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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.[1] 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-

[1] *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
Commodity producing	9,686	13,015	16,840	19,679	23,172	25,679	25,918	25,258	25,703
Agriculture	6,430	8,607	9,994	10,705	11,343	11,117	10,484	10,176	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	1,663	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
Service	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	896	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	2,407	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
Commodity producing	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	22.5	22.2	22.4
Service	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
Commodity producing	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
Service	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
Commodity producing	34.4	29.4	16.9	17.8	10.8	0.9	1.8
Agriculture	33.9	16.1	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
Service	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	26.0	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				
Total	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		
Gold & silver mining	64,353	39,212	22,252	119,938	137,937
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				
Total	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		
Gold & silver mining	6.1	3.2	1.9	10.3	12.4
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)				
Total	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		
Gold & silver mining	100.0	60.9	34.6		68.4
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				
Total		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		
Gold & silver mining		−39.1	−43.3		15.0
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.[a]	7,368,124	10,371,790	10,625,238	10,608,871	11,756,382
Independent hand trades[a]	864,145	510,226	360,329	158,384	187,775
Mfg. industries, total	7,368,124	10,371,790	10,625,238	10,608,871	11,756,382
Chemical & allied industries[b]	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.[a]	89.5	95.3	96.7	n.a.	n.a.
Independent hand trades[a]	10.5	4.7	3.3	n.a.	n.a.
Mfg. industries, total	100.0	100.0	100.0	100.0	100.0
Chemical & allied industries[b]	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.[a]	100.0	140.8	144.2		159.8
Independent hand trades[a]	100.0	59.0	41.7		n.a.
Mfg. industries, total	100.0	140.8	144.2		159.8
Chemical & allied industries[b]	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.[a]		40.8	2.4		10.8
Independent hand trades[a]		−41.0	−29.4		n.a.
Mfg. industries, total		40.8	2.4		10.8
Chemical & allied industries[b]		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 (*continued*)				
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.
[a] 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.
[b] 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
	NUMBER				
Total	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	7,48713	34,188	9,642		
Stockyards	8,365	39,266	17,763	43,449	49,914
Other & n.s. transp. & communication	1,844	5,174	11,747		
	PERCENTAGE DISTRIBUTION				
Total	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	3.5	3.8
Other & n.s. transp. & communication	0.3	0.6	0.9		
	INDEX (1910: 100.0)				
Total	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		n.c.
Other & n.s. transp. & communication	100.0	n.c.	n.c.		
	PERCENTAGE CHANGE FROM PRECEDING CENSUS				
Total		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		n.c.
Other & n.s. transp. & communication		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
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
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.[2]

[2] 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		
Domestic service	2,341,864	1,695,356	2,326,857	3,217,876	3,356,379
Apt. house & office bldg. care & maintenance		178,272	298,090		
Domestic & personal service n.e.c.		115,505	29,406		
	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		
Domestic service	63.8	50.9	48.3	63.7	58.9
Apt. house & office bldg. care & maintenance		5.3	6.2		
Domestic & personal service n.e.c.		3.5	0.6		
	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		
Domestic service	100.0	84.9	113.3		124.7
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		−13.0	37.5		4.3
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.[3] 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

[3] 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.[4] 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.[5] In 1930 about 2,700,000 families took lodgers,[6] 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.[7] 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.

[4] *Ibid.*, p. 23 and 'Underenumeration in the Census as Indicated by Selective Service Data', by R. J. Myers, *American Sociological Review*, June 1948.
[5] 1910 Census, 'Instructions to Enumerators', *Population*, p. 157.
[6] 1930 Census, 'Population Bulletin, Families', United States Summary, Table 32.
[7] 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 linemen 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' ",[8] 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,[9] 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.[10] 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

[8] 1910 Census, *Population*, IV, p. 21.

[9] 1940 Census, *Population*, III, Part 1, Table 78.

[10] 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.[11]

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,

[11] 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.[12] 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-

[12] *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.[13] 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-

[13] 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.[14] 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,

[14] 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.[15] 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.[16]

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

[15] 1900 Census, *Special Report on Occupations*, p. lxvi.

[16] 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,[17] 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.

[17] *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.[18] 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.[19]

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[a]	1890							
		Uncorrected	Corrected by Census	Difference between 1890 & 1900	Estimated %, 1890		Corrected	Uncorrected	Adjustment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10–15	26.1	14.3[b]	25.9[b]	−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[c]			69.4	3,248,711	2,254,224	1,904,865[c]	
16–20	76.8[a]				76.8	3,193,203	2,451,011	2,067,944[d]	383,067
21–24	93.1[a]								
16–24	83.9[a]	79.9[a]							
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[a]	97.4[a]		+1.1					

* Estimated.

[a] 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.

[b] *Ibid.*, Table XI, p. lxxi.

[c] *Compendium of the 11th Census*, Part 3, Population, p. 382.

[d] 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

[18] 1910 Census, *Population*, IV, 26.

[19] This relation was originally developed in Works Project Administration National Research Project, 'Labor Supply and Employment', by Daniel Carson (mimeo., 1939), Table 36.

known.[20] 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.[21]

[20] See the discussion below of a 1920 adjustment.

[21] 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.[22]

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[b]	65.2[b]		
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

[a] Relative changes in school attendance in the ages above 15 were not taken to indicate changes in worker rates.
[b] 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

[22] See his 'Labor Force in Wartime America', NBER, *Occasional Paper 14*, March 1944, p. 40 and Table 2.

amounted to 819,000.[23] 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[a]
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[a]
Rural women 45 & over attached to agriculture		5.6	5.9	4.9[a]
Males 16 & over in labor market		91.0	89.9	88.0
Males 16–20 in labor market[a]	76.8	71.5	68.0	55.7

[a] Computed for this study. The 1900 percentage for males 16–20 was obtained from the 1900 Census (see Table 13).

[23] 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.[24]

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

[24] 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	
AGRICULTURE		
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, 97	Parts of, covering gardeners
	9282	Part of, covering boarding kennels
FORESTRY AND FISHING		
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.
EXTRACTION OF MINERALS		
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
	146	Gypsum mining
Oil wells & gas wells	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	
EXTRACTION OF MINERALS (concl.)		
Other & not specified mining (concl.)	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
CONSTRUCTION		
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 contractors (subcontractors) (except dismantling steel oil tanks [contracting])
	8799	Part of, covering sign painting shops & interior decorators (consulting services)
Construction & maintenance of streets & roads	162	Highway & street construction (except elevated highways)
	1631	Part of, covering drainage project construction
	7441	Part of, covering toll roads, separately operated
	8321	Part of, covering sewer system operation
MANUFACTURING		
Manufacturing	20–39	Manufacturing industries (except 2411, logging camps & logging contractors)
	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 repair; piano & organ tuning, part of 8951; tinsmithing, mattress renovating & repair, & umbrella repair, 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; tinsmithing, 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	
TRANSPORTATION AND PUBLIC UTILITIES		
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
MISCELLANEOUS TRANSPORTATION AND COMMUNICATION		
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
Warehouses & cold storage	79	Warehousing & 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	
TRADE		
Advertising	871	Advertising
Wholesale & retail trade Grain elevators	40–61	Wholesale & retail trade (except 4993, bakeries with retail stores, and 56, eating & drinking places)
	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
FINANCE, INSURANCE, AND REAL ESTATE		
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	
GOVERNMENT SERVICE		
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
PROFESSIONAL SERVICES AND AMUSEMENTS		
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 & bookkeeping)
	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	
DOMESTIC AND PERSONAL SERVICE		
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	
Agriculture		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)
Forestry & fishing Forestry		Added: Forestry	Foresters, forest rangers, & timber cruisers; owners & managers of log & timber camps; lumbermen, raftsmen, & woodchoppers
Fishing		Added: Fishermen & oystermen	Fishermen & oystermen
Extraction of minerals	Omitted: Salt wells & works*	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	Operatives
Oil wells & gas wells		Added: Surveyors; chemists, assayers, metallurgists; draftsmen; lawyers; agents n.e.c; commercial travelers; credit men	Operatives
Other & not specified mines		Added: Surveyors; chemists, assayers, metallurgists; lawyers; agents n.e.c; commercial travelers	Operatives
Construction	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'
Manufacturing	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	
Manufacturing (concl.)			
Chemical & allied industries	Added: Salt works & wells*	Added: salt works & wells*	
Charcoal & coke works		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c; commercial travelers	Operatives; laborers
Explosives, ammunition, etc.		Added: Chemists, civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Fertilizer factories		Added: Chemists; agents n.e.c; commercial travelers, credit men	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
Cigar & tobacco		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers

Clay, glass & stone industries			
Brick, tile & terra-cotta		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Glass factories		Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c; commercial travelers; credit men	Operatives; laborers, glass blowers
Lime, cement & artificial stone		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Marble & stone yards		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Stonecutters; operatives; laborers
Potteries		Added: Chemists; civil engineers & surveyors; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Clothing industries			
Corset factories		Added: Agents n.e.c; commercial travelers; credit men	Operatives; laborers
Glove factories		Added: Agents n.e.c; commercial travelers; credit men	Operatives; laborers
Hat factories (felt)		Added: Chemists; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Shirts, collars, & cuffs		Added: Agents n.e.c; commercial travelers; credit men	Operatives; laborers
Suit, coat, & overall		Added: Draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers; tailors & tailoresses
Other clothing factories		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910–30 used for 1920 interpolation
	1930	1910	
Food & allied industries			
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

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

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910–30 used for 1920 interpolation
	1930	1910	
Metal industries (except iron & steel)			
Brass mills		Added: Chemists, assayers, & metallurgists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Operatives; laborers; molders, founders & casters
Clock & watch factories		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	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 & surveyors; agents n.e.c; 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		Added: Commercial travelers	Operatives; laborers
Leather belt, leather goods, etc.		Added: Chemists; draftsmen; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Shoe factories		Added: Chemists; lawyers; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Tanneries		Added: Chemists; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Trunk, suitcase, & bag		Added: Agents n.e.c; commercial travelers	Operatives; laborers
Lumber & furniture industries			
Furniture factories		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Cabinet makers; operatives; laborers; upholsterers
Piano & organ		Added: Agents n.e.c; commercial travelers; credit men	Operatives; laborers
Saw & planing mills (incl. wood box factories)		Added: Chemists; civil engineers & surveyors; lawyers; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Other woodworking factories		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Coopers; operatives; laborers
Paper & printing & allied industries			
Blank book, envelope, tag, bag, etc.		Added: Chemists; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Paper & pulp mills		Added: Chemists; civil engineers & surveyors; agents n.e.c; commercial travelers; credit men	Operatives; laborers
Paper box factories		Added: Chemists; draftsmen; agents n.e.c; commercial travelers	Operatives; laborers

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910–30 used for 1920 interpolation
	1930	1910	
Paper & printing & allied industries (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
Textile industries			
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

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

TABLE 16 (cont.)

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

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

TABLE 16 (cont.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910–30 used for 1920 interpolation
	1930	1910	
Misc. transportation & communication (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'
Trade	Omitted: Stockyards; warehouses & cold storage	Omitted: Stockyards; warehouses & cold storage; occupations in not specified industries & service groups	
Advertising agencies		Added: Agents n.e.c.	† Proprietors; laborers
Grain elevators			
Wholesale & retail trade		Added: Lawyers; civil engineers & surveyors; chemists Omitted: Agents n.e.c. for other industries; credit men in other industries; commercial travelers in other industries	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
Trade not specified		(the residue)	†
Finance, insurance, & real estate			
Banking & brokerage		Added: Lawyers; civil engineers & surveyors; commercial travelers; agents n.e.c; credit men	Bankers, brokers, & money lenders
Insurance		Added: Commercial travelers; credit men; civil engineers & surveyors; lawyers	Agents, managers, & officials

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

TABLE 16 (concl.)

Industry	Occupations and Industries Added or Omitted		Selected Occupations 1910–30 used for 1920 interpolation
	1930	1910	
Professional service (incl. recreation & amusements) (concl.)			
Recreation & amusements		Added: Musicians & music teachers; actors & showmen; billiard room, dance hall, skating rink, etc., keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners, managers, & officials; stage hands & circus helpers; theatre ushers; laborers, recreation & amusements; attendants, billiard, bowling, dancing establishments	Musicians & music teachers; actors & showmen; billiard room, dance hall, skating rink, etc., keepers; keepers of pleasure resorts, race tracks, etc.; theatrical owners; managers, & officials; stage hands & circus helpers; theatre ushers; laborers, recreation & amusements; attendants, billiard, bowling, dancing establishments
Domestic & personal service		Added: Chemists; civil engineers & surveyors; agents n.e.c; credit men Omitted: Public school janitors; attendants, poolroom, etc.; billiard room, dance hall, skating rink, etc. keepers	
Laundries		Added: Civil engineers & surveyors; commercial travelers; chemists	Owners, managers, & officials; operatives (except delivery men)
Cleaning, dyeing, & pressing shops		Added: Cleaning, dyeing, & pressing shops	Cleaning, dyeing, & pressing shop workers (proprietors, managers, officials, foremen, laborers, other operatives)
Hotels, lodging houses, & eating & drinking places			Hotel keepers & managers; boarding & lodging house keepers; restaurant, cafe, & lunchroom keepers; cooks, male; waiters; housekeepers & stewards* (11.9% of total); saloon keepers & bartenders

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

* See accompanying text.

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

[b] 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
Forestry & fishing		
Fishing	*	.99
Forestry	.97	.91
Mining		
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
Construction industry		
Building construction & 'other' engineering construction	*	.78
Construction & maintenance of streets & roads	.78	.71
Manufacturing industries & independent hand trades		
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.[25] Notes on most of the estimates follow the listing.

AGRICULTURE
Agricultural laborers*
Dairymen & dairywomen
Farmers, planters, & overseers
Gardeners, florists, nurserymen, etc.*
Stock raisers, herders, & drovers
Other agricultural pursuits

FORESTRY AND FISHING
Fishermen & oystermen
Lumbermen & raftsmen
Wood choppers

EXTRACTION OF MINERALS
Miners & quarrymen
Oil well employees
Officials of mining & quarrying companies

CONSTRUCTION
Carpenters & joiners
Masons (brick & stone)
Painters, glaziers, & varnishers
Paper hangers
Plasterers
Plumbers, gas & steam fitters
Roofers & slaters
Builders & contractors
Apprentices not included with tradesmen*

MANUFACTURING INDUSTRIES AND INDEPENDENT HAND TRADES
Candle, soap, & tallowmakers
Oil refinery operatives
Salt works employees
Other chemical workers
Brick & tile makers
Glasswork operatives
Marble & stone cutters
Potters
Bakers
Butter & cheese makers

[25] 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
Tinplate & tinware makers
Other metal workers
Boot & shoemakers & repairers
Harness & saddle makers
Leather curriers, 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
Seamtresses
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, & REAL ESTATE
Bankers & brokers
Bank officials*
Insurance company officials*
Insurance agents and collectors*
Real estate officials, collectors & agents*

TRANSPORTATION & 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 & 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 & 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
- Foresters, forest rangers and timber cruisers

Construction
- Electricians
- Well borers
- Wreckers
- Foremen and overseers (roads and streets)

Manufacturing industries and hand trades
- Apprentices n.e.c.

Transportation and public utilities
- Officials (transportation and public utility)
- Employees of express companies (not clerks)
- Foremen and overseers (transportation and public utility)
- Others in transportation

Miscellaneous transportation and communication
- Stockyard employees
- Officials (misc. transportation)

Trade
- Apprentices in stores
- Decorators, drapers, and window dressers
- Porters and helpers in stores, etc.
- Rag pickers
- Foremen, overseers, and floorwalkers
- Officials (trade)

Government service
- Garbage men and scavengers

Professional services and amusements
- Billiard room, bowling alley, dance hall, etc., keepers
- Ditto, attendants
- Fortune tellers, hypnotists, and spiritualists
- Stage hands, circus helpers, and theatre ushers
- Teachers, other than public school
- Technical and laboratory assistants
- Professors in colleges and universities
- Trained nurses
- Engineers (technical)

Domestic and personal service
- Nurses and midwives (except trained nurses)

Repeater Occupations

The occupations treated as 'repeater' include:

- Agents and collectors
- Blacksmiths
- Clerks, copyists, bookkeepers, and accountants
- Draymen, hackmen, teamsters, etc.
- Messenger, errand, and office boys
- Stenographers and typists
- Laborers
- Packers and shippers
- Weighers, gaugers, and measurers
- 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 ÷ 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 (1910: 100.0)	Index of characteristic occupations		Draymen, hackmen, teamsters, etc.	Index of characteristic occupations		Draymen, hackmen, teamsters, etc.	Index of characteristic occupations		Draymen, hackmen, teamsters, etc.	Index of characteristic occupations		Draymen, hackmen, teamsters, etc.
	New classif.[a]	Old classif.		Unadj.[b]	Adj.[c]		Unadj.[b]	Adj.[c]		Unadj.[b]	Adj.[c]		Unadj.[b]	Adj.[c]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Index of draymen, hackmen, teamsters, etc.			100.0	16.7			24.1			50.1			73.2		
Weighted index of characteristic occupations, all industries included below			100.0	24.6			39.6			66.2			83.3		
INDUSTRY															
Forestry & fishing	15,038	14,153	100.0	23.7	16.1	2,279	36.9	22.4	3,176	69.5	52.6	7,443	77.1	67.8	9,591
Extraction of minerals	28,186	26,528	100.0	17.7	12.0	3,183	26.9	16.4	4,348	41.9	31.7	8,417	62.0	54.6	14,475
Construction	8,538	8,036	100.0	33.9	23.0	1,845	39.2	23.9	1,917	66.5	50.3	4,041	71.7	63.1	5,069
Manufacturing	99,621	93,762	100.0	23.4	15.8	14,862	34.2	20.8	19,493	50.2	38.0	35,602	64.3	56.6	53,043
Transp. & pub. utilities	20,260	19,068	100.0	17.1	11.6	2,214	23.8	14.5	2,755	42.1	31.8	6,067	54.3	47.7	9,103
Misc. transp. & communication	351,479	330,806	100.0	27.0	18.3	60,507	46.8	28.5	94,116	82.3	62.2	205,932	100.4	88.3	292,115
Trade	207,147	194,963	100.0	25.1	17.0	33,146	37.6	22.9	44,589	57.9	43.8	85,357	75.0	65.9	128,505
Govt. service	11,975	11,271	100.0	20.7	14.0	1,584	32.9	20.0	2,255	48.4	36.6	4,127	63.0	55.4	6,241
Professional service	1,987	1,870	100.0	23.1	15.7	293	35.0	21.3	398	54.9	41.5	777	73.5	64.7	1,209
Domestic & personal service	37,855	35,628	100.0	11.1	7.5	2,676	20.9	12.7	4,539	39.8	30.1	10,736	62.5	55.0	19,582
Total	782,086														
Census total		736,085[e]				122,589[f]			177,586[f]			368,499[f]			538,933[f]
Adjustment factor	0.941			0.6782[d]			.6085[d]			0.7565[d]			0.8794[d]		

[a] 1910 Census, *Population*, IV, Table VI.
[b] Indexes, on a 1910 base, of the number of workers with occupations characteristic of the respective industry divisions.
[c] Adjusted to the level of the index for draymen, teamsters, hackmen, etc.
[d] Ratio of the index of the total of repeater occupations to the weighted index of the total of characteristic occupations in included industries.
[e] 1910 Census, *Population*, IV, Table 15.
[f] 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[a]	Index of characteristic occupations	Index of characteristic occupations[b]	1st approx.	Adj. approx.	Index of characteristic occupations[b]	1st approx.	Adj. approx.	Index of characteristic occupations[b]	1st approx.	Adj. approx.	Index of characteristic occupations[b]	1st appox.	Adj. approx.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Agriculture	c		c	170,036	192,375	c	1,046,767	940,578	c	449,202	438,885	c	389,809	443,742
Forestry & fishing	c		c	2,416	2,733	c	7,117	6,395	c	10,122	9,890	c	18,997	21,625
Mining	c		c	14,136	15,993	c	37,880	34,037	c	37,026	36,176	c	93,208	106,104
Construction	508,308	100.0	33.9	172,113	194,724	39.2	199,257	179,043	66.5	337,872	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	c		c	31,348	35,466	c	48,602	43,671	c	87,008	85,010	c	118,056	134,390
Transp. & pub. utilities excl. steam rr. & water transp.	63,042	100.0	4.0	2,496	2,824	10.0	6,304	5,664	26.8	16,895	16,507	43.4	27,373	31,160
Water transp.	77,080	100.0	118.1	91,008	102,964	116.4	89,729	80,626	101.1	77,912	76,123	103.1	79,462	90,456
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	43,195	37.6	57,231	51,425	57.9	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	266
Govt. service	63,007	100.0	20.7	13,049	14,763	32.9	20,723	18,621	48.4	30,502	29,802	63.0	39,669	45,158
Professional service	2,309	100.0	23.1	533	603	35.0	808	726	54.9	1,268	1,239	73.5	1,698	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			2,069,130			1,958,346			2,309,696	
Census total					1,032,084[e]			1,859,223[e]			1,913,373[e]			2,629,262[e]
Adj. factor[q]				1.131[d]			0.899[d]			0.977[d]			1.138[d]	

[a] 1910 Census, *Population*, IV, Table VI, p. 302.
[b] Indexes, on a 1910 base, of the number of workers with occupations characteristic of the respective industry divisions.
[c] The indexes of characteristic occupations were not used for agriculture, forestry and fishing, mining, or steam railroads. See text
[d] Ratio of Census total to total of first approximations.
[e] 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)[a]	270,223[d]	418,957	750,017	1,017,653	1,699,420
Miles of road operated[b]	52,922	93,262	156,404	192,556	240,831
Employees per mile of road	4.80[d]	4.49	4.80	5.28	7.06
Estimated employees, based on employees per mile of road	252,106				
Link relative, employees per mile of road		0.935	1.07	1.10	1.34
Steam rr. employees (Census)[c]	154,027	236,058	462,213	582,150	1,084,544
Ratio, Census to ICC	0.57[d]	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	

[a] 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.*
[b] *Statistical Abstract, 1941*, Table 499.
[c] 1900 Census, *Special Report on Occupations*, pp. xxxii ff; 1910 figure from 1910 Census, Table 15.
[d] 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*.[26] 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

[26] 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[a]	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)[b]	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[c]								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	

[a] *Census of Agriculture, 1900*, 1, 688.

[b] *Comparative Occupation Statistics for the United States, 1870–1940*, by Alba M. Edwards, p. 142.

[c] 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,[1] 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 nonfarm 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

[1] 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').[2]

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

[2] 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
Manufacturing	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
Nonmanufacturing	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
Manufacturing	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
Nonmanufacturing	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.[1] 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.[2] 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-

[1] *'Estimates of the Labor Force, Employment, and Unemployment, 1940 and 1930'*, p. 9.
[2] 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.[3] NYA student workers on the rolls in April 1940 numbered 484,000, of whom only about 122,000 were counted in the labor force.[4] 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

[3] *Estimates of the Labor Force, Employment, and Unemployment, 1940 and 1930*, p. 4.
[4] *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; horseshoes 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.