

Technical Note



Labor force data: the impact of the 1980 census

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The widely publicized national unemployment figures are derived from the Current Population Survey. This survey, conducted by the Bureau of the Census for the Bureau of Labor Statistics, obtains information from approximately 60,000 households each month, making it the largest survey of its type in the world. It provides data on employment and the labor force as well as unemployment, including information on age, sex, race, occupation, and industry.

A sample survey is a cost effective means of obtaining current labor force data. Every surveyed individual, 16 years or older, is classified as employed, unemployed, or not in the labor force, based on the responses to a structured questionnaire focusing on specific activities during the reference week. Because labor force classifications are obtained from the sample households rather than a complete universe, the responses must be transformed from raw survey data into estimates which reflect the target national population—the civilian noninstitutional population 16 years and older. This process has several steps which have been detailed in various technical publications.¹ This article addresses only one aspect of the process—the use of independent population estimates derived and updated from the decennial censuses, which are used to transform the sample data into meaningful statistics.

Population estimates

In a simple example, if information were obtained from a sample of 5 individuals who represent a universe of 100, each response would be multiplied by 20. However, in the CPS, independent population estimates have been established for each of 64 age-sex-race groups. The reason for using separate weights by demographic group is to adjust for the fact that the distribution of the individuals who fall into the sample in any month may differ somewhat from that of the entire Nation in

terms of age, race, or sex. Because these characteristics are closely correlated with labor force status, sample estimates are more accurate when weighting is done separately for each age-sex-race group rather than with a single population estimate for the sample as a whole.

Population estimates are derived by taking population counts by age, sex, and race from the preceding decennial census and adjusting them monthly throughout the ensuing decade, taking into account the aging of the population, mortality, and net migration. When the actual counts from the subsequent census are available, they become the new benchmark from which to estimate future population levels. In past decades, there has generally been a small discrepancy between the new benchmark and the population estimate for that period as derived from the previous census. As the Census Bureau changed from one set of population controls to the next, there would be a corresponding break in the various labor force series because they were based on these population estimates.

Historically, the effect of the change from one population base to the next was relatively minor. For example, the net differences resulting from the introduction of the 1970 census-based population estimates to the CPS were about 800,000 for population and 300,000 for labor force and employment. However, the conversion to the 1980 census-based population estimates has an entirely different order of magnitude. When the 1980 census was taken, the resident population estimate based on the extrapolation of the 1970 census was 221.7 million. However, the 1980 census actually enumerated 226.5 million persons. Consequently, the population estimates underlying the CPS—the civilian noninstitutional population 16 years and over—were increased by 3.7 million (on an annual average basis in 1981) expanding the labor force by 2.3 million and employment by 2.1 million.

Data adjustment

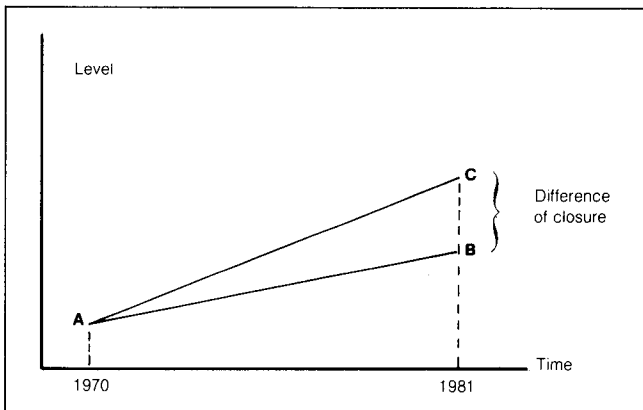
The Census Bureau and BLS have historically followed the procedure of introducing population weights based on the new decennial census into the CPS in a single month (at the beginning of a year to avoid distortions to annual average data), and indicating in footnotes and technical articles the presence of a series break.² Because of the magnitude of the change, this approach was not suitable this time. Accordingly, the Census Bureau revised its intercensal population esti-

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mates and the Bureau of Labor Statistics adjusted many of the more important labor force series in order to avoid sizable discontinuities. Using an estimating methodology developed jointly by BLS and the Census Bureau, the BLS developed revised estimates for some 30,000 labor force series for the 1970's that are consistent with the 1980 census-based population controls as well as the 1970 census.

The revision procedure takes the April 1970 labor force estimates as the last "true" estimate and adjusts each subsequent data cell. The estimated difference in 1981 between each labor force estimate generated by the 1980 census count and the corresponding 1970-based population estimate—called the "difference of closure"—is wedged back in time from December 1980 to April 1970. The procedure takes into account both the distance in time from the 1970 census and the specific size of the difference of closure for each series.³

The following simplified diagram may serve to illustrate the procedure. For any labor force series, point A represents the estimate for 1970, point B represents the estimate for 1981 as originally published using the population weights derived from the 1970 census, and point C represents the estimate for 1981 based on the population weights derived from the 1980 census. Thus, line AB represents the 1970–81 trend in the labor force series as originally published, line AC represents the trend after revision, and BC represents the difference of closure. (Had a real labor force series been graphed, AB and AC would not, of course, be straight lines, but rather would follow paths influenced by secular and cyclical developments.)



One reason for revising the data is that many users need to examine trends over time. In fact, one of the strengths of the CPS is that it provides a consistent time series which permits the tracking of cyclical and secular movement among demographic groups.

These labor force revisions are necessarily provisional

because the underlying estimates of population for the 1970–80 period are considered preliminary by the Bureau of the Census. Completion of the 1980 census coverage studies and evaluation of the 1970–80 population estimates may cause the Census Bureau to readjust its revised population estimates for the 1970–80 period, which, in turn, may cause the BLS to further revise the CPS labor force estimates.

The wedge procedure is based on the premise that within each group the unexpected population increase took place on a consistent basis throughout the 1970's. Without specific evidence to the contrary, this was the most reasonable assumption to make. While the provisional revision provides a smooth, continuous, and reasonable time series, there are several key questions to consider in determining whether the existing wedge procedure will remain the most appropriate. Studies that could aid in this determination include comparisons of 1970 and 1980 census coverage; evaluation of any estimates of undercount in the 1980 census and how they may differ by age, sex, and race from previous censuses; as well as estimates of the number of illegal aliens counted in the 1980 census and judgments about how long such persons have been living in the United States.⁴

Revised labor force data are being issued by the Bureau of Labor Statistics in several steps. More than 350 series of revised monthly seasonally adjusted data were published in the February 1982 issue of *Employment and Earnings*, which also contained revised annual averages for major estimates back to 1970. The March 1982 issue of *Employment and Earnings* contained 62 tables of 1981 annual averages, some including comparisons with 1980, on a revised basis. (Annual averages for 1981, prior to revision, were published in the January 1982 issue and, thus, are available for comparison.) In terms of the *Monthly Labor Review*, the March 1982 issue was the first to contain revised data. In late 1982, BLS is scheduled to publish a data book with 176 tables containing nearly 15,000 data series on a revised basis. In the meantime, many series of both actual and seasonally adjusted data may be obtained from the BLS upon request. Table 1 provides labor force, employment, and unemployment estimates both before and after revision for the 1970–81 period.

While all data series were subject to revision, the underlying population adjustments caused significant changes to only those series that measured levels or counts. Labor force series which are expressed in terms of percentages—such as the unemployment rate, the participation rate, and the employment-population ratio—were largely unaffected by the revision process. This is because the population adjustments generally had the same proportionate effect on the numerator and the denominator used to derive the percentage. Small changes occurred because of rounding differences and where

Table 1. Employment status of the noninstitutional population using 1970 and 1980 census based population estimates, 1970-81

Year	Civilian labor force		Employed		Unemployed		Unemployment rate	
	1970 based	1980 based	1970 based	1980 based	1970 based	1980 based	1970 based	1980 based
	1970	82,715	82,771	78,627	78,678	4,088	4,093	4.9
1971	84,113	84,382	79,120	79,367	4,993	5,016	5.9	5.9
1972	86,542	87,034	81,702	82,153	4,840	4,882	5.6	5.6
1973	88,714	89,429	84,409	85,064	4,304	4,365	4.9	4.9
1974	91,011	91,949	85,935	86,794	5,076	5,156	5.6	5.6
1975	92,613	93,775	84,783	85,846	7,830	7,929	8.5	8.5
1976	94,773	96,158	87,485	88,752	7,288	7,406	7.7	7.7
1977	97,401	99,009	90,546	92,017	6,855	6,991	7.0	7.1
1978	100,420	102,251	94,373	96,048	6,047	6,202	6.0	6.1
1979	102,908	104,962	96,945	98,824	5,963	6,137	5.8	5.8
1980	104,719	106,940	97,270	99,303	7,448	7,637	7.1	7.1
1981	106,393	108,670	98,313	100,397	8,080	8,273	7.6	7.6

changes in the demographic composition of a group affected larger aggregates.

Revised labor force growth

Compared with the data as originally published, the revised data indicate, of course, a faster pace of labor force growth over the past decade. According to originally published data, the labor force grew by 24 million, or 29 percent, during the 1970-81 period; as revised, the increase was 26 million, or 31 percent. (See table 2.) In terms of employment levels, the comparable rates of growth were 25 percent prior to revision and 28 percent afterwards.

The adjustment was not evenly distributed among the various demographic groups. The 1970-81 labor force growth for men was revised upward by more than 10 percent for every age group through 44 years, but the revised labor force levels were actually lower for men 45 to 54 years of age. Women showed smaller increases until the older age categories, where there were very large changes for 55- to 64-year-olds (31 percent) and those 65 and over (18 percent). In general, the share of workers accounted for by persons under 35 years of age increased with the revised data.

Because of the adjustment methodology, these revised growth patterns are a direct result of the patterns of la-

bor force revisions. Labor force estimates for 1981 are, on average, 2.1 percent higher using the 1980 census-based population estimates. About 70 percent of the 2.3 million increase occurred among persons 20 to 34 years of age, whose "corrected" labor force size was 3.7 percent higher than originally estimated. (See table 3.)

Under the revised system, the number of black workers was 2.6 percent higher in 1981 and the age distribution of the incremental increase was even more skewed toward those under age 35. Unlike the situation for whites, for whom the increments for men and women were about the same, the overall increase in the black labor force was higher for women. Furthermore, the age patterns by sex are quite different. The upward revisions in the black male labor force occurred entirely among persons under 45 years of age. For black women, the gains were spread more widely throughout the age spectrum. This is based upon the fact that, according to the 1980 census findings, the population of black men under age 45, as brought forward from the 1970 census, had been underestimated; black women had also been underestimated but to a lesser degree than these black men. The large differences in the population estimates of black men under age 45 are apparently the result of substantial improvements in the completeness of coverage for this group in the 1980 census. Among black women, the improvements in census coverage in 1980 were more evenly distributed across the various age groups.⁵

The effect of the revision in CPS data was particularly sharp for persons of Hispanic origin.⁶ The overall increase in their population estimate was 3.8 percent, about twice the adjustment for whites. The labor force adjustment was not very different for men and women of Hispanic origin, and there was no particular pattern to the adjustments by age. The largest increase occurred among those 20 to 34 years of age, but increases for persons 55 years and older were also larger than average. Within the Hispanic population, adjustments were largest for persons of Cuban origin and smallest for persons of Puerto Rican origin.

Table 2. Civilian labor force growth, by age and sex, between 1970 and 1981 using 1970 and 1980 census based population estimates

[Numbers in thousands]

Age	Total			Men			Women		
	1970 base	1980 base	Percent change	1970 base	1980 base	Percent change	1970 base	1980 base	Percent change
Total, 16 years and over	23,678	25,899	9.4	9,438	10,746	13.9	14,240	15,153	6.4
16 to 19 years	1,601	1,739	8.6	682	769	12.8	919	970	5.5
20 to 24 years	4,961	5,502	10.9	2,611	2,931	12.3	2,350	2,571	9.4
25 to 34 years	12,297	13,356	8.6	5,508	6,152	11.7	6,789	7,204	6.1
35 to 44 years	4,538	4,774	5.2	1,486	1,697	14.2	3,052	3,077	0.8
45 to 54 years	37	21	—	501	-549	-9.6	538	569	5.8
55 to 64 years	457	686	—	-34	44	—	491	642	30.8
65 years and over	-212	-180	15.1	-314	-299	4.8	102	120	17.6

Table 3. Civilian noninstitutional population and civilian labor force by age, sex, race, and Hispanic origin, using 1970 and 1980 census based population estimates, 1981 annual averages

[Numbers in thousands]

Characteristic	Total			Men			Women		
	1970 base	1980 base	Net difference	1970 base	1980 base	Net difference	1970 base	1980 base	Net difference
All persons									
Population, 16 years and over	166,436	170,130	3,694	78,769	80,511	1,742	87,667	89,618	1,951
16 to 19 years	15,905	16,214	309	7,920	8,092	172	7,984	8,121	137
20 to 24 years	20,081	20,820	739	9,717	10,116	399	10,365	10,705	340
25 to 34 years	36,434	37,777	1,343	17,717	18,427	710	18,717	19,350	633
35 to 44 years	26,021	26,291	270	12,527	12,758	231	13,493	13,533	40
45 to 54 years	22,412	22,422	10	10,848	10,797	-51	11,563	11,625	62
55 to 64 years	21,204	21,756	552	10,013	10,151	138	11,191	11,605	414
65 years and over	24,380	24,850	470	10,027	10,170	143	14,353	14,680	327
Labor force, 16 years and over	106,393	108,670	2,277	60,633	61,974	1,341	45,760	46,696	936
16 to 19 years	8,848	8,988	140	4,688	4,777	89	4,160	4,211	51
20 to 24 years	15,543	16,099	556	8,320	8,648	328	7,224	7,451	227
25 to 34 years	29,306	30,392	1,086	16,819	17,479	660	12,487	12,912	425
35 to 44 years	20,969	21,211	242	11,950	12,166	216	9,019	9,045	26
45 to 54 years	16,985	16,970	-15	9,916	9,868	-48	7,069	7,101	32
55 to 64 years	11,734	11,969	235	7,090	7,170	80	4,644	4,799	155
65 years and over	3,008	3,042	34	1,850	1,866	16	1,158	1,176	18
White									
Population, 16 years and over	145,379	147,908	2,529	69,311	70,480	1,169	76,068	77,428	1,360
16 to 19 years	13,347	13,516	169	6,676	6,764	88	6,671	6,752	81
20 to 24 years	17,137	17,609	472	8,399	8,644	245	8,737	8,965	228
25 to 34 years	31,473	32,367	894	15,524	16,005	481	15,949	16,362	413
35 to 44 years	22,732	22,778	46	11,089	11,171	82	11,643	11,606	-37
45 to 54 years	19,661	19,666	5	9,587	9,560	-27	10,074	10,106	32
55 to 64 years	19,032	19,485	453	9,021	9,139	118	10,010	10,346	336
65 years and over	21,998	22,487	489	9,015	9,195	180	12,983	13,292	309
Labor force, 16 years and over	93,586	95,052	1,466	54,027	54,895	868	39,559	40,157	598
16 to 19 years	7,881	7,962	81	4,174	4,224	50	3,707	3,739	32
20 to 24 years	13,549	13,926	377	7,304	7,521	217	6,245	6,406	161
25 to 34 years	25,470	26,208	738	14,881	15,340	459	10,589	10,868	279
35 to 44 years	18,390	18,445	55	10,661	10,740	79	7,730	7,704	-26
45 to 54 years	15,008	14,993	-15	8,865	8,836	-29	6,143	6,157	14
55 to 64 years	10,577	10,764	187	6,463	6,530	67	4,114	4,235	121
65 years and over	2,711	2,753	42	1,680	1,704	24	1,031	1,049	18
Black									
Population, 16 years and over	17,808	18,219	411	7,977	8,117	140	9,831	10,102	271
16 to 19 years	2,227	2,288	61	1,078	1,110	32	1,149	1,178	29
20 to 24 years	2,499	2,642	143	1,108	1,189	81	1,391	1,453	62
25 to 34 years	4,073	4,290	217	1,800	1,914	114	2,272	2,376	104
35 to 44 years	2,755	2,758	3	1,213	1,223	10	1,542	1,534	-8
45 to 54 years	2,308	2,260	-48	1,068	1,003	-65	1,240	1,257	17
55 to 64 years	1,887	1,913	26	860	844	-16	1,028	1,069	41
65 years and over	2,060	2,069	9	851	834	-17	1,209	1,234	25
Labor force, 16 years and over	10,810	11,086	276	5,559	5,684	125	5,251	5,401	150
16 to 19 years	834	862	28	444	462	18	389	400	11
20 to 24 years	1,724	1,828	104	876	941	65	847	888	41
25 to 34 years	3,189	3,365	176	1,601	1,702	101	1,588	1,663	75
35 to 44 years	2,158	2,164	6	1,083	1,093	10	1,075	1,071	-4
45 to 54 years	1,651	1,608	-43	882	829	-53	769	779	10
55 to 64 years	1,000	1,009	9	535	524	-11	465	485	20
65 years and over	254	249	-5	138	134	-4	117	115	-2
Hispanic origin									
Population, 16 years and over	8,970	9,310	340	4,341	4,511	170	4,629	4,798	169
16 to 19 years	1,139	1,176	37	578	597	19	561	579	18
20 to 24 years	1,410	1,478	68	709	743	34	702	735	33
25 to 34 years	2,412	2,527	115	1,168	1,228	60	1,244	1,299	55
35 to 44 years	1,562	1,597	35	737	758	21	826	839	13
45 to 54 years	1,127	1,149	22	537	546	9	590	603	13
55 to 64 years	740	774	34	352	364	12	388	411	23
65 years and over	580	608	28	262	275	13	317	333	16
Labor force, 16 years and over	5,750	5,972	222	3,505	3,644	139	2,245	2,328	83
16 to 19 years	527	545	18	312	323	11	215	222	7
20 to 24 years	1,048	1,100	52	630	662	32	418	439	21
25 to 34 years	1,794	1,884	90	1,098	1,155	57	696	729	33
35 to 44 years	1,147	1,175	28	684	704	20	463	471	8
45 to 54 years	796	812	16	486	495	9	310	317	7
55 to 64 years	372	387	15	247	255	8	125	132	7

Data for *all* published race and ethnic groups are available only since 1973. During the 1973–81 period, the fastest labor force growth was registered for Hispanics, whose population grew dramatically over the period. Based on revised data, the labor force increase was 63 percent during the 8-year period; prior to revision, the growth was estimated to be 60 percent. Despite the sharp increase, the Hispanic share of the total

labor force only moved from 4 to 5.5 percent over the period, using either revised or unrevised data.

The black labor force grew faster than the white, but not nearly as fast as the Hispanic labor force. Revisions raised black labor force growth from 22 to 23 percent between 1973 and 1981. Over the same period, white labor force growth had been 19 percent prior to revision and 20 percent subsequently. □

— FOOTNOTES —

¹ The most comprehensive discussion of the estimation procedure is included in *The Current Population Survey: Design and Methodology*, Technical Paper 40 (Bureau of the Census, 1977), ch. 5. A summary description is included in the Explanatory Notes of each issue of *Employment and Earnings*, published monthly by the Bureau of Labor Statistics.

² For an explanation of the procedures used following the 1970 census, see Gary M. Shapiro and Marvin M. Thompson, "Revisions in Current Population Survey," *Employment and Earnings*, February 1972, pp. 6–9.

³ For a more technical description of the procedures in this adjustment process, see Kenneth D. Buckley, Jennifer Marks, and Ronald J. Statt, "Revisions in the Current Population Survey Beginning in Janu-

ary 1982," *Employment and Earnings*, February 1982, pp. 7–15.

⁴ For the first 1980 census coverage study, see Jeffrey S. Passel, Jacob S. Siegel, and J. Gregory Robinson, "Coverage of the National Population in the 1980 Census by Age, Sex, and Race: Preliminary Estimates by Demographic Analysis," *Current Population Reports*, Series P-23, No. 115 (Bureau of the Census, March 1982).

⁵ *Ibid.*

⁶ It should be noted that the estimates of the Hispanic origin population are not based on independently developed controls specifically for this group. Rather, they arise from the weighting process as a result of individual responses to a question on ethnic origin and the age-sex-race estimates.