

# Creating Comparability in CPS Employment Series

Marisa L. Di Natale

With the release of January 2003 data from the Current Population Survey (CPS), the Bureau of Labor Statistics (BLS) incorporated several major changes and revisions to the time series from the survey.<sup>1</sup> These included two adjustments to CPS population controls that created “bumps” in the historical series of CPS data—one between December 1999 and January 2000, and another between December 2002 and January 2003. BLS recognizes the preference of some data users to have an uninterrupted time series for historical trend analysis. This article presents what BLS believes to be a reasonable method to “smooth” the bumps in the employment series of the major demographic groups for which it publishes monthly data.

## The revisions to CPS data

Of the two population control adjustments, the largest—between December 1999 and January 2000—reflected the switch to population controls based on data from the 2000 decennial census as enumerated. Updates based on the latest decennial census information are generally done 3 or 4 years following each census, and, after the last two censuses, BLS has revised CPS time series data back to the census reference year. BLS revised CPS data from January 2000 to December 2002 to incorporate higher population estimates from the census, as well as new, higher estimates of population growth since the census. At the start of the revision period (January 2000), the new controls raised the civilian noninstitutional population (CNP) aged 16 and older by about 2.6 million. By December 2002, the CNP was 3.8 million greater than originally estimated.

In addition to population data from the decennial census, BLS also receives intercensal population data annually from the U.S. Census Bureau. These annual population updates are based on recent data on net births and deaths, immigration, and emigration, as well as changes in the methodology that the Census Bureau uses to project the population. These updated estimates are usually incorporated

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Marisa L. Di Natale is an economist in the Division of Labor Force Statistics, Office of Employment and Unemployment Statistics, Bureau of Labor Statistics. Telephone: (202) 691-6378; e-mail: [Dinatale.Marisa@bls.gov](mailto:Dinatale.Marisa@bls.gov).

<sup>1</sup>For discussion of the changes and revisions and the effect that they had on the CPS data, see “Revisions to the Current Population Survey Effective in January 2003” in the February 2003 issue of *Employment & Earnings* available on the Internet at <http://www.bls.gov/cps/rvcps03.pdf>.

into the January data. Sometimes these intercensal updates are sizeable, as was the case in January 2003. The Census Bureau estimated that the CNP had registered an additional increase of 941,000 from early 2000 to December 2002. Because this information was not available in time for incorporation into the already planned revision of January 2000 to December 2002 data (based on Census 2000 data), the entire adjustment (+941,000) was added to the population in January 2003. Given the amount of effort needed to completely revise and verify time series for all employment and unemployment estimates produced from the CPS and given that the revisions would be negligible for most series, BLS does not revise historical data to reflect these annual population adjustments.

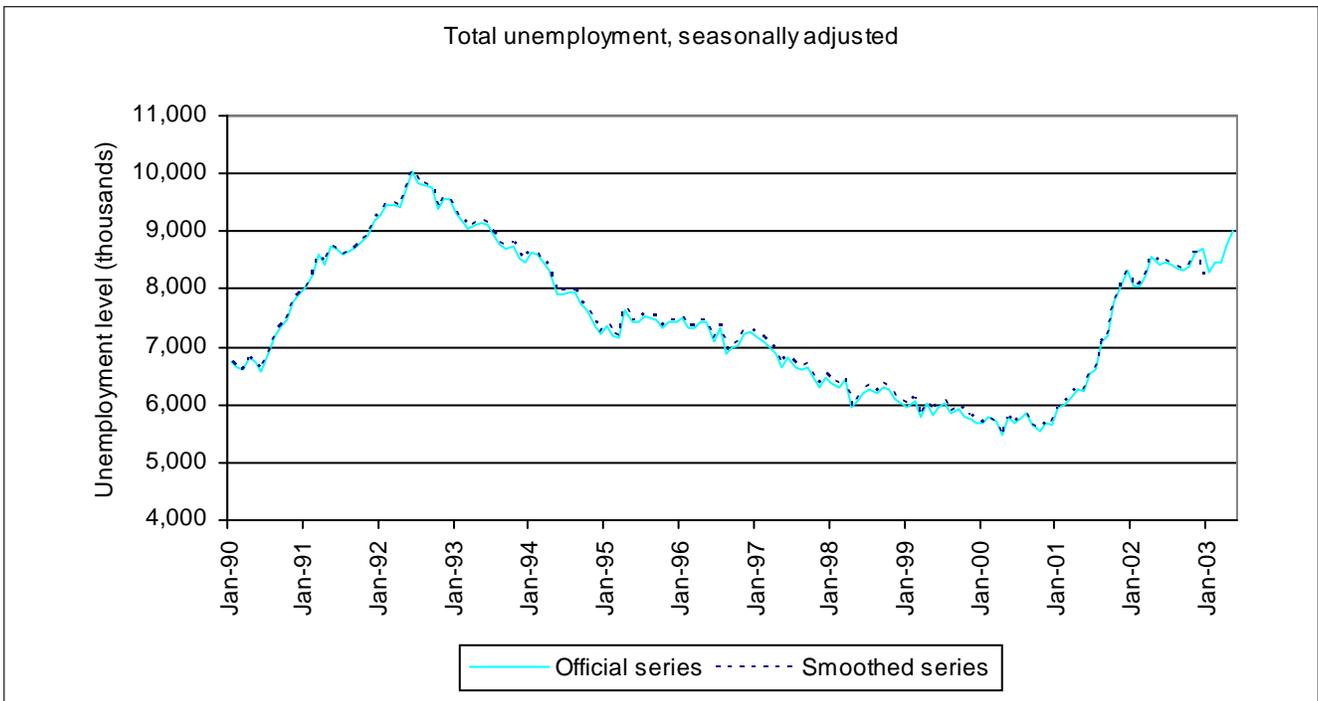
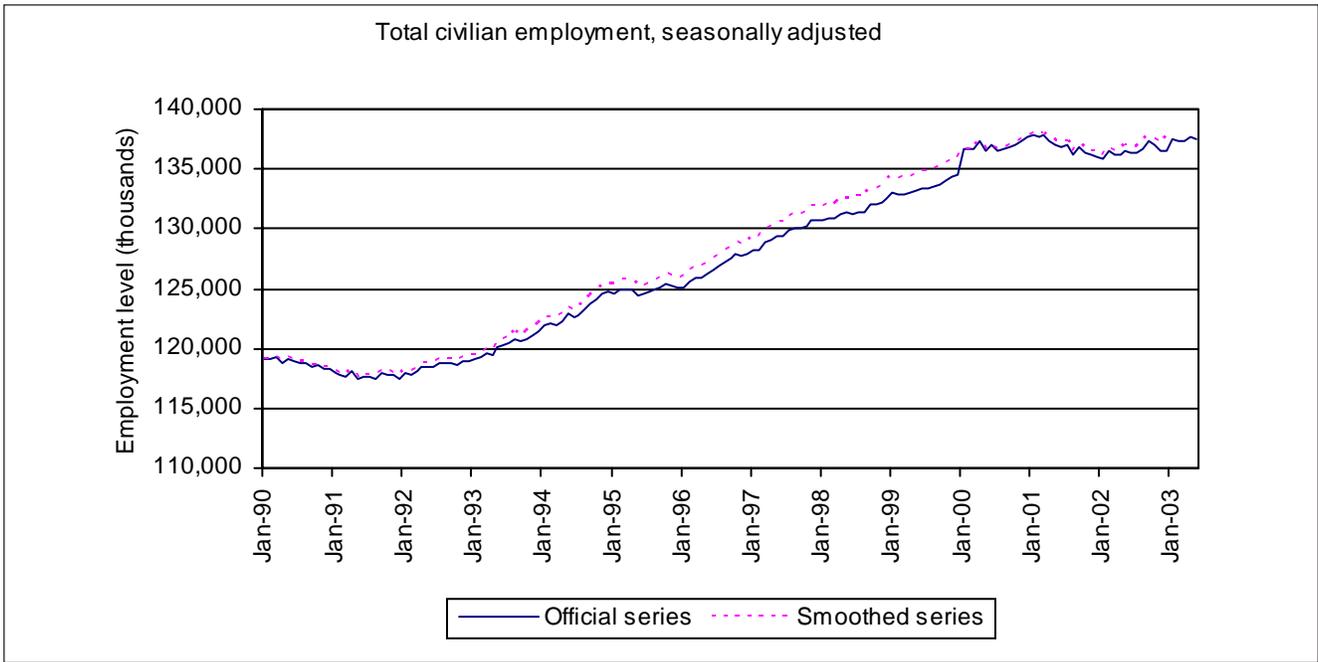
## Smoothing the series

As mentioned above, the two updates to the population controls used in the CPS introduced in January 2003 created two breaks in the historical data series. For many of the CPS data series, the new population controls had little significant effect. However, the adjustments did cause a notable rise in some series, such as employment. Several data users have requested that BLS suggest a method to create a smoothed employment series back to 1990 for the major demographic groups for which it publishes monthly data. Research was done and the technique chosen to smooth the bumps in the data series was to calculate the difference between the new and old estimates at the point of the break and to wedge that difference back into the series over the period during which it is assumed to have accumulated.

Two charts showing the effects of using this smoothing technique on the total employment and total unemployment series (seasonally adjusted) are presented on the following page. Clearly, the smoothing technique had a notable effect on the employment series, but it had almost no effect on the unemployment series. As is shown in the first chart, the smoothing technique eliminated the bumps in employment in January 2000 and January 2003, while preserving the shape of the original trend line. A limitation of this technique is that it assumes that the population growth was distributed evenly over the adjustment period, which may not be the case.

## The method

Two adjustment factors must be derived in order to correct for the two breaks that occurred in the data series in January 2000 and January 2003. Both adjustment factors are calculated the same way, as shown in the equation:



**Adjustment factor = (new estimate at break point/old estimate at break point) - 1**

The method for calculating the adjustment factors for total employment is illustrated below.

1. The not seasonally adjusted employment level in January 2000 after the Census 2000-based revision was 134,912,000. This was divided by the not seasonally adjusted employment level in January 2000 as originally published (before the revision), which was 133,357,000.

$$134,912,000/133,357,000=1.011660 - 1 = 0.011660$$

2. To calculate the second adjustment factor, the revised, not seasonally adjusted December 2002 employment level of 137,735,000 was divided by the unrevised, not seasonally adjusted employment level for that month, 137,159,000.<sup>2</sup>  

$$137,735,000/137,159,000 = 1.004200 - 1 = 0.004200$$

<sup>2</sup>These December 2002 estimates are not seasonally adjusted, noncomposited estimates, and do not appear in official BLS data series. They were published in "Revisions to the Current Population Survey Effective in January 2003," previously cited.

These adjustment factors represent the increase in employment that must be distributed over the period for which estimates are to be revised. So, the first factor should be applied to the 120 months from January 1990 through December 1999, and the second factor should be applied to the 35 months from January 2000 through November 2002.

The following equation represents the calculation that must be done for each month in order to derive a “smoothed” estimate, where  $E_{M\text{smoothed}}$  equals this estimate and  $E_M$  equals the estimate in the  $M$ th month from 1 to 120 for the first factor, and from 1 to 35 for the second factor, for which the formula is being applied.

$$E_{M\text{smoothed}} = E_M ((1 + (\text{factor}/120 \times M))$$

For example, the seasonally adjusted employment level in January 1990 was 119,081,000. Take the adjustment factor for total employment, which is 0.011660, and plug this into the formula above.

$$E_{M\text{smoothed}} = 119,081,000 ((1 + (0.011660/120) \times 1)) \\ = 119,093,000$$

This revised employment level applies the Census 2000-based population controls to the employment level in January 1990. The formula for February 1990 would look like this:

$$E_{M\text{smoothed}} = 119,059,000 ((1 + (0.011660/120) \times 2)) \\ = 119,082,000$$

The adjustment factors for employment for each of the major demographic groups are presented in the table below. Factor 1 refers to the factor to be applied to data for January 1990 through December 1999. This factor adjusts the series for the revisions due to the population increase from the decennial census data. Factor 2 refers to the growth in the population that was incorporated in the January 2003 data (+941,000) and should be applied to data for each month between January 2000 and November 2002.

<b>Employment series</b>	<b>Factor 1 (Jan. 1990- Dec. 1999)</b>	<b>Factor 2 (Jan. 2000- Nov. 2002)</b>
Total, 16 years and over	0.011660	0.004200
Men, 20 years and older	0.013534	0.004603
Women, 20 years and older	0.011757	0.004126
Both sexes, 16 to 19 years	-0.008036	0.000164
White	0.004066	0.003762
Black or African American	0.016231	-0.000133
Hispanic or Latino ethnicity	0.084389	0.019715