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PART II

THE BEHAVIOR OF UNEMPLOYMENT

ANNUAL ESTIMATES OF UNEMPLOYMENT
IN THE UNITED STATES, 1900-1954

STANLEY LEBERGOTT

BUREAU OF THE BUDGET

THE present paper is a preliminary report on estimates of unemployment for the period since 1900 intended to be consistent with the series currently reported by the Census Bureau in its Current Population Survey. These estimates have been derived as part of a broader project of estimating labor force and detailed employment and unemployment series for this period. Their function is to indicate the broad changes that have occurred over these decades, and mark the major year to year shifts in employment and unemployment. The discussion is focussed on four chief topics: the nature of unemployment measures; unemployment estimates as a measure of economic change; unemployment estimates as a measure of the level of unemployed manpower; and methods by which the present series was estimated.

1. The Nature of Unemployment Measures

Unemployment as measured in statistical series is a residual phenomenon. It reflects chiefly the number of persons who are disemployed *and remain without work*. Variations in the demand for labor do not *per se* produce unemployment. It is necessary for the needs and attitudes of those composing the labor force to complement these variations before unemployment is produced. Hence, a comparison of unemployment figures for, say, 1906 and 1946 will be a comparison, in part, of variations in demand and, in part, of variations in needs and attitudes of those in the labor force.

One of the most important single changes in the composition of the labor force over the past century has been the replacement of immigrant males and children by women. In 1900, 18 per cent of our labor was female. By 1952, the proportion was 31 per cent. A substantial part of the increased proportion tends to be in the labor force to supplement family incomes. The difference of 13 per cent, therefore, tends to give an unprecedented flexibility to the labor force. It was assumed previously that variations in the demand for labor would require com-

Note: The present estimates are unofficial and have no connection with the work of the Bureau of the Budget. They will differ somewhat from preliminary estimates that have been used in *Potential Economic Growth of the United States During the Next Decade*, Joint Committee on the Economic Report, 83d Cong., 2d sess., 1954, and are associated with different employment estimates than those used in the 1950 *Economic Report of the President.*

mensurate variations in unemployment. It has now become clear that because of the increased role of women in the labor force considerable variations in demand can be taken up without equally considerable variations in unemployment. When many of these women become dis-employed, they do not, like the male labor force, become unem-ployed—they leave the labor force. The most spectacular example of this, of course, was the transition in 1945-1946. But even during such a stable year as 1952, roughly 10 million women who were not regular workers worked part of the year, withdrawing from the labor force at the end of their work.[1]

A second factor to be considered in historical comparisons partially offsets this tendency—namely the diminished role of farm employment. In 1900 farmers were more numerous than manufacturing employees; today they constitute less than a third. Since unemployment on the farm customarily tends to take the form of underemployment, the expected float of visible unemployment today would tend to be higher because of the shift to urban employment. (As a partial method of allowing for this, estimates are shown in Table 1 for the ratio of unemployment to the nonfarm employee labor force.)[2]

A third factor is the difference in social attitude. In 1900 we had no unemployment insurance system and no network of employment service offices. By 1954, we had an unemployment insurance system plus broad-scale unionization, a basically different orientation by business as to its own obligations and those which the government should assume. Instead of unemployment being considered primarily as a personal fault, it had come to be considered as one aspect of any large-scale complex economy. As a result of all this, we may get better reporting of actual unemployment now than in 1900. Housewives are less ashamed to admit to a Census Bureau enumerator that the family head is unemployed.[3] (Even since 1933 the reporting of unemployment may have been more adequate than previously—although this is very much of an a priori hypothesis.)

Experience suggests a greater reporting of unemployment during the depression, when there is greater sensitivity to it than at other times. As one indication one may note that the unemployment census of

[1] *Work Experience of the Population in 1952*, Bureau of the Census, Series P-50, No. 48, 1953. This estimate includes those who worked less than forty weeks dur-ing the year. One might properly include even more. The average level of unem-ployment over the year was both low and reasonably steady while the gross changes in unemployment revealed no sharp shifts.

[2] For a fuller discussion of this measure see the writer's "Earnings of Nonfarm Employees in the U.S., 1890-1946," *Journal of the American Statistical Association*, March 1948, pp. 87-88.

[3] The change is embodied in the shift from the characteristic phrase of the early depression—"some folks won't work"—to the 1945-1946 phrase, "the 52-20 Club."

TABLE 1

Unemployment, Annual Average, 1900-1954

(*number in thousands of persons 14 years old and over*)

Year	Number Unemployed	Change from Previous Year	Per Cent of Civilian Labor Force	Per Cent of Nonfarm Employees
1900	1,420		5.0	8.7
1901	710	−710	2.4	4.3
1902	800	90	2.7	4.5
1903	800	0	2.6	4.4
1904	1,490	690	4.8	7.9
1905	1,000	−490	3.1	5.1
1906	280	−720	0.8	1.4
1907	600	−320	1.8	2.9
1908	2,960	2,360	8.5	13.5
1909	1,870	−1,090	5.2	8.2
1910	2,150	280	5.9	9.1
1911	2,290	140	6.2	9.5
1912	1,960	−330	5.2	7.9
1913	1,680	−280	4.4	6.6
1914	3,110	1,430	8.0	11.9
1915	3,840	730	9.7	14.3
1916	1,920	−1,920	4.8	7.1
1917	1,920	0	4.8	7.0
1918	560	−1,360	1.4	2.1
1919	950	390	2.3	3.4
1920	1,670	720	4.0	5.8
1921	5,010	3,340	11.9	16.9
1922	3,220	−1,790	7.6	10.9
1923	1,380	−1,840	3.2	4.6
1924	2,440	1,060	5.5	8.0
1925	1,800	−640	4.0	5.9
1926	880	−920	1.9	2.8
1927	1,890	1,010	4.1	5.9
1928	2,080	190	4.4	6.4
1929	1,550	−530	3.2	4.7
1930	4,340	2,790	8.9	13.0
1931	8,020	3,680	15.9	23.3
1932	12,060	4,040	23.6	34.0
1933	12,830	770	24.9	35.3
1934	11,340	−1,490	21.7	30.6
1935	10,610	−730	20.1	28.4
1936	9,030	−1,580	17.0	23.9
1937	7,700	−1,330	14.3	20.0
1938	10,390	2,690	19.0	26.4
1939	9,480	−910	17.2	23.8

TABLE 1 (continued)

(*number in thousands of persons 14 years old and over*)

Year	Number Unemployed	Change from Previous Year	Per Cent of Civilian Labor Force	Per Cent of Nonfarm Employees
1940	8,120	−1,360	14.6	20.2
1941	5,560	−2,560	9.9	13.3
1942	2,660	−2,900	4.7	6.3
1943	1,070	−1,590	1.9	2.5
1944	670	−400	1.2	1.6
1945	1,040	370	1.9	2.5
1946	2,270	1,230	3.9	5.2
1947	2,140	−130	3.6	4.7
1948	2,064	−76	3.4	4.5
1949	3,395	1,331	5.5	7.3
1950	3,142	−253	5.0	6.6
1951	1,879	−1,263	3.0	3.8
1952	1,673	−206	2.7	3.4
1953	1,602	−71	2.5	3.2
1954	3,230	1,628	5.0	6.3

Source: 1900-1928, present estimates; 1929-1939, *Monthly Labor Review*, July 1948; 1940-1954, Bureau of the Census.

November 1937 found 11.0 million totally unemployed and emergency workers—or substantially above what the present estimates indicate.[4] Such an excess is not likely to appear in the current series but some tendency may recur.

A fourth significant factor is the extensive development of paid vacations. Summer declines in demand, seasonal shutdowns, and changes in models produced unemployment in earlier years. They still do today, but the growth in paid vacations provides a slack in the labor force without a corresponding amount of unemployment. A forced vacation is one thing; going fishing while on paid vacation is another. Some 4 million persons with jobs reported themselves on vacation in July 1951—3 million of them on paid vacations—while millions vacationed in other months.[5] Though no precise estimate can be made the data do indicate that vacations are ten times as common now as in 1900.[6]

[4] The 1937 average was 7.7 million and the 1938, 10.4. Since November was at the end of a recession beginning in June, one would expect the November figure to be somewhere between 7.7 and 10.4—perhaps about 9 million.

[5] Unpublished census data. Data for other recent years on vacations suggest similar results, but were not used because they include the effect of the Fourth of July holiday.

[6] This estimate is derived as follows. In the 1901 Cost of Living Survey of 24,402 families some 784 gave vacation as a cause of nonemployment, with an average duration of 2.61 weeks (*Eighteenth Annual Report of the Commissioner*

One would expect that the great improvements in public health and declines in mortality would lead to a decline in unemployment because of illness.[7] The data, however, suggest that the unemployment comparisons between the two dates are not much affected by this factor. Data for nonfarm male workers are available for several dates in the period. In 1900, an average of a week a year was lost in illness; in 1915-1917, about the same; and nationwide surveys in February 1949 and September 1950 again report a similar figure.[8] If valid, such similarity may indicate simply that the effects of improvements in general health have been offset by the decrease in the proportion of children and younger workers employed, the rise in the proportion of older workers, greater willingness to hire disabled workers, etc.

The various changes in the economic and social order which have accompanied changes in unemployment necessarily affect comparisons of unemployment over the years. But they do not vitiate the meaningfulness of such comparisons. For they represent a variation of the familiar index number problem and must be solved as the latter usually is by "looking the difficulty boldly in the face, and then passing on."

2. Unemployment Estimates as a Measure of Economic Change

How does the pattern of economic change indicated by the present unemployment series compare with that indicated by other series and other measures of economic change?

The comparative change in the present and other unemployment series is indicated in Table 2—where the series are presented—and in Table 3—where comparisons are made of year to year changes. The broad picture shows no startling changes in the way we are accustomed to considering this period: 1921 is still a year of major recession; 1908, 1914, 1924, 1927 are still years of recession. But the general magnitude of unemployment as measured by the present series never-

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of Labor, Depts. of Commerce and Labor, 1903, pp. 287, 291). Had the same percentage of labor force time been spent in 1949 on vacations, we would have had an average number on vacation of 99,000. The actual figure was 1,361,000—or ten times as much (*Annual Report on the Labor Force, 1954*, Dept. of Commerce, Series P-59, Table A-11). A small number of persons reported "sickness and vacation" or "slack work and vacation," etc. in 1901.

[7] Present definitions include with the unemployed not all persons who are ill but those who were seeking work when they became temporarily ill.

[8] The 1900 estimate is based on data from the Cost of Living Survey. The 1915-1917 figures are based on Metropolitan Life Insurance Company surveys of policy holders in seven communities (cf. Ernest Bradford, *Industrial Unemployment*, Bureau of Labor Statistics, Bull. 310, 1922, p. 32, where other surveys in 1917, 1913, etc. report similar data).

The 1949-1950 data are reported by Theodore Woolsey (*Estimates of Disabling Illness Prevalent in the United States*, Public Health Monograph 4, 1952) and in unpublished census data.

TABLE 2

Selected Estimates of Unemployment, 1900-1930

(*number in thousands*)

Year	Present Estimates (1)	NICB (2)	Douglas[a] (3)	Carson[b] (4)	Givens[c] (5)	Brookmire Economic Service (6)	Hart (per cent)[d] (7)	Weintraub (per cent)[e] (8)
1900	1,420	1,647	755					
1901	710	1,721	584					
1902	800	500	569				14.1	
1903	800	1,523	609				9.3	
1904	1,490	1,430	883				11.5	
1905	1,000	621	622				9.3	
1906	280	−143	577				5.5	
1907	600	756	695				6.0	
1908	2,960	2,296	1,654				14.8	
1909	1,870	719	925				8.6	
1910	2,150	553	774			0	6.5	
1911	2,290	1,571	1,025			496	10.8	
1912	1,960	920	775			0	9.6	
1913	1,680	1,018	936			267	9.3	
1914	3,110	2,214	1,899			2,027	15.8	
1915	3,840	2,355	1,822			1,479	16.0	
1916	1,920	187	774			112	7.1	
1917	1,920	−1,933	774			0	4.7	
1918	560	−3,099	719			58		
1919	950	−870	880			75		
1920	1,670	558	938	2,695	1,401	0		6
1921	5,010	4,754	2,913	6,085	4,270	3,653		25
1922	3,220	2,917	2,338	4,595	3,441	2,567		22
1923	1,380	749	1,010	2,880	1,532	0		11
1924	2,440	2,034	1,506	3,665	2,315	1,390		13
1925	1,800	817	1,120	2,855	1,775	387		13
1926	880	464	962	2,080	1,669	0		11
1927	1,890	1,620		2,380	2,055	1,466		12
1928	2,080	1,857		2,575				13
1929	1,550	429		1,910				10
1930	4,340	2,896		4,825				19

[a] Unemployment in manufacturing, transportation, building, and mining.
[b] Unemployment of wage and salary workers.
[c] Minimum unemployment.
[d] Unemployment as a percentage of nonagricultural workers.
[e] Unemployment as a percentage of labor supply.

Source: Column 2, *Economic Almanac, 1953-1954*, National Industrial Conference Board, 1953, pp. 422-423; column 3, Paul Douglas, *Real Wages in the United States, 1890-1926*, Houghton Mifflin, 1930, p. 460; column 4, Daniel Carson, "Labor Supply and Employment," WPA, unpublished study, 1939, p. 357; column 5, Meredith Givens, in *Recent Economic Changes in the United States*, National Bureau of Economic Research, 1929, Vol. II, p. 478; column 6, Brookmire Service, quoted in *ibid.*, p. 468; column 7, Hornell Hart, *Fluctuations in Employment in Cities of the United States, 1902 to 1917*, Trounstine Foundation, 1919, p. 48; column 8, David Weintraub, *Technological Trends and National Policy*, National Resources Committee, 1937, p. 70.

theless differs significantly from that reported by earlier series. (So too does the ranking of individual years with respect to the severity of their unemployment.) Thus the present unemployment figures exceed the National Industrial Conference Board estimates for the three decades in the 1900-1930 period—by 8 per cent in the first decade, 555 per cent in the second (because the NICB shows negative unemployment for 1917-1919), and 35 per cent in the third.

Looking at the periods of rising unemployment, one may note that the present series shows larger gains during the three recessions before World War I but distinctly smaller rises during the nine recessions

TABLE 3

Changes in Unemployment, Selected Years, 1903-1954

(*number in thousands*)

	PRESENT ESTIMATES		NICB		DOUGLAS	
YEARS	*Number*	*Per Cent*	*Number*	*Per Cent*	*Number*	*Per Cent*
1903-1904	690	86	—97	—6	274	45
1907-1908	2,360	393	1,540	204	959	138
1913-1914	1,430	85	1,196	117	963	103
1919-1920	720	76	1,428	..	58	7
1920-1921	3,340	201	4,196	752	1,975	211
1923-1924	1,060	77	1,285	172	496	49
1926-1927	1,010	113	1,156	249		
1929-1930	2,790	180	2,467	575		
1930-1931	3,680	85	4,141	143		
1931-1932	4,040	50	4,348	162		
1932-1933	770	6	451	4		
1937-1938	2,690	35	3,393	53		
1945-1946	1,230	118				
1948-1949	1,331	65				
1953-1954	1,628	101				

Source: Based on Table 2.

after that war.[9] The difference in the postwar estimates reflects a difference in the sensitivity of the two series. The NICB *unemployment* series is necessarily more variable because the NICB *employment* series is more variable—and that for two reasons:

1. NICB estimates of employees in trade and service rest more largely on the use of manufacturing employment as an extrapolator—and manufacturing employment is one of the most sensitive employment series. The present estimates for these segments rest on more stable series.

2. NICB series for self-employed persons and domestic servants

[9] The present estimates show smaller percentage increases (8 instances) and smaller absolute increases (7 instances) in unemployment during these 9 postwar recessions.

generally are estimated to fluctuate with the number of employees in those groups. Present procedures rest on the assumption—made in the light of changes reported from population census to census, and data on annual changes since 1930—that the self-employment series is far less sensitive than that for employees.

Douglas' estimates, being limited to unemployment in four major industry groups, will naturally show smaller absolute changes in unemployment. With smaller absolute bases they can and do show much greater variations in percentage change.

A second point may be made. Not only is the present series generally less volatile, but the order of depression years in terms of severity is somewhat different. Thus the present estimates indicate the 1937-1938 recession to have been about as severe as 1929-1930—rather than substantially more severe, as the NICB data indicate. Also they indicate that the 1920-1921 rise in unemployment was clearly less than the 1930-1931 rise—rather than slightly more.

In addition to these general conclusions one may consider three specific examples of difference: 1920-1921, 1916-1917, and 1900-1901.

One of the most significant differences between the year-to-year trends shown by the NICB series and the present estimates is that for 1920-1921, when the NICB shows unemployment rising by 856,000 more than the present estimates do.

1. The difference arises chiefly because the NICB estimates a greater decline in trade and service employment to have occurred than the present series does.

2. The NICB decline for these groups is considerably larger than that indicated in a special survey conducted during 1923 for the National Bureau of Economic Research by Willford I. King.

The present estimates show a mild gain, reflecting the fact that the constant dollar volume of goods available for distribution in 1921 was about the same as in 1920.[10] The NICB figures, on the other hand, reflect the sharp drop in current dollar sales.[11] It is assumed that trade employment trends should more closely parallel trends in the real volume of goods than money sales.

The present estimates show a rise in domestic service and self-

[10] The volume data used for the present estimates were those of William Howard Shaw, *Value of Commodity Output since 1869*, National Bureau of Economic Research, 1947.

[11] The NICB used "the appropriate NY Federal Reserve Bank Index of distribution to extrapolate trade employment." The New York Bank index as reported by Norris Johnson in "New Indexes of Production and Trade" (*Journal of the American Statistical Association*, June 1938) is composed of less-than-carload lot carloadings data, department store sales, chain grocery sales, other chain sales, mail order sales, etc.

employment in service—both substantial groups in the service total. The NICB figures were derived from an estimating series dominated by manufacturing employment, and the latter fell by 25 per cent in this period.[12] Experience in the past quarter century, when we have reasonably reliable direct employment measures, indicates that total service employment in this category (and particularly self-employment) does not respond markedly to short-run cycle fluctuations, and shows little parallelism with the change in manufacturing employment.

For the 1920-1921 change in trade and service employment, and indeed in employment as a whole, one can refer to the estimates secured by W. I. King from direct employer reports.[13] While these data have limitations, they represent direct reports from a surprisingly large sample of employers. King's data indicate changes in the trade and service groups which are much more modest than the NICB data. His estimate of total employment shows a 1920-1921 drop of 3.2 million, almost equal to the present estimate of 3.3 million for the 1920-1921 rise in unemployment. (It is unlikely that three-quarters of a million additional workers entered the labor market during this period above and beyond the normal labor force growth—as would be necessary to make the NICB unemployment change consistent with King's employment change.)

For 1916-1917 NICB shows a far sharper fall in unemployment than the present estimates, and one which would a priori seem more likely in the light of the growth of war production. The difference arises chiefly because the NICB data for manufacturing employment (based on "a sample comprising 64 per cent of the total manufacturing employment in 1919") rose by 1.2 million[14]—while the present estimates report little gain since the deflated volume of manufacturing production as reported in Shaw's data shows only a small rise.[15] Douglas' direct employment series for manufacturing (based on BLS and New

[12] NICB and present figures for service components other than domestic and personal would not differ greatly in the amount of change. It is the domestic and personal group which would account for differences in change.

[13] In *Business Cycles and Unemployment*, National Bureau of Economic Research, 1923, p. 88.

[14] Because the NICB used manufacturing employment in estimating trade employment—and via trade, for service employment—the estimate for manufacturing becomes basic in determining this change. For a simple comparison between present and NICB estimates one should also note NICB includes the armed forces under the service total.

[15] Shaw shows a mild rise for total finished goods, and a drop in manufactured food, clothing, furniture, floor coverings, and miscellaneous house furnishings (Shaw, *op.cit.*, pp. 70, 72, 73). These latter data are used in the present procedure to estimate the trend for employment in trade and such service categories as dressmakers, etc.

York State) shows a gain of 537,000, much closer to the present 200,000 than to the NICB 1.2 million.[16]

As a final comparison one may take the 1900-1901 change. Here the present estimates show a marked decline in unemployment while the NICB figures actually rise slightly. The difference arises because of estimated differences in the trend of trade and service. The NICB series uses the combined movement of agricultural, mining, and manufacturing employment. The very substantial stability in agricultural employment over many decades and the lack of change in manufacturing employment during this year amounts to positing no change in the trade and service group.[17] The present series, on the other hand, reports a growth in employment assumed as resulting from (1) an increase of roughly 12 per cent in the volume of finished commodities (except producer durables) to be handled through the distribution system, and (2) the long-term upward trend of self-employment in these industries.

How do variations in unemployment as measured by the present estimates relate to variations in other measures of economic change? The question is as difficult to answer as it is interesting. The reason for the difficulty is simple. The present estimates were developed on the premise that the best possible employment and unemployment estimates were desired. This meant that the soundest procedure was to take advantage of the major advances in our knowledge of this period which are associated with the names of Shaw, Fabricant, Kuznets, and others who have laboriously developed basic production series for the National Bureau. Hence while a vast variety of other sources were used, together with quite independent data from censuses of prisons, reports of the Collector of Internal Revenue, lists of securities dealers, etc., substantial reliance was placed on these studies which worked the basic census of manufactures data into consistent detailed series. Similarly the employment estimates for construction rest on detailed estimates of deflated activity developed for the purpose at hand. Year-to-year changes in unemployment will closely reflect changes in employment. Individual employment series for key industries will in turn tend to reflect changes in production because of the method of estimate. However the frequency of bench-mark counts—quinquennial censuses of

[16] Paul Douglas, *Real Wages in the United States, 1890-1926*, Houghton Mifflin, 1930, p. 439. Douglas' sample covers some 15 per cent of manufacturing employment in 1914 and Berridge's combination of state data covered not much more as of 1914 or 1919. No information appears to be available concerning the sample used for the NICB estimates.

[17] Douglas shows a change similar to NICB—but since his data do not attempt to reflect trends in trade and service they are not inconsistent with present estimates.

manufacturing before the war and biennial after it—means fairly frequent checks on the combined productivity and hours factor interpolated between these dates. Hence even for these series changes from one bench-mark year to the next are independent of the production data.

While the relationship to production series therefore presents problems, the relationship to the national income estimates is less troublesome. This is because the Kuznets estimates that were used for 1919-1929 are derived chiefly by totaling the factor shares. Interest, rent, profits—these are certainly independent of the data used for the present estimates. And payrolls, the largest single component, are derived in most instances by applying ratios of pay to gross income, sales, or total outlays of the industry concerned. While for manufacturing, for example, that payroll data come from the same source, indeed the same reports, as do the employment data, so that there is likely to be a built-in consistency, the estimating process does not rest on the use of payroll estimates. For the 1930-1940 period the interrelationship of estimates is far less: beginning with 1936, reliance on the payroll totals from the independent body of tax reports filed under the Social Security system achieves a satisfactory degree of independence. For the 1940-1952 period the estimates are essentially independent in provenance. Deflated income data, however, are not available. Data on changes in deflated product were therefore used. The extremely close similarity between year-to-year changes in undeflated income and product justified such a step.[18]

With these qualifications one may review the pattern shown in Chart 1, where year-to-year changes in unemployment are matched against corresponding changes in deflated Gross National Product.[19] The relationship indicated is remarkably close. On the one hand we have estimates derived for the 1920-1940 period as a residual between labor force and employment totals. As such they are subject to the net resultant of errors in each series, with differences then calculated from these residuals. For the 1940-1952 period the series rests on reports from a continuously changing sample, consisting primarily of housewives reporting on the employment status of members of their family. On the other hand, the GNP totals represent the sum of a mass of component estimates developed from a hundred different sources, then deflated by a host of price data reported primarily by a vast sample

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[18] The trend in employment is used in developing the trend in payrolls for domestic service but aside from this limited group there is nothing of note.

[19] Unemployment: present estimates. GNP: 1919-1929 from Simon Kuznets, *National Product since 1869*, National Bureau of Economic Research, 1946, p. 52, GNP wartime concept. GNP: 1930-1954, *National Income Supplement, 1954*, to, and July 1955 issue of, *Survey of Current Business*, Dept. of Commerce.

CHART 1

Changes in Unemployment and Deflated Gross National Product, 1920-1954
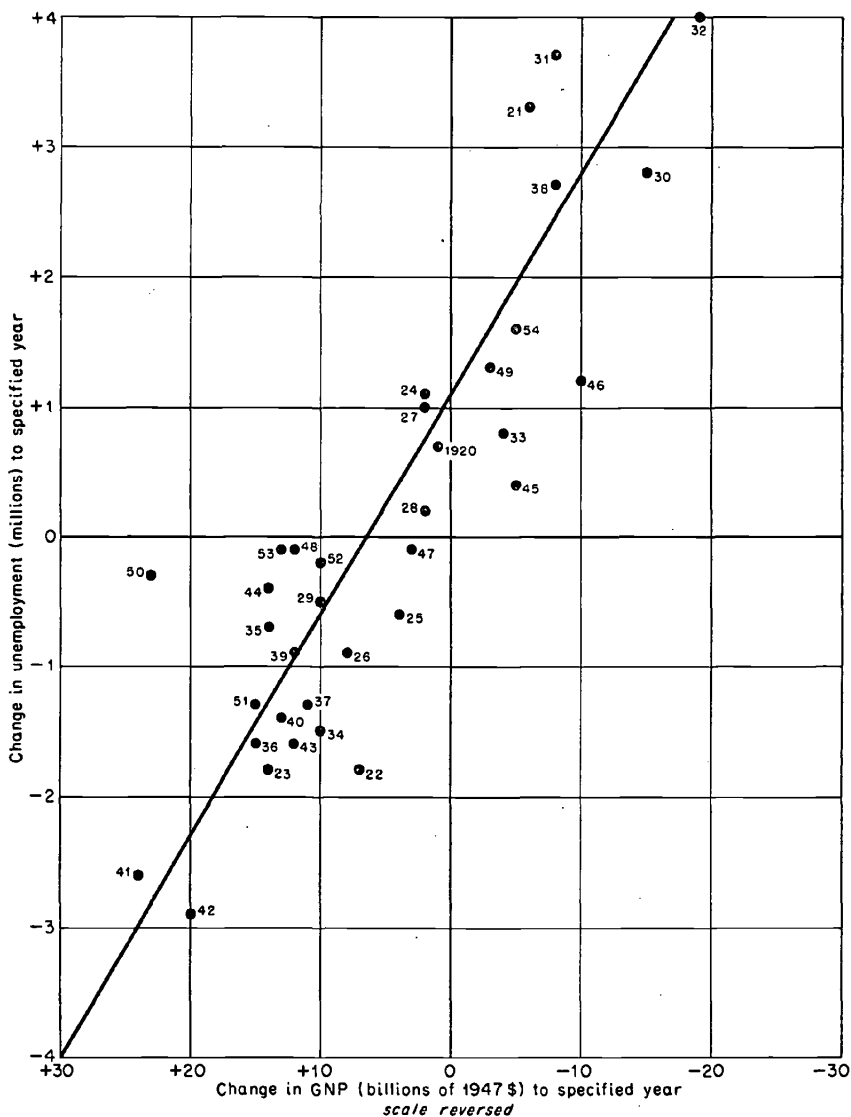
Note: GNP excludes military pay.

of retailers. Reporting errors of necessity exist in the production, the margin and the price data, while conceptual differences separate some of the data (particularly the price data) from those which are required for consistent estimating.

The relationship is nevertheless extremely close. The fact that it is so reflects three factors.

1. Year-to-year changes in unemployment tend to be mirror images of changes in employment. To judge from the 1940-1952 data the stability in the labor force totals from year to year is very great.[20] Despite sharp changes in worker rates for females and particular age groups the fact that most adult males are in the labor force year in and year out gives a considerable stability to the labor force totals.

2. Year-to-year changes in the employment estimates, though derived from a broad variety of sources, are dominated by variations in manufacturing employment (cf. Chart 2). Of necessity annual changes in employment are sensibly linked to changes in payrolls, in sales, and —with some stability in the distributive margin estimate—in final product values.

3. The GNP estimates were adjusted to exclude changes in military pay—an item which pretty well accounts for most of the changes in gross government product during the war years. This was done because variations in military payrolls had little current impact on the domestic productive economy.[21]

The sharp exceptions to this relationship are in many respects as interesting as the relationship itself. Perhaps the most striking are 1941, 1945, 1946, and 1950, all four associated with sharp changes in the mixture of peace and war characterizing our times. In 1941 and 1950 we became actively involved in wars—with sharp rises in GNP. An unemployment decline of nearly 5 million in each of these years (rather than 2.6 and 0.3) would have been required for these years to fit the regression line shown on the chart—a change whose magnitude is probably out of the question in a free labor market.[22]

In 1945 and 1946, on the other hand, there were drastic declines in government purchases, in production, and in manufacturing employment, with nothing like concomitant rises in unemployment. There were equally drastic changes in purchases during the war years, associated, however, with nothing like such a discrepancy. The explanation probably lies in our present measurement of unemployment. If we counted those receiving unemployment compensation (for total unemployment) as *per se* unemployed, then 1945 and 1946 would be
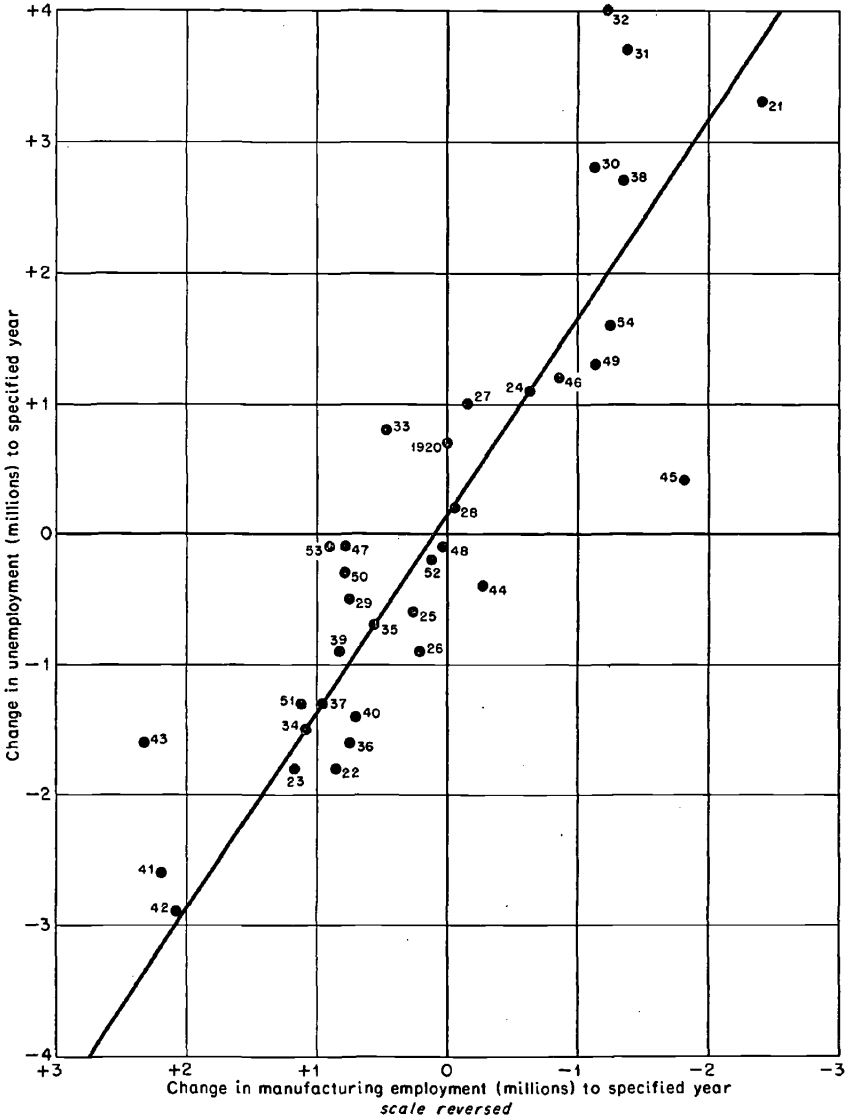
[20] Because the estimates before 1940 are interpolations they cast no direct light on this point.

[21] Data from *National Income Supplement, 1954.* Variations in government purchases, including those of food and clothing for the armed forces, are, of course, not excluded by this procedure.

[22] Moreover in 1950 negative unemployment would have been produced. This suggests that the function might include other variables—e.g. second differences in GNP.

CHART 2

Changes in Unemployment and Manufacturing Employment, 1920-1954

Change in unemployment (millions) to specified year

Change in manufacturing employment (millions) to specified year
scale reversed

in line.[23] And in fact present procedures do define such receipt as unemployment but the information is not automatically sought—par-

[23] The desirability of doing so has, of course, nothing to do with the present discussion. The topic is discussed by the writer in *The Review of Economics and Statistics*, November 1954.

ticularly when, as after the war, many persons indicated that they were not in the labor force even though they might have been drawing unemployment compensation. Regardless of all this, the fact is that for the first time in the record a very substantial drop in employment, in GNP, in manufacturing employment did not produce anything like a proportionate rise in unemployment. The disemployed simply left the labor force or were absorbed by the boom on construction, trade, and other lines starved for help during the war.

How, it may be asked, do the variations in unemployment correspond with variations in business conditions as measured not by a single aggregate measure such as GNP but by a broad summary of measures not merely of products but prices, financial transactions, etc., which lie behind the NBER reference cycles? Given the array of data provided by Burns and Mitchell, we are able to determine for each year during the period how many months of that year were characterized by an expansion of economic activity, and how many, by contraction. In the table below, the years are classified into two groups—namely, those in which the National Bureau chronology reports more months of cyclical expansion than decline, and vice versa.[24] Each of these is then divided between those in which the percentage of the labor force employed, as measured by the current series, rose or fell.

YEARS IN WHICH NBER REPORTED MORE MONTHS OF:	YEARS IN WHICH PERCENTAGE OF LABOR FORCE EMPLOYED:		
	Rose	*Declined*	
Expansion than decline	1901 1922	1902	
	1905 1925	1908	
	1906 1926	1919	
	1909 1934	1924	
	1912 1935	1928	
	1915 1936	1933	
	1916 1939	1938	
	1918 1940		
Decline than expansion	1903	1904	1921
	1913	1907	1927
	1923	1910	1930
	1929	1911	1931
	1937	1914	1932
		1920	

Eleven years of all those in the period do not fall into the main diagonal. Of these the unemployment change for three (1902, 1903, and 1928) is so small as to be well within the margin of error.

[24] Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, National Bureau of Economic Research, 1946, Appendix A.

Concentrating on years with eight months or more in expansion, or contraction, gives us the following array:

YEARS WITH EIGHT MONTHS (OR MORE):	YEARS IN WHICH PERCENTAGE OF LABOR FORCE EMPLOYED:			
	Rose		*Declined*	
Expansion	1901	1925	1919	
	1905	1926	1928	
	1906	1934	1933	
	1909	1935		
	1912	1936		
	1915	1939		
	1916	1940		
	1922			
Decline	1903		1910	1927
	1913		1911	1930
			1914	1931
			1920	1932
			1921	

For 1919, the unemployment measure reflects the net impact of generally rising employment offset by a substantial rise in the civilian labor force attendant upon the return of the A.E.F. from France. Even a minor change in the 1903 figures—less than the likely margin of error—could change the direction of unemployment for those years. For the two other years, in which the mass of cycle indicators point to an economic change in one direction while the unemployment series move in the opposite direction, no single explanation is possible. It will, however, be recognized that relatively long series tend to conform less well to the cyclical indexes than short series, and for the pre-World War I years, the dating may not be finally established.[25]

3. Unemployment Estimates as a Measure of the Level of Unemployed Manpower

While one may concentrate chiefly on changes in unemployment for analysis, the administrator (and citizen) generally has an equal or greater interest in the level of unemployment. What does the record indicate as to the level of unemployment over the past? The number of years in the 1900-1954 period in which the percentage of the labor force unemployed was under 2 per cent, 2-2.9 per cent, etc., is as follows:

[25] Wesley Mitchell, *What Happens During Business Cycles*, National Bureau of Economic Research, 1951, p. 281. There must be few bits of testimony to inherent nobility of scholarship that equal Mitchell's labeling of the reference dates, after more than a quarter century of work, as "tentative."

Per Cent	Number of Years
Under 2	7
2-2.9	6
3-3.9	7
4-4.9	9
5-5.9	8
6-7.9	2
8-9.9	5
10-11.9	1
12-13.9	0
14-15.9	3
16 and over	7

The median year falls in the 4-4.9 per cent unemployment group, as does the mode.

These estimates for the years prior to 1940 are intended to measure the number of persons who are totally unemployed, having no work at all. For the 1930's this concept, however, does include one large group of persons who had both work and income from work—those on emergency work. In the United States we are concerned with measuring lack of regular work and do not minimize the total by excluding persons with made work or emergency jobs. This contrasts sharply, for example, with the German practice during the 1930's when persons in the labor force camps were classed as employed, and Soviet practice which includes employment in labor camps, if it includes it at all, as employment.

While total unemployment constitutes a useful measure of the extent to which our manpower is not fully utilized, it is not a complete measure and should not be used as such. Perhaps the most important element that is excluded is partial unemployment—the involuntary idleness during split weeks or short work days. Various pre-depression surveys showed from 10 to 15 per cent of urban wage earners working part time—most of them presumably desirous of full time work.[26] With the onset of the depression of the 1930's, however, the percentage increased abruptly. The immediate increase appeared to be greater than

[26] In 1915 an estimated 15 per cent of urban wage earners were underemployed (see Paul Brissenden, "Underemployment," *Business Cycles and Unemployment,* as cited, p. 68). In 1919 a survey of manufacturing industries reported 11 per cent of full time lost in idle hours (see Bradford, *op.cit.,* p. 28). In April 1930 the Census reported about 10 per cent of gainful workers on part time (*Census of Unemployment, 1930,* Vol. II, pp. 10, 357). King's data for 1921 gives a figure of about 8 per cent for factory workers in 1921 (*Business Cycles and Unemployment,* as cited, p. 95).

that in 1921. As one example, unemployment in Detroit about doubled from the census in the spring of 1930 to the January 1931 special unemployment census but part time employment increased more than 400 per cent.[27] By March 1932, according to a comprehensive survey of more than 6,000 companies with over 3 million employees, sponsored by the President's Organization on Unemployment Relief, 63 per cent of all employed manufacturing workers were on part time work.[28] No matter how this enormous percentage must be qualified, it is clear that it indicated a substantial quantity of underemployment among those with jobs. As the depression began to lift, the proportion on part-time declined. In November 1937 the proportion in manufacturing on part-time employment was about 20 per cent—or substantially down from the 63 per cent in early 1932.[29] By the postwar period the proportion was further reduced. The proportion of all persons in the labor force working part time in early 1948 was about 8 per cent—and only rose to 12 per cent near the peak of the 1949 recession.[30]

In summary, therefore, partial unemployment may have run to something like 10 per cent for most years, while during the depth of the depression something like half of all factory workers with jobs were on part-time work.

Employment is only one dimension of the economic welfare problem. A second is the number of hours worked, or partial employment. Other dimensions of this problem are the amount of income received and the skills utilized. The general problem of underemployment, however, is still more complex and has received separate discussion in this volume. It will therefore be sufficient here to emphasize that estimates of total unemployment do not include any direct allowance for this factor. The tremendous drop in the number of farmers and retail store keepers from 1940 to 1943 is one indication of the possible

[27] *Census of Unemployment, 1930,* Vol. II, pp. 139, 358, 482, 600.

[28] William J. Barrett, "Extent and Methods of Spreading Work," *Monthly Labor Review,* September 1932, p. 490. These companies reported a decline in employment from 1929 to March 1932 of 26.6 per cent. The decline for all manufacturing companies was about 32 per cent.

[29] The number partly unemployed as of November 1937 is estimated in the *Census of Partial Employment, Unemployment, and Occupations,* Vol. IV, *Final Report on Total and Partial Unemployment, 1937,* p. 20. Data from p. 125 of the same volume give a distribution by industry for the partly employed registrants. It was assumed that the 34 per cent proportion of manufacturing employees in this registrant group (combining manufacturing industry components shown) could be applied to the p. 20 survey total. The resultant figure was then related to the current (i.e. 1954) BLS estimate for 1937 manufacturing employment, after the latter had been adjusted to November levels by earlier BLS monthly indices.

[30] These data refer to all part-time work—only part of which, of course, was involuntary part-time work. Data from special census surveys for March 1948 and May and August 1949 suggest that the increase represented involuntary part-time work.

magnitude of such underemployment—even after allowing for the postwar return to higher levels in trade.

With this basic qualification in mind it may be appropriate to indicate how closely we came to achieving full employment over the past half century. Defining full employment is something like defining small business, low income, monopoly profit, or the just price. Definitions tend to be either imprecise or void of empirical reference. But if we think of the policy uses of the data we can define full employment in the light of what we have achieved in the past. Let us arbitrarily define "workable full employment"—to adapt an admirable phrase of J. M. Clark's—as the level achieved at least one year in four during the past half century. If we do so the percentage of the civilian labor force totally unemployed at full employment would be less than 3 per cent. (The percentage would have to be raised if our reference period were shorter, for it was achieved twice as frequently in the 1900-1925 period as in the 1926-1952.)[31] It has been asserted, however, that "full employment at high wages in a private enterprise economy is undesirable and self-destroying."[32] We may therefore wish to set a figure based on the assumption that full employment is less common. If we set the goal at that which prevailed in 10 per cent of the years, the ratio would run to 2 per cent or less. But one may take a less pessimistic approach. High level employment has characterized the performance of the American economy in the past half century. While even a level of 5 per cent unemployed would hardly be considered to present a major economic policy problem, such a level has been achieved in more than half this period. History does not indicate that our economy requires a substantial or continued high level of unemployment to operate effectively and without marked price rises.

4. Methods by Which the Present Series Was Estimated

The unemployment series for 1900-1930 was estimated by making direct bench-mark estimates of unemployment in 1900, 1910, and 1930, using the population census data on unemployment in those years, and interpolating intercensally by a provisional unemployment series. The provisional series was obtained by estimating civilian labor force and employment for the half century and deducting one series from the other.

BENCH-MARK ESTIMATES

1900. The estimate of unemployment in 1900 was based on data

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[31] If, further, one excludes the war years, 3 per cent or less was achieved only twice in the latter period as against 9 times in the earlier.

[32] R. I. Nowell in *Journal of Farm Economics*, February 1947, p. 143.

collected in two enumerations. One was the 1900 Census of Population, which secured information on nonemployment during the year preceding the taking of the census. The second was an extensive survey made by the Commissioner of Labor of family income and expenditures that secured detailed information for about 25,000 families on cause and duration of unemployment during 1900-1901.

The starting point is the distribution of unemployment as shown in the 1900 Census of Population.[33] From the total shown there, the number of teachers, self-employed in agriculture, and others in occupations characteristically dominated by self-employment were excluded— to exclude periods of "unemployment" that were really periods not in the labor force.[34]

The distribution of male nonfarm employees by duration of unemployment derived in this fashion was adjusted to take account of the information provided by the 1901 Cost of Living Survey.[35] That survey reported for male heads of urban families in the wage-earner group the level and duration of unemployment by cause of unemployment.[36] Two adjustments were made on the basis of these data. First, an estimate was derived of the per cent of persons who should be excluded from each duration group because the causes of their idleness—e.g. no work wanted, drunkenness, old age, strike, vacation—would not currently be considered as justifying the classification of unemployment.[37] Secondly, it was assumed that the higher level of unemployment shown in the cost of living survey, based as it was on a detailed reckoning of the families' employment, income, and expenditure experience over the year, was likely to be more precise than the necessarily brief enumeration in a survey made only every ten years. The proportion unemployed shown in this survey was therefore first adjusted to allow for unemployment of nonfarm workers not covered by the survey—primarily those not heads of families[38] and then the differences between that propor-

[33] *Occupations*, Tables 1, 25.
[34] Such occupations include dentists, lawyers, boarding-house keepers, saloon keepers, etc.
[35] *Eighteenth Annual Report of the Commissioner of Labor, 1903.*
[36] *Ibid.*, pp. 290-291.
[37] The sickness and accident groups were also excluded on the assumption that most persons reporting sickness should be classed as not in the labor force. On the other hand, those for whom any of these causes was reported in combination with another cause were included. This was done because current procedures undoubtedly include some workers as unemployed who report these causes, particularly those who had been seeking work when they became temporarily ill.
[38] The ratio of employment rates among nonfarm gainful workers who were and were not family heads was estimated on the basis of 1930 relationships. These indicated the rate for singles was one-third greater (*Census of Population, 1930*, Vol. II, p. 848 and *Census of Unemployment, 1930*, Vol. II, p. 336). Adjustment for the relatively small portion of all nonfarm employees who were not within the

tion and the rate indicated by the census was used to adjust the census total unemployment figure upward. The adjustment was distributed into the various duration groups in the same way as the reported duration data of the cost of living survey indicate, which in fact implies that three-quarters of census omissions were in the lowest duration group— a reasonable implication since Census Bureau enumerators were likely to miss less of the hard core unemployment.

The average duration of unemployment in each duration group was computed from the very detailed interval data in the cost of living survey. Multiplying the number in each group by average duration and dividing by fifty to get estimated full-time unemployment gives a bench-mark figure for male nonfarm workers in 1900.

For female workers the census data were reduced to exclude data for teachers, agricultural pursuits, and other occupations, multiplied by average duration data (the same average within each duration group was used as above) and then converted to full time unemployment.

For male farm laborers the reported census total included unemployment of family workers. An estimate for wage earners alone was made as follows: In 1910, the unemployment percentage for male laborers not elsewhere specified building and hand trades was 34.8 compared to 11.5 for farm wage-earner laborers. The ratio of one to the other was applied to the laborer (domestic and personal service) rate of 44.3 in 1900 to give an estimate of 14.7 for male farm laborers (wage earners). (A similar procedure was used for females.) These were then distributed by duration as reported farm laborers.

1910. Although the census of 1910 secured data on unemployment of wage earners in the previous year, these data were not tabulated until 1948.

The 1910 data an unemployment are in the form of distributions for unemployed wage earners sixteen years and over by duration of unemployment.[39] By applying the distribution to the total for wage earners sixteen years and over, and deducting estimates made similarly for teachers and home farm laborers (wage earners) one secures a preliminary estimate for the number of unemployed wage earners by duration group. The resultant distribution was reduced to exclude unemployment which would not be counted by current definitions— using the same proportions within each group as indicated in the 1901 Cost of Living Survey—multiplying by the same average duration figures, within each group, as used for 1900 and computing man-years

scope of the survey was not attempted; it would make little difference in the results.

[39] These data were reproduced by the Census Bureau in a set of lithoprinted sheets, in 1948.

of unemployment. The resultant total was adjusted upward for under-enumeration.

This adjustment was derived as follows: A large scale survey on the employment and income of wage earners in selected industries in 1910 was conducted by the Immigration Commission. The survey provided data on duration of employment for 220,000 male wage earners (aged eighteen and over) in a broad range of industries.[40] Because the Commission was concerned with the foreign born the sample overrepresented foreign-born workers and those in certain industries. The separate distributions—e.g. males, native born of native father; white, employed in the agricultural implements industry; foreign born in bituminous coal mining, etc.—were therefore reweighted in accordance with the census gainful worker totals[41] to derive distributions for each industry of the male employees by employment duration. The resultant distributions, while covering all major mining and manufacturing industries (coal, cotton goods, furniture, meat packing, etc.) could not in themselves be taken as an adequate sample for a direct estimate of employment levels. They constitute, however, a very large sample with which to adjust the reported census unemployment data for the same industries. The ratio of adjusted to unadjusted totals for the sum of these industries was then used to adjust the grand total census figures estimated above.[42] There are two reasons for using the Immigration Commission survey to adjust the census reports. First, a detailed inquiry into family economic status was being made, with opportunity for a much more careful consideration of employment status during the previous year than would normally occur during the brief census interview. Second, the instructions in the Immigration Survey specifically required an explanation of lost time or low earnings, presumably leading to a more careful estimation of employment duration than the more general census interview where short duration figures would not be questioned.[43] The result of these differing pro-

[40] Reports, Immigration Commission, Vol. 23, 1911, Table 27.

[41] Census of Population, 1910, Vol. IV, Table VI.

[42] One example may be given. The Immigration Commission data indicate an average duration of employment in iron and steel manufacturing of 9.2 months for native white males of native parentage, 8.5 for native whites of foreign parentage, 7.9 for foreign born, and 10.8 for Negro. Weighting these by the Census gainful worker distributions gives an estimate of 8.5 for the industry—or 3.5 months unemployed. The census data for males in iron and steel indicate 9.1 weeks of unemployment for laborers and 8.4 for semi-skilled workers or, a weighted average of 9.0 weeks. Since these data relate to wage earners in mining and manufacturing in 1910, it is reasonably safe to equate periods of nonemployment with periods of unemployment, vacations being infrequent and periods of sickness being deducted in the earlier adjustment.

[43] Reports, Immigration Commission, Vol. 2, 1911, p. 703.

cedures is apparent in the data. Thus the census report shows 82-86 per cent of male employees in cotton goods with no unemployment in the previous year, whereas the Immigration Commission data show 63 per cent.[44] For coal mining the census shows 32 per cent of the operatives with a full year's employment while the Immigration Commission shows 15 per cent—a figure much more consistent with data on mine activity.[45] To the adjusted census data for unemployment among wage earners was added an allowance for unemployment among those classified as self-employed on the census day but who had periods in the labor force year during which they were seeking work as employees. The sum of the two figures then gives the 1910 unemployment bench mark.[46]

1918. Because of the unreasonable results which derive from a residual estimate for the war years, it is necessary to posit directly a level of unemployment in the peak war year of 1918. This was done by analogy from our actual experience during World War II, allowing for the generally lower level of unemployment in the years before World War I. The ratio of unemployment to nonfarm employees in 1943-1945 was as follows:

Year	Per Cent
1943	2.1
1944	1.6
1945	2.2

Since there was a more tightly organized labor market and production system in World War II, the peak war year, 1944, was excluded, and the 1943 and 1945 percentages were averaged to derive the 1918 estimate. Previous estimates arbitrarily posit an unemployment level for 1920.[47] It was felt preferable, however, not to estimate directly a

[44] Census data are not available for the industry but are shown for laborers, beamers, bobbin boys, spinners, and other occupations in cotton goods.

[45] *Mineral Resources of the U.S., 1911,* Geological Survey, Part 2, p. 45, 52. These data suggest the number of active days per year ran to about 200, roughly 29 days being lost in strikes in 1909.

[46] This procedure implicitly assumes the same unemployment rate among the wage earners as the self-employed. Such an assumption is consistent with census practice in 1890 and 1910, and allows for the fact that not only are some self-employed indistinguishable from wage earners—e.g. carpenters—but that some bona fide self-employed were wage earners for some period in the census year. For example, the unemployment rate for seamstresses and dressmakers was about the same in 1890 and 1910. If there were no unemployment among the self-employed in 1910, then the implicit rate of unemployment for wage earners was nearly double that for 1890—hardly a likely state of affairs.

[47] For example, the NICB assumed that the percentage unemployed by industry

level for a year of such mixed business activity as 1920 (with an unknown aftermath of the war affecting the level) but instead to estimate the level for 1918, a year of undoubtedly peak employment, using analogous data from World War II.[48]

Intercensal Estimates. Intercensal estimates were derived by interpolating between the unemployment figures for 1900, 1910, 1918, and 1929 by a preliminary unemployment series. That series was estimated by deducting employment from the labor force in each year. The derivation of the employment and labor force series was done in great detail and has been described elsewhere.[49]

They may, however, be briefly summarized. Independent employment series were developed for the key components of every major industry group. These series in turn were developed from movement series adjusted to census and other bench-mark dates whenever available. For manufacturing employees quinquennial census bench marks were available, with interpolation for 1899-1909 by an index of employment in selected states accounting for half of all manufacturing employees as of 1904, with interpolation between 1909 and 1914, and between 1914 and 1919 by Shaw's constant dollar data on the output of finished goods' (except nonmanufactured foods) and construction materials. For 1919-1929 the Fabricant series, which utilizes biennial census data and Bureau of Labor Statistics series for interpolation, was used with the 1920-1921 change checked against a special field canvass made by Willford King. The self-employed count for census years was taken from the census of manufactures, with adjustments in 1904 and 1909 for omissions and changes in census enumeration practices, and for 1921-1929 for the census exclusion of small firms. For intercensal years estimates were derived from curves fitted to census dates, except that 1920 was assumed at the 1919 level.

Construction employees prior to 1920 were estimated by a regression against construction materials production (adjusted for inventory fluctuations in certain years) based on the relationship between the two series in the 1920-1940 period. For 1920-1929 estimates of contract activity were derived from estimates of total construction activity, for

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group in 1920 could be interpolated between the percentages for 1900 and 1930 implicit in Population Census data.

[48] Douglas assumed a 3.5 per cent figure for 6 years, including 1918, and a slightly higher figure for 3 other years (Douglas, *op.cit.*, pp. 442-443), deriving his estimate by reducing somewhat the unemployment percentage for trade union members in Massachusetts manufacturing and transportation industries in April-June 1918.

[49] A summary of the preliminary results was presented at the 1950 Annual Meeting of the American Statistical Association. The methods used for 1930-1940 estimates were described briefly by the writer in the *Monthly Labor Review* for July 1948. It is hoped that a fuller description will be published at a later date.

major segments, and the contract series was then deflated by a specially developed series. This series was composed of two parts. One part consisted of materials prices (computed as the geometric mean of a fixed weighted series developed for this purpose and the regular variable weighted series). The other part consisted of average earnings (based on union data reweighted and adjusted to represent the movement of earnings of all employees. The two series were then combined, weighting them by a changing set of ratios of (1) payroll to (2) payroll plus materials costs, and the combined series was then divided by an index of average hours. Similar procedures were used to develop a labor requirements series for the 1929-1940 period which was used for interpolation between estimates for 1929, 1935, and 1939. Self-employed totals were extrapolated by this series.

For utilities a wide variety of data were used. Quinquennial census data for electric light and power, and for gas (biennial for gas during the 1920's) were interpolated from a growth curve to 1917, with data for a sample of private plants for later years. For manufactured gas, quinquennial and biennial census data were available, with interpolations by a regression against an output series. For telegraph employment Interstate Commerce Commission reports for 1926-1929, data supplied by Western Union for 1917-1926, and census of electrical industry data for earlier years were used. Separate estimates were made for other detailed utility and transport employment, using state data, tonnage of documented steam and motor vessels, etc.

For finance Comptroller of the Currency data for 1910, 1916, 1918, 1936, and 1940 make it possible to estimate employment per bank, which, when applied against the Comptroller's series for number of banks gives an extrapolating series for carrying back the BLS 1929 total.

A similar procedure was used for building and loan associations (employees per association times number of associations) and for brokers. Decennial counts of insurance employees and self-employed persons were interpolated by the number of life insurance policies, and decennial data for real estate brokers by the number of available nonfarm housing units.

For trade, decennial estimates of employees in each major line of business were derived by multiplying the number of dealers by the number of employees per dealer, with interpolation of the number of employees in each line by the relevant series for value of finished commodities destined for domestic consumption. For dealers separate estimates were similarly made, with saloon keepers and other groups separately estimated.

For service, separate estimates were made for physicians (salaried physicians estimated for census dates, interpolated by the ratio to

hospital beds; self-employed physicians by the American Medical Association directory counts after the latter had been adjusted for various incomparabilities); dentists (interpolating decennial counts by adding graduations and deducting deaths in the profession); lawyers (decennial counts, interpolated by listings in Martindale's *American Law Directory*); nurses (adjusted census data for trained nurses interpolated by number of nursing graduates; adjusted census data for untrained nurses interpolated by the number of nonwhite births for 1920-1930 and total births for 1910-1920); hospitals (employment per hospital bed in 1900, 1910, 1923, and 1935 interpolated and applied to the number of hospital beds); hotels (decennial counts of proprietors interpolated linearly for 1900-1920, by number of hotels for 1920-1930; census counts of wage earners interpolated 1920-1930 by number of occupied hotel rooms, 1900-1920 by linear interpolation); amusement (employees per theatre, and employees per billiard parlor and bowling alley times estimated numbers of each; musicians by inventory of musical instruments); laundry, cleaning, etc. (quinquennial census counts interpolated by employment in trade using the close regression of one series against the other for seven years from 1900 to 1939); other service (half a dozen series, with decennial counts interpolated linearly in some components, by trade employment in others, subject to other adjustments); domestic service (detailed adjusted decennial census data directly interpolated, with the 1910 level carried to 1914, then reduced steadily to the 1920 level by 1918).

Government employment was estimated from Fabricant's series for federal employment (based on Civil Service Commission and other reports) and school employment, with other local employment interpolated between the selected dates shown by Fabricant by a regression of such employment against school employment.[50]

For agriculture, a variety of adjustments were made in decennial census totals. Family worker counts were interpolated 1900-1910, extrapolated 1910-1917 at the 1900-1910 annual rate of change, and interpolated for other years. For 1925 and subsequent years, data from the Department of Agriculture were used. For wage earners, decennial counts were interpolated by a moving average of a series for the size of aggregate farm enterprise, a measure of labor requirements.

The labor force totals were derived as follows: Unpublished estimates of population by age, sex, and color were adjusted to allow for the net immigration of workers. Worker rates for each group were derived from the decennial census data (as adjusted for the 1910 overcount)

[50] A final version of these estimates will utilize directly estimated series for each component of government employment. The differences are not such as to affect the unemployment estimates significantly except for 1919, which will be lowered.

and interpolated intercensally.[51] The population mulitplied by the rates gave the final civilian labor force figures. Similar interpolation procedures were used by the NICB, Douglas, Hart, and others except that the present estimates utilize revised census population data and make separate allowance not merely for age, sex, and color but also for nativity change in the population—the latter being particularly important in 1900-1910. A special estimate was made of the impact that additional participation by women in the labor force might have had on short-term changes in World War I, using a large-scale 1918 survey by the Women's Bureau. The result indicated no change in the unemployment total here estimated and a rise of only two-tenths of 1 per cent in the underlying labor force estimate for 1918.

The other likely period of irregular labor force change, the 1930's, is outside the scope of the present estimates. (However, it may be noted that the BLS figures were arrived at only after a special study of short-term changes for the 1930's had led to the conclusion that allowing for such changes would not affect "materially either the level or trend of employment for the years 1929-39.")[52]

COMMENT

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I regard Stanley Lebergott's paper highly as a piece of painstaking and exhaustive research. Despite the limited resources at his command, his care is really exemplary not only in assembling relevant data but even more in point, in directing the reader's attention to the assumptions behind the inevitable imputations, interpolations, and projections.

The results of his research, however, raise anew some basic questions on the meaning and significance of long-term historical (or "prehistoric") statistics on unemployment. These long-term data are necessarily constructed from estimates of the labor force and levels of employment drawn from various census materials (largely decennial) for 1940 and prior census periods. The basic information is static in character as compared with the dynamic concepts of labor force

[51] Despite adjustments by Alba Edwards and other experts there is little evidence to show that a gainful worker count secured different results because of January versus April or June enumeration. The subject is considered at length in a fuller report on the labor force estimates with the conclusion reached that cyclical variations—e.g. January 1920 representing a high level, postwar month—could more than have accounted for apparent incomparabilities in the labor force counts between 1900 and 1930.

[52] Cf. the writer's "Labor Force, Employment and Unemployment, 1929-39: Estimating Methods," *Monthly Labor Review*, July 1948.

incorporated in census or sample enumerations after the 1940 census. Most of my remarks pivot around this distinction in view of Lebergott's expressed intention to present estimates "consistent with the series currently reported by the Census Bureau in its Current Population Survey."

Since my subsequent comments may sound critical, I would not want them to imply the undertaking is not worth the effort. On the contrary, the fact that earlier and admittedly inadequate annual estimates by the Conference Board (and other "rash" researchers) are still employed, lacking better-based estimates, is itself justification. I find myself in welcome agreement with both Lebergott's "general preference for additional measurement series rather than improvements in existing series or data"[1] and the exception he rightly makes in this instance. Given the public interest in, and policy implications of, unemployment, it is important to wring from historical data whatever we can about its determinants, including fluctuations in the labor force and adjustments in employment to changing levels of productive activity. In this respect, Lebergott's research is probably definitive—expunging, among other things, the negative unemployment for earlier decades—and is therefore a real contribution. Nevertheless, I believe his results have limited analytical usefulness, primarily because the past data are inadequate for current purposes despite his diligence in rounding up source materials and imagination in putting them together.

Lebergott's figures on unemployment as presented in this paper are in general similar to the earlier estimates of the Conference Board, with respect both to level and cyclical change. This is personally gratifying but not surprising, since (for establishment of bench marks and for purposes of interpolation) the basic data that are common to both series of estimates considerably outweigh those that are unique in either. This initial gratification was replaced after reviewing Lebergott's procedures by this unhappy conclusion: his refinements and improvements are, unfortunately but necessarily, still superimposed on assumptions that "assume away" the answers to the following highly significant question about historical patterns of unemployment:

1. Unemployment statistics and collateral data on the labor force and employment[2] are widely used from the welfare point of view to measure the degree to which the economy succeeds or fails in providing jobs for those seeking work. This logically requires knowledge not only

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[1] Stanley Lebergott, "Measurement for Economic Models," *Journal of the American Statistical Association*, June 1954, p. 213.

[2] A full description of Lebergott's estimates of the labor force and employment was presented in an earlier paper. The unemployment estimates presented here are derived from them and obviously cannot be evaluated independently of them.

of the size of the labor force but also of its dynamics, of how and why it changes. This new series is still static, resting primarily upon long-term demographic change. It is built up by interpolating average participation rates. It sheds little new light on short-run changes in and shifts within the labor force, in contrast to our current monthly reports on the labor force and unemployment.

2. This new series will also be used for purposes of business cycle analysis, to trace the impact of changing levels of economic activity upon levels of employment and unemployment. Actually, this historical employment series is projected in good part on the basis of physical activity and hence may reflect little more than the relative stability or volatility of activity among various industries. To what extent do variations in output affect labor requirements; how much of it is subsumed in hours, and how much in employment? Where independent series on physical activity and employment are available, answers to these questions are possible, but they are not provided, as yet, in this series.

3. A working definition of "full employment" for purposes of public policy is often attempted by reviewing relative levels of unemployment in the past. Lebergott directs himself to this point at some length. Earlier in his paper he had concluded: "Year-to-year changes in unemployment tend to be mirror images of changes in employment. To judge from the 1940-1952 [Monthly Report on the Labor Force] data, the stability in the labor force totals from year to year is very great." It would be interesting to test this conclusion against longer historical experience. Yet it is precisely at this point that the assumptions made necessary by gaps in the data are drawn primarily from 1940-1952 rather than earlier experience. This in turn conditions the unemployment estimates and leaves in doubt the distribution by years of the percentage of the labor force actually unemployed.

In summary, then, the historical labor force and employment series (and therefore the unemployment series) developed by Lebergott are "better" than those we have had heretofore. But they are still at best blunt instruments unsuited to the sharp analytical purposes to which unwary users will put them. Lebergott is alert to these reservations; his thoughtful remarks at the beginning of his paper and at various points throughout leave no doubt on that score. The key assumptions involved in interpolating labor force participation rates and projecting important areas of employment mean that his historical estimates of unemployment are still a discrete series from those subsequently derived since 1940—and ought to be so labeled and used.