses involve the application of an estimate of the importance assumed by different industries in a nation's economy.<sup>1</sup> Industrial structure is a concept of relative proportions.

In view of its significance for social science, and its inherently quantitative content, students of national income and wealth have naturally given the notion a good deal of attention. They have tried to provide figures on carefully defined aspects of industrial structures; for various countries and various periods. In the main they have devoted themselves to the aspects that are their own particular concern, namely, net value added and wealth; but a good deal of supplementary information on the industrial distribution of employment, wages, and gross value of product, for example, is also a part of their stock in trade. However, even members of this fraternity cannot make bricks without clay, though they have been known to get along without straw. At most, then, their efforts have yielded reliable figures covering limited and relatively recent periods. It is no reflection on the heroic efforts of King and Martin to state that for the United States, with which we are immediately concerned, there are really no better figures on the changing industrial structure during the 19th century, if not during the first decade or two of the 20th also, than the decennial data on gainful workers collected by the Bureau of the Census and put into shape by Whelpton, Edwards, and Carson.<sup>2</sup>

<sup>1</sup> The concept may profitably be enlarged, of course, to embrace interrelations among industries. The *tableau économique* set up in statistical form by Wassily Leontief is an example.

<sup>2</sup> P. K. Whelpton, 'Occupational Groups in the United States, 1820-1920', *Journal of the American Statistical Association*, Sept. 1926; A. M. Edwards, *Comparative*

Though they may be better than other statistics, how good are they? The presentation of Carson's revised estimates and an outline of his methods may properly be made the occasion for some critical remarks on the decennial statistics of the industrial distribution of gainful workers in the United States beginning with 1820. These comments may be of some interest also to those concerned with the statistics of other countries and with international comparisons.

A complete critique of a body of data is of course a huge, and in a sense endless, task. It is huge because to be thorough it must include many operations: examination of the schedules used and instructions given to respondents, enumerators, and editors; in the light of their capacity to comprehend and effectively cooperate, of the methods utilized in the field, and of the principles and categories underlying the summarization of the data; analysis of the internal consistency of the data collected; and comparison of these data, or of derivatives of them, with the data—quantitative and qualitative—collected or calculated by other methods or entirely different approaches. The task is endless because no final conclusion can be drawn concerning the adequacy of a body of data except as it is applied to some specific problem or theory. Data adequate for one purpose may be quite inadequate for another; and the number of purposes is infinite. What one can attempt, therefore, in this sort of commentary is simply to list some of the points, obvious and otherwise, that anyone using occupational statistics for the United States must bear in mind if he is not to misuse them. The reader must expect to emerge with a sense of some of the things he must consider in applying the data to his ends rather than with a definite notion of their accuracy or value for any particular purpose.

For his convenience I preface my remarks with a brief survey of the Censuses of Occupations and conclude with a summary table consolidating, with some modifications and additions, Carson's and Whelpton's figures. The readers should understand that

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*Occupation Statistics for the United States, 1870-1940* (Washington, D. C., 1943); and Daniel Carson, 'Changes in the Industrial Composition of Manpower since the Civil War' (see below).

many of the points noted here are referred to by Whelpton, Edwards, and Carson, as well as in the regular Census reports. I have attempted to systematize the discussion, and in some places to go into detail. The authors themselves cover some of the points more fully. My chief purpose is to provide a critical introduction to their work.

1 *The Censuses of the working force are incomplete in several respects; therefore they merely provide raw data for an approximation to an industrial distribution*

Even a simple survey of the basic census data the compilers of the industrial distribution of the working force had to use will give readers unfamiliar with the Censuses of Occupations an appreciation of the problems and difficulties.

A complete or partial census of gainful workers has been taken in the United States every ten years beginning with 1820, except in 1830. As in 1820 and 1840 workers were asked only if they were engaged in certain specified industries, not all industries were covered. In all other censuses workers were requested to report their occupation, whatever it was; and in Censuses beginning with 1910 the industry to which they were attached was also requested.

Based on these reports, an occupational classification has been published for every Census beginning with 1850, but an industrial classification for only 1820, 1840, 1910, 1930, and 1940.<sup>3</sup> However, even the so-called occupational classification is in fairly considerable part also an industrial classification, since many occupational categories were so defined as to be peculiar to specific industries. On the other hand, even the industrial classification, except for

<sup>3</sup> While information on industrial affiliation was collected in 1920, the Census published no industrial distribution for that year.

The five Census reports for 1900 and later years are 12th Census of the United States, 1900, Special Reports: *Occupations* (1904); 13th Census, 1910, *Population*, Vol. IV: *Occupation Statistics* (1914); 14th Census, 1920, *Population*, Vol. IV: *Occupations* (1923); 15th Census, 1930, *Population*, Vol. V: *General Report on Occupations* (1933); 16th Census, 1940, *Population*, Vol. III: *The Labor Force* (1943).

Censuses for years preceding 1900 are discussed, and much of the summary data collected in them reproduced, in the 1900 report, Ch. II (pp. xxix-lxiv). See also Ch. VIII and other portions of the report by A. M. Edwards, cited above.

1940 and perhaps also 1820 and 1840, is not strict since certain occupations, consisting of persons in several industries, were allocated to the industry in which most of them belonged.

Variations between Censuses have been considerable in the occupational and industrial codes utilized, in respect of both the kind of classes set up and the degree of detail. Differences in kind, even for periods as recent as 1930 and 1940, and even for apparently identical occupations, are illustrated by some of the adjustments needed to make the 1930 and 1940 occupational categories comparable (Edwards, pp. 35-48), and by the difficulties encountered by Carson. The number of occupations for which statistics were presented, 1850-1930, ranged from 584 (1860) to 218 (1890); the figure for 1940 is 451. In 1820 three industries were shown separately: agriculture, commerce, and manufactures. The 1840 Census included these plus mining, navigation of the ocean, navigation of canals, lakes, and rivers, and learned professions and engineers—seven in all. The largest number was in 1940, when 132 industries were distinguished.

Variation in detail of classes is especially troublesome when, as in Censuses before 1910, very broad occupational categories straddle many industries. Some are quite important; for example, 'laborers (not specified)'. Adjustments, frequently involving rough estimates, have had to be made for this as well as other difficulties before continuous series on a uniform classification, of either occupations or industries, could be derived from the original Census data.<sup>4</sup>

Besides the incomplete Censuses of 1820 and 1840, in which information on certain industries was not requested, some other enumerations were incomplete in the sense that some specific geographical area, race, or sex was inadequately covered. In the 1850 Census of Occupations, free females and all slaves were omitted. The 1860 Census included free females but continued to omit slaves. The 1870 Census failed to cover some persons in the southern states. It is hardly likely that the earlier, and perhaps also the later, Censuses, adequately covered American Indians.

<sup>4</sup> Considerable effort has also gone into constructing, from the Census data, series according to social-economic groupings. See Edwards, Part III, and his references to Hunt, Wright, and others, as well as to his own writings.

In addition to these changes in coverage, there were variations between Censuses in the age limit below which occupation data were not requested. Analysis of the figures suggests, however, that any error resulting is slight.<sup>5</sup>

Other difficulties that had to be met by adjustments and estimates arose from changes in the schedules or in the Census date,<sup>6</sup> or obviously incorrect or otherwise inadequate reporting. Adjustments for some of these have been made or indicated by the Census authorities: for 1890, upward, for children 10-15 in agricultural pursuits; for 1910, downward, mainly for women and children in agricultural pursuits; for 1920, upward, for the same class of workers as in 1910; for 1930, downward, for the net difference between 'omitted entries' and retired or disabled workers; and for 1940, upward, for the sum of omitted entries and the misclassification of public emergency workers.<sup>7</sup> In addition, the 1930 and 1940 figures have been specially adjusted to enhance their com-

<sup>5</sup> No age limit was specified in 1820 or 1840 though the 1820 instructions direct the exclusion of infants and superannuated persons. In 1850 and 1860 children under 16 were specifically excluded. No lower limit was specified in the 1870 schedules; however, instructions to enumerators stipulated that infants or children too young to take any part in production were to be omitted. The Bureau of the Census assumed this to mean that in effect the returns were confined to persons 10 years of age and over (1900 report, p. xxxi). This age limit was specified in succeeding Censuses through 1930. In 1940 the lower limit was put at 14 years. As the proportion of children in the working force has declined, especially since 1900, an upward bias in its reported growth may be expected. The bias is of course not eliminated though it is lessened by the overlap device. However, it is slight. In 1900, for example, about 8 percent of children 10 years old were gainful workers; the percentage for the whole 10-15 group was about 18, and for those 16-24, about 60. Almost any reasonable curve fitted to these points would suggest a percentage for 9 year old children of less than 6, and perhaps an average of no more than 2 or 3 percent for the age group 5-9. This would mean less than 1 percent of all reported gainful workers in 1900. In 1930 children of 10-15 constituted about 1.4 percent of the reported total. Even if the 1940 percentage were half that, the error in the 1930-40 comparison due to the neglect of the under 14 age group would be much less than 0.7 percent. As most of these children were engaged in agriculture (Edwards, p. 97; the percentage of working children aged 10-15 engaged in agricultural pursuits was 70 in both 1930 and 1870), the error for that industry would be greater.

<sup>6</sup> The Census date ('as of' which the figures are given) has usually been June 1; but on occasion it has been January 1, April 1, April 15, August 7, or the week of March 24-30.

<sup>7</sup> Daniel Carson makes an additional adjustment in the 1890 figures for children over 15 years of age. For 1910 both Carson and Clarence Long make a rather greater adjustment than the Census. Both question also its adjustment for 1920.



parability, mainly by putting the 1930 gainful workers data on a labor force basis, but also by adjusting the 1940 figures for National Youth Administration student workers.

Under (or over) coverage has thus had to be estimated, and continuous occupational and industrial classifications of workers built up. The largest part of the job has been done by the Bureau of the Census itself, particularly in Edwards' valuable report. Whelpton's main contributions were to fill in the gaps for 1820-60 (his results were accepted by the Bureau of the Census); to make preliminary adjustments of the aggregates after 1860 (since superseded by the Bureau's); and to prepare a rough industrial distribution for 1820-1920 (the 1870-1920 figures have been superseded by Carson's estimates). Carson's main contribution was to estimate the industrial distribution on a consistent basis for the entire period 1870-1930, using Census industrial classifications of 1910 and 1930 and Census occupational classifications of these and other years as presented in the regular decennial reports or reworked in Edwards' monograph.

*2 The industrial distributions are based on a definition of gainful work or production that for some purposes is too narrow and distorts the relative importance of and changes in certain industries*

Collation of the instructions to enumerators in the various Censuses of Occupations brings out the difficulties of satisfactorily defining 'gainful worker' and indicates vividly how these difficulties have troubled the directors of the censuses.<sup>8</sup> Some questions arise because the position of the line dividing persons counted among gainful workers from those excluded is essentially arbitrary, depending as it does on how broadly one defines economic production.

a) The chief group of persons affected are women (and a few men) engaged primarily or entirely in the operation of their own households, and other members of the family assisting them.

<sup>8</sup> Instructions for all censuses through 1890 appear in C. D. Wright and W. C. Hunt, *History and Growth of the United States Census* (Government Printing Office, 1900); for censuses 1870-1930, in the 1930 Report on Occupations, pp. 23-31; for 1940, in the 1940 Report, Appendix.

I need not repeat the well-known reasons why the exclusion of housewives and similar houseworkers is recognized as arbitrary. The Census does include housework done by outsiders for a recompense, small though it may be; unpaid family labor contributing to the family's income, including a certain amount of income in kind as well as cash in the case of farms, and perhaps also service and retail establishments; and, in Censuses beginning with 1910, work entailed in keeping boarders, if substantial.<sup>9</sup> Some estimators of national income explicitly include an allowance for the value of housewives' services; others provide supplementary figures to indicate the order of its magnitude; practically all warn of the paradox that ensues when a man marries his housekeeper. If one is interested in the changing industrial distribution of the population it is arguable, I think, that explicit account be taken of the shifts between home and outside work; i.e., that unpaid housework should be included as a category under domestic service. Such inclusion would have enormous influence on the relative importance of domestic service since the number of unpaid houseworkers far exceeds that of paid domestics.<sup>10</sup> In any case, some account must be taken of this large group in interpreting whatever

<sup>9</sup> In the 1910-30 Censuses the keeping of boarders or lodgers was considered a gainful occupation if the person so engaged relied upon it as his principal means of support. In the 1940 Census a housewife keeping 5 or more boarders or lodgers was specifically defined as a member of the labor force. Instructions for Censuses prior to 1910 do not mention keeping boarders.

As late as 1930 almost 10 percent of all families included one or more lodgers, and in 1940, 8 percent (16th Census, *Families, General Characteristics*, p. 4). (In both years households with more than 10 lodgers were excluded from the category of private families.) In earlier years the percentage must have been substantially higher because of the large immigration, a disproportionate fraction of which consisted of adult males. George Stigler points out that in 1901, according to the *Eighteenth Annual Report of the Commissioner of Labor*, over 20 percent of families in urban areas reported income from boarders and lodgers (see his 'Domestic Servants in the United States, 1900-1940' NBER, *Occasional Paper 24*, April, 1946, p. 29).

<sup>10</sup> If the 'domestic and personal service' category is divided to show domestic service separately, as we do later, how shall the keeping of lodgers be treated? On the principle of classifying two-occupation persons by their chief occupation, few housewives would be placed in the personal (excluding domestic) service group, since only 0.8 percent of all families kept more than 3 lodgers in 1930 (*Abstract of the 15th Census*, p. 411).

figures on the working force are published. This can be done only roughly, since the 1940 Census alone has collected adequate information on household work. In that year 28.9 million females 14 years and over were reported as engaged in unpaid housework and 13.0 million in the labor force; males, about a quarter million in unpaid housework. If we estimate the number of females so engaged in earlier years by assuming (as seems approximately confirmed by some figures available for 1920 and 1930)<sup>11</sup> that the percentage of females doing either housework or gainful work equaled the percentage of males gainfully occupied, we have the accompanying figures for 1870-1940. Since the proportion of females of

<sup>11</sup> The 1930 Census reported the number of homemakers, not also gainfully employed, as 24.5 million (*Abstract of the 15th Census*, p. 413). Since a homemaker is defined as the female member of the family who is responsible for the care of the home and the family, this figure fails to include other females, such as daughters, working at home without pay. The more inclusive figure, cited above, is available for 1940 only (16th Census, *Population*, II, Characteristics, Part 1, p. 12). Female 'home housekeepers' without gainful occupation, 16 years and over, are roughly estimated to number 22-23 million in 1920 (J. A. Hill, *Women in Gainful Occupations 1870 to 1920*, Census Monograph IX, 1929, pp. 5-6). Apparently this estimate covers grown daughters helping, as well as housewives.

The assumption that the fraction of females of working age who are gainfully occupied or doing housework at home is equal to the fraction of males of working age who are gainfully occupied is that used by R. G. Hurlin and M. B. Givens, in their chapter, *Shifting Occupational Patterns*, in *Recent Social Trends*; see p. 274, Table 1, and p. 279, note 9; cf. also Edwards, *op. cit.*, p. 90. (Hurlin and Givens apply the method to the group 16 years and older, rather than to the group 10 and older, as is done above.) The two fractions were approximately the same in 1920, if we accept the estimate cited; in 1930, if we make some allowance for daughters; and in 1940. The 1920 ratios, 16 and over, are 89.7 percent for females and 89.9 percent for males; the 1930 ratios, 10 and over, 72.2 percent for females and 76.2 percent for males; the 1940 ratios, 14 and over, 82 percent for females, 79 percent for males. For 1940 the estimate based on the assumption is 54 percent of females 14 and over; the Census figure is 57 percent. The separate 1940 data for urban, rural nonfarm, and rural farm areas, shown in the accompanying table, are also helpful in checking the assumption.

PERCENTAGES OF FEMALES, 14 AND OVER, IN THE LABOR FORCE AND IN HOME HOUSEWORK, 1940

Area	In Labor Force	In Home Housework	Total	All Females 14 & over
Urban	31	52	83	100
Rural-nonfarm	21	60	81	100
Rural-farm	12	69	81	100

## FEMALES ENGAGED IN UNPAID HOUSEWORK (millions)

	1870	1880	1890	1900	1910	1920	1930	1940
Ages 10 & over	8.9	11.5	14.3	17.3	20.5	23.6	26.4	28.9
Ages 14 & over							25.8	

working age who were gainfully occupied increased, the series rises less rapidly than the total number of females in the labor force. Its movements approximately parallel those in the number of paid domestic servants between 1870 and 1910 (see the table at the end of this paper). From 1910 to 1920 the number of servants dropped, then rose to a point in 1940 only 10 percent above 1910 levels. The number of females engaged in unpaid housework went up rather steadily, reaching a level in 1940 almost 45 percent above 1910.

b) The other main group of persons affected by the definition of gainful work is students. The Censuses of 1850 and 1860 covered students over 15 years of age (even if not also gainfully occupied). All other Censuses omitted them, unless they were also gainfully occupied; the 1940 Census, however, specifically covers student nurses and other students in 'company' training schools receiving some compensation, in money or kind, for attendance. A case for including all persons attending at least professional, business, trade, and technical schools could be made on many sensible definitions of production. This kind of maintenance and expansion of a basic part of our capital is recognized as a real occupation by some pupils, by more parents, and by society at large. If the shift away from the apprenticeship system to the presumably more efficient school, with the resultant cessation of immediate money pay while learning, is ignored, understanding of what has happened to the working population is distorted. For some purposes even students engaged in acquiring a general education may not be omitted; a moment's reflection must show how impossible a modern industrial system would be without literate workers.

Inclusion of students would have enormous effect on the relative importance of the industry 'education', as well as on the aggregate working force in relation to population. In 1940, 9.0 million persons 14 and over were attending school (students al-

ready counted in the labor force because engaged also in some gainful occupation are excluded). Inclusion of students attending schools of higher education alone would approximately double the number of persons 'engaged' in education, as the accompanying figures for 1940 reveal.

Inclusion of all pupils would reduce the growth rate of the industrial category 'education', since pupils per teacher declined between every pair of Census years, and were cut in half from 1870 to 1940 (see Sec. 9). If pupils in schools of higher education alone were

Students (millions) <sup>a</sup>	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940
Attending all schools										
Total	4.1	5.7	6.6	10.0	11.7	13.4	18.0	21.8	27.9	27.3
10 & over <sup>b</sup>					7.9	9.1	12.0	14.0	18.7	19.4
15 & over <sup>b</sup>					2.3	2.6	4.0	4.2	7.2	8.3
Attending colleges, universities, professional & normal schools										
Also gainfully occupied										
10 & over					0.16	0.24	0.36	0.60	1.10	1.49
14 & over							1.1	1.0	1.2	0.9

<sup>a</sup> Total attending school: 1850-1920, from 1920 Census, *Population, General Report*, p. 1043; 1930, from *Abstract of the 15th Census*, pp. 261-2; 1940, figure reported for age group 5-24 (1940: *Population, Characteristics*, p. 33), stepped up by the 1930 ratio of the total to that age group. The 1850-60 figures do not include slaves, but they were apparently negligible in number; even in 1870 relatively few colored children were attending school. Number, 10 and over and 15 and over: total number, minus students aged 5-9 or 5-14, as given in the 1940 Report, p. 37. Number attending colleges, etc: from *Biennial Survey of Education*. Number also gainfully occupied, 10 and over: Clarence Long; 14 and over, 1930: Long's estimate, minus the Census figure for the 10-13 group; 1940: total attending, 14-24, minus the number in the same age group reported at school under 'employment status'.

<sup>b</sup> The difference between the total and the age group 5-9 or 5-14; it therefore includes a few persons under 5.

included, the growth rate of the total would be raised, after due allowance, of course, for students already covered among gainful workers.

Besides housewives and students, other groups, such as inexperienced workers and inmates of institutions, are of interest in the present connection. These, of far less importance, are considered in the next section.

3 *Also, this definition of gainful work is neither precise nor constant; the figures for some industries are affected more than those for others*

The line between persons engaged in so-called gainful occupations and persons otherwise engaged is rather arbitrary, as we have just seen. But even after accepting the narrower definition of production that is laid down by the Census we run into difficulties. First, the line shifts somewhat from one Census to another (or, in any one Census, from one industrial or occupational area to another). Second, since the position of the line has not been defined clearly, it is subject to vagaries of interpretation by individual enumerators and reporters, and is in consequence really a zone.<sup>12</sup>

a) A good many housewives work also at 'gainful' occupations—almost 4 million were reported in 1930. The general Census rule (the 'priority rule') has been to classify them as gainful workers;<sup>13</sup> no effort is made to divide them between the two classes in terms of some 'full-time equivalent', even if relatively little time was spent at the gainful occupation.<sup>14</sup> Censuses differ in details of treatment. The 1870-90 Censuses instructed enumerators to exclude, from the gainfully occupied, housewives 'without any (or, any other) gainful occupation'. The 1900 Census treated a housewife as gainfully employed if she had a gainful occupation whether she was 'regularly or only occasionally employed'. The 1910 and 1920 Censuses included housewives only if they 'regularly' earned money at their gainful occupation. The 1930 Census also included women so characterized 'unless this (the gainful occupation) takes only a very small fraction of the woman's time'; and, in general, enumerators were instructed when in doubt to exclude from the

<sup>12</sup> These difficulties explain why some workers in international statistics, and sometimes also national statistics, find it convenient to exclude such categories as unpaid family workers, children under 16, and women working on farms, in making space or time comparisons of labor force data.

<sup>13</sup> That is, the intention has been as stated. However, as indicated by the results of the shift in the Monthly Report on the Labor Force schedule, mentioned later, the priority rule has not always been obeyed.

<sup>14</sup> If persons doing unpaid housework were to be included in the domestic service 'industry', then by another Census rule governing the allocation of persons engaged in more than one industry, the domestic service category might be expected to gain at the expense of other industries.

working force persons spending less than the equivalent of one day's work per week on the job. However, while a woman 'who works only occasionally, or only a short time each day . . . shall not be returned as a farm laborer', 'a woman who operates or runs a farm should be reported as a farmer', presumably even if she does not spend much time at such work. In 1940 the criterion of inclusion was *any* work, full-time or part-time, for pay or profit, i.e., work for pay or profit at any time during the week of March 24-30, 1940; yet unpaid family workers (including housewives) on farms were to be excluded if engaged only in 'occasional work'.

The various instructions to enumerators on this problem are not entirely consistent with one another, nor are they always consistent with instructions on other matters.<sup>15</sup> They point a finger at the kinds of work that might have been subjected to variable Census treatment, and that therefore require the attention of those concerned with such work or the industries in which they are significant—seasonal work, unpaid family work, 'gainful' work done at home, and part-time or occasional work done outside the household (the categories are not, of course, mutually exclusive). Violently seasonal industries in which women are of some importance include agriculture, canning, summer hotels, and other types of production with peaks during the summer months; and certain retail stores, with peaks in the spring and late fall. Unpaid female family workers are found largely in agriculture and food stores and eating places. Gainful work at home presumably consists mainly of laundering, dressmaking, and a certain amount of factory home-work. Part-time or occasional outside work occurs largely in domestic service, retail trade, and nursing.

That a large group may be contained in these borderland areas is indicated by the results of the change in the Monthly Report on the Labor Force schedule and instructions in July 1945.<sup>16</sup> The shift from one schedule to another led to a reduction of over a

<sup>15</sup> Such as those for keeping boarders; here, to warrant treatment as gainful work, the occupation had to afford the principal means of support.

<sup>16</sup> See the discussion by L. J. Ducoff and M. J. Hagood in *Labor Force Definition and Measurement*, Social Science Research Council, Bulletin 56, 1947, Ch. II.

million in the number of persons engaged in own-home housework and a corresponding increase in the labor force. Presumably some were, by this shift, allocated to paid domestic service. But most went to other industries; agriculture took a large fraction.<sup>17</sup> If own-home housework were to be treated as a labor force industrial category, however, a fair number would be assigned to it since their other work, although exceeding 14 hours per week, was largely 'incidental' and therefore presumably less important than their housework.

b) A certain number of young people attend school and work as well. As in the case of housewives 'also gainfully occupied', the priority principle has usually led to including them in the working population.<sup>18</sup> But again, as with housewives, some degree of uncertainty arises because of seasonal work, unpaid family labor, and odd jobs generally. The number actually reported is substantial. From the figures cited above it will be noted that the proportion of student-workers shrank between 1910 and 1940.<sup>19</sup> Because the Census dates for 1900 and all except one of the earlier years were June 1, schools were in session fewer days than in recent years, and farming was more important, one would expect a still more substantial percentage of the normal school population to be reported as 'also gainfully occupied'. This expectation would be consistent with the statistics showing a declining trend in the percentage of children in the working force since 1900.<sup>20</sup>

<sup>17</sup> *Monthly Report on the Labor Force*, Sept. 20, 1945.

<sup>18</sup> However, instructions to enumerators of the 1900 Census explicitly require their exclusion if their gainful occupation takes less of their time than their school work (the latter is not defined whether inclusive or exclusive of home or library work). But the 1900 Census was taken as of June 1 when fewer schools were open than there would be today. And as with housewives, the priority rule has probably been violated on occasion.

<sup>19</sup> But this may be due, in part, to the method of estimating student-workers in 1910 and 1920. Nor can the decline between 1930 and 1940 be taken too seriously. The changed treatment of 'seasonal workers' and the elimination of NYA student-workers would cause a decline, probably offset only in part by the changed treatment of 'new workers'. See Durand and Goldfield, 'Estimates of Labor Force, Employment, and Unemployment in the United States, 1940 and 1930', 1940 Census, *Population*, pp. 7-8.

<sup>20</sup> Edwards, p. 92. The 1870 figures, which depart from the trend, are somewhat anomalous; see the later discussion.



The July 1945 change in the Monthly Report on the Labor Force schedule led to a reduction of a quarter million in the number of persons counted as in school and not in the labor force and a corresponding increase in the number counted as in the labor force as well as in school. Presumably the April test preceding it indicated a much bigger shift at that time, since it was held during the regular school year. Apparently here, too, a substantial number of persons may be allocated one way or another, depending on how the schedule is phrased and—it is fair to say—how the schedule and instructions are understood by the reporter and enumerator.

c) Inexperienced workers seeking their first jobs at the time of the 1940 Census were explicitly covered by it. In earlier Censuses, however, there is some question whether new workers were fully covered. It is likely that those with no specific occupation to report may have been disregarded. However, many beginners do have some specific occupation, acquired in school, learned in odd jobs, or picked up from parents. It seems doubtful, therefore, that all new workers were omitted from the 1930 and earlier Censuses. If so, the Durand-Goldfield estimate of 210,000 new workers omitted in 1930 is an overstatement.<sup>21</sup> In any case, the relevant error is small since we are primarily concerned only with *changes* in the number of new workers. Probably they are concentrated in the nonagricultural sphere. There is no reason to believe that the error affects one nonagricultural industry proportionally more than another.

d) Inmates working in penal and mental institutions and homes for the aged, infirm, and needy constitute another group the treatment of which may be and has been variable.

Institutional inmates are mentioned for the first time in the 1900 instructions: they were to be included only if actually engaged in work for which a stated wage in addition to board was received. Beginning with 1940, they were to be excluded in any event. In 1930, it is estimated, gainful worker inmates aged 14 and over numbered about 200,000<sup>22</sup>—less than 0.5 percent of the total gainfully occupied population, though of course a larger but still small percentage of the industrial groups (presumably health serv-

<sup>21</sup> *Op. cit.*, p. 7.

<sup>22</sup> *Ibid.*, pp. 9-10.

ices, agriculture, and government) in which the inmates were classified. In earlier years, probably, worker-inmates were relatively fewer than in 1930, since the institutional population was smaller.

e) Retired and permanently disabled workers were supposed, I gather, to be excluded from all Censuses, though fairly specific instructions appear only in the more recent. Durand and Goldfield estimated, however, that 472,000 were included in 1930.<sup>23</sup> Whether the figure for the years before 1930 would be bigger or smaller than that for 1930 would presumably depend upon how business conditions at the time the Census was taken compared with the spring of 1930.<sup>24</sup> In any case, it is hardly likely that changes in coverage would be large. Part of the resulting error is canceled, as far as the grand total is concerned, by the error arising from the omission of new workers; both errors tend to be magnified with worsening business conditions. Further, the size of both errors may be related to the proportion of employment in nonagriculture, since unemployment of new workers and retired and disabled workers, as well as of other workers, is probably greater off the farm than on it. That is, the error would be smaller in earlier years than in recent.

f) A separate word must be said about unpaid family workers, most of whom are probably also housewives (or children helping in the household) and students, because there is no way of telling how large each group (housewives, students, etc.) bulks among unpaid family workers.

According to the 1940 Census, in which separate figures are shown for the first time, there were about 1.5 million such workers, 1.2 million of whom were in agriculture; the majority of the remainder were in retail trade. The 1910-30 Censuses reported only those in agriculture, namely 1.5 million in 1930 and again in 1920, and 2.6 million in 1910, including seasonal workers, a class not included in 1940.<sup>25</sup> In all these years the reported number of these

<sup>23</sup> *Ibid.*, p. 11.

<sup>24</sup> On the relation between Census dates and business conditions, see Section 7.

<sup>25</sup> Edwards, p. 63. He notes that the 1910-20 figures are underestimates, since they fail to include some unpaid family workers on other than general farms. The persons omitted because of the 1920 undercount are also left out.

workers constituted a very substantial fraction of the total agricultural working force; in 1930 the percentage was 14; in 1910, over 22. Including all seasonal workers (not all were included even in 1930 and earlier years),<sup>26</sup> unpaid family workers may have considerably exceeded the number actually reported—indeed they may have been double that number.

Leaving aside the seasonal question (to be considered later) there is the usual question concerning the exact line that has been drawn between unpaid family workers and persons not counted at all as gainful workers. (This time our question is raised from the viewpoint of a gainful worker category rather than with reference to a category outside the area covered by gainful workers.) Beginning with the 1870 Census, instructions to enumerators mention children assisting in their parents' business. Enumerators were instructed to exclude domestic errands or family chores, and to include only 'appreciable' assistance in mechanical or agricultural industry (retail stores were not mentioned). In 1910 the instructions were revised to exclude, besides general housework and chores, other work at odd times; only 'material' assistance in other than household work was to be covered. In 1930 it is 'regular' work on farms or 'somewhat regular' work in other than farm industry that is to be covered, with at least the equivalent of one day per week in doubtful cases. The 1940 instructions merely require 'actual assistance' on work contributing to the family income. Since the 1940 Census there has been a very significant further change, this time in the instructions to enumerators of the Monthly Labor Force. Beginning with July 1945 a specific, if arbitrary, limit was set on the number of hours spent on incidental chores below which the person performing the work is not to be counted in the labor force. The number of unpaid family workers, especially in agriculture, was thereby increased almost 600,000. According to a pre-test of this new questionnaire in April 1945, the number may be much larger during the regular school year. The increase is, of course, the counterpart of a large fraction of the reduction in own-home houseworkers and students previously noted.

<sup>26</sup> Durand and Goldfield, pp. 8-9.

g) Some corrections have been made by the Census authorities and others for changes in schedules that inadvertently lead to changes in coverage. These, due primarily to difficulties in classifying children and women, suggest the magnitudes that may be involved in some of the problems we have been discussing.

To the reported 1890 Census figure on agricultural workers the Census authorities later added some 600,000 children 10-15. Compared with the labor force propensities for this age group in 1880 and 1900 the 1890 figure seemed low, apparently because instructions on entries for nonworkers were more specific than in the other years;<sup>27</sup> or the other years may have been too high.

The Census authorities felt (1900 Census, p. lxxii, note 1), that "omissions among persons over 15 . . . were inconsiderable and could not be defined more clearly". But on the basis of an analysis of the figures Carson suggests the addition of about 400,000 persons between 16 and 20.

Also because of a change in instructions, and in any case in comparison with 1900, the 1910 figure for children and adult females was felt to be overstated in the agricultural category. About 800,000 persons were therefore deducted by the Census authorities.<sup>28</sup> Clarence Long has tentatively made a further deduction of 650,000 persons, about 250,000 agricultural and 400,000 nonagricultural workers, on the same grounds.

To avoid the kind of overcount that occurred in 1910, the Census instructions for 1920 were modified. The result this time, not only because of the change in instructions but also because of the change in the time of year at which the Census was taken (see

<sup>27</sup> For the first time persons not gainfully occupied were to be reported with respect to activity: housewife, in housework, at school, at home, or with no occupation. Why the added workers were classified in agriculture alone is not clear; but the question is not material, as is indicated in the next note.

<sup>28</sup> Since the 1900 level of agricultural workers was too low because 'laborers (not specified)' were excluded (see below), it is not clear exactly what is involved in the estimate of the 1910 figure. Also, the number of 'laborers (not specified)' that Edwards allocated to agriculture in 1900 depended, in part, on the 1910 level of agricultural workers. The whole business is complicated!

Further, the final 1890 figure for agriculture is actually based on a method Edwards used to interpolate between 1840 and 1910 that was accepted, in part, by Carson. The 1890 correction, therefore, really turns out in the end to be a correction of the aggregate for all industries rather than of agriculture in particular.

Sec. 7), was an undercount. Of the total added by the Bureau of the Census, 820,000 persons, 785,000 were in agriculture and 35,000 in other industries. However, Long questions any undercount in 1920. In his own calculations he uses the unadjusted Census total.<sup>29</sup>

*4 Further, there are inadequacies of enumeration and reporting; these bear more heavily on certain industries than on others*

It remains for us to consider some further questions concerning coverage, namely those arising from inadequacies of enumeration and reporting that do not originate in conceptual difficulties.

a) The first group of persons inadequately or not at all covered in the Census of Occupations (and the Census of Population) consists of workers employed outside the country or with no fixed place of residence—soldiers and sailors afloat or stationed abroad, fishermen, migratory farm laborers or other itinerant workers, some railroad men, etc. Some of these persons are mentioned in a few early Censuses of Occupations, but it is obvious that few are accounted for. Persons changing their residence on Census day and trappers living in the wilds are also in this category.

It is hardly likely that these omissions appreciably affect the over-all aggregates. Certain individual industries or occupations, however, may be substantially influenced, as Daniel Carson points out: transportation, fishing and national defense come to mind.<sup>30</sup>

b) The only undercoverage of total population, and therefore of gainful workers, corrected by the Bureau of the Census is that due to the undercount in certain southern states in 1870.<sup>31</sup> Some 420,000 gainful workers, 3 percent of the revised total, were added and distributed among the various occupational divisions in accordance with the occupational distribution of persons reported in the southern states—that is, mostly agriculture.

<sup>29</sup> See 'The Labor Force in Wartime America', NBER, *Occasional Paper 14*, March 1944, p. 9.

<sup>30</sup> The Census estimates that about 150,000 members of the armed forces were omitted from the 1940 Census because they were stationed outside the continental United States; see Census Release P-44, No. 12, p. 2n.

<sup>31</sup> Edwards, p. 141. We need not concern ourselves with the corrections of the Censuses of Population prior to 1850.

c) In 1940, for the first time,<sup>32</sup> the Bureau of the Census could determine the number of persons for whom no employment status entry had been made, i.e., for whom it was not known, because of carelessness or inability of the enumerator to get information, whether they were or were not in the labor force. It believes that as many as 530,000 persons in the labor force in 1940—1 percent of the total—were omitted because no entry was made for them.<sup>33</sup> No indication is given concerning the industries most affected. On the basis of the 1940 data, the Census Bureau estimates, rather roughly, that some 420,000 persons—or somewhat less than 1 percent—were similarly omitted in 1930.

Omitted entries in earlier years are not known and cannot be estimated. It is hardly likely that they were much less important than those in 1930 and 1940. In the case of 1870, indeed, there is some ground for suspecting that a rather large number of entries for young people were omitted.<sup>34</sup> The percentage of the population counted in the ranks of the gainfully occupied was substantially lower in 1870 than in 1880 and later years up through 1910, as may be seen from the tabulation. The 1870 percentages for males 16 years and over could be expected to be relatively low because of the long death and casualty roll of the Civil War. Conservative estimates are said to put the number of deaths at 600,000. Even after allowance for disabilities and deaths that would have occurred in the absence of war, perhaps 1 percent of all men 16 years and over would be accounted for. In addition, the proportion of adult males in the working force might have been reduced because of the drop in the rate of immigration during the decade preceding 1870. The 'abnormal conditions' left by the Civil War may thus be accepted as at least partially explaining the figures for adult

<sup>32</sup> It would have been possible to determine the number of omitted entries in 1890, because of the requirement that an entry be made for nonworkers; but as far as I know, the number was not tabulated.

<sup>33</sup> Durand and Goldfield, p. 5.

<sup>34</sup> Both Whelpton and Edwards, noting the unusually low percentage of the population reported as gainfully occupied in 1870, use 1880 and 1840 rather than 1870 and 1840 as the bases for estimating the 1850 and 1860 percentages of the population that were gainfully occupied (Edwards, p. 142; Whelpton, p. 342, note r). They ascribe the 1870 situation to the "abnormal conditions following the Civil War".

males. The figures for females seem to be in accord with their trends. But the low percentage of males, 10-15, gainfully occupied, remains unexplained.<sup>35</sup>

PERCENTAGE GAINFULLY OCCUPIED, 1870-1930

	1870	1880	1890	1900	1910	1920	1930
Ages 10-15							
Male	19.3	24.4	25.9	26.1	21.7 (18.0)	16.8 (11.4)	6.4
Female	7.0	9.0	10.0	10.2	8.1 (8.4)	5.8 (5.6)	2.9
Ages 16 & over							
Male	88.7	90.6	90.5 (92.5)	90.5	91.1	91.0 (90.0)	88.0
Female	14.8	16.0	19.0 (19.1)	20.6	24.0 (22.5)	24.2 (24.0)	25.3

Edwards, p. 92. The figures in parentheses for 1890, 1910, and 1920 take into account the corrections suggested by Daniel Carson or Clarence Long.

d) In consequence of the deliberate limitations on the 1820-60 Censuses the figures for some industries are weaker than those for others. Whelpton's attempts to overcome these limitations are discussed in Section 6.

\* \* \* \* \*

We emerge from the discussion of the aggregates with the keen realization that the gainful worker concept, as used in United States Censuses, is, to begin with, rather hazy; and, further, that the zone of uncertainty surrounding it has been widened by changes in schedules and instructions between successive Censuses. We are left with no very clear notion of its width or its variations from Census to Census. Review of the schedules and instructions merely precipitates qualitative considerations and indicates the *possibility* of variation in count; it offers no basis for quantitative assessment. Except when two counts, utilizing different concepts and procedures, are made for the same period, as in July 1945 (and some earlier pre-tests), and to some extent when

<sup>35</sup> One possible hypothesis concerning 1870 is that this Census date comes closer to a fairly severe trough in business activity than any of the later ones (see Sec. 7). If, as Long suggests, there is a cyclical swing in the percentage gainfully occupied that conforms with business cycles, 1870 would show a smaller labor force propensity than later Censuses; how much smaller is a question, however.

schedules are so arranged that the absence of an entry indicates that something has been missed, as in the 1940 Census, we can merely assume smooth (or, even, little) change, and detect abrupt—and therefore presumably unreasonable—change by comparing contiguous Censuses. The danger here is that our preconceptions will mold the figures with which we end up.

The zones of uncertainty are broader for industrial areas in which are concentrated the groups of the working population subject to variable treatment from one Census to another. Outstanding, of course, is agriculture, though retail trade and personal service also are of concern.

*5 The industrial classification is necessarily gross and rough*

An industrial distribution of the working force derived from Census data is based on information collected not only from individual workers but also from family members, boarding-house keepers, and others responding for them. As a rule little is known about the establishments in which the persons for whom the report is made earn their bread. Consequently, the detailed information needed to distinguish clearly between overlapping industrial categories or industries divided arbitrarily cannot be given. For example, we shall never be able to distinguish clearly, in occupational Censuses, between wholesale and retail trade, since many establishments do both and the reporter can not be sure which is more important; or between manufacturing and trade or service establishments, since it is a quantitative criterion that distinguishes between, say, a small retail bakery making and selling mostly its own products, and a factory establishment selling mostly at wholesale.<sup>36</sup> In the Census of Manufactures, for example, establishments are classified from detailed information on the character and value of individual products.

Even the information respondents might possess is not always fully elicited by enumerators since no detailed industrial or occupational classification is actually utilized in taking the Census.

<sup>36</sup> For similar reasons, the Census of Occupations cannot be as close to an 'establishment' basis as, say, the Census of Manufactures, though it is undoubtedly far closer to an establishment basis than to the enterprise basis on which corporate data are reported in Statistics of Income.



Instructions to enumerators do request detail; Census instructions for 1870 read, "Call no man an 'agent' without further explanation." But it is also true that no enumerator carries around with him a copy of the Bureau of the Budget's standard classifications. Nor, as Carson has pointed out, could he at the wage he receives.

A further difficulty arises from the fact that industrial classifications have changed, with the passage of time, partly because of changes in the economy itself, partly because our ideas on classification have improved. Related is the difficulty caused by changing or indefinite terminology or the changing content of the same and sometimes indefinite categories. The occupation 'clerk' surely has a somewhat different meaning today from what it had in 1870.

As a consequence and at best, Censuses of Occupations can as a rule identify positively only relatively broad industrial categories;<sup>37</sup> and even these must inevitably suffer from fuzzy edges.

Restraining our expectations to a reasonable level, we may inquire how closely Edwards and Carson have been able to approximate the industrial categories from Census data.

a) The initial question concerns the comparability of the 1910 and 1930 industrial categories, the basic framework of the 1870-1930 distribution. These two Censuses were not tabulated by the same code; nor is either classification defined in the detail to which the Bureau of the Budget has accustomed us in recent years. Anyone who has struggled with problems of classification, and especially anyone who has tried to match two sources of data, will appreciate the possibilities of incomparability that lie imbedded, like land mines, even in apparently similar classifications.

As the Census reports give no clue to the comparability of the 1910 and 1930 classifications, Carson cannot settle the issue, al-

<sup>37</sup> This disadvantage should not be minimized. Study of broad industrial groups is of value in getting an initial view and in deriving hints as to forces operating in an economy. But this value is limited. Economists who have examined data for broad, and therefore necessarily heterogeneous, groups sooner or later feel impelled to divide them.

I hardly need say that the conventional (or general purpose) classification, the basis of the Census categories, is really acceptable only when given in detail, and can therefore be utilized in the construction of other, more definitely analytical, classifications.

though he is careful to show how he matched 1910 with 1930 and how his classification compares with the Standard Industrial Classification. Perhaps the failure of the Census authorities to compare 1910 and 1930 indicates serious incomparability.

b) Similar doubts arise in connection with the occupational categories for 1870–1920, the basis for Edwards' and Carson's interpolations and extrapolations. Anyone thumbing through Edwards' detailed notes, or the collation of occupational data for years prior to 1900, given in the 1900 Census, will realize the great variety of categories, the difficulties caused by combining several occupations—and in different ways in successive Censuses—and the frequent vagueness of terminology. Some distinctive occupations simply do not appear in some Censuses, although they existed in the years covered by those Censuses, nor is it clear where they are subsumed.

c) A serious difficulty in building up an industrial distribution of the working population arises from the failure of the Census to obtain the industrial affiliation of a substantial number of workers in years before 1910, or always to publish the information it had. The big groups that therefore straddle more than one industry are 'laborers (not specified)', 'draymen, hackmen and teamsters', and clerical workers. But the problem does not end with laborers, draymen, and clerical workers; even professional persons, cooks, and telephone operators are employed in more than one industry.

Laborers (not specified) were as much as 8 to 11 percent of all gainful workers during 1870–1900. Worse, it is highly uncertain that they may legitimately be assumed to be distributed in some stable proportion or in accordance with any simple formula among all industries. The very vagueness of the occupational category (it is an 'all other' class, including as it does skilled farm hands as well as unskilled workers of various types) militates against such a simple assumption.

The other two occupational categories—draymen, etc. and clerical workers—are more specific, and there would seem to be less danger in distributing them in one way or another among the various industries. Together they are only about half as numerous as laborers (not specified) in 1900 and one-fifth in 1870. All three

occupational groups combined amount to 12–13 percent of the total working force in 1880–1900, and 9 percent in 1870.<sup>38</sup>

There is little one can do in the way of criticizing Edwards' and Carson's distributions of these three (and other) nonspecific occupations. While both tried various methods before deciding on those finally used, neither presents the alternative estimates, nor does either indicate what the industrial picture would have looked like if no effort had been made to distribute the troublesome nonspecific occupations.<sup>39</sup> The unallocated residual in Carson's tables and the clerical occupations in Edwards' tables are not at all estimates of the margins of uncertainty surrounding the industrial distributions. If the residuals included the big nonspecific occupations, or even only portions of them, they would be much larger. By distributing these occupations, both authors have removed some of the uncertainty from the immediate ken of the reader.

As there is little basis for either estimating or commenting on the number of laborers (not specified) allotted to most industries, I shall confine myself to Edwards' method of estimating the number assignable to agriculture. Following Whelpton, he determines the number of agricultural workers in 1870–1900 by interpolating between the 1840 and 1910 ratios of agricultural to total workers<sup>40</sup> with the aid of the ratio of persons living in rural places to all persons.<sup>41</sup> The 1840 ratio of agricultural to total workers is Whelpton's estimate. If it is surrounded by a margin of error (as is suggested, at a later point, that it might be), then so is the esti-

<sup>38</sup> Together with certain other groups treated similarly by Edwards, they amount to 11 percent in 1870, 14–15 percent in 1880–1900.

<sup>39</sup> Edwards does not distribute most clerical workers or a large fraction of draymen. If a percentage distribution of Edwards' data, excluding his category 'clerical workers', is compared with a similar distribution of Carson's, excluding the 'not specified' residual, the discrepancies appear to be rather small (for some purposes!): the broad trends are definitely the same in both.

<sup>40</sup> In 1840 and 1910 there was no large laborers (not specified) group; the agricultural figures are therefore accepted as complete.

<sup>41</sup> The correlation between the ratio of rural to total population and the ratio of agricultural to total working force is good except for the most recent Census, 1940. Better, probably, would be the correlation between the ratio of rural-farm to total population and the ratio of agricultural to total workers; but the rural-farm figures are not available for 1820 and 1840. (The ratio of farm to total families, a good substitute, also is not available for the early decades of the 19th century.)

mate of the agricultural force; and, consequently, that for all other industries as well.<sup>42</sup> It is only fair to note, however, that even if no laborers (not specified) were allocated to agriculture, or even if all were, the downward trend in agriculture's relative importance would still remain very clear and pronounced.<sup>43</sup> For some purposes, on the other hand, for example, if the level or trend of labor productivity in agriculture is in question, it makes a good deal of difference how laborers (not specified) are handled.

d) Carson uses what he calls 'characteristic' occupations as his basic data in estimating the working force of an industry. The characteristic occupations are an excellent basis of estimation for an industry when they have these traits: the great majority of the working force of the industry is in these occupations and the great majority of the people in these occupations is attached to that industry. When they do not have these traits, there is danger that the index of characteristic occupations is biased as an index of the total working force of an industry. If, for example, there has been a tendency, with the passage of time, for the group of professional persons (taken as a whole) to subordinate their positions and accept work as employees of various business concerns and drop strictly professional practice, the group will no longer accurately reflect the trend in the number of professional-grade persons

<sup>42</sup> Since Carson uses Edwards' estimate as a starting point for his own, he also in effect relies on the interpolation method in part.

<sup>43</sup> Similarly, if all women and males under 16 were excluded from the labor force, because of doubt concerning changes in coverage, the downward trend in agriculture would hardly be affected. The figures on the percentage of the working force engaged in agriculture, 1870-1930, tell the story.

PERCENTAGE OF WORKING FORCE ENGAGED IN AGRICULTURE, 1870-1930

	1870	1880	1890	1900	1910	1920	1930
All persons 10 & over							
Edwards	53	49	43	38	31	27	21
Edwards (excl. addition for laborers [not specified])	48	44	39	35	31	27	21
Carson	50	50	42	37	31	27	22
Males 16 & over							
Edwards	57	53	46	40	33	29	25

Edwards' data appear on pp. 98, 104, and 142 of his report.

attached to professional pursuits. As a matter of fact, the ranks of professional-grade persons have been invaded by engineers, chemists, and similarly trained persons frequently—sometimes largely—engaged in industry as employees. Also, with the growth of large scale business, one may expect more and more professionals such as lawyers and architects to be employees of industrial concerns rather than independent practitioners. If these trends have materialized, Carson's estimate of professional service is biased upward, at least until 1910.

Similar questions might be raised in using the statistics for any industrial group. No general bias may be expected, however.<sup>44</sup>

e) I would like to conclude this section with one general criticism. I have mentioned the desirability of using data outside the Censuses of Occupations to aid in assessing the value of the data provided by them. The Census of Manufactures, Statistics of Railways, and other sources should prove useful checks. Indeed, since the Census of Occupations is not adequate in itself, Edwards would have done better if he had utilized other sources in making up his estimates, rather than relying almost wholly on the Census itself. Carson did use a certain amount of other material, but it is not clear that he exploited all possibilities.<sup>45</sup>

I make this criticism with some diffidence. Anyone who has compared various sources will remember the headaches induced by differences in definition, in the way labor turnover affects the figures, and in reporting units (individuals, establishments, or enterprises), not to speak of differences that cannot be identified. The skeptic will profit from a comparison, easily made, of the various estimates of construction employment and labor force by Carson, the National Industrial Conference Board, Kuznets, the National Income Division of the Department of Commerce, and

<sup>44</sup> The problem raised by persons with two or more occupations is also troublesome, since it may raise the figures for some industries and reduce those for others; see Carson's comments. With the growth of large city government, one source of part-time employment has probably shrunk; but the provision of means of rapid transit between rural and urban communities may have stimulated others.

<sup>45</sup> These various sources are not, however, entirely independent. Edwards mentions (p. 33) the use of the Census of Business and of Manufactures, etc. to allocate indefinite returns in the Census of Occupations to the proper industries.

the Bureau of Labor Statistics.<sup>46</sup> We should be grateful for the first steps taken by Edwards and Carson, realizing, as I am sure they do, that the journey is not ended.

6 *For the industrial distributions of 1820-60 the factual foundation is relatively slim*

As has been mentioned, the Censuses of 1820 and 1840 covered only specified industries (in 1830 there was no Census of Occupations); that for 1850 covered only free males over 15; and that for 1860, only free persons over 15. Whelpton estimated the missing persons, a substantial part of the estimated totals.<sup>47</sup> Edwards accepted Whelpton's estimates with very little revision. Since these totals, and their industrial distribution, have been widely used, some remarks on them are not out of place.

Whelpton's method of estimation is rather intricate. Briefly, he first estimated, roughly, the number of slaves and free persons 10-15, in 1860, and these plus free females in 1850, in each industry group except those covered by the Census in 1820. This step gave an estimated total for each industry in 1850 and 1860. Corresponding totals for these industries in 1820 and 1840 were obtained by extrapolating the 1850 and later figures.<sup>48</sup> Using these 1820 and

<sup>46</sup> Or compare Carson's figures on gainful workers in manufacturing and hand trades with Census of Manufactures data on wage earners in manufactures, hand, neighborhood and building trades. Carson's estimate for 1900 is 1,040,000, or about 20 percent, above the Census of Manufactures figure for 1899. His 1870 estimate is 200,000, or 10 percent, above the 1869 figure.

Anyone trying to use the Census of Manufactures for the period prior to 1899 will run into some trouble. The summary data for 1849-99 published in all recent Census of Manufactures volumes suffer from rather annoying defects: they fail to note, unlike the more carefully prepared recent data, significant changes in the scope of the Census and in the definitions of employment.

In the earlier Census of Occupations volumes there is frequent comparison between it and the Census of Manufactures. "The latter suffers by comparison" (*Compendium of the 9th Census*, p. 616); apparently because the number reported in it was smaller than that given in the former.

<sup>47</sup> To 2.5 million persons reported in the 1820 Census Whelpton added 390 thousand, or 14 percent of the estimated total. The corresponding percentages for the other Census years are: 1840, 11; 1850, 31; and 1860, 22.

<sup>48</sup> The 1820 figure for mining was derived from an extrapolation of the 1840 figure.

The extrapolation in each case is of the ratio of persons in the industry to all persons aged 10 and over in 1850 and later years, either along 'a smooth curve' or by simply assuming that the ratio for 1850, or 1850 and 1860, held in 1820 and 1840 too.

1840 figures for industries not covered by the Census as well as for those covered, Whelpton obtained a grand total of the gainfully occupied for each of these two years. He then went back to 1850 and 1860 and estimated grand totals by interpolating on a straight line between the 1840 and 1880 ratios of the gainfully occupied, 10 and over, to total population, 10 and over (see note 34). Using these totals for 1850 and 1860, and the ratio of the agricultural working force to the total (the latter being derived from the relation between the rural and nonrural population), he estimated the agricultural working force. The combined estimate for manufactures and commerce (trade plus transportation) for 1850 and 1860, the difference between the total gainfully occupied and the figures already estimated for the other industries, was split between the two industries on the basis of 1870 and 1840 relations. Finally, 1830 figures were estimated by interpolations between 1820 and 1840.

PERCENTAGE OF POPULATION 10 & OLDER GAINFULLY OCCUPIED, 1820-1930

Whelpton		Edwards	
1820	44.4	1870	44.4
1830	45.5*	1880	47.3
1840	46.6	1890	49.2 (50.0)
1850	46.8*	1900	50.2
1860	47.0*	1910	52.2 (51.3)
		1920	51.3 (50.3)
		1930	49.5

\*Interpolated.

Figures in parentheses are Carson's or Long's.

Whelpton's figures are as later revised by Edwards on the basis of adjusted population figures (see Edwards, p. 142); the revision is slight. Since the 1820 and 1840 Censuses failed to specify a lower age limit, it is clear that Whelpton assumes the limit to have been 10, as in recent Censuses.

When Whelpton's figures, expressed as percentages of population gainfully occupied, are compared with later data they do not seem greatly out of line. Since the younger age groups and rural residency were relatively more important in 1820-60 than in 1870 and later years, and labor propensities were smaller in the younger and the rural groups, Whelpton's lower ratios (except in 1870) are at least not in disconformity with expectations.<sup>49</sup> All

<sup>49</sup> Persons in the age group 5-19 accounted for 39.4 percent of the population in 1820, 37.2 in 1840, 37.4 in 1850, 35.8 in 1860, 35.4 in 1870, and 34.3 in 1880 (Thompson and Whelpton, *Population Trends in the United States*, p. 109). Persons living in places with populations of less than 2,500 were 92.8 percent of the population in

this means is, of course, that the figures appear to be more or less what one would expect to obtain by applying, to the sex-age-residency groups of 1820-60, labor force propensities derived from the 1880 or 1880-1900 Censuses.<sup>50</sup>

On the whole, there seems insufficient reason for accepting Whelpton's aggregates for the years before 1870 as anything like precise estimates. Indeed, it is not too much to say that the estimates for missing industries in 1820 and 1840 are almost sheer guesses, and that the straight-line interpolations between the ratios for 1840 (themselves in part, guesses) and 1880 and between 1820 and 1840 are inadequately supported. Compared with the occupation figures as they stood in the published Census reports at the time Whelpton wrote, his estimates are certainly an improvement. The early Census reports are traps for the unwary. But Whelpton clearly states that he considers his estimates merely rough approximations, which he hopes will be superseded by more

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1820, 89.2 in 1840, 84.7 in 1850, 80.2 in 1860, 74.3 in 1870, and 71.8 in 1880 (Edwards, p. 142).

According to the more recent data, which of course may not be entirely or at all applicable to the situation a hundred years ago, the contemporary figure is low for the rural group because of a low labor force propensity of women—the latter was half of the national average in 1940 (1940 Census, *Population*, II, Characteristics, p. 50).

However, the 1820 figure seems a bit low relative to 1840, perhaps because of an understatement in 1820 relative to 1840. The 1820 schedule asked first for the number of free white persons, second for the number of persons engaged in agriculture, commerce, or manufactures, and third for the number of slaves and free colored persons. Conceivably, the number reported in answer to the second question might cover only free white persons or not cover all colored persons. The 1840 schedule asked first for the number of free white persons, second for the number of free colored persons and slaves, and third for the number of persons employed in mining, etc.—giving less possibility of omitting colored persons.

As for 1840, the schedule called for the number of persons 'employed' in each industry specified. It is conceivable that this might have led to the omission of at least some unemployed persons. But the term 'employed' may really be vague enough to have covered also 'unemployed' persons in 1820.

<sup>50</sup> I say 'more or less' advisedly. If the reported 1850 and 1860 Census figures are stepped up by estimating directly the missing areas, as well as we can, a lower figure is obtained for 1860 (45.7) and a higher figure (48.1) for 1850. Obviously, as the difference between them indicates, the figures cannot be taken very seriously. In calculating them it is necessary to assume, for example, that the labor force propensity of slaves equaled that of colored persons in 1890—a weak reed, at best.



detailed work by the Bureau of the Census. However, his figures for 1820–60 have not yet been improved upon.

Until further work is done, I am inclined to believe that Whelpton's estimates are no better than those obtained by assuming simply that for 1820–60 the ratios of gainful workers to total population 10 years and over lie between 44 and 50 percent. If I *had* to narrow the range, I would put the limits at 46 and 48, and caution the reader against ascribing much validity to them.

If the figures for the missing industries in 1820 and 1840 are untrustworthy, we are left with only the industries for which actual data are available for these years: 'agriculture' and 'manufactures' (1820 and 1840) and 'mining' (1840) seem sufficiently clear and well defined to be comparable with categories given in later years.<sup>51</sup> 'Commerce' (1820) and 'commerce' plus 'navigation' (1840) Whelpton takes to mean what are later called 'trade', 'transportation', and 'finance and real estate'; but the term 'commerce', seems too general for such an identification to be acceptable. The 1840 category 'learned professions' constitutes less than the whole of the later 'personal and professional services', and the figures for them are therefore no more than lower limits.

Slaves, females, and children were rather highly concentrated in certain industries at that time, and any error in Whelpton's allocations would probably be small.<sup>52</sup> However, since manufactures and trade and transportation were estimated by Whelpton as residuals, doubt concerning the grand total carries over to them, and the estimates for these industries might well be expressed in terms

<sup>51</sup> Though there is perhaps a question concerning the degree of coverage of these industries in 1820, especially agriculture; see note 49 above. 'Manufacture' is, in 1820, specifically defined by the Census to include "all those artificers, handicraftsmen and mechanics whose labor is preeminently of the hand, and not upon the field"; i.e., to include the hand trades and construction, and is therefore comparable with the sum of Carson's two categories—'manufactures' and 'construction'.

<sup>52</sup> Of the 2.4 million added by Whelpton for these missing groups in 1850 the largest part—about 2 million—is assigned to agriculture; and of the 2.3 million added in 1860, approximately all. (I assume this after comparing the original Census figures with Whelpton's estimates of the total, allowing for the transfer to agriculture of a large portion of 'laborers [not specified]', originally classified by the Census in nonagriculture.)

of a range. The various figures are brought together in Section 9.

All the figures for the period preceding 1870 suffer from the strictures applying to the later data. Whelpton, too, distributed 'laborers (not specified)' and 'clerical occupations by rough and ready methods—indeed, much rougher than the methods used by Edwards and Carson.

*7 The data pertain to only a portion of one year in every decade; they tell little about the intervening periods*

Following the fashion, we may conceive of time series as a composite of primary trends, long cycles, business cycles, seasonal cycles, and random perturbations. Obviously it is out of the question for the decennial data we are discussing to yield valid information on anything except trends. But how well can they be expected to do that?

The ease with which the trend of a time series may be seen depends upon the rates of change during each of the three kinds of cycles (i.e., their amplitudes and durations), their regularity, the importance of random perturbations, and the slope of the trend. The steeper the trend, the smaller the composite rate of change during cycles, and the weaker the random perturbations, the more distinct will the trend appear. If, as is the case with the data we are discussing, the entire series is not available, but only occasional observations are at our disposal, our difficulties are multiplied. Even a seasonal fluctuation may obscure a primary trend if the seasonal is relatively sharp, the trend of relatively mild slope, and successive observations are scattered over different months of the year.

a) The seasonal problem arises because not all the Censuses were taken at the same time of year and there is a seasonal movement in the size (and industrial distribution) of the working population.

The monthly count of the labor force, available since the spring of 1940, is distinctly higher during the summer than at other seasons. In 1940 and 1941 the difference between April and the maximum month (July) was about 3.8 million (some 7 percent), most of it concentrated in the age group 14–24.<sup>53</sup> In the 1940

<sup>53</sup> Durand and Goldfield, p. 8. The figures cover persons 14 and over.

Census seasonal laborers out of work in March because of seasonal shutdowns were supposed to be excluded, although some inadvertently were not. In earlier Censuses no specific instructions concerning seasonal workers were issued. Apparently only a fraction reported themselves at the time of the 1930 Census as gainfully occupied, presumably because they were usually doing housework or going to school; Durand and Goldfield estimate that about 1.2 million were counted as gainfully occupied, of whom about 500,000 were student workers. If the estimate for 1930 is accepted, there is of course no problem of passing from 1930 to 1940, as far as the total is concerned.<sup>54</sup>

However, the problem remains for some other years. Census dates were August 7 for 1820, June 1 for 1840–1900, April 15 for 1910, January 1 for 1920, April 1 for 1930, and the week of March 24–30 for 1940. According to the 1941 data in the Monthly Report on the Labor Force, January is about the same as March and lower than April, while both the 1940 and 1941 data indicate that June and August are close to each other and to the peak month, July, and therefore are definitely bigger than January, March, or April.<sup>55</sup> One may therefore expect a discontinuity in the figures between 1900 and 1910 (June 1 to April 15), 1910 and 1920 (April 15 to January 1), and 1920 and 1930 (January 1 to April 1), the effects of which are mitigated because some seasonal workers report themselves gainfully occupied even out of season. In the first two pair of years it would be a decline, in the third, a rise, both mainly in the agricultural working force. Since agriculture was relatively much more important in 1840 than in 1900, even the constancy of the June 1 Census date might not have prevented some seasonal influence on the figures for 1840–1900. Only the 1920 figures have been adjusted by the Bureau of the Census for dis-

<sup>54</sup> Carson has expressed to me considerable doubt concerning the validity of the 1930 estimate; he feels it to be entirely too high.

<sup>55</sup> The 1940 Monthly Report on the Labor Force data are for the week ending June 8—the week of May 11 is much lower and only slightly higher than March or April; and the 1941 data are for the week ending June 14—the week of May 10 is much lower and not much higher than April. It would appear, therefore, that June 1 might not be as much above April 15 as the 1940–41 figures suggest at first sight.

crepancies presumed to have arisen in considerable part from differences in Census dates.<sup>56</sup>

The 1910 figures too were adjusted, but downward, to eliminate what the Census considered the effect of a change in instructions to enumerators.<sup>57</sup> If we are right in thinking that 1910 may have been 'lower' than 1900 because of the seasonal factor, the Census adjustment may really be a net adjustment, the difference between a downward adjustment for the change in instructions and an upward adjustment for the change in dates. Since the Census adjustment applied to agriculture alone, there would seem reason for suspecting that other seasonal industries too, such as building, should be adjusted. Indeed, Long has suggested such a further adjustment.

The inclusion of seasonal workers out of season indicates that the dates of the Censuses cannot be taken literally as the dates to which the responses apply. Some (but apparently not all) seasonal workers not in the habit of working at the time of the Census did report themselves as in the ranks of the gainfully occupied. To that extent, the actual date of reference is uncertain. The number reported is probably greater than the 'correct' figure for the date of the Census and less than the peak figure for the year.

b) The business cycle problem is posed for us because the Censuses have been taken during various cyclical phases as determined by A. F. Burns and Wesley C. Mitchell.<sup>58</sup> Reference dates are on an annual basis for 1840 and 1850, and monthly for the later period. June 1, 1840 came in early mid-contraction, following the peak in 1839; the succeeding trough was in 1843. June 1, 1850 came in mid-expansion, following the trough in 1848, the succeeding peak was in 1853. For the later Census dates the information is more precise: June 1, 1860 came in the middle of Stage IV, the peak being reached in October 1860; June 1, 1870 came at the beginning of Stage VIII, a year after the peak in June 1869, and 6 months before the trough in December 1870; June 1, 1880 came early in Stage III, the preceding trough being in March 1879 and the

<sup>56</sup> Edwards, pp. 138-41.

<sup>57</sup> Edwards, pp. 137-8. The seasonal factor was ignored.

<sup>58</sup> *Measuring Business Cycles* (NBER 1946), Tables 16 and A1.

following peak in March 1882; June 1, 1890 came one month before the peak in July 1890; June 1, 1900 came in Stage VIII, a year after the peak in June 1899 and 6 months before the trough in December 1900; April 15, 1910 came in Stage VI, 3 months after the peak in January 1910; January 1, 1920 came during the peak month of January 1920; April 1, 1930 came 10 months after the peak in June 1929, and 3 years before the succeeding trough in March 1933; March 24-30, 1940 came 22 months after the preceding trough in May 1938 (reference dates for the cycle including 1940 have not yet been set).

On the whole, therefore, the timing of Census dates has varied considerably in relation to business conditions: of 10 dates, 6 came nearer peaks than troughs, 4 nearer troughs than peaks.<sup>59</sup>

The effect of business cycles depends also, of course, on the degree of fluctuation in the number and industrial distribution of the labor force. If the cyclical change is negligible, the fluctuations occurring rather in the ratio of unemployment to employment, there should be little need to worry about the problem—unless one is interested in the number employed rather than in the total labor force. Long's work suggests, indeed, great stability in the total number in the labor force. There must be, however, at least some shuttling back and forth between industries. Consequently, though the total labor force may be more or less stable, its industrial distribution may not be.

Another point is worth mentioning in this connection. The cyclical amplitude of a series is a function of the scope of the series. The more diverse the activities it embraces, the better chance is there of offsetting and reduction in fluctuation. The industrial categories at our disposal differ in the width and heterogeneity of the area covered. We may therefore look for some differences among them in cyclical fluctuation and thus in the degree to which trends may be obscured; also for narrower amplitude in each than in figures for individual industries.

<sup>59</sup> However, according to Frickey's standard pattern of short term fluctuations, 1866-1914, 2 of the latter 4 dates, those nearer troughs than peaks, were near troughs that lay relatively close to the long run average of business activity. See his *Economic Fluctuations in the United States* (Harvard University Press, 1942).

c) Not much is known about long cycles and random perturbations. But we know enough about the former, and about the rapid and far-reaching changes that may be wrought by wars (two Censuses followed large-scale conflicts) to be on our guard. In the case of building construction, for example, 1860 came close to the low in per capita building permits in 1862; 1870, to the following high in 1871; 1880, to the low in 1878. The next peak was 1890 itself, and 1900 the following low; 1910 came close to the peak in 1909, 1920 to the low in 1918; and 1930 came on the downturn between the high in 1925 and the low in 1933.<sup>60</sup> The changes shown by the Census data may therefore at least be questioned as faithful representations of the true trend movements for this industry. Another example: the low level reached by the number of domestic servants in 1920, compared with 1910 and 1930, may reflect the effect of the war.<sup>61</sup> In any case, the trend of this industrial category is obscured.

8 *The figures are for persons in the working force; they provide only approximations to other quantities, such as the number of employed persons*

A gainful worker is either actually gainfully employed or 'actively seeking' work. What 'actively seeking' work means I leave to others. The first question I wish to raise concerns the significance of the industrial attachment of an unemployed person.

a) Many occupations are predominantly associated with a particular industry. Even some apparently rather general or non-specific occupations are really heterogeneous collections of partly or wholly specific occupations. Anyone familiar with bookkeeping and accounting, for example, knows that recording practices vary from one industry to another. A person claiming knowledge, skill, and experience in bank accounting might well hesitate to take a position in the accounting department of a department store. Although the occupational statistics may put all kinds of accountants together, producing the problem of allocation encountered by

<sup>60</sup> Riggleman's data; see Burns and Mitchell, p. 422.

<sup>61</sup> NBER, *Occasional Paper 24*, p. 3. The British figures, cited by Stigler, show a similar low point, in this case in 1921 compared with 1911 and 1931.

Carson and others, an unemployed accountant may feel that he is attached to some particular industry. And in addition to the valuable capital of special training and experience, which is lost when a person moves to another industry, the regional concentration of industry may be an obstacle to movement.

But there is indeed a limit to the strength of the attachment of persons to specific industries. Under the pressure of continued unemployment, geographic obstacles may be overcome, and intangible capital finally written off. Some occupations are only very loosely attached to specific industries: some classes of entrepreneurs and laborers are outstanding in this respect. Multi-occupation persons, working in two or more industries, can perhaps shift their main efforts from one industry to another easily. New workers and immigrants may seize the first opportunity they stumble on. Indeed, there may have been a trend in the strength of attachment to individual industries; but the balance between improved transport, communications, etc. and job simplification on the one hand, and industrial unionization, seniority rules, unemployment compensation systems, immigration restrictions, and other impediments to movement on the other, is difficult to assess.

If unemployed persons have any industrial attachment, the Census figures are relevant to various problems. One is the measurement of the ratio of output to labor input, the latter defined broadly to include unemployed as well as employed workers. An industry so organized that there is much idle time in it may for some purposes be properly charged with the labor not used as well as with that used.<sup>62</sup> In most industries the time of certain classes of labor—clerical, managerial, maintenance—is so treated as a matter of business policy.

b) An important use to which the gainful worker data are frequently put is the measurement of trends in employment and the industrial distribution of employment. The gainful worker data cannot accurately measure either if there is industrial variation in the level and changes in the unemployment rate. At best they are an approximation. How good is it? Unfortunately, little is known

<sup>62</sup> But not necessarily blamed; the basic causes may be outside the control of the entrepreneurs in the industry.

about unemployment in most industries prior to 1930. If we accept certain data in the 1900 Census, we can get some notion of industrial variation in unemployment rates in 1899. These and data from the 1940 Census show that, between the periods covered, the gainful worker data are biased upward as estimates of employment trends and that the bias is greatest (and very substantial) for construction, least for public utilities (Table 1). Admittedly the recent period is unusual, and comparisons of other Census periods might yield quite different results;<sup>63</sup> but too little is known about unemployment in the earlier years to warrant the assumption that it always had negligible influence on the validity of the gainful worker figures as clues to employment.<sup>64</sup>

Another characteristic of the gainful worker data is worth recalling in this connection. All persons are included impartially in the Census of Occupations. Since, by the priority rule, even a part-time or seasonal worker—a student or housewife—is counted as one person, the gainful worker aggregate is larger than a 'full-time equivalent' gainful worker total would be. The relative importance of industries in which there is considerable part-time and seasonal work (for example, agriculture, trade, personal services) will be overstated.<sup>65</sup> And if there is a trend in the proportion of such work, it will affect the relative importance of these industries. On the other hand, as Carson points out, persons with two or more jobs are counted only once in the Census of Occupations.

c) I need hardly warn this audience of the danger in using the gainful worker data as a key to the changing industrial composition of physical output.<sup>66</sup> For narrow industrial classes the danger might be fatal. For the broad groups Carson presents, it is less serious. While there is great variation among individual industries in trends in output per man for categories as wide as agriculture,

<sup>63</sup> Some limited information is provided by the data in Section 7. For a comparison between, say, 1900 and 1930, the bias may well be small for most purposes.

<sup>64</sup> Tabulation of the unemployment data collected in the 1910 Census would add to our information on employment before World War I.

<sup>65</sup> According to the 1939 Census, about a fifth of all workers in retail and service establishments are part-time.

<sup>66</sup> The following remarks apply as well to capital assets, net value added, etc.



**TABLE 1**  
**Percentage of Labor Force Employed, by Industry, 1900, 1939, 1940**

	Census Year ended May 31, 1900 <sup>a</sup>	Calendar Year 1939 <sup>b</sup>	Week of March 24- 30, 1940 <sup>b</sup>
Agriculture	92-95	78-85	93
Forestry & fishing	83-90	61-69	75
Mining	81-90	61-71	82
Manufacturing (incl. hand trades)	91-95	74-81	90
Construction	81-89	48-56	59
Transportation & other public utilities	93-96	83-88	92
Trade, incl. finance	96-98	80-85	92
Domestic & personal service	93-96	71-77	90
Professional service & amusements			
Incl. teachers	87-93	73-82	93
Excl. teachers	96-98	76-83	93
Government	98-99	84-88	93
Not allocated			
Clerical workers	96-98		
Laborers (not specified)	81-89		
Industry not reported		32-45	34
<b>Total</b>	<b>90-95</b>	<b>73-80</b>	<b>87</b>

<sup>a</sup> Manmonths employed as a percentage of available manmonths. Based on the 1900 Census, Tables 2 and 25. The Census authorities consider similar 1890 data inferior in various respects to those of 1900; the 1880 data were not tabulated.

The 1900 data relate to the number of 'months not employed' in the preceding fiscal year. Teachers on vacation were considered unemployed, as would, by definition, seasonal workers not in the labor force out of season. The data were published in frequency distributions with rather wide intervals; for this reason the estimates are presented here in the form of a range, the lower estimate being based on the use of one end of each class, the higher on the other end. Since the data are for monthly units, they may understate the percentage of unemployment in terms of weeks, for it is unlikely that less than half a month of unemployment would cause that month to be reported as one of unemployment.

The National Industrial Conference Board gives average employment in the calendar year 1900 as 94 percent of the total labor force. Our figure, for the fiscal year ended May 31, 1900 (a 12-month period closer to the peak month in general business, June 1899, than the calendar year 1900), is 90-95 percent.

The categories for 1900 are the occupational groups published in the 1900 Census modified to approach Carson's industrial groups more closely.

<sup>b</sup> For the calendar year 1939, full-time manmonths employed (excluding emergency work) as a percentage of available manmonths; for the week of March 24-30, 1940, the number employed (excluding emergency workers) as a percentage of the experienced labor force. Based on the 1940 Census report, *Industrial Characteristics of the Labor Force*, Table 15, and the Census Release, Series P-14, No. 13, Table 2.

The 1939 data are derived from the number of equivalent full-time months worked in 1939 by experienced persons (excluding emergency workers). Emergency work done by them is included. Available manmonths for an industry include the time of emergency workers reporting themselves as normally attached to that industry. Owing to lack of information, it was necessary to assume that the non-emergency work in 1939 of persons with a status of emergency workers at the time of the Census in March 1940 was equal to the emergency work done in 1939 by persons with a status of experienced non-emergency workers at the time of the Census. Since seasonal workers were supposed to be excluded, and the Census was taken in March, there is less overstatement of seasonal unemployment than in 1900. Because the 1939 employment figures are in terms of a full-time equivalent we may expect them to be smaller than the 1900 figures; on the other hand, new workers are excluded in 1939 but not in 1900.

The data are published in the form of frequency distributions by months of work; hence the range. The class for persons not reporting was taken as ranging from zero to 12; excluding these persons would narrow the ranges shown.

The Bureau of Labor Statistics 1939 estimate of average employment (not on a full-time basis) as a percentage of the labor force is 84, excluding emergency workers from the number employed.

manufacturing, etc., the variation is much smaller.<sup>67</sup> Compared with the variation in gainful worker trends, it may in fact be small, making the latter something that may legitimately be called an approximation to relative trends in output. But the degree of approximation is low, and varies from one industrial group to another.<sup>68</sup>

9 *The figures for 1820-1940 summarized; despite their deficiencies they occupy an important place among our historical data*

I now bring together, in Table 2, Whelpton's figures for 1820-70 and Carson's for 1870-1940, with such excisions, additions, and modifications as seem desirable. The reader will, of course, want to consult these writers' papers for their own summary tables, data for industrial subgroups for 1910-40, and various useful derivative tables and notes, as well as Edwards' valuable monograph for its wealth of detailed data and information.

The changes I have made are several. These, together with notes summarizing some of the applicable comments made in preceding sections, are noted below.

First, the changes:

a) Carson points out that his major industry groups were designed to fit, as closely as possible, Kuznets' industrial classification of national income, which itself reflects in part Kuznets' efforts to make the best use of the available data on income payments and business savings. It is for this reason that Carson distinguishes between 'transportation and public utilities' and 'miscellaneous transportation and communication', and places public schools and the postal system in the 'government service' category. I have

<sup>67</sup> Cf. Solomon Fabricant, 'Labor Savings in the United States, 1899-1939', NBER, *Occasional Paper 23*, Nov. 1945.

<sup>68</sup> Indexes in *Occasional Paper 23*, for four major groups show the following. The rank correlation, at least, is perfect!

INDEX, 1939 (1899: 100), RELATIVE TO THE CORRESPONDING INDEX FOR THE TOTAL OF THE FOUR GROUPS

	Agriculture	Mining	Manufacturing	Public utilities
Output	54	123	126	148
Employment	68	114	152	177

TABLE 2  
Industrial Distribution of Gainful Workers, United States, 1820-1940  
(Unit: 1,000 persons)

	1820	1830	1840	1850	1860	1870		1880	1890	1900	1910	1920	1930		1940	
							Comparable with							Comparable with		
							Earlier years	Later years						Earlier years	1940	
Agriculture	2,070	2,770	3,720	4,900	6,210	6,850	6,430	8,610	9,990	10,710	11,340	11,120	10,480	10,180	9,000	
Forestry & fisheries	n.a.	n.a.	n.a.	25	50	60	60	95	180	210	250	280	270	120	140	
Mining	n.a.	n.a.	15	90	170	180	200	310	480	760	1,050	1,230	1,150	1,160	1,110	
Mfg. & independent hand trades	350	n.a.	790	1,260	1,930	2,750	2,250	3,170	4,750	6,340	8,230	10,880	10,990	10,770	11,940	
Construction							750	830	1,440	1,660	2,300	2,170	3,030	3,030	3,510	
Trans. & other pub. utilities	n.a.	n.a.	n.a.	420	780	1,350	640	860	1,530	2,100	3,190	4,190	4,850	4,810	4,150	
Finance & real estate							830	1,220	1,990	2,760	3,370	4,060	6,030	6,190	7,180	
Educational service							190	330	510	650	900	1,170	1,650	1,630	1,550	
Other professional service, & amusements							140	190	350	500	770	1,080	1,760	1,720	2,320	
Domestic service	n.a.	n.a.	n.a.	940	1,310	1,770	940	1,080	1,520	1,740	2,150	1,700	2,330	2,550	2,610	
Personal service							250	360	640	970	1,520	1,630	2,490	2,500	3,100	
Govt. n.e.c.	460	1,160	895	65	80	30	100	140	190	300	540	920	1,050	1,130	1,680	
Unallocated							140	195	170	370	600	380	380	1,340	3,330	
Total	2,880	3,930	5,420	7,700	10,530	12,920	12,920	17,390	23,740	29,070	36,730	41,610	48,830	47,400	53,300	

Based almost entirely on estimates of Daniel Carson, P. K. Whelphton, and A. M. Edwards as prepared mainly from gainful worker and labor force data collected in the decennial Censuses of Population. See text for detailed explanation and notes.  
n.a.: not available. n.e.c.: not elsewhere classified.  
\* Difference between number of persons not reporting industrial affiliation (1,335,000), and excess of the 'gainful worker' total over the 'labor force' total (1,190,000).

combined the two transport groups, partly because they are not very clearly distinguishable in the gainful worker data for most years, and partly because the distinction does not seem generally useful. Not needing to put all government activity together, I have taken public schools and the postal system out of 'government service' and have placed the former in a special group of interest in itself, 'educational service', which includes also private schools and other educational activities, and the latter in the 'transportation and other public utilities' category.<sup>69</sup> Because 'trade' and 'finance and real estate' seem difficult to distinguish in the Census data prior to 1910, I have combined them. And because of the importance of and interest in 'domestic service' in connection with the housewife problem, I have broken it out from Carson's 'domestic and personal service' group.<sup>70</sup> The contents of each group are specified in detail by Carson in his Tables 15 and 16.

b) For reasons given above I have identified Whelpton's 'trade and transportation' with the sum of Carson's 'trade', 'finance and real estate', and two transportation groups. Similarly, I have identified Whelpton's 'manufacturing and mechanical pursuits' with Carson's 'manufacturing and hand trades' plus 'construction'; and Whelpton's 'domestic and personal service' and 'professional service' with Carson's two groups bearing similar names plus his 'government service'.

c) I have used Edwards' revisions (p. 142) of Whelpton's 'all occupations' and 'agriculture', which differ but slightly from Whelpton's estimates. The unallocated figure for 1850-70 consists of the difference between Whelpton's and Edwards' totals. For reasons given in Section 6, I have discarded Whelpton's estimates for several groups, 1820-40.

<sup>69</sup> The series for 'educational service' is based on the industrial category as reported in the 1940 Census, extrapolated to 1870 by the number of teachers, including college presidents and professors. The postal system 1910-40 is Carson's series extrapolated to 1870 by means of Edwards' estimates for certain postal occupations.

<sup>70</sup> The domestic service series for 1900-30 is that of Stigler (Table 1) raised 15 percent, as he suggests, and extrapolated to 1870 by the relevant occupational data compiled by Edwards. The 1930-40 figures are Edwards' (p. 84).

d) I have accepted Clarence Long's total for 1910, rather than Carson's, and have adjusted the unallocated figure for the difference between the two totals.

e) Carson's second 1930 total has been adjusted downward. This places the 1930 total on the 'labor force' basis as estimated by Durand and Goldfield. A corresponding adjustment was made in the 'not allocated' item for 1930. Thus modified, the 1930 'not allocated' item represents the net difference between 1,336,000, Carson's figure for the number of persons for which adequate information on industrial affiliation is not given, and 1,191,000, the Durand-Goldfield estimate of the difference between the 1930 'labor force' and 'gainful worker' total.

f) Rounding most of the figures off to the nearest 10,000 accounts for some slight discrepancies between the totals and the sums of the separate items.

And now some notes:

a) The figures for 1820-1930 are for gainful workers 10 years old and over; those for 1930-40, for the labor force 14 and over. (Strictly speaking, of course, the second set of 1930 figures, except the total and the unallocated item, are for gainful workers.) As pointed out above, some of the 1820-70 figures include some minor estimates for young workers, and others are rather indefinite about the precise position of the lower age limit.

b) As mentioned, the grand totals for 1820-60 are Whelpton's estimates or Edwards' minor revisions. If, as I suggest, these estimates are little better than guesses, the reader may wish to replace them with ranges. Assumed labor-force propensities of 44 to 50 percent, for example, would yield totals (in thousands) of:

1820	1830	1840	1850	1860
2,840-3,220	3,800-4,320	5,120-5,810	7,240-8,230	9,870-11,210

There would be correlated changes in other parts of the table, which I have not worked out: in agriculture, 1850-1900; in the sum of manufacturing and construction and the sum of transportation, trade, and finance, 1850-60; and of course in the unallocated item.

c) The figures in the table vary in quality. On the whole, the

columns for 1910-40 are most accurate, those for 1870-1900 less accurate, and those for 1820-60 least accurate. The 1830 data are mere interpolations. Edwards' characterization of his own figures is applicable to Carson's estimates: Edwards states that the figures for the following occupational groups are 'partly estimated': manufacturing and mechanical trades, 1870-1900; transportation and communication, 1870-1900; public service, 1900; professional service, 1870-1900; domestic and personal service, 1870-1900; and clerical occupations, 1900. He calls the following 'largely estimated': trade, 1870-1900; public service, 1870-90; and clerical occupations, 1870-90.<sup>71</sup> He does not qualify the data for 1910 on or his figures for agriculture, forestry and fishing, and mining. The agricultural series for 1870-1920 is, of course, also 'partly estimated', in this case by the interpolation method described in Section 5 and by the adjustments, for under- or over-coverage (Sec. 3), which reflect the difficulties raised by varying the treatment of women and children. To this I would add that Carson's construction group, based as it is on occupations found also to a large extent in manufacturing and hand trades, must be considered 'largely estimated'. The 'other professional service, and amusements' group is also probably in this category for the period prior to 1910.

d) Those who wish to include own-home houseworkers may do so readily; estimates are given in Section 2. Data for students cannot, however, be easily amalgamated with those in the table, mainly because there is no full information on the number of students already counted among gainful workers; see Section 2.

<sup>71</sup> The 1880 figures for clerical occupations are not characterized by Edwards, presumably because of a misprint. I have assumed that he would consider them 'largely estimated', as he does the clerical data for 1870 and 1890.

CHANGES IN THE INDUSTRIAL COMPOSITION OF MANPOWER  
SINCE THE CIVIL WAR

DANIEL CARSON

THIS STUDY ORIGINATED IN 1937 in the Works Progress Administration National Research Project; in 1939 a mimeographed report on the methods was issued. The original estimates have been extended and revised by the author on his own responsibility. Advantage has been taken of the work done by Alba M. Edwards of the Bureau of the Census in developing comparable data for certain occupations 1870-1930.<sup>1</sup> Other significant modifications have also been made since the original report was issued. This paper presents the revised estimates. No attempt is made to describe or analyze them. From the statement of the method economists can judge the adequacy of the estimates for their purposes.

Estimates on the industrial distribution of workers, 1870-1930, covering unemployed workers usually in the labor market as well as employed wage and salary earners, employers, own-account workers, and unpaid family workers, are supplemented by Census figures on the industrial distribution of the 1940 labor force and nearly comparable 1930 figures. The twelve broad industry divisions are agriculture; forestry and fishing; extraction of minerals; manufacturing industries and hand trades; construction; transportation and public utilities; miscellaneous transportation and communication; trade; finance, insurance, and real estate; government service; professional service and amusements; and domestic and personal service.

For 1910-40 estimates are presented also for some of the major groups within the broad divisions. For example, for transportation and public utilities eight major groups are given: express companies, pipe lines, steam railroads, street railways, telephone and telegraph, water transportation, electric light and power, and gas works. Some fifteen major groups of manufacturing industries and hand trades are presented, and up to eight in other broad industry divisions.

The final estimates appear in Section 1. Section 2 briefly describes the basic data, nearly all of which were collected in the Censuses of Occupations. Section 3 outlines the procedures fol-

<sup>1</sup> *Comparative Occupation Statistics for the United States, 1870-1940.*

TABLE 1  
Manpower by Industry Division, 1870-1940

Industry Division	Ages 10 and Over							Ages 14 & Over	
	1870	1880	1890	1900	1910	1920	1930	1930	1940
	NUMBER (THOUSANDS OF PERSONS)								
Total, all industries	12,925	17,392	23,739	29,073	36,881	41,614	48,830	48,595	53,299
<i>Commodity producing</i>	9,685	13,015	16,840	19,679	23,172	25,679	25,918	25,258	25,703
Agriculture	6,450	8,307	9,994	10,705	11,343	11,117	10,484	10,175	9,004
Forestry & fishing	59	94	177	209	245	284	269	121	137
Extraction of minerals	198	314	475	760	1,054	1,230	1,150	1,165	1,110
Construction	752	830	1,445	1,603	2,297	2,167	3,030	3,029	3,508
Mfg. & independent hand trades	2,247	3,170	4,748	6,342	8,232	10,882	10,986	10,767	11,944
<i>Service</i>	3,085	4,179	6,729	9,033	12,958	15,548	21,574	22,000	24,264
Transp. & pub. utilities	513	643	1,121	1,548	2,485	3,085	3,325	3,279	2,511
Misc. transp. & communication	104	173	355	486	537	890	1,242	1,249	1,326
Trade	785	1,155	1,825	2,460	3,366	4,064	6,033	6,190	7,179
Finance, insurance, & real estate	43	63	163	302	517	795	1,420	1,470	1,549
Government service	251	396	597	803	1,304	1,871	2,415	2,497	3,061
Professional service & amusements	199	304	518	721	1,079	1,503	2,324	2,267	2,936
Domestic & personal service	1,189	1,445	2,152	2,712	3,670	3,334	4,815	5,048	5,703
Industry not specified	154	198	169	362	750	387	1,338	1,336	3,331
	PERCENTAGE DISTRIBUTION								
Total, all industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Commodity producing</i>	74.9	74.8	70.9	67.7	62.8	61.7	53.1	52.0	48.2
Agriculture	49.7	49.5	42.1	36.8	30.8	26.7	21.5	20.9	16.9
Forestry & fishing	0.5	0.5	0.7	0.7	0.7	0.7	0.6	0.2	0.3
Extraction of minerals	1.5	1.8	2.0	2.6	2.9	3.0	2.4	2.4	2.1
Construction	5.8	4.8	6.1	5.7	6.2	5.2	6.2	6.2	6.6
Mfg. & independent hand trades	17.4	18.2	20.0	21.8	22.3	26.1	22.2	22.2	22.4
<i>Service</i>	23.9	24.0	28.3	31.1	35.1	37.4	44.2	45.3	45.5
Transp. & pub. utilities	4.0	3.7	4.7	5.3	6.7	7.4	6.8	6.7	4.7
Misc. transp. & communication	0.8	1.0	1.5	1.7	1.5	2.2	2.5	2.6	2.5
Trade	6.1	6.6	7.7	8.5	9.1	9.8	12.4	12.7	13.5
Finance, insurance, & real estate	0.3	0.4	0.7	1.0	1.4	1.9	2.9	3.0	2.9
Government service	1.9	2.3	2.5	2.8	3.5	4.5	4.9	5.1	5.7
Professional service & amusements	1.5	1.7	2.2	2.5	2.9	3.6	4.8	4.7	5.5
Domestic & personal service	9.2	8.3	9.1	9.3	10.0	8.0	9.9	10.4	10.7
Industry not specified	1.2	1.1	0.7	1.2	2.0	0.9	2.7	2.7	6.2
	INDEX (1910: 100.0)								
	1870	1880	1890	1900	1910	1920	1930	1940	
Total, all industries	35.0	47.2	64.4	78.8	100.0	112.8	132.4	145.2	
<i>Commodity producing</i>	41.8	56.2	72.7	84.9	100.0	110.8	111.9	113.8	
Agriculture	56.7	75.9	88.1	94.4	100.0	98.0	92.4	81.8	
Forestry & fishing	24.2	38.4	72.4	85.0	100.0	115.7	109.7	124.7	
Extraction of minerals	18.8	29.8	45.0	72.1	100.0	116.6	109.1	103.9	
Construction	32.7	36.1	62.9	72.4	100.0	94.3	131.9	152.8	
Mfg. & independent hand trades	27.3	38.5	57.7	77.0	100.0	132.2	133.4	148.0	
<i>Service</i>	23.8	32.2	51.9	69.7	100.0	120.0	166.5	183.6	
Transp. & pub. utilities	20.7	25.9	45.1	62.3	100.0	124.2	133.8	102.5	
Misc. transp. & communication	19.4	32.2	66.1	90.5	100.0	166.8	231.3	245.6	
Trade	23.3	34.3	54.2	73.1	100.0	120.7	179.2	207.9	
Finance, insurance, and real estate	8.3	12.1	31.5	58.4	100.0	153.7	274.7	289.4	
Government service	19.3	30.3	45.8	61.6	100.0	143.4	185.2	227.0	
Professional service & amusements	18.4	28.2	48.0	66.9	100.0	139.3	215.5	279.0	
Domestic & personal service	32.4	39.4	58.6	73.9	100.0	90.8	131.2	148.2	



TABLE 1 (concl.)

Industry Division	PERCENTAGE CHANGE FROM PRECEDING CENSUS						
	1880	1890	1900	1910	1920	1930	1940
Total, all industries	34.6	36.5	22.5	26.9	12.8	17.3	9.7
<i>Commodity producing</i>	34.4	29.4	16.9	17.8	10.8	0.9	1.8
Agriculture	33.9	18.1	7.1	6.0	-2.0	-5.7	-11.5
Forestry & fishing	59.0	88.4	17.5	17.6	15.7	-5.2	13.7
Extraction of minerals	58.3	51.2	60.2	38.7	16.6	-6.5	-4.7
Construction	10.4	74.1	15.1	38.1	-5.7	39.8	15.8
Mfg. & independent hand trades	41.1	49.8	33.6	29.8	32.2	1.0	10.9
<i>Service</i>	35.5	61.0	34.2	43.5	20.0	38.8	10.3
Transp. & pub. utilities	25.3	74.3	38.1	60.5	24.2	7.8	-23.4
Misc. transp. & communication	66.2	105.3	37.0	10.5	66.8	38.6	6.2
Trade	47.2	57.9	34.8	36.8	20.7	48.4	16.0
Finance, insurance, & real estate	46.0	159.2	85.6	71.1	53.7	78.7	5.4
Government service	57.4	50.2	34.6	62.4	43.4	29.1	22.6
Professional service & amusements	52.7	70.3	39.3	49.6	39.3	54.7	29.5
Domestic & personal service	21.5	48.9	28.0	35.3	-9.2	44.4	13.0

The 1870-1930 figures, for gainful workers, are according to the modified 1930 Census industrial classification; the 1940 figures, for the labor force, are according to the 1940 Census industrial classification for major industry groups combined into the modified 1930 broad industry divisions. The totals and subtotals are the rounded sums of unrounded components.

TABLE 2  
Manpower Available for Forestry and Fishing by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	245,189	283,719	268,992	120,905	137,410
Forestry	177,363	230,913	195,165	49,337	68,777
Fishing	67,826	52,806	73,827	71,568	68,633
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Forestry	72.3	81.4	72.6	40.8	50.1
Fishing	27.7	18.6	27.4	59.2	49.9
	INDEX (1910: 100.0)				
Total	100.0	115.7	109.7		n.a.
Forestry	100.0	130.2	110.0		n.a.
Fishing	100.0	77.9	108.8		104.4
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		15.7	-5.2		13.7
Forestry		30.2	-15.5		39.4
Fishing		-22.1	39.8		-4.1

See notes to Table 1.

n.a.: not available.

**TABLE 3**  
**Manpower Available for Extraction of Minerals by Major Industry Group, 1910-1940**

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
<b>Total</b>	1,054,354	1,229,757	1,149,852	1,165,203	1,109,860
Coal mining	670,455	807,114	691,288	691,210	652,265
Crude petroleum & natural gas production	55,889	174,454	198,446	202,401	207,699
Copper mining	45,697	43,966	39,510	119,938	137,937
Gold & silver mining	64,353	39,212	22,252		
Iron mining	58,207	47,967	31,936		
Lead & zinc mining	23,765	26,007	20,537		
Quarrying, & sand & gravel production	93,957	60,466	98,344	96,360	83,235
Other & not specified mining*	42,031	30,571	47,539	55,294	28,724
	PERCENTAGE DISTRIBUTION				
<b>Total</b>	100.0	100.0	100.0	100.0	100.0
Coal mining	63.6	65.6	60.1	59.3	58.8
Crude petroleum & natural gas production	5.3	14.2	17.3	17.4	18.7
Copper mining	4.3	3.6	3.4	10.3	12.4
Gold & silver mining	6.1	3.2	1.9		
Iron mining	5.5	3.9	2.8		
Lead & zinc mining	2.3	2.1	1.8		
Quarrying, & sand & gravel production	8.9	4.9	8.6	8.3	7.5
Other & not specified mining*	4.0	2.5	4.1	4.7	2.6
	INDEX (1910: 100.0)				
<b>Total</b>	100.0	116.6	109.1		103.9
Coal mining	100.0	120.4	103.1		97.3
Crude petroleum & natural gas production	100.0	312.1	355.1		364.4
Copper mining	100.0	96.2	86.5	68.4	
Gold & silver mining	100.0	60.9	34.6		
Iron mining	100.0	82.4	54.9		
Lead & zinc mining	100.0	109.4	86.4		
Quarrying, & sand & gravel production	100.0	64.4	104.7		90.4
Other & not specified mining*	100.0	n.c.	n.c.		n.c.
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
<b>Total</b>		16.6	-6.5		-4.7
Coal mining		20.4	-14.4		-5.6
Crude petroleum & natural gas production		212.1	13.8		2.6
Copper mining		-3.8	-10.1	15.0	
Gold & silver mining		-39.1	-43.3		
Iron mining		-17.6	-33.4		
Lead & zinc mining		9.4	-21.0		
Quarrying, & sand & gravel production		-35.6	62.6		-13.6
Other & not specified mining*		n.c.	n.c.		n.c.

See notes to Table 1. \*Includes salt mines.  
n.c.: includes not specified mining for which data are not comparable from Census to Census.

TABLE 4  
Manpower Available for Construction by Major Industry Group,  
1910-1940

	Age 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	2,296,985	2,167,039	3,029,791	3,029,458	3,508,434
Building construction	2,051,411	1,993,598	2,574,968	n.a.	n.a.
Construction & maintenance of streets & roads	245,574	173,441	454,823	n.a.	n.a.
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Building construction	89.3	92.0	85.0	n.a.	n.a.
Construction & maintenance of streets & roads	10.7	8.0	15.0	n.a.	n.a.
	INDEX (1910: 100.0)				
Total	100.0	94.3	131.9		152.8
Building construction	100.0	97.2	125.5		n.a.
Construction & maintenance of streets & roads	100.0	70.6	185.2		n.a.
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		-5.7	39.8		15.8
Building construction		-2.8	29.2		n.a.
Construction & maintenance of streets & roads		-29.4	162.2		n.a.

See notes to Table 1. n.a.: not available.

lowed in deriving the final estimates. Supplementary tables bearing on the industry definitions, procedures, and on the accuracy of the final estimates are given in Section 4.

## 1 FINAL TABLES

Tables 1-12 present the estimates of the industrial distribution of manpower in the United States, at decade intervals. Accompanying the estimates of the number of persons are derivative figures designed to highlight the changes and the relative importance at successive Censuses of the various industrial groups. Tables for

TABLE 5

## Manpower Available for Manufacturing Industries and Independent Hand Trades by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	8,232,269	10,882,016	10,985,567	10,767,255	11,944,157
Mfg. industries, adj. <sup>a</sup>	7,368,124	10,371,790	10,625,238	10,608,871	11,756,382
Independent hand trades <sup>a</sup>	864,145	510,226	360,329	158,384	187,775
<i>Mfg. industries, total</i>	7,368,124	10,371,790	10,625,238	10,608,871	11,756,382
Chemical & allied industries <sup>b</sup>	197,213	390,827	513,581	n.a.	n.a.
Cigar & tobacco factories	196,795	214,609	149,563	149,472	124,645
Clay, glass & stone industry	370,564	317,295	371,961	n.a.	372,905
Clothing industry	680,566	706,350	789,846	1,952,602	2,304,942
Textile industries	901,158	1,147,386	1,183,429		
Food & allied products	554,339	806,466	907,253	888,595	1,212,428
Iron & steel, machinery & vehicle industries	1,736,407	3,052,308	2,848,182	n.a.	n.a.
Metal industries, excl. iron & steel	248,757	344,483	332,976	270,928	303,074
Leather industries	341,733	402,866	374,069	385,998	407,183
Lumber & furniture industries	797,742	812,030	863,026	1,057,311	1,069,617
Paper, printing, & allied industries	524,247	661,160	839,839	882,799	1,033,718
Electrical machinery & supply industry	92,870	231,784	383,570	360,504	403,104
Rubber factories	59,864	195,478	166,391	161,367	173,481
Misc. mfg. industries	665,869	1,088,748	901,552	n.a.	n.a.
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Mfg. industries, adj. <sup>a</sup>	89.5	95.3	96.7	n.a.	n.a.
Independent hand trades <sup>a</sup>	10.5	4.7	3.3	n.a.	n.a.
<i>Mfg. industries, total</i>	100.0	100.0	100.0	100.0	100.0
Chemical & allied industries <sup>b</sup>	2.7	3.8	4.8	n.a.	n.a.
Cigar & tobacco factories	2.7	2.1	1.4	1.4	1.1
Clay, glass & stone industry	5.0	3.1	3.5	n.a.	3.2
Clothing industry	9.2	6.8	7.4	18.4	19.6
Textile industries	12.2	11.1	11.1		
Food & allied products	7.5	7.8	8.5	8.4	10.3
Iron & steel, machinery & vehicle industries	23.6	29.4	26.8	n.a.	n.a.
Metal industries, excl. iron & steel	3.4	3.3	3.1	2.6	2.6
Leather industries	4.6	3.9	3.5	3.6	3.5

TABLE 5 (cont.)

	Ages 10 and Over			Ages 14 and Over	
	1910	1920	1930	1930	1940
	PERCENTAGE DISTRIBUTION (continued)				
Lumber & furniture industries	10.8	7.8	8.1	10.0	9.1
Paper, printing, & allied industries	7.1	6.4	7.9	8.3	8.8
Electrical machinery & supply industry	1.3	2.2	3.6	3.4	3.4
Rubber factories	0.8	1.9	1.6	1.5	1.5
Misc. mfg. industries	9.0	10.5	8.5	n.a.	n.a.
	INDEX (1910: 100.0)				
Total	100.0	132.2	133.4		148.0
Mfg. industries, adj. <sup>a</sup>	100.0	140.8	144.2		159.8
Independent hand trades <sup>a</sup>	100.0	59.0	41.7		n.a.
<i>Mfg. industries, total</i>	100.0	140.8	144.2		159.8
Chemical & allied industries <sup>b</sup>	100.0	198.2	260.4		n.a.
Cigar & tobacco factories	100.0	109.1	76.0		63.4
Clay, glass & stone industry	100.0	85.6	100.4		n.a.
Clothing industry	100.0	103.8	116.1	}	147.3
Textile industries	100.0	127.3	131.3		
Food & allied products	100.0	145.5	163.7		223.3
Iron & steel, machinery & vehicle industries	100.0	175.8	164.0		n.a.
Metal industries, excl. iron & steel	100.0	138.5	133.9		149.7
Leather industries	100.0	117.9	109.5		115.5
Lumber & furniture industries	100.0	101.8	108.2		109.4
Paper, printing, & allied industries	100.0	126.1	160.2		187.6
Electrical machinery & supply industry	100.0	249.6	413.0		461.8
Rubber factories	100.0	326.5	277.9		298.8
Misc. mfg. industries	100.0	163.5	135.4		n.a.
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		32.2	1.0		10.9
Mfg. industries, adj. <sup>a</sup>		40.8	2.4		10.8
Independent hand trades <sup>a</sup>		-41.0	-29.4		n.a.
<i>Mfg. industries, total</i>		40.8	2.4		10.8
Chemical & allied industries <sup>b</sup>		98.2	31.4		n.a.
Cigar & tobacco factories		9.1	-30.3		-16.6
Clay, glass & stone industry		-14.4	17.2		n.a.
Clothing industry		3.8	11.8	}	18.0
Textile industries		27.3	3.1		
Food & allied products		45.5	12.5		36.4

TABLE 5 (concl.)

	Ages 10 and Over			Ages 14 and Over	
	1910	1920	1930	1930	1940
	PERCENTAGE CHANGE FROM PRECEDING CENSUS ( <i>continued</i> )				
Iron & steel, machinery & vehicle industries		75.8	-6.7		n.a.
Metal industries, excl. iron & steel		38.5	-3.3		11.9
Leather industries		17.9	-7.1		5.5
Lumber & furniture industries		1.8	6.3		1.2
Paper, printing, & allied industries		26.1	27.0		17.1
Electrical machinery & supply industry		149.6	65.5		11.8
Rubber factories		226.5	-14.9		7.5
Misc. mfg. industries		63.5	-17.2		n.a.

See notes to Table 1. n.a.: not available.

\* Adjustment due to overcount of unpaid family laborers in 1910 Census is, for manufacturing, 14,045 in 1910 and 7,023 in 1920; for independent hand trades, 1,986 in 1910 and 993 in 1920.

<sup>b</sup> Includes salt wells and works.

broad industry divisions, 1870-1940, are presented first, then tables for the narrower groups, 1910-40.

## 2 CHARACTER AND SOURCES OF BASIC DATA

The estimates were derived largely from the 1870-1940 Censuses of Population. Most of the 1870-1900 data are from the 1900 Census, *Special Report on Occupations*. The 1910-30 data are mainly from the 1910 Census, *Occupations*, Volume IV, and from the 1930 Census, *Occupations*, Volume V. Many supplementary data were taken from *Comparative Occupation Statistics for the United States, 1870-1940*, by A. M. Edwards, and other sources such as the Biennial Survey of Education (United States Office of Education), the Census of Manufactures, the Census of Business, Census of Agriculture, Census of Population (for population data), Census of Electrical Industries, Annual Reports of the Postmaster General, and Interstate Commerce Commission reports, *Statistics of Railways*. Some estimates for various categories were made specifically for this paper. Sources for all data used are listed in Section 3 or 4. Except for a few estimates made by the author the

TABLE 6  
Manpower Available for Transportation and Public Utilities by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	2,485,053	3,085,429	3,325,402	3,279,355	2,510,854
Express companies	53,122	77,616	62,239	62,239	36,063
Pipe lines	3,508	11,643	25,001	18,748	19,336
Steam railroads	1,621,906	1,873,675	1,747,058	1,808,155	1,201,776
Street railways	190,652	231,798	208,513	235,789	212,150
Telephone & telegraph	269,588	419,591	578,602	468,511	383,815
Water transportation	221,886	280,591	299,804	266,780	216,328
Electric light & power	70,523	118,279	289,255	295,016	350,832
Gas works	53,868	72,236	114,930	124,117	90,554
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Express companies	2.1	2.5	1.9	1.9	1.4
Pipe lines	0.1	0.4	0.8	0.6	0.8
Steam railroads	65.3	60.7	52.5	55.1	47.9
Street railways	7.7	7.5	6.3	7.2	8.4
Telephone & telegraph	10.9	13.6	17.4	14.3	15.3
Water transportation	8.9	9.1	9.0	8.1	8.6
Electric light & power	2.8	3.8	8.7	9.0	14.0
Gas works	2.2	2.3	3.5	3.8	3.6
	INDEX (1910: 100.0)				
Total	100.0	124.2	133.8		102.5
Express companies	100.0	146.1	117.2		67.9
Pipe lines	100.0	331.9	712.7		735.1
Steam railroads	100.0	115.5	107.7		71.6
Street railways	100.0	121.6	109.4		98.4
Telephone & telegraph	100.0	155.6	214.6		175.8
Water transportation	100.0	126.5	135.1		109.6
Electric light & power	100.0	167.7	410.2		487.8
Gas works	100.0	134.1	213.4		155.7
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		24.2	7.8		-23.4
Express companies		46.1	-19.8		-42.1
Pipe lines		231.9	114.7		3.1
Steam railroads		15.5	-6.8		-33.5
Street railways		21.6	-10.0		-10.0
Telephone & telegraph		55.6	37.9		-18.1
Water transportation		26.5	6.8		-18.9
Electric light & power		67.7	144.6		18.9
Gas works		34.1	59.1		-27.0

See notes to Table 1.

**TABLE 7**  
**Manpower Available for Miscellaneous Transportation and**  
**Communication by Major Industry Group, 1910-1940**

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	<b>NUMBER</b>				
<b>Total</b>	537,174	896,180	1,242,253	1,248,558	1,325,815
Air transportation		n.a.	18,189	18,006	24,855
Garages, greasing stations, auto laundries & auto repair shops	44,460	365,110	681,768	654,394	555,352
Radio broadcasting & transmitting		n.a.	8,964	8,964	26,665
Truck, transfer, & cab companies	321,178	392,397	434,786	457,832	598,176
Warehouses & cold storage plants	23,840	60,045	59,394	65,913	70,853
Livery stables	7,487	34,188	9,642		
Stockyards	8,365	39,266	17,763		
Other & n.s. transp. & communication	1,844	5,174	11,747	43,449	49,914
	<b>PERCENTAGE DISTRIBUTION</b>				
<b>Total</b>	100.0	100.0	100.0	100.0	100.0
Air transportation		n.a.	1.5	1.4	1.9
Garages, greasing stations, auto laundries & auto repair shops	8.3	40.7	54.9	52.4	41.9
Radio broadcasting & transmitting		n.a.	0.7	0.7	2.0
Truck, transfer, & cab companies	59.8	43.8	35.0	36.7	45.1
Warehouses & cold storage plants	4.4	6.7	4.8	5.3	5.3
Livery stables	25.6	3.8	0.8		
Stockyards	1.6	4.4	1.4		
Other & n.s. transp. & communication	0.3	0.6	0.9	3.5	3.8
	<b>INDEX (1910: 100.0)</b>				
<b>Total</b>	100.0	166.8	231.3		245.6
Air transportation		n.a.	n.a.		n.a.
Garages, greasing stations, auto laundries & auto repair shops	100.0	821.2	1,533.4		1,301.4
Radio broadcasting & transmitting		n.a.	n.a.		n.a.
Truck, transfer, & cab companies	100.0	122.2	135.4		176.9
Warehouses & cold storage plants	100.0	251.9	249.1		267.8
Livery stables	100.0	24.9	7.0		
Stockyards	100.0	469.4	212.3		
Other & n.s. transp. & communication	100.0	n.c.	n.c.		n.c.
	<b>PERCENTAGE CHANGE FROM PRECEDING CENSUS</b>				
<b>Total</b>		66.8	38.6		6.2
Air transportation		n.a.	n.a.		38.0
Garages, greasing stations, auto laundries & auto repair shops		721.2	86.7		-15.1
Radio broadcasting & transmitting		n.a.	n.a.		197.5
Truck, transfer, & cab companies		22.2	10.8		30.7
Warehouses & cold storage plants		151.9	-1.1		7.5
Livery stables		-75.1	-71.8		
Stockyards		369.4	-54.8		
Other & n.s. transp. & communication		n.c.	n.c.		n.c.

See notes to Table 1. n.a.: not available. n.s.: not specified.  
n.c.: not comparable from Census to Census because of inclusion of 'not specified transportation and communication'.



1930-40 comparison is of figures from *Comparative Occupation Statistics*.

TABLE 8  
Manpower Available for Trade by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	3,365,792	4,063,955	6,032,633	6,189,797	7,178,533
Advertising	n.a.	n.a.	64,488	70,246	79,035
Grain elevators	15,977	31,096	31,124	6,034,045	6,938,046
Wholesale & retail trade	3,349,815	4,000,615	5,851,515		
Other & n.s. trade	n.a.	32,244	85,506	85,506	161,452
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Advertising	n.a.	n.a.	1.1	1.1	1.1
Grain elevators	0.5	0.8	0.5	97.5	96.6
Wholesale & retail trade	99.5	98.4	97.0		
Other & n.s. trade	n.a.	0.8	1.4	1.4	2.2
	INDEX (1910: 100.0)				
Total	100.0	120.7	179.2		207.9
Advertising	n.a.	n.a.	n.a.		n.a.
Grain elevators	100.0	194.6	194.8	201.0	201.0
Wholesale & retail trade	100.0	119.4	174.7		
Other & n.s. trade	n.a.	n.a.	n.a.		n.a.
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		20.7	48.4		16.0
Advertising		n.a.	n.a.		12.5
Grain elevators		94.6	0.1	15.0	15.0
Wholesale & retail trade		19.4	46.3		
Other & n.s. trade		n.c.	n.c.		n.c.

See notes to Table 1. In 1910 wholesale and retail trade included advertising and other and not specified trade; in 1920, advertising.

n.a.: not available. n.c.: not comparable because of inclusion of 'not specified trade'. n.s.: not specified.

The data for 1870-1930 cover 'gainful workers' and for 1940, 'labor force'. 'Gainful workers' is defined to include persons who reported themselves as usually working or available for work, and to exclude inexperienced workers. 'Labor force' is defined to cover

persons actively working (including those on emergency work) or seeking work; those not working or seeking work because no job was to be found in their occupation and locality, or who had been instructed to report for work within a certain period, or were wait-

TABLE 9  
Manpower Available for Finance, Insurance, and Real Estate by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	517,070	794,732	1,420,274	1,469,901	1,548,557
Banking & other finance	213,050	390,952	624,783	605,953	499,040
Insurance	153,174	225,783	507,299	512,357	545,964
Real estate	150,846	177,997	288,192	351,591	503,553
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Banking & other finance	41.2	49.2	44.0	41.2	32.2
Insurance	29.6	28.4	35.7	34.9	35.3
Real estate	29.2	22.4	20.3	23.9	32.5
	INDEX (1910: 100.0)				
Total	100.0	153.7	274.7		289.4
Banking & other finance	100.0	183.5	293.3		241.5
Insurance	100.0	147.4	331.2		352.9
Real estate	100.0	118.0	191.1		273.6
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		53.7	78.7		5.4
Banking & other finance		83.5	59.8		-17.6
Insurance		47.4	124.7		6.6
Real estate		18.0	61.9		43.2

See notes to Table 1.

ing for the completion of an office or a shop in which they expected to conduct a private enterprise; those with a temporary disability; and inexperienced workers. By definition, however, the labor force excludes other persons not in jobs and not currently seeking work.<sup>2</sup>

<sup>2</sup> See *Comparative Occupation Statistics*, III, by John D. Durand, for a detailed description of the differences between 'labor force' and 'gainful workers'. Opin-

TABLE 10  
Manpower Available for Government Service by Major Industry Group,  
1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	1,304,337	1,870,736	2,415,151	2,496,584	3,061,203
Public school system	593,725	745,961	1,081,639	1,081,639	1,064,460
Postal service	169,820	209,004	283,936	283,919	311,684
Government service, n.e.c.	540,792	915,771	1,049,576	1,131,026	1,685,059
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Public school system	45.5	39.9	44.8	43.3	34.8
Postal service	13.0	11.2	11.8	11.4	10.2
Government service, n.e.c.	41.5	48.9	43.5	45.3	55.0
	INDEX (1910: 100.0)				
Total	100.0	143.4	185.2		227.0
Public school system	100.0	125.6	182.2		179.3
Postal service	100.0	123.1	167.2		183.6
Government service, n.e.c.	100.0	169.3	194.1		289.2
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		43.4	29.1		22.6
Public school system		25.6	45.0		-1.6
Postal service		23.1	35.9		9.8
Government service, n.e.c.		69.3	14.6		49.0

See notes to Table 1. n.e.c: not elsewhere classified.

'Economic manpower' and 'force of workers' as used here are equivalent to the Census terms 'gainfully employed' and 'gainful

ions concerning the practical effect of the change in concept upon the total number of persons counted in the labor market vary widely. The author's view is that the new concept could not be implemented effectively because the persons the Bureau of the Census was able to hire as enumerators were not interested in what seemed to be technical distinctions. Nor did Congress appropriate the funds with which the Census Bureau could have trained them for their jobs. Similar lack of training and interest on the part of the enumerators makes it unlikely that many inexperienced workers were excluded from 'gainful workers'. The exclusion of inexperienced workers would seem to have required both training and a separate question such as was found to be necessary to get a full count of workers in the Monthly Survey of the Labor Force.

worker', which were avoided because of the confusion concerning employment status. In accepting Edwards' figures for 1940, which are for what the Census calls the 'labor force', a concept somewhat different from that of 'gainful workers', we perforce stretch our terms to cover that concept too.

TABLE 11  
Manpower Available for Professional Service and Amusements by Major Industry Group, 1910-1940

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	1,078,577	1,502,624	2,323,826	2,267,459	2,936,303
Professional service	786,403	1,194,376	1,880,621	1,913,579	2,454,821
Recreation & amusements	292,174	308,248	443,205	353,880	481,482
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Professional service	72.9	79.5	80.9	84.4	83.6
Recreation & amusements	27.1	20.5	19.1	15.6	16.4
	INDEX (1910: 100.0)				
Total	100.0	139.3	215.5		279.0
Professional service	100.0	151.9	239.1		306.8
Recreation & amusements	100.0	105.5	151.7		206.4
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		39.3	54.7		29.5
Professional service		51.9	57.5		28.3
Recreation & amusements		5.5	43.8		36.1

See notes to Table 1.

The figures for 1870-1930 cover persons 10 years and older usually working or available for work; those for 1930-40 cover persons 14 and over.

Many of the individuals enumerated are multiple-job workers; besides having full-time jobs, they earn supplementary income through other employment. Others are part-time workers; they do not wish to or cannot devote the full working week to economic activity. It is problematical whether the extra work of multiple-

**TABLE 12**  
**Manpower Available for Domestic and Personal Service by Major Industry Group, 1910-1940**

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	NUMBER				
Total	3,670,334	3,333,965	4,814,573	5,048,147	5,702,939
Laundries	148,522	163,011	310,379	419,370	475,303
Cleaning, dyeing, & pressing shops	17,764	26,563	109,245		
Hotels & lodging places	971,727	941,456	636,060	1,410,901	1,871,257
Eating & drinking places			730,246		
Other domestic & personal services	2,532,321	2,202,935	3,028,643	3,217,876	3,356,379
Barbers, beauticians & manicurists	190,457	213,802	374,290	3,217,876	3,356,379
Domestic service	2,341,864	178,272	2,326,857		
Apt. house & office bldg. care & maintenance			298,090		
Domestic & personal service n.e.c.			115,505		
	PERCENTAGE DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Laundries	4.0	4.9	6.4	8.3	8.3
Cleaning, dyeing, & pressing shops	0.5	0.8	2.3		
Hotels & lodging places	26.5	28.2	13.2	27.9	32.8
Eating & drinking places			15.2		
Other domestic & personal services	69.0	66.1	62.9	63.7	58.9
Barbers, beauticians & manicurists	5.2	6.4	7.8	63.7	58.9
Domestic service	63.8	5.3	50.9		
Apt. house & office bldg. care & maintenance			6.2		
Domestic & personal service n.e.c.			3.5		
	INDEX (1910=100.0)				
Total	100.0	90.8	131.2		148.2
Laundries	100.0	109.8	209.0	286.0	
Cleaning, dyeing, & pressing shops	100.0	149.5	615.0		
Hotels & lodging places	100.0	96.9	140.6	186.5	
Eating & drinking places					
Other domestic & personal services	100.0	87.0	119.6	124.7	
Barbers, beauticians & manicurists	100.0	112.3	196.5	124.7	
Domestic service	100.0	84.9	113.3		
Apt. house & office bldg. care & maintenance					
Domestic & personal service n.e.c.					

TABLE 12 (concl.)

	Ages 10 and Over			Ages 14 & Over	
	1910	1920	1930	1930	1940
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		-9.2	44.4		13.0
Laundries		9.8	90.4		13.3
Cleaning, dyeing, & pressing shops		49.5	311.3		
Hotels & lodging places	}	-3.1	45.1		32.6
Eating & drinking places					
Other domestic & personal services					
Barbers, beauticians & manicurists		12.3	75.1		4.3
Domestic service			37.2		
Apt. house & office bldg. care & maintenance	}	-15.1	67.2		
Domestic & personal service n.e.c.					-74.5

See notes to Table 1.

n.e.c: not elsewhere classified.

job workers is greater or less than the work deficit of part-time workers.

Multiple-job workers are frequently multiple-industry workers, and appear to be more numerous among persons engaged in farming and government service than among those attached to other industries. In the former case farming is usually the primary source of income and the persons are so classified. In the latter case government service is usually a source of supplementary income, and persons so engaged are listed in their primary industry. Many part-time workers are attached to trade, domestic service, and other services.

The total manpower figures in this paper are probably understatements. Not everyone is counted in the Census enumerations.<sup>3</sup> A complete Census count of workers cannot be obtained without millions of return and check-up visits. Since Congress did not vote additional compensation to enumerators for such visits, only some were made. There is also evidence that an appreciable number of

<sup>3</sup> For example, it is estimated that nearly 900,000 children under 5 years of age were omitted from the 1940 Census (National Resources Planning Board; *Estimates of Future Population in the United States, 1940-2000*, p. 22).

young men between 18 and 25 were omitted because they were 'on the move'. A study of the draft registration data for World War II indicates an undercount in all ages by the 1940 Census averaging 3.4 percent, reflecting a similar undercount of the economic manpower.<sup>4</sup> Census enumerators do not report a significant number of other persons without a fixed place of residence, such as migratory workers and seamen. Although the Census officials made determined efforts, many individuals in sparsely settled and highly congested areas were also missed.

Many workers were deliberately excluded by the Census from the number of persons engaged in the market economy. Since 1910 enumerators have been instructed to exclude all boarding- and lodging-house keepers for whom that activity was not the major source of support or income.<sup>5</sup> In 1930 about 2,700,000 families took lodgers,<sup>6</sup> but fewer than 145,000 boarding-house and lodging-house keepers were reported. For some 95 percent of the 2,700,000 families, lodgers provide a supplementary income not indicated by occupations figures. Evidence for the supplementary nature of the income is that 90 percent of the families took no more than 3 lodgers. Another group, part of which is believed to be frequently excluded from these counts, is nonagricultural unpaid family workers. The number reported in the 1940 Census was only 278,703. A large proportion of these also are part-time workers.

Census Bureau officials have pointed out that the labor force estimates have been understated because respondents doing house work or going to school as well as engaging in economic activity tend to report the former, if it was more important, instead of the latter, as requested.<sup>7</sup> Two tests were made. In each case two schedules were used: one asked the usual questions about the kind of activity—whether working, seeking work, attending school, at home, etc; the other asked about the major activity of each person.

<sup>4</sup> *Ibid.*, p. 23 and 'Underenumeration in the Census as Indicated by Selective Service Data', by R. J. Myers, *American Sociological Review*, June 1948.

<sup>5</sup> 1910 Census, 'Instructions to Enumerators', *Population*, p. 157.

<sup>6</sup> 1930 Census, 'Population Bulletin, Families', United States Summary, Table 32.

<sup>7</sup> See Gertrude Bancroft and Emmett H. Welch, 'Recent Experience with Problems of Measurement' (of the labor force), a paper presented at the 105th annual meeting of the American Statistical Association, Cleveland, Jan. 24, 1946.

For those reported in a major activity other than working or seeking work a supplementary question was asked—had he or she also worked or sought work during the survey period? The supplementary question in the test of April 1945 raised the estimated labor force figure about 2,500,000. In a similar test made in July 1945, the school vacation period changed the primary activity of many individuals from school to work, and the supplementary question raised the total only 1,400,000.

Because of the manner in which the population is canvassed, the industrial composition is mainly a product of self-classification or classification by a member of the worker's family who answers for him. Other respondents for workers include lodging-house keepers, residential hotel employees, and neighbors. A classification of this type cannot be as accurate as one based on a canvass of establishments.

A person engaged in more than one industry is classified in the industry in which he earned the largest portion of his income. The products of the immediate place of work determine the industry. For example, an individual working for the captive mine of a steel corporation is classified in mining.

The usual impression is that Census figures are averages for the year. But since the labor force fluctuates seasonally, the Census counts are influenced by the month in which the Census is taken. The Censuses of 1870–1900 were held in June; those of 1910, 1930, and 1940, in April; that of 1920, in January. Surveys of the labor force made by the Census Bureau in 1941 and 1942 indicate that agricultural employment in June was about 3 percent larger than the annual average; in April, about 1 percent smaller; and in January about 2.5 percent smaller. However, statistical evidence is lacking that would indicate a substantial degree of incomparability between the gainful worker figures obtained in the Censuses taken in different seasons. See the discussion in Section 4 on adjustments of the estimates for agricultural laborers.

Each industry has its own seasonal pattern. Since agricultural work approaches its peak in June and its trough in January, the figures for agriculture in the Censuses of 1870–1900 may be higher than the annual averages. If they were above the annual averages



in the years when the Censuses were taken in June, the number of workers attached to other industries was, and to a smaller degree, understated. Many who are farm laborers in the growing and harvesting seasons are engaged in other industries at other times of the year; e.g., in logging camps. Many teachers, especially in small rural schools in the 19th century, worked on farms during the summer months to supplement their slender incomes. Some teachers for whom farm operators reported were enumerated as farm laborers.

Still another factor that influences figures on economic manpower is the phase of the business cycle reflected in each Census. Fortunately, all Censuses from 1870 through 1930 reflect the influence of prosperity. The crisis of 1920 occurred several months after the Census month. And although the 1930 Census was taken several months after the crisis of 1929, the size of the labor force is believed to have been only slightly affected by the recession. Comparability through 1930, for either total manpower or the industrial distribution, has not been seriously affected by cyclical fluctuations in business.

In interpreting the 1930-40 changes in the labor force for specific industries, the great employment depression of the 1930's should be considered; in preceding decades the changes were due mainly to increases in production. The effects of the depression were uneven. The labor force of some industries contracted; that of others expanded. In some industries, e.g., textile and clothing, the wage and hour law was the major influence in raising the labor force above the 1930 level. Federal work relief policies gave many a worker a new occupation; many workers previously attached to other industries were drawn into construction work. Consequently, the labor force for the construction industry increased during a period in which regular construction activity declined sharply.

Because of large reserves, the labor force of industries in which there is a relatively large turnover, e.g., canning and preserving, tended to increase. The labor force of industries whose growth had already been seriously retarded or was on the decline, such as coal mining and steam railways, declined. Most of the expansion in public service may be traced directly to the depression and the

inauguration of social security. The garage and auto repair industries seem to have been affected by the growing practice of owner repairing and of parking automobiles in the streets.

The Bureau of the Census presented its data for 1870-1900 by occupational groups. All workers were included in the five broad divisions of occupations: agricultural pursuits (including forestry and turpentine farm occupations), professional service (including government officials and electricians), domestic and personal service (including soldiers, sailors, and marines; firemen and policemen; and not specified laborers), trade and transportation (including all clerks, bookkeepers, typists and stenographers), and manufacturing and mechanical pursuits (including construction, mining, and fishing occupations). Occupational data, available also for 1910-30, appear in the improved grouping by Alba M. Edwards: agriculture, forestry and fishing, extraction of minerals, manufacturing and mechanical (including construction occupations), transportation and communication, trade, public service, professional service, domestic and personal service, and clerical occupations.

In 1910, for the first time, the Census Bureau presented a complete industrial distribution of the force of workers. The 1930 Census also presented an industrial distribution, much like that in 1910. In these tabulations nearly all workers were distributed to the industries to which they were attached. On these two distributions the entire series presented in this paper for 1870-1930 was built. The force of workers for each industry in 1920 was estimated on the basis of an interpolation of the 1910 and 1930 ratios of the total in the industry to the number in selected occupations. The ratios were based on all occupations for which comparable data for 1910, 1920, and 1930 could be obtained. Estimates for each industry division, 1870-1900, were based on a series of workers with occupations characteristic of the division. For many occupations comparability was obtained from *Comparative Occupation Statistics*, while some occupations were estimated by me.

Although the 1930 Census industrial distribution has only nine broad industry divisions, twelve are presented here. The three divisions not given in the Census are construction; miscellaneous trans-

portation and communication; and finance, insurance, and real estate. The object was to have a classification that would be as close as possible to the classification used in the national income studies of the National Bureau of Economic Research. That was the reason for separating miscellaneous transportation and communication from transportation and public utilities. For the latter, relatively satisfactory statistics were available. Construction has long been considered a major industry division. It, and finance, insurance, and real estate also constituted broad industry divisions in the new industrial classification used in the 1940 Census.

Forestry and fishing was presented in 1930 as a broad industry division and was kept so because the activities of the individuals covered were sufficiently distinct from agriculture, with which it is sometimes combined. Hand trades, however, was combined with manufacturing industries since it was impossible from Census data for the period prior to 1910 to determine how many blacksmiths and other craftsmen were attached to manufacturing establishments.

#### *Qualifications for Industry Estimates*

The industrial composition of the force of workers presented in this paper is affected by Census coding practices. For example, garage workers, including those of retail stores, factories, construction firms, etc. (except those in telephone company garages) were coded into the garage, greasing station, and auto laundry industry. All telegraphers (including those on railroads but excluding those in steel mills), telephone operators, telephone and telegraph line-men and maintainers were coded into the telephone and telegraph industry. Several other similar coding practices affect the accuracy of manpower figures and comparisons with data from other sources. These and other factors that affect the estimates in this paper are indicated below.

Significant parts of forestry and fishing are conducted in sparsely settled remote areas. Consequently, the tendency toward an undercount of workers in these industries is probably greater than in other industries. Other factors tend to lead to an even greater undercount for fishing. One is that fishermen who work on large ships are sometimes enumerated as sailors; another that some of

the many fishermen out on the water at the time of the enumerator's visit are omitted.

The 1930 Census definition of water transportation includes dredging, dock and levee construction as well as municipal ferry and other government water transportation. Coding practices affect this industry too, but to a minor degree. Wireless operators, maids, and kitchen helpers of various kinds working on ships are excluded. Water transportation is one of the industries seriously affected by undercount, since a substantial number of seamen are always at sea and without a fixed place of residence on land.

The coverage of public service is the least satisfactory among the major industry divisions. The definition of the industry in this paper differs from that of the Census Bureau in that it includes the public school and the postal systems. However, large numbers of government workers who were coded into other industries in the Census reports could not be segregated and transferred to public service.

Nearly all government library and most government hospital workers were coded into professional service. Most of those who were not so coded were included in domestic and personal service. Government architects, physicists, economists, statisticians, public health physicians, dentists, alms-house superintendents, prison keepers, playground attendants, and asylum attendants were coded into professional service. All custodians of government buildings and nearly all government bathhouse workers were coded into domestic and personal service. Workers attached to arsenals, navy yards, municipal power plants, garbage and sewage disposal plants, and government printing offices were coded into manufacturing. Municipal railroad and ferry service workers were covered in the major groups of transportation and public utilities. Government garage workers were placed in the garage, greasing station, and auto laundry industry. Municipal and state street and road maintainers and builders, other government force account construction workers, bridge keepers, toll keepers, sewer maintenance workers, and street cleaners were coded into construction. Opinions vary widely about which of the above-mentioned components should be included under public service.

Professional services and amusements tend to be overstated by

the inclusion of all physicians, dentists, physicists, economists, statisticians, and agronomists. The general inclination of respondents to report themselves in the occupation with the greatest prestige also tends toward overstatement. For other industry definitions see, in Section 4, the tabular comparison of the industry classification used in this study with the Standard Industrial Classification.

Comparability of 1930 with 1940 for two small industry groups—miscellaneous repair services and hand trades and railway express services—could not be established. Many of the components of miscellaneous repair services and hand trades were included in 1930 under 'other and not specified trade'. Data for more than a minor part of the separate industries of the group were not available for 1930 and the figure used is that given in the 1930 Census report for other and not specified trade, adjusted to include some hand trades. Express services were defined in 1940 in the same way as in 1930, but the reported figure in Edwards' book (about 19 percent lower than one estimated on the basis of express company employment) is footnoted as not comparable. The effect upon the 1930-40 comparison for the entire transportation and public utilities division, however, is small.

### 3 PROCEDURES FOR DERIVING FINAL TABLES

#### *Industry Classification*

The industry classification used in this report is a modification of the 1930 Census industrial classification. A construction division was formed of 'building construction' (from the 1930 Census division 'manufacturing and mechanical industries') and 'construction and maintenance of streets and roads' (from the Census division 'transportation and communication'). A miscellaneous transportation and communication division comprises those major groups (except 'construction and maintenance of streets and roads') from 'transportation and communication' for which relatively satisfactory data were not available for an appreciable period, warehouses and stockyards (from 'trade'), and auto repair shops (from 'manufacturing and mechanical industries'). Another division—

finance, insurance, and real estate—is composed of the major groups named (from 'trade').

For the three new broad divisions, the major groups as presented by the Census were merely regrouped. Transportation and public utilities had to be regrouped in part. This division includes the major groups (except postal service) of the Census division 'transportation and communication' for which relatively good data are available for an appreciable period, plus electric light and power, and gas works (from 'manufacturing and mechanical industries'). To government service, two new major groups were added: postal service (transferred from 'transportation and communication') and the public school system (estimated on the basis of data from the U. S. Office of Education and the National Education Association). The number of teachers, nurses, clerks, bus drivers, and janitors was estimated. All except bus drivers, taken from the Census group 'truck, transfer and cab companies', were taken from 'professional services and amusements'.

Mining was modified by the omission of salt wells and works (leaving salt mines in mining). The steam railroad industry was adjusted by adding an estimated part of car and railroad shops, a major industry group under manufacturing. The street railroad industry was similarly adjusted.

The above mentioned regrouping took the following major groups out of the Census division 'manufacturing and mechanical industries': building construction, auto repair shops, electric light and power, gas works, and part of car and railroad shops. Salt wells and works and editors, reporters, and journalists were added.

The efforts made to approximate the classification of the National Bureau of Economic Research were only with respect to its broad outlines. The manufacturing division is different in at least one respect: it includes persons with mechanical hand trades (not in factories) such as dressmakers, seamstresses, milliners, blacksmiths, etc. because the earlier Censuses do not distinguish between craftsmen attached to factories and those in independent shops plying their craft. 'Trade' is different in that it includes advertising agencies. Since individuals attached to the latter group

were combined with other workers under 'trade' in 1910 and earlier years it could not be separated for the years prior to 1930.

*Adjustment of 1910 Census Data*

After the 1930 classification had been shaped to the desired form, the 1910 Census industrial classification was adjusted in the same manner. In addition, various detailed adjustments were required for comparability with the 1930 data.

Several occupations that had been distributed to their respective industries in 1930 were coded into a single industry in 1910: chemists, assayers, and metallurgists; civil engineers and surveyors; draftsmen; lawyers; agents (not elsewhere classified); creditmen; and commercial travelers. Industries in which such occupations were included in 1930 were adjusted to include them in 1910. Each occupation was distributed among the major groups according to the 1930 distribution.

The 1910 Census figure for building and hand trades was made comparable with the 1930 classification for building construction by removing independent hand trades and laborers (estimated) not attached to building construction, and adding estimated numbers of tinsmiths and sheet metal workers, draftsmen, civil engineers and surveyors, chemists, and truck and tractor drivers. For adjustments to other industries see Table 16.

The 1930 Census presented a division not paralleled for 1910: 'industry not specified'. One was formed, however, by combining 'laborers (not specified)' with workers in a group of office occupations for which industry data were lacking. 'Laborers (not specified)' was the residual of some 500,000 after the estimated number of building laborers had been deducted from 'laborers (building and not specified)'. Since the latter group appears under the general classification 'manufacturing and mechanical industries', the implication would seem to be that they properly belong in manufacturing. But they do not, for when the industrial affiliation of laborers attached to manufacturing was not known, they "... were classified under 'other not specified industries'", a major group under manufacturing. The Census report states that in many cases "... it was impossible to determine anything in re-

gard to the industries in which the occupations were pursued. These were classified under 'occupations in not specified industries and service groups' ''<sup>8</sup> which appears as one of the major groups under trade in the 1910 industrial classification and consists of various office occupations.

A final adjustment was made for an overcount of unpaid family workers (see Table 14). The overcount for agriculture (see Sec. 4) was assumed to be one of unpaid family laborers. The nonagricultural industries were adjusted for the remainder of the overcount. The distribution of the latter adjustment was based on the distribution of unpaid family laborers reported for 1940,<sup>9</sup> derived on the assumption that, in general, the overcount would be largest in industries in which unpaid family workers were most numerous.

#### *Interpolation for 1920*

Although the 1920 Census was not tabulated by industry, little difficulty was encountered in making an industrial distribution comparable with that for 1910 and 1930, since comparable data for some of the occupations for each industry were tabulated for 1910, 1920, and 1930. For many industries the only comparable occupations were 'operatives' and 'laborers'; in others they numbered up to a score or more.<sup>10</sup> Comparable totals were made of the number of workers in as many of these occupations as could be obtained for the three Census years.

Ratios were then computed for 1910 and 1930 between the total attached to the industry and the corresponding number in the selected occupations (sometimes referred to as specified occupations). The ratios were in the direction expected by the growing specialization of work and expansion of office personnel. Because the ratios were generally stable, and moved in the right direction, and for other reasons, they were considered sufficiently dependable for interpolation for 1920. Multiplying the 1920 total for the selected occupations in each industry by the interpolated ratio yielded the estimate of manpower. To obtain as fine a division as

<sup>8</sup> 1910 Census, *Population*, IV, p. 21.

<sup>9</sup> 1940 Census, *Population*, III, Part 1, Table 78.

<sup>10</sup> See Table 16 for the comparable occupations for each industry.



could be made and to avoid the problem of weighting, these estimates were prepared for the smallest Census industry grouping.

*Characteristic Occupations, 1870-1900*

Data in the Census reports for 1870-1900 are divided into two broad groups—characteristic and repeater occupations. For example, boatmen and sailors, 'street railway employees', 'steam railroad employees', telephone and telegraph linemen, and telephone and telegraph operators are occupations characteristic of transportation and public utilities; brick and tile makers, iron and steel workers, cabinet makers, etc., of manufacturing. Other characteristic occupations are primarily, but less completely, attached to one industry; e.g., the building trades.

In this era of large and complex enterprises, most occupations characteristic of one industry are found also in other industries. Cooks and waiters, for example, are employed by manufacturing establishments, shipping concerns, and hospitals, as well as in restaurants. Physicians and nurses are also employed by all these as well as by insurance companies, government agencies, and in establishments in the industrial division of which they are characteristic. Workers with characteristic occupations, however, are attached to their respective industries to so large a degree that individuals with these occupations were assigned to the corresponding industries as a first step in estimating the industrial distribution of manpower.

The estimates for each industry division 1870-1900 are based upon a series of occupations characteristic of the industry. For example, the number of workers attached to mining is largely based upon the number of miners and quarrymen, oil well employees, and officials of mining and quarrying companies. These three occupation designations accounted for more than 90 percent of the workers attached to the industry in 1910. In each industry all such occupations for which comparable data were available were used to extrapolate industry estimates for 1870-1900. Most of the characteristic occupations used in the extrapolations appeared in Census reports. Some were estimated, however, especially when it was felt that a fair approximation was aided and more error

might be introduced into the industry estimates if they were not included. The inclusion of estimates of insurance agents and real estate officials, collectors, and agents in the characteristic occupation series for extrapolating industry totals back to 1870, for example, yielded more satisfactory estimates than would otherwise have been obtained.

The various occupations are not reported uniformly in the different Censuses. Some occupation designations reported separately in certain years were combined with others in other years. Insurance agents, for example, were reported in 1870, 1880, and 1910, but combined with other kinds of agent in 1890 and 1900. Estimates were made for these years. The number of insurance agents was estimated by interpolating the insurance company income for life, fire, and marine insurance per agent for 1880 and 1910, and applying the interpolated income figures to the 1890 and 1900 figures of company income for life, fire, and marine insurance.

The number of real estate agents in 1890 was estimated by interpolating the 1880 and 1900 ratios of real estate agents to agents other than insurance. Estimates of postal clerks and carriers, 1870-1900, are based upon the 1910 and 1930 ratios of the number reported in the Census to the number reported annually by the Postmaster General. Policemen and firemen in fire departments 1870-1900 were estimated by extrapolating the 1930 and 1910 ratios of policemen and of firemen to population in cities of 25,000 or more.<sup>11</sup>

Wage earners (except the highly skilled) in hotels and restaurants in 1890 were estimated by interpolating their ratio to the managerial group in 1880 and 1900. The 1900 estimate was based upon the 1930 ratio of all waiters reported by the Census to hotel and restaurant wage earners (excluding the highly skilled). Waiters as a group were 45 percent more numerous than the rest of the hotel and restaurant wage earner group (excluding the skilled) in 1930.

The classification of nurses in pre-1900 Census reports included groups that were later subdivided into trained nurses and nurses,

<sup>11</sup> Ratios to population in cities of 100,000 or more and in cities of 10,000 or more yielded approximately the same results.

not trained—children's nurses, practical nurses, etc. A subdivision of the group was desirable, for the former are characteristic of professional services, and the latter, of domestic and personal service. Nurses in the earlier years were distributed by extrapolating the percentage distribution of all nurses computed from Census reports for 1910-30. The extrapolation was made graphically on a parabolic type curve through the percentages for 1910-30 and toward 1870, avoiding excessively high or excessively low figures for the intervening years.

The 1900 subdivision reported by the Census seems incomplete, for the occupation designations were 'nurses, trained' and 'nurses, *not specified*' (italics ours). Another indication that trained nurses were underreported is the great difference between the ratios of trained to all nurses in the reported figures for 1900 and 1910. It seems unlikely that trained nurses would have increased relative to other nurses, or relative to the population, so much more in 1900-10 than in either 1910-20 or 1920-30. The figure for trained nurses reported for 1900 was therefore believed to be an understatement and the estimate substituted.

Private school teachers are classified under professional service; public school teachers under government service. All school teachers, however, were reported in a single Census figure. They were distributed on the basis of the distribution reported by the United States Office of Education for 1890-1930.<sup>12</sup> Percentages for 1870 and 1880 were estimated by extrapolating the 1890-1930 trend computed by the method of semi-averages.

Electricians were not reported separately for 1870-90, but were reported in 1860 and 1900. There were only 12 electricians in 1860 (listed under professional service) and 50,717 in 1900. The number of electricians in 1870-90 was estimated graphically by interpolating absolutes on a semi-logarithmic chart. A geometric progression was assumed because of the very rapid growth. The estimates for electricians were subtracted from the figures for technical engineers, with whom they were grouped.

The estimates of clerks in stores for 1890 and 1900 were complicated by the long-standing confusion among enumerators and re-

<sup>12</sup> *Statistical Summary of Education, 1931-32* (U. S. Office of Education), Table 5.

spondents concerning clerks and salespersons; many salespersons are enumerated as clerks. The wide variation in ratios of clerks in stores to salespersons derived from the Census figures indicates that the error is not relatively constant. In 1860 all salespersons were probably reported as clerks.<sup>13</sup> In 1870 the Census reported 16 times as many store clerks as salespersons; and in 1880, 11 times as many, while in 1910 only four-tenths as many clerks as salespersons were reported. This inconsistency was remedied by computing ratios of clerks plus salespersons to merchants plus dealers, interpolating the ratios, applying the interpolated ratios to merchants plus dealers for 1890 and 1900, then subtracting the number of salespersons reported by the Census. Whatever error there was in the estimate of salespersons was compensated by the misclassification in the enumeration of clerks.

A modification of this method was applied to apprentices in certain building trades and to officials in trade and transportation. They were estimated on the basis of the ratios computed for the nearest Census year. Estimates for other characteristic occupations were taken from Edwards' report.

Estimates in which we have little confidence are referred to as 'other characteristic occupations' and are at times included in the tabulations of repeater rather than of characteristic occupations. The object is to exclude such estimates from totals of workers with occupations characteristic of each industry division and so prevent their influencing the industry distributions of repeater occupations. The characteristic occupations that form the basis for extrapolating the industry estimates for each broad industry division are listed in Section 4.

#### *Repeater Occupations*

Repeater occupations comprise those not typical of a specific industry. They are numerous in various industries. The group we included is different from the group designated 'repeater occupations' by the Bureau of the Census. The separation into characteristic and repeater occupations assumes special significance for this study because individuals with characteristic occupations consti-

<sup>13</sup> 1900 Census, *Special Report on Occupations*, p. xxxix, note 5; and p. iv, note 3.

tuted, in 1870, 80 percent or more of the manpower in the different industry divisions, except construction and transportation and public utilities. And counting the stevedores in the laborer adjustment for transportation and public utilities with other characteristic occupations, the percentage for that group would be 74. For miscellaneous transportation and communication, including draymen, teamsters, hackmen, etc., with characteristic occupations, the percentage is 86. In six industry divisions the percentage is 93 or more. In agriculture nearly 100 percent have characteristic occupations. The number of persons with occupations characteristic of professional service is substantially larger than the estimated manpower for the industry. Draftsmen, technical engineers, designers, chemists, assayers, metallurgists, and lawyers were attached to other industries in significant numbers. In addition to forming the major component, the series on characteristic occupations serve as a basis for estimating the industrial distribution of many repeater occupations.

Workers with repeater occupations accounted for the rest of total manpower. In distributing them the estimates for the various industries were computed so as to yield progressions similar to the movements of the respective number of workers with characteristic occupations. Bookkeepers attached to stores, clerks, bookkeepers, and accountants attached to finance, manufacturing, professional service, domestic and personal service, and transportation were estimated by interpolating ratios of the repeater occupation to related factors.

The modified index for characteristic occupations was most frequently used to allocate the repeater occupations. Indexes for the total of workers with characteristic occupations for each major industry division, 1870-1910, computed on a 1910 base, were modified by applying a ratio of the index of the repeater occupation to the weighted index of the total for characteristic occupations in the industries in which the repeater occupation was recorded in 1910, then applied to the respective 1910 totals for the repeater occupation. Agriculture was omitted from the weighted index of characteristic occupations because few workers with repeater occupations were attached to the industry. The weighted index of the total for

characteristic occupations was computed by weighting the index for each industry by the number of workers with the repeater occupation in 1910 (see Table 19).

In the case of trade the use of the series for characteristic occupations as indicators of the progression of the repeater occupations was better served by adding one or more repeater occupations. According to the Census, the number of salespersons rose from 14,203 in 1870 to 875,180 in 1910. This increase, as indicated above, was due partly to the erroneous reporting of many as 'clerks in stores'. When salespersons are combined with clerks the growth is from 236,707 to 1,262,363. The inclusion of clerks prevents the influence of an erroneous count upon the indexes of characteristic occupations for trade, and upon the subsequently estimated number of workers with repeater occupations.

In the 1910 Census there are in some cases two totals for the same occupation designation, one for the pre-1910 definition and one for the new definition. For example, according to the new classification, draymen, hackmen, and teamsters in the various industries in 1910 totaled 782,086; according to the pre-1910 classification, 736,085.<sup>14</sup> As a preliminary step to the allocation, the latter was distributed to the various industry groups according to the distribution of the former.

The modified index method was used to estimate the industrial distribution of draymen, teamsters, hackmen, etc; stationary engineers and firemen; blacksmiths; weighers, gaugers, and measurers; packers and shippers; messenger, errand, and office boys; stenographers; clerks, bookkeepers, and accountants (not otherwise estimated), and agents (other than real estate and insurance).

Laborers (not specified), a residual group that included some agricultural laborers, required special treatment. The Census reported a substantial increase in laborers (not specified) in each decade between 1870 and 1900; and between 1900 and 1910, a 50 percent decline. This contrast to the 27 percent increase in the total working force indicated that the classification had been changed. The Bureau of the Census, which had just become a permanent organization, had in 1910 coded laborers, as far as possible,

<sup>14</sup> 1910 Census, *Population*, IV, Tables VI and 15, respectively.

into their respective industries. Only the smallest possible residue of laborers was grouped as not specified. Because of this additional complication laborers could not be allocated in the same way as the other repeater occupations.

The first approximation of the number of laborers, 1870-1900, for each industry division was obtained in the manner that seemed best suited to the data for the industry, and the independent estimates for all industries were adjusted to the reported number of laborers (not specified).

Comparison of the number of steam railroad laborers reported as such for 1900 with the number estimated from Interstate Commerce Commission data indicates that only some of the laborers attached to the industry were included in the Census figure. First approximations to the degree of underreporting in other years were computed by estimating the total number of laborers for the industry, then applying the 1900 percentage of undercount (see Table 21).

Evidence of an undercount of farm laborers could not be obtained from industry employment data but an undercount could be inferred from the large number of persons in rural areas tabulated as laborers (not specified). It was adjusted for by estimating the total number of workers with agricultural occupations and subtracting the reported number. The total number of persons with agricultural occupations was estimated by interpolating the 1850 and 1920 ratios of agricultural workers to improved acres of farm land and applying them to the decennial figures of improved acres of farm land.

Edwards' estimates (pp. 143-4) of the undercount of laborers for forestry and fishing and mining were used. Laborers were allocated to other industries on the basis of the indexes of characteristic occupations (not modified). All estimates of laborers made in the various ways were regarded as first approximations. The first approximations were then adjusted to the total for laborers (see Table 20).

#### *1870-1900 Industry Totals*

The sum of the characteristic and repeater occupations for each industry approximated the manpower for the industry. A final step

was then necessary. The sum for construction in 1910, for example, was found to be about 135,000 too high, since many carpenters, electricians, and others whose occupations were characteristic of construction were attached to other industry divisions. The factor 0.9447—required to bring the sum to the correct 1910 total for the industry—was applied also to the totals for 1870–1900 to obtain industry totals for those years. A similar adjustment was made for each industry division.

The total of industry estimates for each year so derived leaves a small residual unaccounted for. Listed as 'industry not specified', it is primarily a reflection of the industry not specified group in 1910, but includes also the net total of our errors of estimation.

#### *1930–1940 Comparison*

The comparable figures for 1930 and 1940 were based primarily on *Comparative Occupation Statistics*. Edwards' 1940 figures are for individuals 14 years of age and older in the labor force, tabulated on the basis of the 1940 industry classification, according to the present industry of employed workers and the usual industry of public emergency workers and experienced workers seeking jobs. The 1930 figures are estimates of gainful workers 14 and over, also according to 1940 industry definitions, by present industry for employed persons and usual industry for the unemployed.

All 1930 and 1940 comparable figures for major industry groups, except 'industry not reported', published in Edwards' report, were used here. Rather than combine them in the broad industry divisions of that report we combined them in the broad divisions used for 1870–1930 to facilitate comparison with earlier figures. For example, instead of retaining the business and repair services division, its major groups were placed in the divisions in which they appeared in earlier years. Auto storage, rental, and repair services was placed in miscellaneous transportation and communication; advertising and business services except advertising were placed in trade; and miscellaneous repair services and hand trades, in manufacturing. Water and sanitary services, regarded as a public utility in 1940, were placed in public service in the 1930–40 comparison. A few of the major groups under the 1940 classification were so



different from the earlier ones that 1940 indexes and 1930-40 percentage changes were not computed.

The number of workers in a few industry groups for which Edwards did not give 1930 figures was estimated—street railways and bus lines, trucking and taxicab service, miscellaneous personal services, and water and sanitary services. Manpower for water and sanitary services was estimated by applying to the 1940 figure the 1930-40 relative change in population in cities of 100,000 or more. Miscellaneous personal services was estimated by applying to the 1930 figures for appropriate characteristic occupations the 1940 ratios of employment to characteristic occupations for specific industries. An allowance for unemployment was combined with employment in obtaining the 1940 ratios. The selected industries are photographic studios and commercial photography, funeral services and crematories, barber shops and beauty parlors, shoe repair shops and shoe shine parlors. Before applying the ratios to the 1930 figures for the respective occupations, the latter were adjusted for comparability with 1940 as given in *Comparative Occupation Statistics*, Table 3. The total for these industries in 1930 was raised 18 percent to allow for the other components of miscellaneous personal services. The industries, characteristic occupations, and ratios are given in Table 18.

The number of workers attached to street railroads and bus lines in 1930 was estimated by adding to the previously estimated number of street railway workers (for 1870-1930) the number of bus employees, estimated by interpolating the 1927 and 1932 bus employment figures in *Census of Electrical Industries, Street Railways, 1937*. Unemployment of bus workers was also allowed for. The figure for trucking and taxicab services is the difference between the combined figure for street railway, bus line, trucking, and taxicab services in *Comparative Occupation Statistics*, Table 7, and the adjusted figure for street railways and bus lines.

Edwards' industry data for 1940 include 2,052,256 for 'industry not reported'. The total for 'industry not specified' in this study is 3,331,233. The difference is accounted for primarily by the addition to Edwards' figure of 767,341 new workers and Durand's correction of the 1940 Census figure, 509,501 (see *Comparative Occupation Statistics*, Table 1).

*Additional Adjustment for 1890*

The Census Bureau adjusted the 1890 total and agricultural manpower for an undercount of 582,522 boys and girls, ages 10-15.<sup>15</sup> For reasons given below, a further adjustment was required for the ages 16-20—estimated to be 420,513.

After the adjustment for children 10-15 years by the Census Bureau, the percentage of children participating in the labor market, 18.0, was only slightly below that for 1900, 18.2.

Comparison of the worker rate for young men 16-24 reported in 1890 with that for 1900 shows a much greater difference than would be justified by the corrected figures for males in the age group 10-15 and the percentage reported for the age group 25-34. The reported percentages for the age groups 10-15, 16-24, and 25-34, are, in 1890, 25.9, 79.9, and 97.4; in 1900, 26.1, 83.9, and 96.3.

It would be only reasonable to expect that had there been merely a slight change in the worker rate for boys 10-15 in 1890 as compared with 1900, and a small change for the ages 25-34, there would be merely a slight change in the ages 16-24. Conversely, it would be unreasonable to expect a pronounced change unless circumstances affected the 16-24 age group alone or had affected it to a far greater degree.

Labor market participation varies with age. In 1900 the worker rate for children ranged from 8.2 for 10-year olds to 36.1 for 15-year olds. The pattern in 1890 must have been quite similar. It can reasonably be expected that labor market participation will continue to increase with each year of age after 15 until about the age of 20. Marriage reduces the ranks of women in the labor market in the older ages, as shown in the 1930 Census report.<sup>16</sup>

The labor market participation in 1900 of males for each year of age above 15 was estimated from the progression for males 10-15 and the percentage in the labor market in the age groups 16-20 and 21-24. The 1900 progression for the age groups above 15, similar to the progressions reported in 1930 and 1940, is based upon the ratio of the worker rate for each year of age to the rate for the

<sup>15</sup> 1900 Census, *Special Report on Occupations*, p. lxvi.

<sup>16</sup> 1930 Census, *Population*, V, Ch. 5, Table 5, and 1940 Census, *Population*, IV, Part 1, Table 24.

age group of which it is a part. Following an increase in the worker rate of more than one-third from 14 to 15, the rate for 16-year-old boys was about one-fifth higher than that for 15-year-olds; the rate for boys of 17 increased about as much as that for boys of 16; the rate at 18 was about one-thirteenth higher than that at 17. Each succeeding year of age reflects the continued increase in labor market participation, although generally at a progressively retarded rate.

If the 1890 estimates of the worker rate for boys for each year of age, prepared in the same manner as for 1900, are based on the reported rate for the age group 15-19,<sup>17</sup> the percentage of 16-year-old boys would be only one one-hundredth higher than the percentage obtained for 15-year-olds from the corrected percentage for the 10-15 age group, rather than the one-fifth higher estimated for 1900. On this basis also it seems clear that an adjustment is required.

The 1890 worker rate for boys of each year of age in the group 16-20 was estimated by beginning with an 1890 figure 0.2 percentage points lower at age 15 than for the 1900 rate and 1.1 points higher for the age group 25-34, centered at 30. These are the 1890-1900 differences for the 10-15 and 25-34 age groups, respectively. A series of percentages for 1890 was then estimated by interpolating the differences in percentage points (Table 13, col. 4) and applying these differences to the 1900 percentages of boys 16-20 in the labor market. The worker rate for each year of age (col. 5) was applied to the corresponding male population figure to obtain an adjusted estimate of the number of workers for each year of age (col. 7). The difference between the estimated number of male workers 16-20 and the reported figure is 383,067. The adjusted percentage for 1890 is 76.8, identical with that for the same age group reported for 1900.

The above procedure applied to females yielded an adjustment of 37,446. The total adjustment for the two sexes is 420,513. As the Census regarded the entire adjustment for the ages 10-15 to be for agriculture, the adjustment for the ages 16-20 was also considered an adjustment for agriculture.

<sup>17</sup> *Compendium of the 11th Census, Part 3, Population*, p. 382.

*Estimated Overcount for 1910*

In its first report on the force of workers for 1910, the Census Bureau acknowledged a substantial overcount, particularly in agriculture.<sup>18</sup> The size of the overcount has been estimated by various methods. The approach here is based on the observation that there is a close and inverse relation between changes in worker rates of children and the percentage attending school.<sup>19</sup>

TABLE 13

Adjustment for Undercount of Males 16-20 in the Labor Market, 1890

Age group	Percentage in the Labor Market					Male Population	Males in the Labor Market		
	1900 <sup>a</sup>	1890					Corrected	Uncorrected	Adjustment
		Uncorrected	Corrected by Census	Difference between 1890 & 1900	Estimated %, 1890				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
10-15	26.1	14.3 <sup>b</sup>	25.9 <sup>b</sup>	-0.2					
14	36.5		36.3*	-0.2					
15	50.6		50.4*	-0.2		644,358	324,756		
15-19	69.3*	58.6 <sup>c</sup>			69.4	3,248,711	2,254,224	1,904,865 <sup>c</sup>	
16-20	76.8*				76.8	3,193,203	2,451,011	2,067,944 <sup>d</sup>	
21-24	93.1 <sup>a</sup>							383,067	
16-24	83.9 <sup>a</sup>	79.9 <sup>a</sup>							
16	60.5*	51.2*		-0.1	60.4	679,536	410,440		
17	73.5*	62.2*		0.0	73.5	629,165	462,436		
18	79.1*	66.9*		+0.1	79.2	679,280	537,990		
19	84.1*	71.2*		+0.2	84.3	616,372	519,602		
20	88.1*			+0.3	88.4	588,850	520,543		
25-34	96.3 <sup>a</sup>	97.4 <sup>a</sup>		+1.1					

\* Estimated.

<sup>a</sup> The figures for the age groups are from the 1900 Census, *Special Report on Occupations*, Table XXXVIII, p. cxviii; the figures for ages 14 and 15 were derived from *ibid.*, p. clxiv.<sup>b</sup> *Ibid.*, Table XI, p. lxxi.<sup>c</sup> *Compendium of the 11th Census*, Part 3, Population, p. 382.<sup>d</sup> Estimated on the basis of the worker rates reported for the 15-19 and 20-24 age groups.

The change in the worker rate of children 10-15 from 1900 to 1920 was known but the change from 1900 to 1910 was not

<sup>18</sup> 1910 Census, *Population*, IV, 26.<sup>19</sup> This relation was originally developed in Works Project Administration National Research Project, 'Labor Supply and Employment', by Daniel Carson (mimeo., 1939), Table 36.

known.<sup>20</sup> The 1900-10 as well as the 1900-20 change in the percentage of children in the same ages attending school were also known. The change in the worker rate for 1900-10 was based upon the ratio of the 1900-10 increase to the 1900-20 increase in the percentage of children attending school. For example, the proportion of boys 10-15 attending school increased 12.2 percentage points from 1900 to 1920 and 8.7 percentage points from 1900 to 1910. The 1900-10 change was found to be 71.3 percent of that for 1900-20. The 71.3 percent was applied to the 1900-20 change in the worker rate, yielding an estimated decline in the worker rate for 1900-10 of 10.6 percentage points. The 1900-10 change in the worker rate derived from the Census was a decline of 1.3 percentage points; the difference between 10.6 and this figure, 9.3 percentage points, was the estimated overcount in the worker rate for 10-15 year old boys in 1910. The estimated overcount is 508,173 (see Table 14). This process was applied also to the data for girls in the same ages, yielding an estimated overcount of 252,114.

The relation between changes in the worker rate and school attendance in the age group 16-19 in the first decade of the 20th century was not as close as it was for younger children, and the method described above was not considered satisfactory for youths. A simpler approach was adopted. For 16-19 year old boys the 1900-10 decline in the worker rate was assumed to be directly proportional to the increase in school attendance. On this basis the worker rate was estimated to have declined 5.3 percent, and since the worker rate derived from the Census report indicated an increase of 2.4 percent, the overcount is estimated to be 7.7 percent.

In the case of girls 16-19 it was assumed that the 1900-10 change in the worker rate was the same as that for 1890-1900, indicating an increase in the worker rate of 1 percent; that derived from Census reports was 7.64 percent.

No adjustment was made for women over 19 years of age. The estimated rise in the percentage of 10-15 year old boys and girls attending school was based on an adjustment of percentages for the age group 10-14 for 1900.<sup>21</sup>

<sup>20</sup> See the discussion below of a 1920 adjustment.

<sup>21</sup> Percentages for the age group 10-14 were obtained from the 1900 Census, *Population*, Part II, p. xciii.

The total adjustment, nearly 1,287,000, is between the Census estimate of less than 797,000 and Clarence Long's estimate of approximately 1,400,000.<sup>22</sup>

TABLE 14  
Estimate of Overcount in 1910

	Total	Ages 10-15		Ages 16-19	
		Male	Female	Male	Female
PERCENTAGE POINTS					
Change in worker rate, 1900-20		-14.8	-4.6	a	a
Change in school attendance, 1900-20		+12.2	+11.5	a	a
Change in school attendance, 1900-10		+8.7	+7.5	+5.3	a
Ratio of 1900-10 change to 1900-20 change		71.3 <sup>b</sup>	65.2 <sup>b</sup>		
Estimated change in worker rate, 1900-10		-10.6	-3.0	-5.3	+1.00
Reported change in worker rate, 1900-10		-1.3	+1.7	+2.4	+7.64
Estimated overstatement in worker rate, 1910		9.3	4.7	7.7	6.64
NUMBER					
Population, 1910		5,464,228	5,364,137	3,664,807	3,677,571
Estimated overcount, 1910	1,286,668	508,173	252,114	282,190	244,191

<sup>a</sup> Relative changes in school attendance in the ages above 15 were not taken to indicate changes in worker rates.

<sup>b</sup>Percentage, rather than percentage point, changes.

### *The Question of a 1920 Adjustment*

In this paper no adjustment is made for an undercount in the number of workers in 1920. It is believed that the number with agricultural occupations was not comparable with those for preceding years, but that a fair degree of comparability was established by shifting some of the enumerated workers to agriculture. The statistical evidence, after adjusting the 1910 data for an overcount, fails to support the view that an adjustment is needed for an undercount in 1920. Clarence Long is tentatively of this opinion, and will discuss the matter in his forthcoming book.

The Census Bureau adjustment to the total labor force for 1920

<sup>22</sup> See his 'Labor Force in Wartime America', NBER, *Occasional Paper 14*, March 1944, p. 40 and Table 2.

amounted to 819,000.<sup>23</sup> Most of it was for agriculture. The Census Bureau gives two reasons: first, many persons who participate in economic activity only part of the year do not participate during the season in which the 1920 Census was taken; second, Census enumerators were strictly instructed not to include women as farm workers unless they performed substantial activity on farms. These reasons seem to form a qualitative basis for adjustment but require quantitative support.

The need for an adjustment was supported by the statement that a considerable proportion of children living on farms neither worked nor attended school. 'Children', as the term is used by the Census Bureau with reference to the labor market, means boys and girls 10-15 years old. Comparison with other Census years cannot be made for the ratio of farm workers to the farm population. If, however, a much larger proportion of children on farms were neither in the labor market nor at school in 1920, the figures for the entire nation would be affected. The sum of the percentages of children attending school and reported as in the labor market in 1920 was 97; in 1900, 1910, and 1930, respectively, the sums were 95, 96 (as adjusted for an overcount of workers), and 99. If the Census adjustment for 1910 is included, the sum of percentages will be 100 for that year, even higher than in 1930. These figures do not support the view that there was an undercount of children in the labor market in 1920.

The Census Bureau presents various data in its discussion of the need for an adjustment for the ages 16 and over. Some of the data are given in the accompanying tabulation, which includes a few additional figures to round out some of the series.

Percentages	1900	1910	1920	1930
Women 16 & over in labor market	20.6	24.0	24.0	25.3 <sup>a</sup>
Women 16 & over in labor market, based on 1910 age composition			24.56	
Rural women 16-44 attached to agriculture		7.1	6.0	4.8 <sup>a</sup>
Rural women 45 & over attached to agriculture		5.6	5.9	4.9 <sup>a</sup>
Males 16 & over in labor market		91.0	89.9	88.0
Males 16-20 in labor market <sup>a</sup>	76.8	71.5	68.0	55.7

<sup>a</sup> Computed for this study. The 1900 percentage for males 16-20 was obtained from the 1900 Census (see Table 13).

<sup>23</sup> Edwards, pp. 138-40.

Edwards states that the proportion of young men 16-20 in the labor market is considerably smaller in 1920 than in 1910 (when the enumerated 1920 figure is used). However, he did not adjust the 1910 figure for an overcount. Had this adjustment been made, the decline would have been much smaller. The estimates in this study yield the following worker rates for males in these ages for 1900, 1910, 1920, and 1930, respectively: 76.8, 71.5, 68.0, 55.7. They do not indicate a considerably smaller worker rate in 1920 than in 1910.

Much of the discussion in Edwards' report hinges on how many workers would have been in the labor market had the 1910 percentages been applied in 1920. As may be seen from the tabulation, the addition of a few 1930 worker rates puts the 1920 figures in an altogether different perspective. In this setting the 1920 worker rate for women 16 and over (adjusted for age composition) merely reflects the long term trend of the increasing participation of women in economic activity. The 1920 percentage of rural women 16-44 in agriculture reflects the long continued drift of rural women to nonagricultural work, accelerated in 1917-20 by the strong demand for labor in cities. And the lower worker rate for youths 16-20 in 1920 also is an expression of tendencies that had continued since before 1900, mainly because of the lengthening period of school attendance.

#### 4 SUPPLEMENTARY TABLES AND NOTES

##### *Our Industrial Classification and the Standard*

The industry classification used in this study is given in terms of the Standard Industrial Classification of the Bureau of the Budget in Table 15. The table does not indicate all the Standard Industrial Classification industries included in each industry division. Many of the small components were omitted.<sup>24</sup>

##### *Occupations and Industries Utilized in Adjusting the 1910 and 1930 Data and Interpolating for the 1920 Estimates*

Table 16 shows the shifts in industries and occupations from the Census classification of 1930 required to set up the classification

<sup>24</sup> The author wishes to acknowledge the courtesy of the Census Bureau in supplying the 1930 classification for some of the small industries that were difficult to classify.



**TABLE 15**  
**Industrial Classification Used in This Paper in Terms of the Standard Industrial Classification**

Industry in This Paper	Components in Terms of Standard Industrial Classification
<b>AGRICULTURE</b>	
Agriculture	01 Commercial farms 02 Self-sufficiency farms 03 Part-time farms (when they are the major source of income of the operator) 04 Institutional farms 05 Farm homes (hired workers only) 06 Undetermined noncommercial farms (hired workers only) 07 Agricultural & similar service establishments (except 0711, Cotton ginning and compressing; 0712, Custom grist mills, incl. custom flour mills; 0741, Hunting & trapping as a business) 7019 ) 72 ) 86 ) Parts of, covering gardeners 97 ) 9282 Part of, covering boarding kennels
<b>FORESTRY AND FISHING</b>	
Forestry	081 Timber tracts 2411 Logging 083 Reforestation 085 Forestry services, n.e.c. (excl. part of 084, Turpentine farming & distilling)
Fishing	091 Fisheries 099 Fishery services, n.e.c.
<b>EXTRACTION OF MINERALS</b>	
Coal mining	12 Bituminous & other soft coal mining 11 Anthracite mining
Copper mining	102 Copper-ore mining
Gold & silver mining	104 Gold & silver ore mining
Iron mining	101 Iron-ore mining
Lead & zinc mining	103 Lead & zinc-ore mining
Quarrying & sand & gravel production	141 Dimension-stone quarries 142 Crushed-stone quarries (except limestone) 143 Crushed-limestone quarries 144 Sand & gravel quarries, pits & dredges 145 Clays and ceramic & refractory minerals
Oil wells & gas wells	146 Gypsum mining 13 Crude petroleum & natural gas production 1795 Dismantling steel oil tanks (contracting)
Other & not specified mining	1471 Rock-salt mining (excl. salt wells) 1481 Phosphate-rock mining 1482 Sulphur mining 1489 Minerals used as chemical raw material, n.e.c.

Industry in This Paper	Components in Terms of Standard Industrial Classification
<b>EXTRACTION OF MINERALS</b> <i>(concl.)</i> Other & not specified mining <i>(concl.)</i>	1499 Nonmetallic minerals, n.e.c. 1051 Aluminum-ore mining 1091 Mercury-ore mining 1092 Manganese-ore mining 1093 Chromium, molybdenum, tungsten, & vanadium ore mining
<b>CONSTRUCTION</b> Building construction	16 Construction: General contractors (except 164, marine construction; drainage projects; levees, gas mains, parts of 1631; & pipe lines, part of 1699) 17 Construction: Special trade contrac- tors (subcontractors) (except dis- mantling steel oil tanks [contract- ing]) 8799 Part of, covering sign painting shops & interior decorators (consulting services)
Construction & maintenance of streets & roads	162 Highway & street construction (ex- cept elevated highways) 1631 Part of, covering drainage project construction 7441 Part of, covering toll roads, sepa- rately operated 8321 Part of, covering sewer system opera- tion
<b>MANUFACTURING</b> Manufacturing	20-39 Manufacturing industries (except 2411, logging camps & logging con- tractors) 0711 Cotton ginning & compressing 0712 Part of, covering custom flour mills 084 Part of, covering turpentine farms & distilleries 1471 Part of, covering salt wells 4993 Bakeries with retail stores 8231 Power, steam 8321 Part of, covering garbage & sewage disposal plants 89 Misc. repair services & hand trades (except 891, blacksmith shops; 893, watch, clock, & jewelry re- pair; piano & organ tuning, part of 8951; tinsmithing, mattress ren- ovating & repair, & umbrella re- pair, parts of 8999) 9021 Part of, covering rental & repair of motion picture equipment 9272 Dental laboratories
Hand trades	The following small establishments specializing in their crafts: 891, blacksmithing; 893, watch, clock, & jewelry repair; piano & organ tuning, part of 8951; shoe making & cobbling, part of 8551; tinsmith- ing, part of 8991; 5131, millinery stores; & dressmakers, seamstresses (not in factories or stores)

TABLE 15 (cont.)

Industry in This Paper	Components in Terms of Standard Industrial Classification
<b>TRANSPORTATION AND PUBLIC UTILITIES</b>	
Express companies Steam railroads	1631 Part of, covering railway roadbed construction
	72 Railroads (except telegraphers & gardeners)
	805 Rental of railroad cars
Street railways	73 Street, suburban, & interurban rw. (incl. companies operating bus lines in conjunction with st. rw.)
Pipe lines	1631 Part of, covering contract pipe laying
	78 Pipeline transportation
Telephone & telegraph	1699 Part of, covering telephone line construction
	721 Part of, covering rr. telegraphers
	81 Communication (except 813, radio broadcasting & television & radio telegraph, part of 8121)
	8799 Part of, covering switchboard operation of PBX
Water transportation	1631 Part of, covering flood control projects, if levees
	164 Marine construction (dock construction, dredging, etc.)
	7221 Part of, covering car & other ferries operated by rr.
	76 Water transportation
	9149 Part of, covering yacht clubs, boat clubs, & boat hiring
Electric light & power	1699 Part of, covering transmission line construction
	821 Electric light & power
Gas works	1631 Part of, covering gas main construction
	822 Gas
<b>MISCELLANEOUS TRANSPORTATION AND COMMUNICATION</b>	
Air transportation	77 Air transportation
	9532 Part of, covering flying schools
Garages, greasing stations, auto laundries, & auto repair shops	88 Automobile repair services & garages (except 8811, automobile rentals without drivers)
Livery stables	7499 Part of, covering livery stables
Radio broadcasting & transmitting	76 Part of, covering radio telegraphers on ships
	8121 Part of, covering radio telegraph
	813 Radio broadcasting & television
Truck, transfer & cab companies	74 Highway passenger transportation (except operation of tollroads & highway bridges, part of 7411; school buses operated under contract, livery stables, & ambulance services, parts of 7499)
	8811 Automobile rentals without drivers
	75 Highway freight transportation
	79 Warehousing & storage
Warehouses & cold storage Other & not specified transportation	801 Forwarding
	802 Packing & crating
	8031 Part of, covering tourist agencies
	809 Services incidental to transportation, n.e.c.
	8799 Part of, covering messenger service other than telegraph or radio

Industry in This Paper	Components in Terms of Standard Industrial Classification
<b>TRADE</b>	
Advertising	871 Advertising
Wholesale & retail trade	40-61 Wholesale & retail trade (except 4993, bakeries with retail stores, and 56, eating & drinking places)
Grain elevators	8559 Part of, covering clothing rental
	8561 Part of, covering undertakers
	8741 Parts of, covering teachers' agencies, nurses' registries, private employment agencies
	8799 Parts of, covering window trimming service and auctioneers' establishments
	9199 Part of, covering amusement concessions
Other & not specified trade	7019 Part of, covering part of cemetery manpower
	707 Title-abstract companies
	8031 Parts of, covering arrangement of transportation & rate services
	8721 Parts of, covering consumer credit reporting bureaus, collecting agencies, addressographing services, adjustment & credit bureaus
	8731 Parts of, covering mimeograph services & public stenographers
	8799 Parts of, covering bottle exchanges & inspection, & sampling of commodities not connected with transportation
	9012 Part of, covering film exchanges
	9421 Parts of, covering accounting, auditing, & bookkeeping services, & certified public accounting
	9699 Parts of, covering farm granges & farm bureaus
<b>FINANCE, INSURANCE, AND REAL ESTATE</b>	
Banking & brokerage	62 Banking
	63 Credit agencies other than banks, long term
	64 Credit agencies other than banks, short term
	65 Investment trusts & companies & holding & investment-holding companies
	66 Security & commodity brokers, dealers, & exchanges
	67 Finance, n.e.c.
	8031 Part of, covering transportation brokers
Insurance	68 Insurance carriers
	69 Insurance agents, brokers, and service
Real estate	703 Lessors of real property
	704 Owners of real estate for improvement
	705 Trading for own account
	706 Agents, brokers, managers, etc.

TABLE 15 (concl.)

Industry in This Paper	Components in Terms of Standard Industrial Classification
<b>GOVERNMENT SERVICE</b> Public school system	7499 Part of, covering school buses operated under contract
	9511 Public schools
	9599 Part of, covering public school kindergartens
Postal service	97 Part of, covering postal service
Government service, n.e.c.	7511 Parts of, covering garbage collection & city ash collection
	831 Water services
	8431 Part of, covering auto courts, government owned
	8799 Part of, covering detective agencies
	9199 Part of, covering agricultural & county fairs
	97 Part of, covering government service, n.e.c., except gardeners
<b>PROFESSIONAL SERVICES AND AMUSEMENTS</b>	
Professional service	7499 Part of, covering ambulance service
	853 Photographic studios
	8541 Part of, covering barber schools
	8542 Part of, covering beauty schools
	8799 Parts of, covering translation services, fingerprint services, notaries public, statistical services, food research service, physical laboratories, personnel management, efficiency experts, photographic laboratories
Professional service	92 Medical & other health services (except 9272, dental laboratories; boarding kennels, part of 9282; midwives, part of 9299)
	93 Legal services
	94 Professional services, n.e.c. (except 942, accounting, auditing & book-keeping)
	95 Educational services (except 9511; public schools; & flying schools, part of 9532; public kindergartens, part of 9599)
	96 Nonprofit membership organizations (except farm bureaus & other farm associations)
Amusements	90 Motion picture production & theatres (except 9012, film distribution; rental & repair of motion picture equipment [part of 9021])
	91 Amusement & recreation except motion pictures (except theatrical scenery rental, part of 9121; boat clubs, boat hiring, & yacht clubs, parts of 9149; agricultural & county fairs, & amusement concessions, parts of 9199)

Industry in This Paper	Components in Terms of Standard Industrial Classification
<i>DOMESTIC AND PERSONAL SERVICE</i>	
Hotels, restaurants, boarding houses, etc.	56 Eating & drinking places 84 Hotels, rooming houses, camps, & other lodging places
Laundries	851 Laundries & laundry services
Cleaning, dyeing & pressing shops	852 Cleaning & dyeing (incl. rug cleaning) 8551 Part of, covering hat cleaning & blocking 857 Cleaning, pressing, altering & garment repairing 8999 Part of, covering mattress renovating & repairing
Domestic & personal service, n.e.c.	0741 Part of, covering hunting carried on as a business 701 Owner-operators of improved property 702 Lessee-operators of improved property 854 Barber & beauty shops 8551 Part of, covering shoe blacks 8591 Turkish baths & massage parlors 8599 Parts of, covering locker rental and porter services 86 Domestic service (except gardeners) 8751 Window cleaning 8752 Fumigating, termite control, disinfecting, extermination services 8759 Office cleaning or charring 8991 Part of, covering umbrella repair 9299 Part of, covering midwives

used in this paper. The modifications in the 1910 Census data appear in the middle column. The selected occupations for 1910-30, taken as the basis for the interpolation of industry estimates for 1920, appear in the last column.

Most of the items added or omitted in the 1910 column are occupations. Many items in the 1930 column are industry divisions. Industry groups for which no estimates were made in 1920 and no published data were available in 1910 are marked with a dagger: air transportation, radio broadcasting and transmitting, rayon factories, advertising agencies, and trade, not specified. Occupations or industry divisions for which estimating was important and that were added or omitted are marked with an asterisk. The methods of estimating are described below.

TABLE 16  
 Census Data Utilized in Preparing 1910, 1920, and 1930 Industry Estimates  
 Occupations and Industries Added to or Omitted from the 1910 and 1930 Census Industry Figures, and  
 Occupations Selected for the 1920 Interpolation

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Agriculture</i>		Added: Landscape gardeners Omitted: Turpentine farmers, turpentine farm foremen, managers, & laborers; forestry; fishermen & oystermen	Farmers, farm managers & foremen, farm laborers (wage earners & unpaid family farm workers)
<i>Forestry &amp; fishing</i> Forestry		Added: Forestry	Foresters, forest rangers, & timber cruisers; owners & managers of log & timber camps; lumbermen, raftsmen, & wood-choppers
Fishing		Added: Fishermen & oystermen	Fishermen & oystermen
<i>Extraction of minerals</i>		Omitted: Salt wells & works*	
Coal mines		Added: Surveyors; chemists, assayers, metallurgists; lawyers; agents n.e.c.	Operatives
Copper mines		Added: Surveyors; chemists, assayers, metallurgists; draftsmen; agents n.e.c.	Operatives
Gold & silver mines		Added: Surveyors; chemists, assayers, & metallurgists	Operatives
Iron mines		Added: Surveyors; chemists, assayers, metallurgists; agents n.e.c.; draftsmen	Operatives
Lead & zinc mines		Added: Surveyors; chemists, assayers, & metallurgists; draftsmen	Operatives

Quarries		Added: Surveyors; chemists, assayers, & metallurgists; draftsmen; agents n.e.c.; commercial travelers; credit men Added: Surveyors; chemists, assayers, metallurgists; draftsmen; lawyers; agents n.e.c.; commercial travelers; credit men	Operatives
Oil wells & gas wells			Operatives
Other & not specified mines		Added: Surveyors; chemists, assayers, metallurgists; lawyers; agents n.e.c.; commercial travelers	Operatives
<i>Construction</i>	Added: Building construction; construction & maintenance of streets & roads	Added: Building & hand trades; construction & maintenance of streets & roads	
Building construction		Added: Tinsmiths & sheet metal workers*; draftsmen; chauffeurs, truck & tractor drivers*; draymen & teamsters in building*; civil engineers & surveyors; chemists & metallurgists; credit men Omitted: Independent hand trades; general laborers in industry, n.s.*	Carpenters; builders & building contractors; operatives, building; carpenters' apprentices; plumbers' apprentices; plumbers, gas and steam fitters; brick & stone masons; painters, glaziers, varnishers in building construction; plasterers & cement finishers; roofers & slaters; sawyers; structural iron workers (building); paper hangers
Construction & maintenance of streets & roads		Added: Civil engineers and surveyors; chemists; agents, n.e.c.	Road & st. building & repairing laborers; foremen & overseers; 'other occupations'
<i>Manufacturing</i>	Omitted: Building construction; electric light & power plants; gas works	Omitted: Building & hand trades; electric light & power plants; gas works	



TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Manufacturing (concl.) Chemical &amp; allied industries Charcoal &amp; coke works</i>	Added: Salt works & wells*	Added: salt works & wells* Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers Added: Chemists, civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men Added: Chemists; agents n.e.c.; commercial travelers, credit men	Operatives; laborers
Explosives, ammunition, etc.			Operatives; laborers
Fertilizer factories			Operatives; laborers
Paint & varnish factories		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Petroleum refineries		Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Rayon factories Soap factories		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	† Operatives; laborers
Other chemical factories		Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
<i>Cigar &amp; tobacco</i>		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers

*Clay, glass & stone industries*  
Brick, tile & terra-cotta

Glass factories

Lime, cement & artificial stone

Marble & stone yards

Potteries

97

*Clothing industries*  
Corset factories

Glove factories

Hat factories (felt)

Shirts, collars, & cuffs

Suit, coat, & overall

Other clothing factories

Added: Chemists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men  
Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c.; commercial travelers; credit men

Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers; credit men

Added: Chemists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men  
Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers; credit men

Added: Agents n.e.c.; commercial travelers; credit men

Added: Agents n.e.c.; commercial travelers; credit men

Added: Chemists; agents n.e.c.; commercial travelers; credit men

Added: Agents n.e.c.; commercial travelers; credit men

Added: Draftsmen; agents n.e.c.; commercial travelers; credit men

Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men

Operatives; laborers

Operatives; laborers, glass blowers

Operatives; laborers

Stonecutters; operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers; tailors & tailoresses

Operatives; laborers

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Food &amp; allied industries</i> Bakeries		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers; bakers
Butter, cheese, & condensed milk		Added: Chemists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Candy factories		Added: Chemists; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Fish curing & packing		Added: Agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Flour & grain mills		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers; millers
Fruit & vegetable canning		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Slaughtering & meat packing		Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Sugar factories & refineries		Added: Chemists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Other food factories		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers
Liquor & beverage industries		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers

<p><i>Iron &amp; steel industries, etc.</i> Agricultural implements</p>	<p>Omitted: Automobile repair shops*</p>	<p>Added: Chemists; civil engineers &amp; surveyors; lawyers; agents n.e.c; commercial travelers; credit men Added: Chemists, assayers, &amp; metallurgists; civil engineers &amp; surveyors; lawyers; agents n.e.c; commercial travelers; credit men</p>	<p>Operatives; laborers</p>
<p>Automobile factories</p>		<p>Added: Chemists, assayers, &amp; metallurgists; civil engineers &amp; surveyors; lawyers; agents n.e.c; commercial travelers; credit men</p>	<p>Operatives; laborers</p>
<p>Blast furnaces &amp; steel rolling mills (incl. tin-plate mills)</p>		<p>Added: Chemists, assayers, &amp; metallurgists; civil engineers &amp; surveyors; agents n.e.c; commercial travelers</p>	<p>Operatives; laborers, heaters; puddlers</p>
<p>Railroad car mfg.</p>	<p>Omitted: Steam &amp; st. rw. car repair workers*</p>	<p>Added: Chemists; assayers, &amp; metallurgists; civil engineers &amp; surveyors; agents n.e.c; commercial travelers Omitted: Steam &amp; st. rw. car repair workers*</p>	<p>Operatives; laborers</p>
<p>Ship &amp; boat building</p>		<p>Added: Chemists; assayers, &amp; metallurgists; civil engineers &amp; surveyors; agents n.e.c; commercial travelers</p>	<p>Operatives; laborers</p>
<p>Wagon &amp; carriage factories Other iron &amp; steel &amp; machinery</p>		<p>Added: Commercial travelers Added: Chemists, assayers, &amp; metallurgists; civil engineers &amp; surveyors; lawyers; agents n.e.c; commercial travelers; credit men; auto repair shop workers*</p>	<p>Operatives; laborers Operatives; laborers; iron molders, founders, &amp; casters</p>
<p>Not specified metal industries</p>		<p>Omitted: Auto repair shops Added: Chemists, assayers, &amp; metallurgists; civil engineers and surveyors; agents n.e.c; commercial travelers; credit men</p>	<p>Operatives; laborers</p>

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Metal industries (except iron &amp; steel)</i>			
Brass mills		Added: Chemists, assayers, & metallurgists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers; molders, founders & casters
Clock & watch factories		Added: Chemists, assayers & metallurgists; civil engineers & surveyors; agents n.e.c.; commercial travelers	Operatives; laborers
Copper factories		Added: Chemists, assayers & metallurgists; civil engineers & surveyors; agents n.e.c.; commercial travelers	Operatives; laborers
Gold & silver factories		Added: Chemists, assayers, & metallurgists; draftsmen; agents n.e.c.; commercial travelers; credit men	Operatives; laborers; gold & silversmiths
Jewelry factories		Added: Chemists; draftsmen; agents n.e.c.; commercial travelers; credit men	Jewelers & lapidaries; operatives; laborers
Lead & zinc factories		Added: Chemists, assayers, & metallurgists; civil engineers & commercial travelers; credit men	Operatives; laborers
Tinware, enamelware, etc.		Added: Chemists, assayers, & metallurgists; civil engineers & surveyors; lawyers; agents n.e.c.; commercial travelers; credit men Omitted: Tinsmiths & sheet metal workers for the building industry*	Operatives; laborers
Other metal factories		Added: Chemists, assayers, & metallurgists; civil engineers & surveyors; agents n.e.c.; commercial travelers; credit men	Operatives; laborers

*Leather industries*  
Harness & saddle factories  
Leather belt, leather goods, etc.

Shoe factories

Tanneries

Trunk, suitcase, & bag

*Lumber & furniture industries*  
Furniture factories

Piano & organ

Saw & planing mills (incl. wood  
box factories)

Other woodworking factories

*Paper & printing & allied industries*  
Blank book, envelope, tag, bag,  
etc.

Paper & pulp mills

Paper box factories

Added: Commercial travelers  
Added: Chemists; draftsmen;  
agents n.e.c.; commercial trav-  
elers; credit men  
Added: Chemists; lawyers; a-  
gents n.e.c.; commercial trav-  
elers; credit men  
Added: Chemists; agents n.e.c.;  
commercial travelers; credit  
men  
Added: Agents n.e.c.; commercial  
travelers

Added: Chemists; civil engineers  
& surveyors; agents n.e.c.;  
commercial travelers; credit  
men

Added: Agents n.e.c.; commer-  
cial travelers; credit men  
Added: Chemists; civil engineers  
& surveyors; lawyers; agents  
n.e.c.; commercial travelers;  
credit men

Added: Chemists; civil engineers  
& surveyors; agents n.e.c.;  
commercial travelers; credit  
men

Added: Chemists; agents n.e.c.;  
commercial travelers; credit  
men

Added: Chemists; civil engineers  
& surveyors; agents n.e.c.; com-  
mercial travelers; credit men  
Added: Chemists; draftsmen;  
agents n.e.c.; commercial trav-  
elers

Operatives; laborers  
Operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers

Cabinet makers; operatives; la-  
borers; upholsterers

Operatives; laborers

Operatives; laborers

Coopers; operatives; laborers

Operatives; laborers

Operatives; laborers

Operatives; laborers

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Paper &amp; printing &amp; allied industries</i> (concl.) Printing, publishing & engraving	Added: Editors & reporters	Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c; commercial travelers; credit men; editors & reporters	Compositors; linotypers; electrotypers; lithographers; operatives; laborers; apprentices; pressmen; editors & reporters
<i>Textile industries</i> Carpet mills		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Cotton mills		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Hemp, jute, & linen mills		Added: Agents n.e.c; commercial travelers	Operatives; laborers
Knitting mills		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Lace & embroidery mills		Added: Draftsmen; commercial travelers	Operatives; laborers
Rope & cordage factories		Added: Chemists; draftsmen; agents n.e.c; credit men	Operatives; laborers
Sail, awning & tent factories		Added: Agents n.e.c; commercial travelers	Operatives; laborers
Silk mills		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Textile dyeing, finishing, & printing mills		Added: Chemists; draftsmen; agents n.e.c; commercial travelers	Dyers; operatives, laborers
Woolen & worsted mills		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers

<p>Other &amp; not specified textile mills</p> <p><i>Miscellaneous industries manufacturing</i></p> <p>Electrical machinery &amp; supply factories</p> <p>Rubber factories</p> <p>Broom &amp; brush factories</p> <p>Button factories</p> <p>Straw factories</p> <p>Turpentine farms &amp; distilleries</p> <p>Other misc. mfg. industries</p> <p>Other not specified mfg. industries</p> <p><i>Independent hand trades</i></p>	<p>Added: Chemists; civil engineers &amp; surveyors; agents n.e.c.; commercial travelers; credit men</p> <p>Added: Chemists; civil engineers &amp; surveyors; lawyers; agents n.e.c.; commercial travelers; credit men</p> <p>Added: Chemists; civil engineers &amp; surveyors; lawyers; agents n.e.c.; commercial travelers; credit men</p> <p>Added: Draftsmen; agents n.e.c.; commercial travelers</p> <p>Added: Chemists; commercial travelers</p> <p>Added: Chemists; agents n.e.c.</p> <p>Added: Chemists; civil engineers &amp; surveyors; lawyers; agents n.e.c.; commercial travelers; credit men</p> <p>Added: Chemists; civil engineers &amp; surveyors; lawyers; agents n.e.c.; commercial travelers; credit men</p> <p>Added: Blacksmiths, blacksmith helpers &amp; apprentices, dressmakers (not in factory), dressmaker apprentices, jewelers (not dealers), milliners and millinery dealers, milliner apprentices, piano &amp; organ tuners (not in factory), seamstresses (not in factory), shoemakers (not in factory), blanket weavers (not in factory), carpet weavers (not in factory)</p>	<p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Operatives; laborers</p> <p>Dressmakers &amp; seamstresses (not in factory); jewelry &amp; watchmakers (not in factory); shoemakers (not in factory); piano &amp; organ tuners (not in factory)</p>
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TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Transportation &amp; public utilities</i>	<p>Added: Electric light &amp; power; gas works</p> <p>Omitted: Construction &amp; maintenance of streets &amp; roads; postal service; garages, greasing stations, &amp; auto laundries; truck, transfer, &amp; cab companies; air transportation; livery stables; radio transmitting &amp; broadcasting; other transportation &amp; communication</p>	<p>Added: Electric light &amp; power; gas works</p> <p>Omitted: Construction &amp; maintenance of streets &amp; roads; postal service; garages, greasing stations, &amp; auto laundries; truck, transfer, &amp; cab companies; livery stables; other transportation &amp; communication</p>	
Pipe lines Steam railroads	<p>Added: Part of car &amp; rr. shop workers*</p>	<p>Added: Part of car &amp; rr. shop workers*</p>	<p><b>Laborers</b> Locomotive engineers; firemen; baggagemen &amp; freight agents; boilerwashers &amp; engine hostlers; brakemen; laborers; conductors; foremen &amp; overseers; motormen; officials &amp; superintendents; switchmen &amp; flagmen; yardmen; inspectors; porters; 'other occupations', Agents; messengers; laborers</p>
Express companies Street railways	<p>Added: Part of car &amp; rr. shop workers*</p>	<p>Added: Civil engineers &amp; surveyors; part of car &amp; rr. shop workers*</p>	<p>Conductors; foremen &amp; overseers; laborers; motormen; officials &amp; superintendents; switchmen &amp; flagmen; inspectors; 'other occupations', Proprietors, managers, &amp; officials; inspectors; foremen &amp; overseers; linemen; messengers; operators, laborers</p>
Telegraph & telephone		<p>Added: Chemists; civil engineers; commercial travelers; credit men</p>	

<p>Water transportation</p> <p>Electric light &amp; power plants</p> <p>Gas works</p>		<p>Added: Civil engineers; credit men</p> <p>Added: Chemical engineers; chemists; civil engineers &amp; surveyors; lawyers; commercial travelers</p> <p>Added: Chemical engineers; chemists; civil engineers &amp; surveyors; lawyers; commercial travelers</p>	<p>Boatmen, canalmen, &amp; lock keepers; captains, masters, mates, &amp; pilots; longshoremen &amp; stevedores; sailors &amp; deckhands; laborers</p> <p>Operatives; laborers</p>
<p><i>Misc. transportation &amp; communication</i></p>	<p>Added: Air transportation; auto repair shops; garages, greasing stations, &amp; auto laundries; livery stables; radio broadcasting; truck, transfer, &amp; cab companies; stockyards; warehouses &amp; cold storage; other &amp; not specified transportation</p>	<p>Added: Air transportation; auto repair shops; garages, greasing stations, &amp; auto laundries; livery stables; radio broadcasting; truck, transfer, &amp; cab companies; stockyards; warehouse &amp; cold storage; other &amp; not specified transportation</p>	<p>Operatives; laborers</p> <p>Owners, managers, &amp; officials; laborers</p> <p>Hostlers &amp; stable hands</p>
<p>Air transportation</p> <p>Auto repair shops</p> <p>Garages, greasing stations, &amp; auto laundries</p> <p>Livery stables</p> <p>Radio broadcasting &amp; transmitting</p> <p>Truck, transfer, &amp; cab companies</p>	<p>Omitted: School bus drivers*</p>	<p>Added: Auto repair shops*</p> <p>Added: Garages, greasing stations, &amp; auto laundries</p> <p>Added: Credit men</p> <p>Omitted: Chauffeurs, truck, and tractor drivers in building industry; * garage owners &amp; managers; garage laborers, other garage workers</p>	<p>† Owners &amp; managers, truck, transfer, &amp; cab companies; chauffeurs, truck, &amp; tractor drivers; draymen &amp; teamsters, &amp; expressmen</p>

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<i>Misc. transportation &amp; communication</i> (concl.)			
Stockyards		Added: Agents n.e.c.	Laborers
Warehouses & cold storage		Added: Agents n.e.c.; civil engineers & surveyors; credit men	Proprietors, managers, & officials; laborers
Other & not specified transportation			Foremen & overseers; inspectors; laborers; proprietors, managers, & officials; 'other occupations'
<i>Trade</i>	Omitted: Stockyards; warehouses & cold storage	Omitted: Stockyards; warehouses & cold storage; occupations in not specified industries & service groups	† Proprietors; laborers
Advertising agencies		Added: Agents n.e.c.	
Grain elevators		Added: Lawyers; civil engineers & surveyors; chemists	Retail dealers, managers, & superintendents; laborers, helpers, & porters; floorwalkers & foremen; deliverymen; wholesale dealers, importers, etc.; clerks in stores, salespeople; fruit & vegetable graders; meat cutters; decorators; drapers, & window dressers; employment office keepers; undertakers
Wholesale & retail trade		Omitted: Agents n.e.c. for other industries; credit men in other industries; commercial travelers in other industries	†
Trade not specified		(the residue)	
<i>Finance, insurance, &amp; real estate</i>		Added: Lawyers; civil engineers & surveyors; commercial travelers; agents n.e.c.; credit men	Bankers, brokers, & money lenders
Banking & brokerage		Added: Commercial travelers; credit men; civil engineers & surveyors; lawyers	Agents, managers, & officials
Insurance			

<p>Real estate</p> <p><i>Government Service</i></p> <p>Public school system</p> <p>Postal service</p> <p>Government service n.e.c.</p>	<p>Added: Public school teachers*, nurses*, clerks*, janitors*</p> <p>Added: Public school teachers*, nurses*, clerks*, janitors*</p> <p>Added: Judges; agents n.e.c.; chemists, assayers, &amp; metallurgists</p>	<p>Agents &amp; officials</p> <p>Public school teachers*, nurses*, clerks*, janitors*</p> <p>Postmasters; mail carriers</p> <p>Firemen (fire department); guards, watchmen, &amp; doorkeepers; laborers in public service; marshals, sheriffs, &amp; detectives; policemen; soldiers, sailors, &amp; marines; officials &amp; inspectors (city &amp; county); officials &amp; inspectors (states &amp; U.S.); other public service pursuits</p>
<p><i>Professional service (incl. recreation &amp; amusements)</i></p> <p>Professional service</p>	<p>Added: Agents n.e.c.; commercial travelers; credit men</p> <p>Omitted: Judges; part of lawyers; editors, reporters, &amp; journalists; teachers in public schools*; public school nurses*; public school clerks*; part of chemists, assayers, &amp; metallurgists; part of civil engineers &amp; surveyors; part of draftsmen; landscape gardeners; actors &amp; showmen; keepers of pleasure resorts, race tracks, etc.; theatrical owners, managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusements</p>	<p>Architects; artists, sculptors, &amp; art teachers; authors; cler-gymen; college presidents &amp; professors; technical engineers; dentists; lawyers, judges, &amp; justices; osteopaths; photographers; physicians &amp; surgeons; teachers (athletics, dancing, etc.); trained nurses; veterinary surgeons; librarians; abstractors; notaries &amp; justices of the peace; healers; keepers of charitable &amp; penal institutions; officials of lodges, societies, etc.; religious workers; dentists' assistants &amp; attendants; librarians' assistants &amp; surgeons' assistants</p>

TABLE 16 (concl.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910-30 used for 1920 interpolation
	1930	1910	
<p><i>Professional service (incl. recreation &amp; amusements) (concl.)</i>                      Recreation &amp; amusements</p>	<p>Added: Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers of pleasure resorts, etc.; theatrical owners, managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement &amp; amusements; attendants, billiard, bowling, dancing establishments</p> <p>Added: Chemists; civil engineers &amp; surveyors; agents n.e.c.; credit men</p> <p>Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers</p> <p>Added: Civil engineers &amp; surveyors; commercial travelers; chemists</p> <p>Added: Cleaning, dyeing, &amp; pressing shops</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>
<p><i>Domestic &amp; personal service</i></p>	<p>Added: Civil engineers &amp; surveyors; agents n.e.c.; credit men</p> <p>Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers</p> <p>Added: Civil engineers &amp; surveyors; commercial travelers; chemists</p> <p>Added: Cleaning, dyeing, &amp; pressing shops</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>
<p>Laundries</p>	<p>Added: Civil engineers &amp; surveyors; agents n.e.c.; credit men</p> <p>Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers</p> <p>Added: Civil engineers &amp; surveyors; commercial travelers; chemists</p> <p>Added: Cleaning, dyeing, &amp; pressing shops</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>
<p>Cleaning, dyeing, &amp; pressing shops</p>	<p>Added: Civil engineers &amp; surveyors; agents n.e.c.; credit men</p> <p>Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers</p> <p>Added: Civil engineers &amp; surveyors; commercial travelers; chemists</p> <p>Added: Cleaning, dyeing, &amp; pressing shops</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>
<p>Hotels, lodging houses, &amp; eating &amp; drinking places</p>	<p>Added: Civil engineers &amp; surveyors; agents n.e.c.; credit men</p> <p>Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers</p> <p>Added: Civil engineers &amp; surveyors; commercial travelers; chemists</p> <p>Added: Cleaning, dyeing, &amp; pressing shops</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>	<p>Musicians &amp; music teachers; actors &amp; showmen; billiard room, dance hall, skating rink, etc.; keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, &amp; officials; stage hands &amp; circus helpers; theatre ushers; laborers, recreation &amp; amusement; attendants, billiard, bowling, dancing establishments</p>

<p><i>Other domestic &amp; personal service</i> Barbers, beauticians, &amp; manicurists Domestic service (private family)</p>			<p>Barbers, hairdressers, &amp; manicurists Housekeepers &amp; stewards; cooks; laundresses &amp; launderers; chauffeurs; other servants; waiters; nurses (not trained)<sup>a</sup> Charwomen &amp; cleaners; elevator tenders; janitors &amp; sextons; porters<sup>b</sup></p>
<p>Apartment house &amp; office building maintenance<sup>b</sup></p>			
<p><i>Domestic &amp; personal service n.e.c.</i></p>	<p>(the residue)</p>	<p>(the residue)</p>	

\* See accompanying text.

<sup>a</sup> Includes all persons in these occupations not allocated to any other industry. See note b for method of estimating the industry total for 1920.

<sup>b</sup> The workers in selected occupations appearing in domestic and personal services n.e.c. in the 1930 Census, *Population, V, Chapter 7, Table 2, p. 412*, were assumed to represent the total attached to apartment house and office building maintenance. Figures for 1920 were estimated by applying the 1930 percentage of workers with the characteristic occupations in the industry to the corresponding 1920 figures.  
n.e.c.: not elsewhere classified.

Salt wells and works: based on employment reported in the Census of Manufactures plus an allowance of 5 percent for unemployment.

Tinsmith and sheet metal workers in building construction: based on the 1930 percentage of all tinsmiths in building construction.

Chauffeurs, truck and tractor drivers for building construction, and draymen and teamsters for building construction: based on the 1930 percentage of workers with these occupations in building construction.

Laborers in industry not specified: the difference between 'laborers (building and not specified)' and building laborers, estimated by applying the 1930 building industry ratio of laborers to workers with characteristic occupations.

Automobile repair shops: based on the changes estimated for garages, greasing stations, and auto laundries.

Steam railroad and street railway car repair workers: the difference between the Census figure for 'car and railroad shops' and the employed plus unemployed car manufacturing workers. Employment was estimated on the basis of Census of Manufactures and BLS indexes of employment; unemployment was assumed to be 5 percent. The residual was prorated to steam railroads and street railways. These steam railroad and street railway car repair shop workers were added to the respective Census figures for their industries.

School bus drivers: estimated for 1930 by multiplying the number of proprietors and employees per bus (*Census of Business, 1935, Motor Bus Transportation*, p. 72) by the number of school buses in 1930 (*Bus Transportation*, Feb. 1931, Vol. 10, No. 2, p. 66).

Public school teachers: estimated by applying to the Census figure for school teachers the percentage that public school teachers were of all school teachers reported by the U. S. Office of Education (see its *Statistical Summary of Education, 1931-32*, Table 5).

Public school nurses, clerks, and janitors: based on the ratio of the number in each occupation to the population in each of five groups of cities classified by size, and arbitrarily assumed ratios for rural areas at one-half the ratios for cities of 2,500-5,000. The ratios were obtained from data in the National Education Association, *Research Bulletin IX*, 3, 1931.

Recreation and amusements: estimated for 1910 and 1920 by applying the 1930 ratio of the total for the industry to the characteristic occupations (minus musicians and music teachers) and adding musicians and music teachers.

*Ratios of Specified Occupations to Total, 1910 and 1930*

Table 17 reveals the stability of the ratios of workers with selected occupations to the total for the respective major groups of industries for 1910 and 1930, used for estimating the manpower for each industry group in 1920. Of course, the closer the ratio is to 1.00, the less the estimation involved. For the nonagricultural industries the ratios for 1910 were computed before an overcount of unpaid family workers, a very small fraction of each industry, had been adjusted for.

The source of the data, unless otherwise noted, is the Census of Population. The items added or omitted are for 1930 with respect to the data in Volume V, Chapter 7, Table 2; for 1910, with respect to the data in Volume IV, Table VI. The selected occupations for 1910-30 are from the 1930 report, Volume V, Chapter 2, Table 3.

*Miscellaneous Personal Services, 1930*

The industries and the characteristic occupations to which they were related for estimating the manpower for miscellaneous personal services in 1930 comparable with the 1910 figure are given in Table 18. The 1940 ratios of the number attached to the industry and the number of workers with characteristic occupations are given in the last column.

*Characteristic Occupations, 1870-1900*

The characteristic occupations used as the basis for the extrapolated estimates for each industry division 1870-1900 are listed below. The data for 1870-1900, unless otherwise specified, are from the 1900 Census, *Special Report on Occupations*, Table III, p. xxxii. The 1870 figures are adjusted for an undercount in thirteen southern states, based on, or as given in, *Comparative Occupation Statistics*, Table 8. The 1910 figures, unless otherwise noted, are also from the latter source. In the description of sources, all references to the 1910 Census are to Population, Volume IV, *Occupations*.



TABLE 17

Ratio of the Number of Persons included in the 1920 Interpolation to the Total Number, 1910 and 1930

	1910	1930
Agriculture	.999	.999
<i>Forestry &amp; fishing</i>		
Fishing	*	.99
Forestry	.97	.91
<i>Mining</i>		
Coal mines	.92	.90
Gold & silver mines	.86	.82
Copper mines	.86	.78
Quarries	.86	.66
Iron mines	.86	.76
Lead & zinc mines	.82	.79
Other & not specified mines	.66	.71
Oil wells & gas wells	.46	.53
<i>Construction industry</i>		
Building construction & 'other' engineering construction	*	.78
Construction & maintenance of streets & roads	.78	.71
<i>Manufacturing industries &amp; independent hand trades</i>		
Chemical & allied industries		
Fertilizer factories	.72	.70
Explosive, ammunition, etc. factories	.69	.56
Soap factories	.55	.44
Other chemical factories	.50	.41
Charcoal & coke works	.51	.54
Paint & varnish factories	.45	.39
Petroleum refineries	.40	.38
Cigar & tobacco factories	.85	.83
Clay, glass & stone industry		
Glass factories	.87	.74
Potteries	.86	.80
Brick, tile & terra-cotta	.80	.74
Marble & stone yards	.78	.77
Lime, cement, & artificial stone	.68	.60
Clothing industries		
Suit, coat & overall	.90	.89
Shirts, collars, & cuffs	.89	.87
Glove factories	.89	.86
Other clothing factories	.85	.82
Hat factories (felt)	.85	.79
Corset factories	.85	.74
Food & allied industries		
Fish curing & packing	.84	.80
Candy	.77	.70
Bakeries	.66	.64
Slaughtering & meat packing	.66	.58
Flour & grain mills	.65	.58
Fruit & vegetable canning	.62	.68
Sugar factories & refineries	.63	.56
Other food factories	.60	.49
Butter, cheese & condensed milk	.58	.49
Liquors & beverages	.49	.39

	1910	1930
Iron & steel, machinery, & vehicle industries		
Blast furnaces & steel rolling mills, incl. tin plate mills	.68	.58
Other iron & steel & machinery factories	.56	.40
Agricultural implements	.41	.37
Wagon & carriage factories	.42	.46
Ship & boat building	.39	.40
Automobile factories	.34	.45
Not specified metal factories	.31	.47
Metal industries (except iron & steel)		
Clock & watch factories	.67	.66
Gold & silver factories	.64	.58
Brass mills	.63	.51
Copper factories	.61	.52
Jewelry factories	.59	.56
Lead & zinc factories	.58	.54
Other metal factories	.50	.52
Tinware, enamel ware, etc.	.34	.45
Leather industries		
Shoe factories	.87	.84
Tanneries	.85	.78
Trunk, suitcase, & bag	.77	.69
Leather belt & leather goods	.73	.69
Harness & saddle factories	.72	.84
Lumber & furniture industries		
Furniture factories	.81	.84
Other woodworking factories	.80	.71
Saw & planing mills	.67	.68
Piano & organ factories	.62	.54
Paper & printing & allied industries		
Paper box factories	.83	.68
Paper & pulp mills	.74	.59
Printing, publishing, & engraving	.69	.63
Blank book, envelope, tag, bag, etc.	.59	.54
Textile industries		
Carpet mills	1.02	.75
Textile dyeing, finishing, & printing mills	.94	.95
Other & not specified textile mills	.91	.69
Cotton mills	.89	.85
Knitting mills	.88	.82
Silk mills	.86	.80
Woolen & worsted mills	.85	.80
Hemp, jute, & linen mills	.83	.68
Rope & cordage factories	.81	.71
Sail, awning & tent factories	.65	.60
Lace & embroidery mills	.66	.73
Electrical machinery & supply factories	.39	.40
Rubber factories	.75	.66
Miscellaneous manufacturing industries		
Turpentine farms & distilleries	.91	.90
Straw factories	.88	.86
Button factories	.83	.77
Broom & brush factories	.75	.64
Other miscellaneous manufacturing industries	.65	.54
Other and not specified manufacturing industries	.47	.87
Independent hand trades	.63	.75

TABLE 17 (concl.)

	1910	1930
Transportation & public utilities		
Telegraph & telephone	.86	.80
Street railroads	.83	.72
Pipe lines	.74	.55
Steam railroads	.70	.64
Water transportation	.69	.60
Gas works	.41	.37
Express companies	.29	.31
Electric light & power plants	.24	.29
Miscellaneous transportation services		
Other & not specified transportation	*	*
Truck, transfer & cab companies	.98	.83
Livery stables	.46	.69
Stockyards	.72	.49
Warehouses & cold storage	.54	.44
Trade		
Wholesale & retail trade	.84	.81
Grain elevators	.69	.60
Finance		
Real estate	.82	.83
Insurance	.63	.56
Banking & brokerage	.50	.35
Professional service	.92	.75
Government		
Government, n.e.c.	.80	.82
Postal service	.64	.55
Domestic & personal service		
Laundries	.84	.79
Domestic & personal service, except laundries & cleaning & dyeing	.88	.95

\* The Census report for this industry not sufficiently complete for computing the ratio.

TABLE 18

Industry and Characteristic Occupation in 1930 and the Ratio of the Former to the Latter in 1940

Industry, 1930	Occupation, 1930	Ratio 1940
Photographic studios & commercial photography	Photographers	0.97
Funeral services & crematories	Funeral directors & embalmers	1.46
Barber shops & beauty parlors	Barbers, beauticians, & manicurists	1.02
Shoe repair shops	Shoemakers & repairs not in factory	1.17
Shoe shine establishments	Shoe blacks	0.80

The table number alone is cited. Occupations that were estimated are marked with an asterisk.<sup>25</sup> Notes on most of the estimates follow the listing.

AGRICULTURE	Painters, glaziers, & varnishers
Agricultural laborers*	Paper hangers
Dairymen & dairywomen	Plasterers
Farmers, planters, & overseers	Plumbers, gas & steam fitters
Gardeners, florists, nurserymen, etc.*	Roofers & slaters
Stock raisers, herders, & drovers	Builders & contractors
Other agricultural pursuits	Apprentices not included with tradesmen*
FORESTRY AND FISHING	MANUFACTURING INDUSTRIES AND
Fishermen & oystermen	INDEPENDENT HAND TRADES
Lumbermen & raftsmen	Candle, soap, & tallowmakers
Wood choppers	Oil refinery operatives
EXTRACTION OF MINERALS	Salt works employees
Miners & quarrymen	Other chemical workers
Oil well employees	Brick & tile makers
Officials of mining & quarrying companies	Glasswork operatives
CONSTRUCTION	Marble & stone cutters
Carpenters & joiners	Potters
Masons (brick & stone)	Bakers
	Butter & cheese makers

<sup>25</sup> When estimates were necessary, those of Edwards (pp. 137-56), were used if possible. However, we made estimates if we felt they might be substantially better. For example, Edwards estimated the number of firemen (fire department) on the assumption that the number in 1890 was 25 percent of the number in 1900, and the figures for 1880 and 1870 were each 25 percent of that 10 years later. By this approach the estimate of firemen in 1870 is only 227 (p. 150), just about the number of paid firemen in Chicago alone. Other estimates were prepared for this study.

Estimating the number of attendants for billiard parlors, bowling alleys, dance halls, etc. 1870-1900 by assuming a 50 percent increase in each decade, 1870-1930, Edwards got figures exceeding the number of 'keepers' of such establishments (p. 151). In 1930 there were only about half as many attendants as 'keepers'. Since establishments tend to become larger, estimates yielding a higher ratio of attendants to keepers in the earlier years could not be accepted.

Edwards estimated the number of letter carriers on the assumption that the percentage of clerks and copyists who were mail carriers in 1900 applied also to 1870, 1880, and 1890, getting a 210 percent increase from 1870 to 1890. A series based upon figures from the annual reports of the Postmaster General indicates an increase of 290 percent. Also, Edwards uses the 1900 figure as reported in the Census, which the Postmaster General reports indicate is only about 60 percent as large as it should be. The 1870-1900 and 1900-10 increases indicated are correspondingly affected. We made estimates for this and other occupations.

Confectioners  
 Millers  
 Other food preparers  
 Bottlers & soda water makers  
 Brewers & maltsters  
 Distillers & rectifiers  
 Tobacco & cigar factory operatives  
 Iron & steel workers  
 Stove, furnace, & grate makers  
 Tool & cutlery makers  
 Wheelwrights  
 Wiremakers & workers  
 Machinists  
 Steam boiler makers  
 Brassworkers  
 Clock & watch makers & repairers  
 Gold & silver workers  
 Tinsplate & tinware makers  
 Other metal workers  
 Boot & shoemakers & repairers  
 Harness & saddle makers  
 Leather carriers, dressers, finishers & tanners  
 Trunk & leather case makers, etc.  
 Cabinet makers  
 Coopers  
 Saw & planing mill employees  
 Other woodworkers  
 Paper & pulp mill operatives  
 Boxmakers (paper)  
 Engravers  
 Bookbinders & finishers  
 Printers, lithographers, & pressmen, etc.  
 Editors & reporters  
 Bleachers, dyers, & scourers  
 Print works operatives  
 Carpet factory operatives  
 Cotton mill operatives  
 Hosiery & knitting mill operatives  
 Silk mill operatives  
 Woolen mill operatives  
 Worsted mill operatives\*  
 Other textile mill operatives  
 Dressmakers  
 Seamstresses  
 Hat & cap makers  
 Milliners

Shirt, collar, & cuff makers  
 Tailors & tailoresses  
 Other textile workers  
 Broom & brush makers  
 Charcoal, coke & lime burners  
 Glovemakers  
 Manufacturers & officials\*  
 Publishers of books, maps, & newspapers\*  
 Model & pattern makers  
 Rubber factory operatives  
 Turpentine farmers & laborers\*  
 Upholsterers  
 Other misc. industries\*

## TRADE

Commercial travelers  
 Merchants & dealers (except wholesale)  
 Merchants & dealers (wholesale)  
 Meat cutters  
 Undertakers  
 Auctioneers  
 Newspaper carriers & newsboys  
 Salesmen and saleswomen  
 Clerks in stores\*  
 Bookkeepers & accountants in stores\*

## FINANCE, INSURANCE, &amp; REAL ESTATE

Bankers & brokers  
 Bank officials\*  
 Insurance company officials\*  
 Insurance agents and collectors\*  
 Real estate officials, collectors & agents\*

## TRANSPORTATION &amp; PUBLIC UTILITIES

Boatmen & sailors  
 Steam rr. employees  
 Street rw. employees  
 Telegraph & telephone linemen  
 Telegraph & telephone operators  
 Electric light & power company employees  
 Gas works employees

## MISC. TRANSPORTATION &amp; COMMUNICATION

Livery stable keepers  
 Hostlers

## GOVERNMENT SERVICE

Firemen (fire department)\*  
 Policemen and detectives\*  
 Postal clerks & mail carriers\*  
 Public school teachers\*  
 Officials (government)  
 Soldiers, sailors & marines

## PROFESSIONAL SERVICE

Actors  
 Theatre operators, showmen, etc.  
 Artists & teachers of art  
 Architects  
 Chemists, assayers, & metallurgists  
 Designers, draftsmen, & inventors  
 Clergymen, religious & social workers  
 Dentists  
 Lawyers  
 Other literary & scientific persons\*

Musicians & teachers of music  
 Physicians & surgeons  
 Veterinary surgeons  
 Photographers  
 Other professional service

## DOMESTIC &amp; PERSONAL SERVICES

Barbers & hairdressers  
 Bartenders  
 Saloon keepers  
 Boarding & lodging house keepers  
 Hotel keepers  
 Restaurant keepers  
 Employees of hotels & restaurants  
 (except clerks)\*  
 Launderers & laundresses  
 Housekeepers & stewards  
 Servants\*  
 Janitors & sextons  
 Other domestic & personal service workers\*

NOTES ON ESTIMATED OR ADJUSTED NUMBER OF  
 WORKERS WITH CHARACTERISTIC OCCUPATIONS

## AGRICULTURE

*Agricultural laborers:* the 1910 figure for agricultural laborers is adjusted for an overcount; the 1870-1900 figures for undercounts. The first step in making adjustments was to estimate the total number of agricultural workers by interpolating the 1850 and 1920 ratios of agricultural workers to improved acreage and applying them to improved acreage for 1870-1910. The differences between the estimated totals and the number of agricultural workers reported by the Censuses were taken as the first approximations to adjustments of agricultural laborers for 1870-1900 and the final adjustment for 1910 (Tables 20 and 22).

*Gardeners, florists, nurserymen, etc.:* adjusted to exclude foresters, forest rangers, and timber cruisers, as reported in *Comparative Occupation Statistics*, p. 145.

*Other agricultural pursuits:* the 1890 figure adjusted by removing turpentine farmers and laborers; estimated by interpolating between the 1880 and 1900 ratios of 'turpentine farmers and laborers' to 'other agricultural pursuits' plus turpentine workers.

## FORESTRY AND FISHING

The 1910 figures are from the 1910 Census, Table I.

## EXTRACTION OF MINERALS

*Officials of mining and quarrying companies:* estimated for 1880 and 1890 by interpolating between the 1870 and 1900 ratios of officials to miners and quarrymen.

*Oil well employees:* the 1910 figure is from the 1910 Census, Table 15.

## CONSTRUCTION

*Building trades apprentices not included with tradesmen:* apprentices to paper hangers, plasterers, and roofers and slaters were not included in 1890 with tradesmen but were estimated on the basis of the 1900 ratios of apprentices to journeymen.

## MANUFACTURING INDUSTRIES AND INDEPENDENT HAND TRADES

Nearly all the figures for 1910 were obtained by combining the figures for operatives with those for laborers. Important exceptions are listed below.

*Salt works employees:* the 1910 figure is from the 1910 Census, Table 15.

*Glasswork operatives:* the 1910 figure includes, for comparability, glass factory operatives, glass factory laborers, and glass blowers.

*Bakers:* the 1910 figure includes, for comparability, bakers, bakery operatives, and bakery laborers.

*Gold and silver workers:* the 1910 figure includes, for comparability, goldsmiths and silversmiths; jewelers and lapidaries (factory); apprentices; as well as operatives and laborers attached to gold and silver factories and to jewelry factories.

*Tinplate and tinware makers:* the 1910 figure includes, for comparability, tinsmiths, sheet metal workers, tinware and enamelware operatives and laborers.

*Trunk and leather case makers, etc:* the 1910 figure includes, for comparability, leather belt and other leather goods operatives and laborers.

*Boxmakers (paper):* the 1910 figure includes, for comparability, operatives and laborers for blank book, envelope, etc. factories.

*Woolen mill operatives*: the 1910 figure is from the 1910 Census, Table 15.

*Worsted mill operatives*: the 1910 figure is the difference between 'woolen mill operatives' (*ibid.*) and the sum of operatives and laborers for woolen and worsted mills as given in *Comparative Occupation Statistics*, Table 8.

*Other textile mill operatives*: the 1910 figure includes, for comparability, operatives and laborers in rope and cordage factories, jute and linen mills, and 'other and not specified textile mills'.

*Dressmakers and seamstresses*: the 1910 figure includes, for comparability, operatives and laborers in 'other clothing factories', dressmakers' apprentices, and dressmakers and seamstresses (not in factory).

*Other textile workers*: the 1910 figure includes, for comparability, operatives and laborers in sail, tent, and awning factories; lace and embroidery factories; and an estimated number of sewing machine operators and 'not specified textile workers'.

*Charcoal, coke, and lime burners*: the 1910 figure is from the 1910 Census, Table 15.

*Turpentine farmers and laborers*: the 1890 figure was estimated by interpolating between the 1880 and 1900 ratios of turpentine farmers and laborers to 'other agricultural pursuits' plus 'turpentine farmers and laborers', and applying the interpolated ratio to 'other agricultural pursuits' in 1890 when turpentine farmers and laborers were included.

*Upholsterers*: the 1910 figure is from the 1910 Census, Table 15.

*Other miscellaneous industries*: white washers in all years were excluded; the 1890 and 1900 figures exclude well borers and apprentices (n.e.c.); the 1870 and 1880 figures exclude apprentices (n.e.c.); the 1910 figure excludes apprentices (arbitrarily estimated).

#### MISCELLANEOUS TRANSPORTATION AND COMMUNICATION

*Livery stable keepers*: the 1910 figure is from the 1910 Census, Table 15.

#### TRADE

*Merchants and dealers, wholesale and retail*: figures for 1870-1910 are from *Comparative Occupation Statistics*, Table 8. Hucksters, peddlers, and butchers are included.



*Meat cutters:* figures for 1870–1900 are from *ibid.*, p. 149; the 1910 figure is from the 1910 Census, Table I.

*Salesmen and saleswomen; and clerks in stores:* the 1910 figures are from the 1910 Census, Table I; the 1890 and 1900 figures were estimated similarly to bookkeepers and accountants, see below.

*Bookkeepers and accountants in stores:* first approximations for 1890 and 1900 were based upon an interpolation of the 1880 and 1910 ratios of bookkeepers and accountants in stores to merchants and dealers; the 1910 figure is the sum of bookkeepers, accountants, and cashiers reported in the 1910 Census, Table VI.

#### FINANCE, INSURANCE, AND REAL ESTATE

*Bankers and brokers:* the 1910 figure is from the 1910 Census, Table 15.

*Bank officials:* the 1910 figure, for cashiers, is from the 1910 Census, Table VI; the 1890 figure was estimated by interpolating between the 1880 and 1900 ratios of bank officials to bankers and brokers and applying the interpolated ratio to the number of bankers and brokers in 1890.

*Insurance company officials:* the 1890 figure was estimated by interpolating between the 1880 and 1900 ratios of officials per 1,000 insurance agents and applying the interpolated ratio to the number of agents in 1890; the 1910 figure is from the 1910 Census, Table I.

*Insurance agents and collectors:* the 1890 and 1900 figures were estimated by interpolating between the 1880 and 1910 income for fire, marine, and life insurance companies per insurance agent and applying the interpolated income per agent to the comparable insurance company income for 1890 and 1900. The life insurance income figures are from the *Statistical Abstract, 1937*, Table 302, p. 277, quoting F. L. Hoffman and *Spectator Yearbooks*. The fire and marine insurance income for 1890, 1900, and 1910 are from the *Statistical Abstract, 1919*, p. 646; the estimate for 1880 is based upon the 1890 ratio of premiums and assessments for 'other' insurance to total income for fire and marine insurance. The 1910 figure for agents—the sum of agents and collectors—is from the 1910 Census, Table VI.

*Real estate officials, collectors, and agents:* the 1890 and 1900 figures

are from successive divisions of 'agents', which included claims, commission, real estate and insurance agents, agents not specified, real estate dealers, collectors, etc. The 1870 and 1880 Census figures for agents apparently exclude insurance agents, since a separate figure is given for 'employees of insurance companies (not clerks)', primarily insurance agents. The first step in estimating real estate agents for 1890 and 1900 was to remove insurance agents and collectors. The residual figures for agents are comparable with the 1870, 1880, and 1910 figures. The 1880 and 1900 percentages that real estate agents were of agents other than insurance were interpolated for 1890; the interpolated percentage was applied to the corresponding 1890 figure for agents to obtain the 1890 estimate of real estate agents. The 1900 estimate is the difference between the Census figure for insurance and real estate agents and the estimated number of insurance agents. The 1910 figure—the sum of 'agents and officials' and 'collectors'—is from the 1910 Census, Table VI.

#### GOVERNMENT SERVICE

*Firemen (fire department)*: based on extrapolated 1930 and 1910 ratios of firemen per 1,000 population in cities of 25,000 or more.

*Policemen and detectives*: based on extrapolated 1930 and 1910 ratios of policemen and detectives per 1,000 population in cities of 25,000 or more.

*Postal clerks and mail carriers*: the 1870–1900 figures were estimated by applying the 1910 and 1930 ratios of Census figures for clerks and letter carriers to the number reported by the Postmaster General to the number reported by the Postmaster General for the earlier Census years. The 1910 figure—the sum of clerks (general), clerks (railway mail), and mail carriers—is from the 1910 Census, Table VI.

*Public school teachers*: estimated for 1890–1910 by applying to the Census figure for teachers the percentage distribution of public school and private school teachers reported by the Office of Education in the *Statistical Summary of Education, 1931–32*, Table 5. The 1870 and 1880 figures are based on an extrapolation, by the method of semi-averages, of the 1890–1930 percentages that public school teachers were of all teachers.

## PROFESSIONAL SERVICE AND AMUSEMENTS

*Theatre operators, showmen, etc.*: the 1910 figure—the sum of theatrical owners, managers, and officials and showmen—is from the 1910 Census, Table I.

*Designers, draftsmen, and inventors*: the 1910 figure is from the 1910 Census, Table I.

*Other literary and scientific persons*: scientific persons in 1880 were estimated, subtracted from 'teachers and scientific persons', and added to 'other literary and scientific persons'.

## DOMESTIC AND PERSONAL SERVICE

*Bartenders and saloonkeepers*: the 1870 and 1880 figures for bartenders and saloonkeepers combined and the 1890 and 1900 figures for saloonkeepers separately are from *Comparative Occupation Statistics*, p. 151; the 1910 figure for saloonkeepers and bartenders is from the 1910 Census, Table I.

*Barbers and hairdressers; Boarding and lodging house keepers; Hotel keepers; Launderers and laundresses; Housekeepers and stewards; and Janitors and sextons*: the 1910 figure is from the 1910 Census, Table 15.

*Restaurant keepers*: the 1870 and 1880 figures are from *Comparative Occupation Statistics*, p. 151; the 1910 figure is from the 1910 Census, Table I.

*Employees of hotels and restaurants (except clerks)*: estimated for 1890 and 1910 by interpolating the ratios of occupations common to hotels and restaurants to hotel keepers and restaurant keepers for 1880, 1900, and 1930, and applying the interpolated ratios to the number of such keepers in the other Census years. The number of such workers in 1900 is based on the 1930 ratio to waiters applied to the 1900 figure for waiters.

*Housekeepers and stewards*: in 1870 and 1880 persons in these occupations were largely included with 'servants'.

*Servants*: 1890–1910 figures were adjusted to exclude the estimated number of hotel and restaurant employees. The unadjusted figures are from the 1910 Census, Table 15.

*Other domestic and personal service*: the 1870 figure is from *Comparative Occupation Statistics* (p. 152), adjusted for an undercount; the 1880 figure is the Census figure for 'other domestic and personal service', from which was subtracted the number of 'em-

ployees of Government (not clerks)', the 'other professional service' part of 'other professional and personal services' (arbitrarily estimated), and 'employees of charitable institutions'; the 1910 figure is from the 1910 Census, Table 15.

#### *'Other' Characteristic Occupations*

'Other' characteristic occupations, distributed by industry division, are:

Forestry and fishing	Decorators, drapers, and window dressers
Foresters, forest rangers and timber cruisers	Porters and helpers in stores, etc.
Construction	Rag pickers
Electricians	Foremen, overseers, and floorwalkers
Well borers	Officials (trade)
Wreckers	Government service
Foremen and overseers (roads and streets)	Garbage men and scavengers
Manufacturing industries and hand trades	Professional services and amusements
Apprentices n.e.c.	Billiard room, bowling alley, dance hall, etc., keepers
Transportation and public utilities	Ditto, attendants
Officials (transportation and public utility)	Fortune tellers, hypnotists, and spiritualists
Employees of express companies (not clerks)	Stage hands, circus helpers, and theatre ushers
Foremen and overseers (transportation and public utility)	Teachers, other than public school
Others in transportation	Technical and laboratory assistants
Miscellaneous transportation and communication	Professors in colleges and universities
Stockyard employees	Trained nurses
Officials (misc. transportation)	Engineers (technical)
Trade	Domestic and personal service
Apprentices in stores	Nurses and midwives (except trained nurses)

#### *Repeater Occupations*

The occupations treated as 'repeater' include:

Agents and collectors	Stenographers and typists
Blacksmiths	Laborers
Clerks, copyists, bookkeepers, and accountants	Packers and shippers
Draymen, hackmen, teamsters, etc.	Weighers, gaugers, and measurers
Messenger, errand, and office boys	Stationary firemen and engineers

As indicated in Section 3, the chief method used to allocate the number of workers with repeater occupations to the industry divi-

sions involves the modified index of characteristic occupations (Table 19). A table in the 1910 Census giving 1910 figures comparable with those for preceding censuses shows a smaller total for draymen, etc. The first step was to adjust the 1910 distribution to the total shown for the occupation under the pre-1910 classification (see col. 2). Column 4 presents the 1870 indexes for characteristic occupations in the different industry divisions on a 1910 base. For example, the index of workers with occupations characteristic of manufacturing in 1870 was 23.4. The others range all the way down to 11.1. Weighting each index by the corresponding number of draymen, etc. in 1910 gave a weighted index for the combined industries of 24.6. Since the index of draymen, etc. for 1870 was only 16.7, the indexes for the industry divisions were modified by multiplying by  $(16.7 \div 24.6)$ . The modified indexes (col. 5) were then applied to the respective 1910 figures for draymen, etc. in column 2 to yield the estimated distribution of draymen, etc. (col. 6). The process was repeated for the other years.

The method of distributing laborers resembles that for draymen, etc. One difference is that estimates for forestry and fishing, and extraction of minerals in *Comparative Occupation Statistics* (p. 144) were taken as first approximations. First approximations for steam railroads and agriculture were made independently as described below. For other industries they were based on their indexes of characteristic occupations rather than modified indexes. By taking these figures as first approximations, the laborer estimates for agriculture, forestry and fishing, extraction of minerals, and steam railroads were adjusted, together with first approximations for other industries, to the total for laborers (Table 20). Laborers were estimated separately for three divisions of transportation and public utilities—water transportation, steam railroads, and other transportation and public utilities. Water transportation was computed separately because laborers (longshoremen) constitute a large part of its manpower and its progression from 1870 to 1910 was distinctly different from that of other major groups of transportation and public utilities.

#### *Adjustment for Laborers on Steam Railroads*

The *Census of Population* reports 249,317 laborers as included among 'railroad employees' in 1900. Were these all or only some of

TABLE 19

## Derivation of Industrial Distribution of Draymen, Hackmen, Teamsters, etc., 1870-1900

	1910		1870		1880		1890		1900	
	Industrial distribution of teamsters, etc.		Index of occupations (1910: 100.0)		Draymen, hackmen, teamsters, etc.		Index of characteristic occupations		Index of characteristic occupations	
	New classif. <sup>a</sup> (1)	Old classif. (2)	Unadj. b (4)	Adj. c (5)	Unadj. b (7)	Adj. c (8)	Unadj. b (10)	Adj. c (11)	Unadj. b (13)	Adj. c (14)
Index of draymen, hackmen, teamsters, etc.			16.7		24.1		50.1		73.2	
Weighted index of characteristic occupations, all industries included below			100.0		39.6		66.2		83.3	
INDUSTRY										
Forestry & fishing	15,038	14,153	100.0	16.1	2,279	36.9	69.5	52.6	77.1	67.8
Extraction of minerals	28,186	26,528	100.0	17.7	3,183	26.9	41.9	31.7	62.0	54.6
Construction	8,538	8,036	100.0	23.0	1,845	39.2	66.5	50.3	71.7	63.1
Manufacturing	99,621	93,762	100.0	23.4	14,862	34.2	50.2	38.0	64.3	56.6
Transp. & pub. utilities	20,260	19,068	100.0	17.1	2,214	23.8	42.1	31.8	54.3	47.7
Misc. transp. & communication	351,479	330,806	100.0	27.0	60,507	46.8	82.3	62.2	100.4	88.3
Trade	207,147	194,963	100.0	25.1	33,146	37.6	57.9	43.8	75.0	65.9
Govt. service	11,975	11,271	100.0	20.7	1,584	32.9	48.4	36.6	63.0	55.4
Professional service	1,987	1,870	100.0	23.1	293	35.0	54.9	41.5	77.7	64.7
Domestic & personal service	37,855	35,628	100.0	11.1	2,676	20.9	39.8	30.1	62.5	55.0
Total	782,086	736,085 <sup>e</sup>			122,589 <sup>f</sup>		177,586 <sup>f</sup>		368,499 <sup>f</sup>	538,933 <sup>f</sup>
Census total	0.941				.6085 <sup>d</sup>		0.7565 <sup>d</sup>		0.8794 <sup>d</sup>	
Adjustment factor										

<sup>a</sup> 1910 Census, *Population*, IV, Table VI.

<sup>b</sup> Indexes, on a 1910 base, of the number of workers with occupations characteristic of the respective industry divisions.

<sup>c</sup> Adjusted to the level of the index for draymen, teamsters, hackmen, etc.

<sup>d</sup> Ratio of the index of the total of repeater occupations to the weighted index of the total of characteristic occupations in included industries.

<sup>e</sup> 1910 Census, *Population*, IV, Table 15.

<sup>f</sup> 1900 Census, *Special Report on Occupations*, Table III, p. xxxii. The 1870 figure is adjusted for an undercount on the basis of the adjustment in *Comparative Occupation Statistics, 1870-1940*, Table 8.

TABLE 20  
Derivation of Industrial Distribution of Laborers, 1870-1900

	1910		1870		1880		1890		1900					
	No. of laborers <sup>a</sup>	Index of characteristic occupations <sup>b</sup>	Index of characteristic occupations <sup>b</sup>	1st approx.	Adj. approx.	Index of characteristic occupations <sup>b</sup>	1st approx.	Adj. approx.	Index of characteristic occupations <sup>b</sup>	1st approx.	Adj. approx.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Agriculture	°	°	°	170,036	192,375	°	1,046,767	940,578	°	449,202	438,885	°	389,809	443,742
Forestry & fishing	°	°	°	2,416	2,733	°	7,117	6,395	°	10,122	9,890	°	18,997	21,625
Mining	°	°	°	14,136	15,993	°	37,880	34,037	°	37,026	36,176	°	93,208	106,104
Construction	508,308	100.0	33.9	172,113	194,724	39.2	199,257	179,043	66.5	837,872	330,113	71.7	364,609	415,056
Manufacturing	1,574,670	100.0	23.4	368,000	416,348	34.2	537,907	483,338	50.2	790,484	772,330	64.3	1,012,985	1,153,141
Steam railroads				31,348	35,466	°	48,602	43,671	°	87,008	85,010	°	118,056	134,390
Transp. & pub. utilities excl. steam rr. & water transp.	63,042	100.0	4.0	2,498	2,824	10.0	6,304	5,664	26.8	16,885	16,507	43.4	27,373	31,160
Water transp. & water transp.	77,080	100.0	118.1	91,008	102,964	116.4	89,729	80,826	101.1	77,912	76,123	103.1	76,462	90,466
Misc. transp. & communication	1,361	100.0	27.0	367	415	46.8	636	571	82.3	1,120	1,094	100.4	1,367	1,556
Trade	152,291	100.0	25.1	38,179	43,165	37.6	67,231	51,425	67.9	88,146	86,122	75.0	114,142	129,935
Finance, insurance, & real estate	365	100.0	10.6	39	44	15.1	55	49	38.1	139	136	64.2	234	268
Govt. service	63,007	100.0	20.7	13,040	14,763	32.0	20,723	18,621	48.4	30,502	29,802	63.0	39,669	45,158
Professional service	2,300	100.0	29.1	533	603	35.0	808	726	54.9	1,288	1,239	73.5	1,693	1,933
Domestic & personal service	76,951	100.0	11.1	8,518	9,637	20.9	16,114	14,479	39.8	30,650	29,946	62.5	48,087	54,740
Total, 1st approx.				912,238	1,032,084 <sup>e</sup>		2,069,130	1,859,223 <sup>e</sup>		1,958,346	1,913,373 <sup>e</sup>		2,309,866	2,629,262 <sup>e</sup>
Census total				1,131 <sup>d</sup>			0,899 <sup>d</sup>			0,977 <sup>d</sup>			1,138 <sup>d</sup>	
Adj. factor <sup>c</sup>														

<sup>a</sup> 1910 Census, *Population*, IV, Table VI, p. 302.

<sup>b</sup> Indexes, on a 1910 base, of the number of workers with occupations characteristic of the respective industry divisions.

<sup>c</sup> The indexes of characteristic occupations were not used for agriculture, forestry and fishing, mining, or steam railroads. See text.

<sup>d</sup> Ratio of Census total to total of first approximations.

<sup>e</sup> 1900 Census, *Special Reports on Occupations*, Table III, p. xxxii.

the laborers? The earliest detailed distribution of railroad employees was that for railroad employment reported by the Interstate Commerce Commission for 1914. On the basis of the distribution of railroad employment for that year, it was estimated that there were nearly 614,000 laborers in 1910. On the assumption that the proportion of laborers in 1900 was approximately the same as in 1914, the total number of laborers in 1900 is estimated to be 367,373 or 118,056 more than reported by the Census.

TABLE 21

First Approximation to Undercount of Steam Railroad Laborers, 1870-1900

	1870	1880	1890	1900	1910
Railroad employees (ICC) <sup>a</sup>	270,223 <sup>d</sup>	418,957	750,017	1,017,653	1,699,420
Miles of road operated <sup>b</sup>	52,922	93,262	156,404	192,556	240,831
Employees per mile of road Estimated employees, based on employees per mile of road	4.80 <sup>d</sup>	4.49	4.80	5.28	7.06
Link relative, employees per mile of road	252,106	0.935	1.07	1.10	1.34
Steam rr. employees (Census) <sup>c</sup>	154,027	236,058	462,213	582,150	1,084,544
Ratio, Census to ICC	0.57 <sup>d</sup>	0.5634	0.6163	0.5721	0.6382
Laborers (est. from ICC data)	97,551	151,243	270,756	367,373	613,637
Laborers incl. in Census figure				249,317	
Laborers excl. from Census figure, 1st approx.	31,348	48,602	87,008	118,056	

<sup>a</sup> The 1880 and 1890 figures are from the *Compendium of the 11th Census, 1890*, Part 3, p. 893; the figures for 1900 and 1910 are from the Interstate Commerce Commission, *Annual Reports of Statistics of Railways in the United States*.

<sup>b</sup> *Statistical Abstract, 1941*, Table 499.

<sup>c</sup> 1900 Census, *Special Report on Occupations*, pp. xxxii ff; 1910 figure from 1910 Census, Table 15.

<sup>d</sup> Estimated.

The next question was whether the figures for 'steam railroad employees' reported by the Census of Population for other years had uniformly understated laborers. As the ratios of the Census figures to those reported by the Interstate Commerce Commission for 1890-1910 and that reported for 1880 in the *Transportation Census for 1890* were confined to a range of from 0.56 to 0.64, it was assumed that the undercount of railroad laborers was proportionally the same as in 1900. The estimated understatement of railroad laborers was then computed by applying the 1900 percentage of undercount to the Interstate Commerce Commission figure



for 1890, the *Transportation Census* figure for 1880, and the estimated figure for 1870 (see Table 21). These estimates also were regarded as first approximations to the undercount of railroad laborers.

An estimate of railroad workers in 1870, needed to estimate the undercount of railroad laborers, was made on two bases: (a) the ratios of the Census figure for 'steam railroad employees' to railroad employment; (b) the number of workers per mile of road (Table 21). The first basis was taken as the more dependable.

#### *Adjustments for Agricultural Laborers, 1870-1920*

Estimates made specifically for this report are based on the most closely related factors. In the case of agriculture they are based upon the relation between improved acreage on farms and agricultural workers. Acreage farmed per agricultural worker would have been a better ratio, but the data are not available.

The first comprehensive Census of Agriculture was for 1850. Edwards' estimate of agricultural workers for that year is 4,901,882, which yields a ratio of 23.1 improved acres per worker. This figure was accepted as the best available starting point. Since 1920 is the last year for which comparable figures of improved acreage on farms were reported, the ratio for that year was used as the terminal point. The 1920 figure of workers with agricultural occupations reported by the 1920 Census was adjusted for an undercount of hired laborers, many of whom, at Census time, were engaged in other industries. The basis of the adjustment was the increase in the employment of hired agricultural laborers from January to April as estimated in *Trends in Employment in Agriculture*.<sup>26</sup> These figures indicated an adjustment of 442,000. The adjusted 1920 figure for agriculture is 11,107,812, which yields a ratio of 45.3 improved acres per worker.

Ratios of improved acres per worker, interpolated for 1870 through 1910, were applied to the corresponding figures of improved farm acreage. The results were considered first approximations to the total number of workers with agricultural occupations (Table 22). First approximations to adjustments for agricultural laborers were taken as the differences between the estimated totals

<sup>26</sup> WPA National Research Project, by E. E. Shaw and J. A. Hopkins, A-8, 1938, Table H-1.

TABLE 22  
First Approximations to Adjustments of Agricultural Workers, 1870-1920

	1850	1860	1870	1880	1890	1900	1910	1920
Improved farm acreage <sup>a</sup>	113,032,614	163,110,720	188,921,099	284,771,042	357,616,755	414,793,191	478,451,750	503,073,007
Agric. workers (Edwards) <sup>b</sup>	4,901,882	6,207,634	6,849,772	8,584,810	9,938,373	10,911,998	11,591,767	11,448,770
Improved acreage per worker (Edwards)	23.1	26.3	27.6	33.2	36.0	38.0	41.3	43.9
Est. agric. workers, 1920 <sup>c</sup>								11,107,812
Improved acreage per worker, interpolated			29.5	32.7	35.8	39.0	42.2	45.3
Est. workers with agric. occupations, 1st approx.			6,404,105	8,708,595	9,989,294	10,635,723	11,337,719	11,107,812
Adj. of agric. workers, 1st approx.			170,036	1,046,747	449,202	389,809	-1,050,590	

<sup>a</sup> *Census of Agriculture, 1900*, 1, 688.

<sup>b</sup> *Comparative Occupation Statistics for the United States, 1870-1940*, by Alba M. Edwards, p. 142.

<sup>c</sup> Estimated by adding to the number of persons reported in agricultural occupations the number of agricultural wage laborers estimated to have been classified in another occupation because they were engaged in other work in January. The estimated misclassification was based on the percentage rise in employment of hired farm laborers from January to April in *Trends in Employment in Agriculture* (WPA National Research Project, 1938), Table H-1.

of workers with agricultural occupations and those reported in the Censuses. For 1890 the subtraction was not made until the adjustments for undercount in the ages 10-15 and 16-20 had been added to the reported number of agricultural workers.

The undercount of agricultural workers for 1870-1900 was estimated in several ways. The general procedure was first to estimate total agricultural workers, then subtract the reported number of agricultural workers. Edwards' approach was to interpolate the ratios of the percentage of the workers for all industries available for agriculture to the percentage of the population in localities of less than 2,500 persons by the formula  $y = a + bx + cx^2$  fitted to known points for 1820, 1840, 1910, 1920, and 1930 (pp. 141-3). The method is very similar to that P. K. Whelpton used in an article, 'Occupational Groups in the United States, 1820-1920', *Journal of the American Statistical Association*, September 1926, in which the ratio is "interpolated along a smooth curve."

RATIOS FROM *Comparative Occupation Statistics* AND CENSUS TO  
CENSUS CHANGES IN THEM

	Ratio	10-year change		Ratio	10-year change		Ratio	10-year change		Ratio	10-year change
1820	0.7738		1850	0.7517*	.0178	1880	0.6872*	.0299	1910	0.5709	.0514
1830	0.7729*	.0009	1860	0.7346*	.0171	1890	0.6569*	.0303	1920	0.5532	.0173
1840	0.7695	.0034	1870	0.7131*	.0215	1900	0.6223*	.0346	1930	0.4892	.0640

\*Interpolated

Essentially, the ratio treats agricultural manpower as a function of the rural population. However, in 1870, when 74 percent of the population was in rural areas, only half the manpower was in agriculture; in 1930, 44 percent of the population was in rural areas, but only 21 percent of the manpower was in agriculture. In other words, about one-third of the rural manpower was nonagricultural in 1870, about half in 1930. In view of this large nonagricultural affiliation on the part of the rural population, the ratios for any year may easily be 2-5, or even more, percent off a smooth interpolation. Wars, particularly, disturb demographic progressions. During a war large numbers of rural workers shift from agricultural to other pursuits, and many remain permanently. There is good reason to believe that the ratio for 1870 was considerably affected by the Civil War; it was probably much lower than in earlier decades.

The depression prevailing during most of the 1870's tended to retard the shift of rural agricultural workers to other industries. This tendency was strengthened by the Homestead Act, which was responsible for a more than one-third increase in improved acreage, chiefly in the overwhelmingly agricultural sections in the newly opened West. In terms of ratios of the percentage of the workers for all industries available for agriculture to the percentage of the population in places with fewer than 2,500 inhabitants a sharp reduction should, therefore, be expected in 1870, and probably little change in 1880. The ratios, however, allow for a change in 1870-80 one-third higher than that in 1860-70.

The changes in the ratio estimated for the period around World War I are similarly out of line. The two-third smaller change for the war decade than for the preceding decade implies that three times as many rural workers shifted from agricultural to nonagricultural industries in 1900-10 as in 1910-20, despite the strong pull of nonagricultural industries during the war and the farm labor shortage from 1917 until the 1920 Census was taken. Similarly, the ratios imply a shift during 1920-30 nearly four times as large as during the war decade.

The method adopted in this study was one more appropriate to agriculture—computing the ratio of agricultural workers to improved farm acreage. The estimates by Edwards, Whelpton, and myself are given in the accompanying tabulation.

	1850	1860	1870	1880	1890	1900	1910	1920
	Agricultural Workers (thousands)							
Edwards	4,902	6,208	6,850	8,585	9,938	10,912	11,592	11,449
Whelpton	4,965	6,287	6,904	8,505	9,770	10,699	11,704	10,923
Carson			6,404	8,709	9,989	10,636	11,338	11,108
	Ratio of Improved Farm Acreage to Agricultural Workers							
Edwards	23.1	26.3	27.6	33.2	36.0	38.0	41.3	43.9
Whelpton	22.8	26.0	27.8	33.5	36.6	38.8	40.9	46.0
Carson		26.3	29.5	32.7	35.8	39.0	42.2	45.3
	Change in Ratio from Preceding Decade							
Edwards		3.2	1.3	5.6	2.8	2.8	3.3	2.6
Whelpton		3.2	1.8	5.7	3.1	2.2	2.1	5.1
Carson		3.2	3.2	3.2	3.1	3.2	3.2	3.1

As already mentioned, the final 1920 figure is the 1920 Census figure adjusted for the January to April change in the employment of hired farm laborers. Exception may be taken that no seasonal adjustment was made for farm operators or unpaid family farm laborers for comparability with the (April) 1910 Census or with the (June) 1870-1900 Censuses. An adjustment for the full change in agricultural employment from January to June would have had to be based on the June 1900 figure adjusted to the January level of employment, and the average increase in improved acres per worker per decade from 1900 to 1920 allowed for. That would have yielded a ratio of 58.3 improved acres per worker, or 8,629,000 workers with agricultural occupations for January 1920 instead of 10,665,812, the Census figure. A similar adjustment for April would give an estimate of 9,528,000 or about 1,140,000 less than the Census figure for January.

Obviously, changes in total employment cannot serve in adjusting for the understatement in agriculture. Adjusting for a certain fraction of the change in employment would still be arbitrary, and as likely to introduce as large an error as a correction. Consequently, only the change in the employment of hired laborers was used, since this group is under the strongest economic pressure to shift from agriculture to another industry in the slack agricultural season.

By the same approach an April estimate for workers with agricultural occupations in 1910 would be 9,666,000 instead of 12,388,309, the Census figure, or 11,337,719, our estimate. The last-mentioned figure, as well as our estimate for 1920, appears consistent with the June figures for agricultural workers in preceding Censuses, after adjustment for the average decade increase in improved acreage per worker. The 1910 and 1920 figures are consistent with farm population figures also. The corresponding ratios of workers with agricultural occupations to farm population are 0.353 and 0.351, respectively. The ratio for 1930 is 0.344. Unfortunately, farm population statistics are not available for years prior to 1910.

#### *Adjustment factors*

Factors required to adjust first approximations to industrial distributions of certain repeater occupations are:

	1870	1880	1890	1900
Laborers	1.131	0.899	0.775	1.138
Clerks, copyists, bookkeepers, & accountants			0.919	0.974

*Proportion of Industry Estimated*

The ratios of the sum of workers in occupations attached to the different industry divisions to the corresponding estimated totals (Table 23) are, in large degree, ratios of workers with characteristic occupations to totals for the industry. The figures for characteristic occupations that involved a large degree of estimation were omitted. Included, however, were the number of clerks, copyists, bookkeepers, and accountants in those industries where they were numerous, since figures for 1870, 1880, and 1910 were obtained from Census reports and estimates for the other two years could not be greatly in error.

TABLE 23

Ratios of Unestimated Part of Industry Divisions to Estimated Totals, 1870-1900

	1870	1880	1890	1900
Agriculture	0.97	0.89	0.85	0.96
Forestry & fishing	0.92	0.90	0.91	0.85
Extraction of minerals	0.86	0.83	0.87	0.79
Construction	0.79	0.83	0.85	0.76
Mfg. industries & independent hand trades	0.74	0.77	0.79	0.74
Transportation & public utilities	0.53	0.59	0.64	0.58
Misc. transportation & communication	0.25	0.27	0.23	0.20
Trade	0.93	0.95	0.93	0.89
Finance, insurance, & real estate	1.02	1.02	0.98	0.95
Govt. service	0.79	0.80	0.78	0.75
Professional service & amusements	0.99	0.98	0.91	0.87
Domestic & personal service	1.02	1.02	1.00	0.98

Much of the fluctuation in ratios for a specific industry division may be traced to the uneven percentage of the working force reported as 'laborers (not specified)', and to the varying percentage of such laborers assigned to agriculture—the chief factors that account for the 0.85 to 0.97 variation in the ratios for agriculture. The lowest ratio, for 1890, is partly due to the undercount of 16-20 year old boys and girls. If the adjustments for agricultural laborers

were included with characteristic occupations, the ratio to the total for the industry would be 0.999 for each year.

Draymen, teamsters, hackmen, etc. are on the borderline between a repeater and a characteristic occupation. It is a characteristic occupation for miscellaneous transportation and communication, comprising about 60 percent of the total for the industry, and a repeater occupation for other divisions. The estimates are excluded from the totals on which the ratios are based because a large degree of estimation was involved in their derivation.

#### COMMENT

IRVING H. SIEGEL

The papers by Fabricant and Carson present a thoughtful commentary on *Census of Occupation* concepts and data and make a distinctive contribution to the literature in the form of revised industrial distributions of the nation's workers for several decades. These distributions take account of the patient efforts of other students, notably Edwards and Whelpton. Despite numerous limitations, the resulting series provide important evidence on the changes in the structure of the economy since the Reconstruction Period and, in some detail, since 1910. As Fabricant indicates, these series are of intrinsic interest (and would be even more so were they on the 1940 basis throughout) and should not be accepted as mere substitutes for nonexistent national income statistics.

Neither Carson nor Fabricant (nor, for that matter, Edwards or Whelpton) would consider the new industrial distributions definitive. They admit the limitations freely; in their pursuit of continuity, they accept or make multitudinous adjustments of varying quality, still without exhausting the possibilities. Carson's use of terms like 'economic manpower' and 'force of workers' to embrace the more or less comparable statistics based on what Fabricant calls the "rather hazy" concept of 'gainful workers' and the extension of these terms to include figures representing the 'labor force' should not be regarded as more than a terminological convenience.

Nor should Carson's yielding in Table 1 to the temptation of splicing the 1870-1930 and the 1930-40 indexes,<sup>1</sup> while he does not attempt to reduce the absolute data to continuous series, be regarded as more than a formality, a lapse into convention. Many will reject Fabricant's suggestion concerning the classification of nonworking students with teachers in an expanded 'education industry'; but the essential fact is the inadequacy of the available statistics for the grouping of the entire population of working age by major activity, whether or not remunerated. All in all, it would seem that Carson, Fabricant, and the others from whom they borrow heavily have carried research in the field to the point of rapidly diminishing returns—at least as far as practical results are concerned.

Fabricant makes a passing reference—and Carson none at all—to the 'social-economic' distribution of the nation's workers for 1910-40 in *Comparative Occupation Statistics for the United States, 1870-1940*, Part III. In view of Edwards' comments in his preface to this work and in Chapter 14, it may be inferred that he regards the social-economic classification as his major contribution. He distinguishes six main groups: professional; proprietors, managers, and officials; clerks and kindred workers; skilled workers and foremen; semiskilled workers; and unskilled workers (farm and non-farm laborers and 'servant classes'). While this, like any other, classification has its merits, the claims Edwards advances seem extravagant. He conceives these classes to be 'homogeneous', each possessing its 'peculiar characteristics'; indeed, he attributes to each group "a somewhat distinct standard of life, economically, and, to a considerable extent, intellectually and socially" and "characteristic interests and convictions as to numerous public questions". To anyone with democratic principles, the characterization of these groups as 'classes' in more than a statistical sense is exceptionable; but, fortunately, there are more objective and less sentimental grounds for criticism.

Edwards' classification scheme, admittedly 'hybrid', provides

<sup>1</sup> Since the 1946 Conference the Bureau of the Census has released separate 1930-40 occupational adjustment factors for males and females consistent with the total adjustment factors presented by Edwards in his Tables 1 and 2 (see Current Population Reports: Labor Force, Series P-50, No. 4, Feb. 9, 1948).



no realistic 'scale' of social or economic status. The groups are not homogeneous, as he asserts, and they are ranked in accordance with neither income nor education, two of his criteria. To include 'newsboys' among 'clerks and kindred workers' is conventional enough; but to imply that they thereby become 'white collar workers' and have the supposed outlook and interests of this 'class' is another matter. In recent decades, the distinction between 'mental' and 'manual' work has become a less trustworthy guide to social or economic position than it may once have been; and, within the manual category, extent or character of unionization has, perhaps, become more significant than 'skill' level, concerning which, moreover, wartime training experience has destroyed certain myths and for the differentiation of which Census data are, in any case, too gross. Organized 'waiters and bartenders' would be surprised to find themselves not only considered 'unskilled' but included with 'bootblacks' and 'janitors' in the 'servant classes'. Casual newspaper readers as well as harassed government conciliators would find their credulity strained by the characterization of the 'unskilled'—which group, according to Edwards, includes also 'teamsters', 'longshoremen and stevedores', and 'mining operatives'—as "lower in economic status than the workers in any other group". 'Bakers' and 'furriers', found at all three skill levels in the *Dictionary of Occupational Titles*, are classified by Edwards as 'semiskilled'. In short, there is ample reason to question the content as well as the significance of Edwards' classes.

Finally, a word about the future. Developments in recent years presage further improvement in the Census of Occupations—in the nonlabor force data as well as in the data for persons in the labor market. The need for a sound manpower 'inventory' and for sharper concepts has become a practical matter with government's assumption of an increasing interest in the welfare of workers, with its provision of more vocational and apprentice training aid, placement and counseling services, unemployment compensation, veterans' readjustment allowances, etc. The *Dictionary of Occupational Titles* has grown out of the work of the United States Employment Service. WPA's administrative needs had much to do with the change from the 'gainful worker' to the 'labor force'

status concept and with the initiation of the *Monthly Report on the Labor Force*. An important forward step was taken with the development in 1938-39 of a "convertibility list of occupations" and an "industrial classification for reports from individuals" by a joint committee established by the American Statistical Association and Central Statistical Board (now Division of Statistical Standards, Bureau of the Budget). Both lists were used in the 1940 Census of Occupations and provide a basis for further standardization of federal occupational statistics. The second list is a modification of a standard industrial classification developed by another Central Statistical Board committee. The occupation and industry classification systems are under continuous review and have been refined somewhat since originally issued. Finally, the *Monthly Report on the Labor Force* has made possible valuable experimentation with definitions and concepts (e.g., the treatment of unpaid family labor and the comparison of the administrative concept of 'availability for work' with 'looking for work').<sup>2</sup>

GLADYS L. PALMER

Mr. Fabricant well summarizes the problems that must be faced in attempting to get a consistent historical picture of the growth of the labor force and changes in its industrial distribution. I agree with his general conclusion that estimates for recent years are more

<sup>2</sup> A picture of recent developments in the field of occupation statistics may conveniently be obtained from annual reports of the Joint Committee on Occupational Classification in March issues of the *Journal of the American Statistical Association* and from the following articles in the same periodical: J. N. Webb, 'Concepts Used in Unemployment Surveys' (with comments by Joy and Wood), March 1939, 49-61; G. L. Palmer, 'The Convertibility List of Occupations and the Problems of Developing It', Dec. 1939, 693-708; V. S. Kolesnikoff, 'Standard Classification of Industries in the United States', March 1940, 65-73; Fels and Whelpton, 'An Industrial Classification for Reports from Individuals', March 1940, 74-85; A. R. Eckler, 'The Revised Census Series of Current Unemployment Estimates', June 1945, 187-96; Ducoff and Bancroft, 'Experiment in the Measurement of Unpaid Family Labor in Agriculture', June 1945, 205-13; Ducoff and Hagood, 'Objectives, Uses and Types of Labor Force Data in Relation to Economic Policy', Sept. 1946, 293-302; Bancroft and Welch, 'Recent Experience with Problems of Labor Force Measurement', Sept. 1946, 303-12; Stewart and Wood, 'Employment Statistics in the Planning of a Full-Employment Program', Sept. 1946, 313-21.

reliable than estimates for earlier years and that the industrial distributions are at best rough. A purist in occupational or industrial classification would shudder at the mere thought of attempting to construct a series that would be comparable over time. Nevertheless, these rough approximations furnish important analytical tools for economic research, and we are indebted to Messrs. Whelpton, Edwards, and Carson, and others for good spade work.

Mr. Fabricant urges the desirability of using data outside the Censuses of Occupation to aid in assessing their value. My own feeling is that until we have a set of internally consistent data such comparisons would not be very fruitful. I believe Mr. Edwards was right in striving to utilize fully the Censuses of Population for the adjustments he made. Labor force counts have to be consistent with the age and sex structure of the population and its place of residence, and estimates of changes in the industrial structure of the labor force have to be consistent with estimates of changes in the occupational structure. I do not know whether the occupational distribution could be estimated from Mr. Carson's industrial distribution. I do know that in attempting to estimate *both* occupational and industrial distributions for Philadelphia for 1910, 1920, and 1930 in terms of the 1940 major group arrangements, some mechanical complications were introduced into both series but some check on the internal consistency of the data in each series was automatically provided. Even better checks would be obtained if one had estimates of industrial group by occupational group or by age and sex for each decade. For many analytical purposes, such combinations or cross-classifications are vital.

The validity of the assumptions as well as the consistency of the data must be checked. Is it valid to use 'characteristic' occupations to construct an index for estimating the labor force of an industry? Mr. Fabricant notes the possibility of an upward bias in Mr. Carson's estimates for professional services, at least to 1910, and comments that similar questions may be raised for other industries, but expects no general bias. In my opinion, the question of bias should be further explored. Some tests might be developed that would check the validity of the assumptions inherent in any attempt to make Census of Population data comparable from

decade to decade or to interpolate for decades for which no data are available. It may be true, as is generally assumed, that when new industries expand rapidly, their occupational structure is more stable than the industrial distribution of occupations, but we do not know very much about these relations currently and the effects of wars and of rapid technological changes may have made this assumption less valid.

Mr. Fabricant presents evidence that trends in the industrial attachments of the labor force are biased upward as estimates of employment trends and that the degree of the bias varies by industries. I agree with this general conclusion and the data for Philadelphia (App. Tables 1 and 2) present further evidence on this point, indicating that, for one city at least, there may even be a reversal of trend.

With regard to Mr. Carson's estimates, I too find it difficult to comment without knowing more about how his assumptions affected the data. I suspect that he had no alternative except to use the 1930 classification, or some modification of it, if he wanted to have a series back to 1870 without a definite break at 1910. I suspect also that other methods of combining the data or of interpolating various segments of the series would not alter the direction of the general trends indicated for the broad groups in his series. The usefulness of the data is somewhat impaired on two counts: (a) Many workers classified in the hand trades and some workers in manufacturing in earlier years belong in the service industries according to the 1940 classification. The fact that they cannot be separated for different disposition in earlier decades means that the totals for commodity-producing industries are slightly higher in relation to the service industries than they would be, if, say, the 1940 classification were used. (b) The changing nature of the content of the category 'industry not specified' and its relative size in the later period detracts from the validity of the indexes and percentage changes computed for specified categories in his Table 1. The long-term trends in major industry groups are the net result of varying rates of growth or decline in segments but, unfortunately, it is impossible to get comparable series for the segments of all major industry groups. However, some detail

for manufacturing from 1910 to 1940 can be obtained, and it provides extremely useful data for analysis.

An outstanding contribution to our knowledge of the industrial attachments of the labor force was made when the 16th Census of Population separated the coding of occupation and industry and adopted a modification of the Standard Industry Classification for use in 1940. For the first time industry data collected in a Census of Population could be directly compared with data from other sources. In other words, differences in employment as recorded in the Census of Population and in other sources are now due to differences in concepts of 'employment', 'workers', the time reference, or some other measurement problem, not to differences in the definition of an industry group. Changes introduced into the industry and occupation codes used in 1940 had the advantage of measuring current phenomena more adequately but the disadvantage of creating obstacles to historical analysis. Mr. Edwards undertook to provide a conversion pattern to facilitate such historical analysis, but this pattern applies to only the more comparable segments. If possible, estimates should be developed from which the revised labor force figures for 1930 and 1940 for all major industry groups could be derived. The technical experts at the Bureau of the Census have done a great deal of preliminary work in this general field and have access to source materials and an experience that cannot be duplicated. It would be highly desirable if the Bureau could undertake to provide estimates for major industrial and occupational groups in terms of the 1940 arrangement or future modifications for as many decades as feasible. Moreover, there are advantages to having standard procedures for deriving such estimates even though for special analytical purposes modifications may be introduced or independent estimates derived.

APPENDIX TABLE 1

Industry of Gainful Workers, 1910 and 1920, and of Experienced Labor Force, 1930 and 1940, 14 Years and Over, Philadelphia (thousands)

Industry Group	Gainful Workers				Experienced Labor Force				% Net Change 1910-40
	1910		1920		1930		1940		
	No.	%	No.	%	No.	%	No.	%	
Total, all industries	710	100.0	819	100.0	884	100.0	856	100.0	+20.5
<i>Manufacturing</i>	282	39.7	335	40.9	302	34.2	300	35.0	+6.4
Food & kindred products	15	2.1	19	2.4	21	2.3	27	3.1	+77.6
Textile mill products	65	9.2	65	7.9	63	7.1	49	5.8	-24.2
Apparel	37	5.1	35	4.2	37	4.1	43	5.1	+19.8
Lumber, furniture, & lumber products	10	1.3	11	1.4	10	1.2	7	0.9	-20.0
Paper & allied products	6	0.8	7	0.8	7	0.8	10	1.1	+63.5
Printing, publishing, & allied industries	18	2.6	19	2.4	19	2.2	21	2.4	+13.2
Chemicals (incl. petroleum)	9	1.3	16	1.9	15	1.7	17	1.9	+83.2
Stone, clay & glass products	7	1.0	5	0.6	4	0.5	4	0.4	-45.4
Iron, steel, machinery, & transportation equipment	64	9.1	109	13.3	78	8.8	83	9.7	+28.8
Miscellaneous	51	7.2	49	6.0	48	5.5	39	4.6	-24.0
<i>Nonmanufacturing</i>	428	60.3	484	59.1	582	65.8	556	65.0	+29.8
Agriculture & mining	7	1.0	4	0.5	6	0.7	4	0.4	-47.0
Construction	49	6.9	63	7.7	77	8.7	69	8.0	+40.2
Transp., communications, & other utilities	67	9.4	80	9.8	82	9.3	61	7.1	-8.9
Trade	130	18.3	138	16.9	169	19.1	181	21.2	+39.3
Finance, insurance, & real estate	17	2.4	28	3.4	35	4.0	35	4.1	+101.9
Business & repair services	5	0.7	8	1.0	15	1.7	19	2.3	+282.3
Personal services	93	13.1	86	10.5	101	11.3	84	9.8	-9.8
Amusement & recreation	5	0.7	6	0.7	9	1.0	9	1.0	+77.8
Professional services	35	5.0	42	5.1	55	6.3	62	7.3	+76.5
Government n.e.c.	20	2.8	29	3.5	33	3.7	32	3.8	+62.6

Percentages based on distributions before rounding.

For a description of the method see Ducoff and Hagood, *Labor Force Definition and Measurement: Recent Experience in the United States*, App. C.

Miscellaneous manufacturing includes tobacco, rubber, leather, nonferrous metals, and other manufacturing industries.

Figures for persons not reporting industry have been distributed.

1910 data from unpublished tabulations of the Census Bureau; converted to the 1940 arrangement with the advice of the Census Bureau.

1920 data, from the *1920 Census of Population*, IV, are based on a conversion of the occupation statistics for gainful workers made by the University of Pennsylvania, Industrial Research Department. Occupations that appeared in only one industry by the 1940 industry arrangement were tabulated and those that appeared in more than one industry were distributed in the same proportions industrially as they were distributed in 1930, as indicated by the special tabulation of the 1930 Census.

1930 data are from the *1930 Census of Population*, III, and from a special tabulation of unpublished Census materials which give a detailed industrial distribution

of the gainfully occupied according to the 1930 Census industry classification by occupation for occupations occurring in more than one industry. Since the industrial classifications of the Census were changed in 1940, the 1930 groups had to be converted to the 1940 arrangement. The conversion pattern in *Comparative Occupation Statistics for the United States, 1870-1940* was followed with certain minor modifications. As the adjustment factors were based on national data, they were not applicable to this area. The converted figures for the gainfully occupied in 1930 were then adjusted to conform to the labor force concept used in the 1940 Census. This adjustment was made as suggested by the Bureau of the Census in *Population, Estimates of Labor Force, Employment and Unemployment in the United States, 1940 and 1930*.

1940 figures are from the *1940 Census of Population, III*, as adjusted by the Industrial Research Department. The total labor force was adjusted to conform to the revised labor force for the United States by the methods suggested in *Estimates of Labor Force, Employment and Unemployment in the United States, 1940 and 1930*. This adjustment was then assumed to be distributed by employment status by industry as the published figures had been. Estimates of the industrial distribution of persons on public emergency work (for whom the Philadelphia data, comprising less than 3 percent of the total labor force, were not tabulated) were based mainly on the distribution of such persons in the United States.

APPENDIX TABLE 2

Industry of Employed Persons 14 Years and Over, Philadelphia, 1910, 1920, 1930, and 1940 (thousands)

Industry Group	1910		1920		1930		1940		% Net Change 1910-40
	No.	%	No.	%	No.	%	No.	%	
Total employed, all industries	684	100.0	783	100.0	803	100.0	710	100.0	+3.8
<i>Manufacturing</i>	271	39.7	320	40.9	266	33.1	256	36.1	-5.7
Food & kindred products	14	2.1	19	2.4	19	2.3	23	3.3	+60.3
Textile mill products	63	9.2	62	7.9	52	6.5	40	5.7	-36.3
Apparel	35	5.1	33	4.2	32	4.0	36	5.1	+2.6
Lumber, furniture, & lumber products	9	1.3	11	1.4	9	1.1	6	0.8	-33.1
Paper & allied products	6	0.9	6	0.8	6	0.7	8	1.2	+39.9
Printing, publishing, & allied industries	18	2.6	18	2.3	18	2.3	19	2.6	+4.2
Chemicals (incl. petroleum)	9	1.3	15	2.0	14	1.8	15	2.2	+77.1
Stone, clay & glass products	7	1.0	5	0.6	4	0.5	3	0.4	-54.2
Iron, steel, machinery, & transportation equipment	61	9.0	104	13.3	69	8.6	73	10.2	+17.8
Miscellaneous	49	7.2	47	6.0	43	5.3	33	4.6	-33.2
<i>Nonmanufacturing</i>	413	60.3	463	59.1	537	66.9	454	63.9	+10.0
Agriculture & mining	7	1.0	4	0.5	5	0.7	2	0.3	-67.4
Construction	47	6.8	60	7.7	61	7.6	34	4.9	-26.1
Transp., communications, & other utilities	64	9.4	77	9.8	76	9.5	53	7.5	-17.7
Trade	125	18.3	132	16.9	160	19.9	156	22.0	+24.6
Finance, insurance, & real estate	17	2.4	27	3.4	34	4.2	32	4.5	+90.3
Business & repair services	5	0.7	8	1.0	14	1.7	16	2.2	+223.4
Personal services	90	13.2	83	10.5	93	11.6	68	9.5	-25.0
Amusement & recreation	5	0.7	5	0.7	8	1.0	7	0.9	+36.3
Professional services	34	5.0	40	5.1	54	6.7	57	8.0	+66.8
Government n.e.c.	19	2.8	27	3.5	32	4.0	29	4.1	+53.9

Revisions of data published in the Report to the Philadelphia City Planning Commission: *The Population of Philadelphia & Environs and Labor Force & Employment Estimates—A Projection for 1950.*

Percentages based on distributions before rounding.

Miscellaneous manufacturing includes tobacco, rubber, leather, nonferrous metals, and other manufacturing industries.

Figures for persons not reporting industry have been distributed.

For 1910 and 1920 unemployment rates based on estimated rates for the United States were applied to total gainful workers for the respective dates and the residual 'employed' figures distributed by industry as the total gainful workers had been. Because of the high levels of employment prevailing in both 1910 and 1920, it was assumed that the unemployment rate in Philadelphia was unlikely to deviate significantly from the rate for the United States as a whole. (In a period of high unemployment the evidence indicates that such an assumption would be incorrect.) For the same reason, it was assumed that the inaccuracies introduced by letting the incidence of employment and unemployment fall with equal weight by industry are not large enough to distort seriously the trends over time.

In 1930 the industrial distribution of the unemployed, as presented in the *1930 Census of Unemployment, I*, was applied to the unemployment total obtained by adjusting the 1930 data to the labor force and employment status concepts of 1940. The distribution of employed persons is the residual, that is, the difference between the labor force and the unemployed in each industry.

1940 data are from the *1940 Census of Population, III*, as adjusted by the University of Pennsylvania, Industrial Research Department. The adjusted employment level was assumed to be distributed by industry as the published employment figure had been.



## REPLY BY MR. CARSON

Fabricant's paper is an interesting guide to the labyrinths of Census data on the industrial characteristics of manpower in the 19th and 20th centuries and is, of course, required reading for anyone desiring a thorough knowledge of the industrial development of the country. He analyzes the various historical series of the industrial composition of gainful workers in the United States and reviews the methods and underlying assumptions. The weaknesses he called to my attention have helped me to improve my own estimates of the industrial distribution. My comments are directed to a few points regarding which my view diverges somewhat from Fabricant's.

*Gainful Worker*

If one wishes to understand the market economy, about which so little is known, one must study the operations, products, and interrelations of the individuals who participate in the production of goods and services for the market. These individuals, prior to 1940, were called 'gainful workers'. Fabricant's suggestion of including groups such as home-makers and students as 'gainful workers' would not aid in studying contributing participants in the market economy.

For some social problems there are reasons for *combining with*, as distinguished from *including in*, the labor force women managing households for their families. Such a grouping would be useful when problems of living standards are under consideration, particularly when the levels of undeveloped countries are compared with those of more industrialized countries. In support of his position, Fabricant pointed to the classic paradox of including a hired housekeeper among gainful workers, but excluding her after she married her employer even though she continued the same household duties. The paradox might vanish by including housewives, but a host of new problems would be introduced.

I cannot think of any use, however, in including students in the labor force, unless one wishes to create something that may be called a 'socially significant' group. Fabricant's reason is that a modern industrial economy cannot be operated without a literate

population; further, that education may be counted a contribution to capital formation. In other words, the learning process is considered to have the character of production. In my view students may be considered the end product of the teaching staff and others who help to maintain institutions of learning, and therefore, as products created by the employees of the institutions. In other words, instead of being regarded as producing entities, students come under the category of consuming entities.

To my mind, Fabricant overemphasizes the breadth of the concept of economic production. Our primary concern is with the problems of the market economy. If, for example, the question were the degree of failure to provide employment, the inclusion of homemakers and students in the labor force would reduce the rate of employment about 25 percent. It would therefore tend to befog the issues of unemployment.

#### *Effect of Business Cycles*

Fabricant emphasizes the effect, on the manpower series, of the cyclical phase to a much greater degree than I believe is warranted. The official date of each Census as well as the month would be important if the elasticity of manpower were similar to that of industrial production. However, I believe that manpower is relatively inelastic and that major recessions alone significantly affect the magnitude of the labor force, and then substantially only after a lag of about one or two years. I find support in the observation that not until years after the 1929 crisis was cognizance taken of the movement of forced entries into the labor market. An earlier influx would very likely have induced earlier recognition. Further, I do not recall that the problem was raised in connection with major depressions of shorter duration than that following 1929.

If this theory is correct, and only much new information can show whether it is, then since the Civil War the manpower of only 1880 and 1940 could have been substantially affected. Only in these years was there a lag of more than one year from the preceding peak or was the cycle not near a new peak. This theory may well explain the large relative increase in the gainful worker group between 1870 and 1880, which Whelpton believed to be due to the abnormal conditions that affected the 1870 figures.

*Outside Information*

Fabricant's suggestion that data outside the Censuses of Occupations be used to aid in estimating the industrial distribution of persons in the labor market may give an erroneous impression. He is quite correct in that further progress can be made with outside sources of information, but for some time we have been traveling the road of rapidly diminishing returns. I did not inform him of the full extent to which I did use outside sources. For example, a long study of many kinds of outside data preceded the distribution of 'laborers not specified'. Most of it was unfruitful but it was on the basis of Census of Manufactures data that the 1900-10 adjustment in laborers was made for manufacturing industries. This distinctly improved the estimates for manufacturing industries for 1870-1900. Data from the Census of Agriculture were also important in distributing a large group of laborers with unspecified occupations.

The Census of Manufactures was used in various estimates from 1900 (which affected the 1870-90 estimates also) through 1930. After weeks trying to get 1870-1900, and more complete 1930-40, divisions of manufacturing industries by major industry groups with the help of Census of Manufactures data, I gave up when I found the results were nowhere nearly commensurate with the effort.

Other information outside the Censuses of Occupations that was used included street railway data from the Censuses of Electrical Industries; public school data from the Biennial Survey of Education, National Education Association Research Bulletins, and the annual review issues of Motor Bus Transportation; railway express and steam railroad data from Statistics of Railways; postal service data from the Annual Reports of the Postmaster General; insurance data from the Statistical Abstract (quoting F. L. Hoffman and Spectator Yearbooks); various employment data from the Bureau of Labor Statistics; data on various services from the Census of Business; data on population in cities of stated sizes from the Census of Population; and from the Statistical Abstracts and a variety of other sources.

*Economic manpower*

Siegel thinks that the use of the term 'economic manpower' to embrace gainful workers and labor force should not be regarded as more than a "terminological convenience". Since the more sharply defined labor force concept has been stressed, it has become something of a fad to hold up one's hands in horror at the thought of such a violation of logic. I shall attempt to show, however, that it is a violation of the logic of appearances rather than of reality. First, I shall demonstrate that the inaccuracies of the 1930 gainful workers figures are not as gross as is frequently believed, next show known areas of error in the 1940 labor force figures. It should then be apparent that all Census data, as well as demographic and economic data in general, can be only approximations.

Much is made of the part of the labor force definition that excludes seasonal workers not currently working or seeking work. This group is estimated to have swelled the 1930 gainful workers figure by 1,156,000.<sup>1</sup> However, the number of such seasonal workers cannot be larger than the total number of workers reported by the 1930 Census in unemployment class E. In the 1930 Census all gainful workers who did not work on the day preceding the enumerator's visit were first classified according to whether they did or did not have a job. Persons who had no jobs were divided into those who were and were not able to work. All seasonal workers who did not have jobs and were able to work were then classified according to whether or not they were looking for work. Seasonal workers who did not have jobs, were able to work, and were not looking for jobs were classified with other such groups and reported in unemployment class E. There is no other unemployment class in which such seasonal workers could properly be included. The total of all persons reported in unemployment class E was 88,000.<sup>2</sup> The Census adjustment for such seasonal workers, 1,156,000, compares with this outside limit in class E.

That a possible error in classifying the jobless in 1930 is not as large as the one indicated by the adjustment in the Census study is evident when the adjustment for the age group 14-19 is com-

<sup>1</sup> *Estimates of the Labor Force, Employment, and Unemployment, 1940 and 1930*, p. 9.

<sup>2</sup> 1930 Census, *Unemployment*, Vol. 1, p. 2.

pared with the number of reported unemployed in these ages in the 1930 Census. The Census adjustment of student seasonal workers aged 14-19, 381,000, is about 10,000 larger than the total number in these ages in classes A and B unemployed, plus an estimated number in other classes of jobless workers. Mathematically, that leaves a minus quantity for unemployed youth in 1930. The rate of unemployment for youth must obviously have been larger than that for all gainful workers.

Apparently, then, the degree of incomparability between gainful workers and labor force due to the inclusion of seasonal workers not currently working or seeking work has been greatly exaggerated. This overadjustment is nearly equal to the entire net adjustment to gainful workers for comparability with labor force made in the Census study. After careful examination of the other adjustments I have arrived at the considered opinion that only a small part can be justified.

To be sure, the concept of labor force is more precise and is surrounded by a smaller twilight area. But my tables are not tables of concepts but tables of figures intended to represent them as well as the Bureau of the Census could. Attention therefore should be on how well the figures fit the concepts rather than the concepts themselves.

In 1940 the labor force concept covered all emergency workers—those on WPA work relief, in the CCC, NYA students, in NYA out-of-school program, etc. This is an area for which the degree of accuracy can be measured. Persons on work relief at Census time numbered 3,526,000, of whom only 2,529,000 were enumerated as in the labor force.<sup>3</sup> NYA student workers on the rolls in April 1940 numbered 484,000, of whom only about 122,000 were counted in the labor force.<sup>4</sup> There was, then, 28 percent underreporting of emergency workers, and it was much greater for one component.

As the techniques of enumeration improved, the Census Bureau recognized substantial errors in other areas. The original Census

<sup>3</sup> *Estimates of the Labor Force, Employment, and Unemployment, 1940 and 1930*, p. 4.

<sup>4</sup> *National Youth Administration, 1940 Annual Report*, p. 70; *Estimates of the Labor Force, Employment, and Unemployment, 1940 and 1930*, p. 5.

figures were revised upward, and the latest estimate of the labor force—for March 1940—is nearly 2,000,000 higher. If for no other reason than that it is based on a small sample enumeration, the latest revision remains an estimate.

To expect Census tabulations, either industry or population, to be more than approximations is to expect the impossible. Even if Congress appropriates enough money to train enumerators for the 1950 Census and the quality of the resultant data is higher, the figures will still be significantly short of perfect. And Census to Census comparisons of gainful worker figures or of gainful worker and labor force figures, or indexes of them, can be only approximations.

#### *Manufacturing industries and independent hand trades*

Various questions have been raised about the inclusion of the independent hand trades with manufacturing industries. Miss Palmer is quite right in that the form in which Census data are available left no better alternative. She expressed the opinion that the totals for the commodity producing industries are slightly higher in relation to service industries than they would be if the 1940 classification were used. However, that question is less pertinent than whether more accurate divisions into commodity producing and service industries would be obtained by using the 1940 classification or the 1930 classification throughout. I am satisfied that the 1930 classification gave the better division into commodity producing and service industries. The largest components of the independent hand trades are blacksmiths, dressmakers, seamstresses, milliners and millinery dealers, shoemakers, carpet weavers, blanket weavers, piano and organ tuners, and jewelers and watchmakers.

In 1870 about three-fourths of the population lived in communities with fewer than 2,500 inhabitants. Independent handicrafts played a more important part in the production of commodities in the post-Civil War period than in more recent years. In the post-Civil War period dressmaking also was done to a large degree by independent dressmakers and seamstresses working in homes.

In 1889, 39,000 wage earners were employed in women's clothing industries whereas in 1890 dressmakers and seamstresses numbered 440,000. Even in 1910, there were 450,000 dressmakers and seamstresses not in factories, a group about 5 percent as large as the manpower in all manufacturing industries. Blanket and carpet weavers also are commodity producers.

Blacksmithing is reputed to be the father of the metal mechanical arts. In smaller communities a substantial part of the work now done in machine shops was, after the Civil War, done by blacksmiths. They were less horse shoers than metal fabricators. There was much working of iron and steel to produce and repair wagons, agricultural implements, block and tackle, chains, hardware, etc., involving shaping, heat treating, quenching, drilling, grinding, and other operations. Toward the end of the century horseshoeing became a more important part of the blacksmith's work, reaching its peak in the first decade of the 20th century. In the two decades before 1910, horseshoeing became a fine art; horse-shoes were made to correct or alleviate various hoof ailments. Blacksmiths are now considerably fewer. All in all, they may be regarded as substantially commodity producing.

Milliners are commodity-producing, millinery dealers service-producing. Many dealers combined commodity production with the service function, especially in the early part of the period covered in the study. An error is introduced if the workers who performed both functions are classified under either. Also in the early part of the period, 'shoemakers' included a larger proportion of custom shoemakers and a smaller proportion of cobblers. Jewelers and watchmakers, other than those in factories and stores, and piano and organ tuners are, of course, service-producing.

Even if only dressmakers, dressmakers' apprentices, seamstresses, and blanket and carpet weavers, are considered as commodity producers, more than half of the independent handicraftsmen were clearly commodity-producing workers. If blacksmiths are added, this group would constitute about three-fourths of the independent handicraftsmen. Classifying independent hand trades with the commodity-producing industries clearly seems more satisfactory than classifying them with the services.