August 6, 2004

Employment from the BLS household and payroll surveys: summary of recent trends

Overview

The Bureau of Labor Statistics (BLS) has two monthly surveys that measure employment levels and trends: the Current Population Survey (CPS), also known as the household survey, and the Current Employment Statistics (CES) survey, also known as the payroll or establishment survey.

Estimates from both surveys are published in the "Employment Situation" news release each month. The household and payroll surveys use different definitions of employment and distinct survey and estimation methods. To help data users better understand the differences in the surveys' employment measures and divergences that sometimes occur in their trends, the following information is provided.

- **Summary comparison of household and payroll survey concepts, definitions, and methodologies**
- **Employment trends as measured by the payroll and household surveys**
- **Possible causes of differences in employment trends**
- **Summary of recent changes made to each survey:**
  - **Population control adjustments to the household survey**
  - **Benchmark revisions to the payroll survey**

Summary comparison of household and payroll survey concepts, definitions, and methodologies

Major features and distinctions of the two surveys are compared below in Box 1.

Box 1. How the household and payroll surveys compare

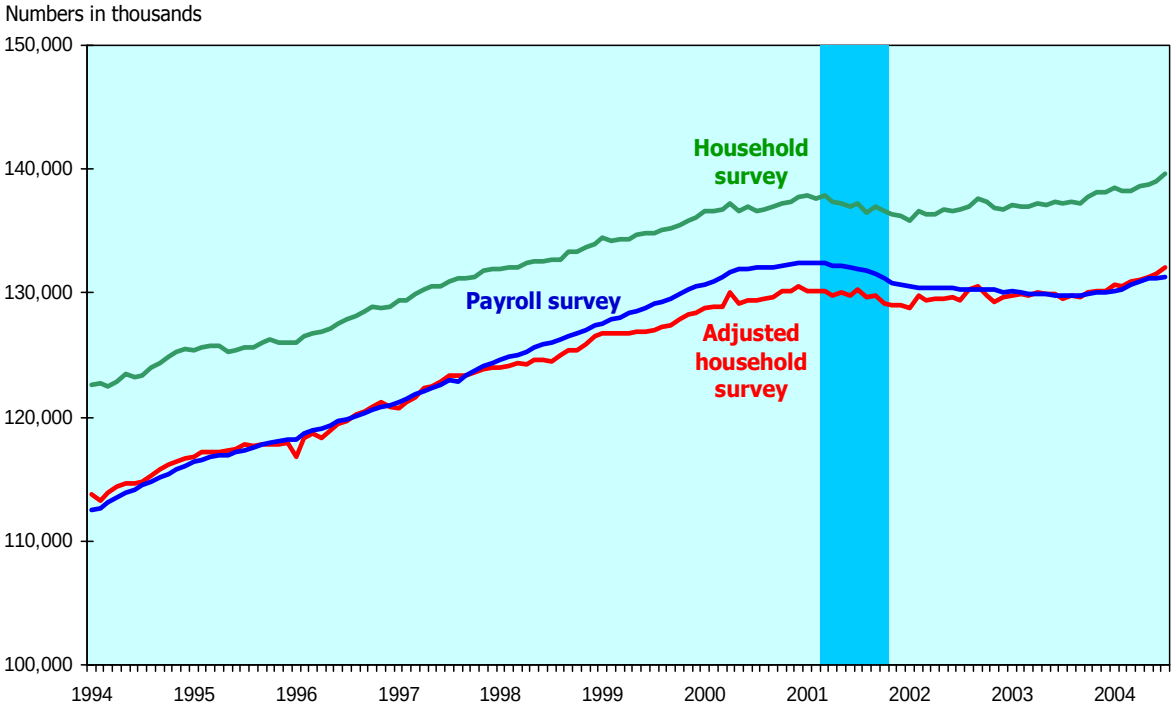
Comparison by:	Household Survey (CPS)	Payroll Survey (CES)
Universe	Civilian noninstitutional population age 16 and over	Nonfarm wage and salary jobs
Type of survey	Monthly sample survey of approximately 60,000 households	Monthly sample survey of about 160,000 businesses and government agencies covering approximately 400,000 establishments
Major outputs	Labor force, employment, unemployment, and associated rates with significant demographic detail	Employment, hours, and earnings with significant industry and geographic detail
Reference period	Calendar week that includes the 12th of the month	Employer pay period that includes the 12th of the month (could be weekly, biweekly, monthly or other)
Employment concept	Estimate of employed persons (multiple jobholders are counted only once)	Estimate of jobs (multiple jobholders counted for each nonfarm payroll job)
Employment definition differences	Includes the unincorporated self employed, unpaid family workers, agriculture and related workers, private household workers, and workers absent without pay	Excludes all of the groups listed at left, except for the logging component of agriculture and related industries
Size of over-the-month change in employment required for a statistically significant movement	±339,000	±108,000
Benchmark adjustments to survey results	No direct benchmark for employment. Adjustments to underlying population base revised annually to intercensal estimates, and every 10 years to the decennial census	Employment benchmarked annually to employment counts derived primarily from Unemployment Insurance (UI) tax records

Employment trends as measured by the household and payroll surveys

Chart 1 shows employment from the household and payroll surveys from January 1994 through the most recent month. Two variations of household survey employment used in BLS research are presented (these variations differ from the official series that appears in the "Employment Situation" and in the public database available through the BLS website). The green household survey line represents a version of total household survey employment where the effects of sizeable population control revisions in January 2000, 2003, and 2004 have been smoothed. The red "adjusted" household survey line represents the smoothed household survey employment series that has been further modified to make it more similar in concept and definition to payroll survey employment. This adjustment to household survey employment subtracts from total employment agriculture and related employment, nonagricultural self employed, unpaid family and private household workers, and workers absent without pay from their jobs, and then adds nonagricultural wage and salary multiple jobholders.

Chart 1 shows that, because of its broader employment definition, the household survey employment level (green line) normally exceeds that of the payroll survey. When the household survey is adjusted to more closely match the payroll survey definition (red line), trend discrepancies between the two surveys are more discernible. In particular, there is an obvious multi-year period from the late 1990s until the onset of the recent recession when payroll employment was growing significantly faster than household survey employment. More recently, the two series converged.

Chart 1. Household and payroll survey employment, seasonally adjusted, 1994-2004



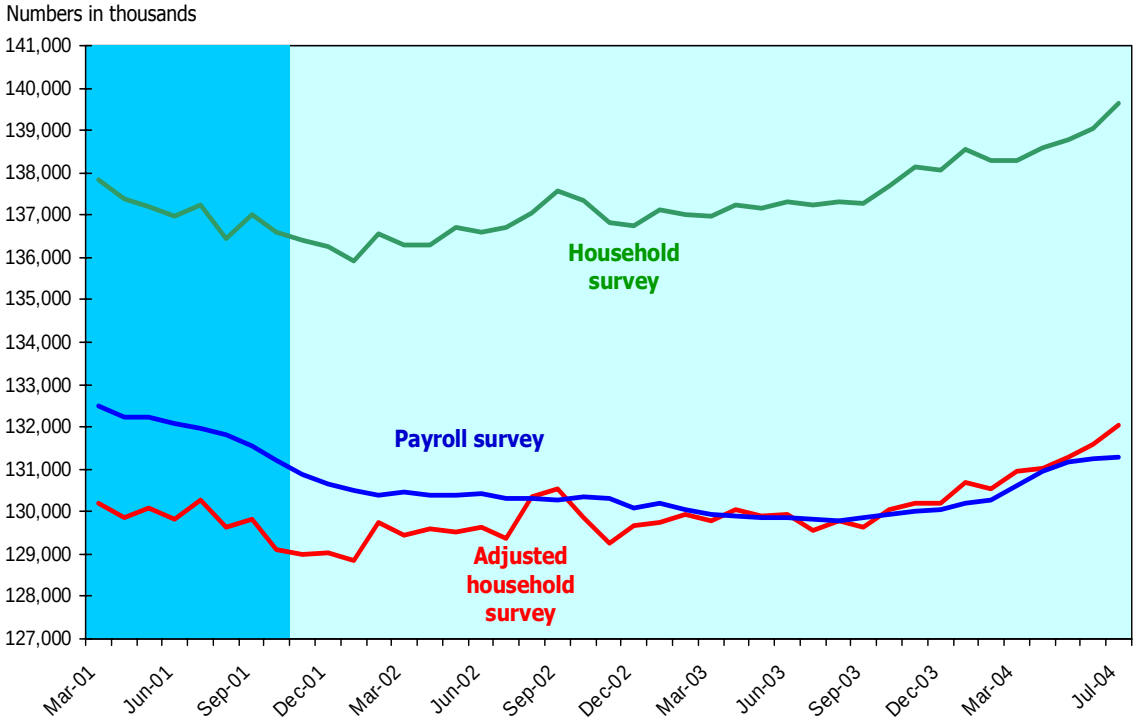
NOTE: The household series presented here has been smoothed for population control revisions. The "adjusted" household series has been smoothed for population control revisions and adjusted to an employment concept more similar to the payroll survey. Shaded area indicates recession.

SOURCE: Bureau of Labor Statistics, August 6, 2004.

Chart 2 shows the same payroll and household employment series as chart 1, but highlights only the recent recession and post-recessionary period from March 2001 through the most recent month. The Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) designated March 2001 as the most recent business cycle peak and November 2001 as the most recent trough. (The NBER is a private, nonprofit, nonpartisan research organization that is the generally acknowledged arbiter of business cycle dating.)

From Chart 2, more recent trends in employment from the two surveys can be seen. Payroll employment declined for a number of months following the end of the recession, while household survey employment trended up. Since last fall, employment as measured by both surveys has increased. In the past 2 months, however, payroll employment has shown less growth than household employment.

Chart 2. Household and payroll survey employment, seasonally adjusted, March 2001-July 2004



NOTE: The household series presented here has been smoothed for population control revisions. The "adjusted" household series has been smoothed for population control revisions and adjusted to an employment concept more similar to the payroll survey. Shaded area indicates recession.

SOURCE: Bureau of Labor Statistics, August 6, 2004.

Box 2 shows the change in employment levels from the payroll and household surveys as measured across the following time periods: 1) over the most recent month, 2) over the most recent year, 3) since March 2001, the most recent business cycle peak, and 4) since November 2001, the most recent business cycle trough. The peak and trough dates are determined by the National Bureau of Economic Research (NBER).

Box 2. Recent trends in payroll and household survey employment

Numbers in thousands

	Over-the-month change: June 2004-July 2004	Over-the-year change: July 2003-July 2004	From March 2001 (peak)-July 2004	From November 2001 (trough)-July 2004
Payroll survey: total nonfarm employment, seasonally adjusted[1]	32	1,458	-1,235	401
Household survey: total employment, smoothed for population control revisions and seasonally adjusted	629	2,420	1,808	3,254
Difference	597	962	3,043	2,853

[1] Payroll employment for July 2004 is preliminary and subject to revision.

NOTE: The household survey figures in Box 2 are calculated from a variation of household survey employment used in BLS research (also shown by the green lines in Charts 1 and 2). This version of household survey employment smoothes out the effects of sizeable population control revisions to the survey in January 2003 and January 2004.

Box 3 shows employment trends in the payroll and household surveys over the same periods as in Box 2, but this illustration uses adjusted household employment that is more comparable to the payroll survey (also shown in Charts 1 and 2). Even with this adjustment, the difference in employment change as measured by the two surveys is still substantial.

Box 3. Recent trends in payroll employment and household survey employment adjusted to an employment concept more similar to that of the payroll survey

Numbers in thousands

	Over-the-month change: June 2004-July 2004	Over-the-year change: July 2003-July 2004	From March 2001 (peak)-July 2004	From November 2001 (trough)-July 2004
Payroll survey: total nonfarm employment, seasonally adjusted[1]	32	1,458	-1,235	401
Household survey: total employment, smoothed for population control revisions, adjusted to be more like the payroll survey, and seasonally adjusted	434	2,480	1,826	3,032
Difference	402	1,022	3,061	2,631

[1] Payroll employment for July 2004 is preliminary and subject to revision.

NOTE: The household survey figures in Box 3 are calculated from a variation of household employment used in BLS research (also shown by the red lines in Charts 1 and 2). This version of household employment smoothes out the effects of sizeable population control revisions to the survey in January 2003 and January 2004. In addition, it adjusts household survey employment to make it more similar in concept and definition to payroll employment. This adjustment to household survey employment subtracts from total employment agriculture and related employment, nonagricultural self employed, unpaid family and private household workers, and workers on unpaid leave from their jobs, and then adds nonagricultural wage and salary multiple jobholders.

Possible causes of differences in employment trends

The following summarizes some issues with the surveys that are important when comparing changes in employment from the two sources.

Sampling error – The payroll survey has a much larger sample size than the household survey. The payroll survey's active sample covers approximately 400,000 business establishments *of all sizes* representing about one-third of total nonfarm employment. The household survey is much smaller at 60,000 households, covering a very small fraction of total employed persons. Household survey employment is therefore subject to larger sampling error, about 3 times that of the payroll survey on a monthly basis (see Box 1). When looking at short-term trends in either survey, especially over-the-month changes, it is essential to assess the statistical significance of the change. When comparing the two series over longer periods of time, however, other factors also need to be considered; some of these are discussed below.

Payroll survey benchmark – The payroll survey estimates are benchmarked once a year against a full universe count of employment derived from Unemployment Insurance (UI) tax records that nearly all employers are required to file. The payroll survey's most recent benchmark—to March 2003 employment records—resulted in a small downward revision of one-tenth of one percent, indicating that the survey estimates were accurately tracking the universe of nonfarm payroll employment (see additional information on the payroll survey benchmark below).

With regard to the benchmark source data, BLS has recently reviewed information from publicly available UI management reports concerning the timeliness of new business enrollments into the UI system. The findings are available in the report "Assessing the Timeliness of Business Births in BLS Establishment Statistics" on the BLS Internet site at http://www.bls.gov/cew/eta581study.pdf.

New business births in the payroll survey – The payroll survey sample does not include new firms immediately. They are incorporated with a lag. In the interim, a model-based estimate is used each month to account for employment resulting from new firm births. Based on the relatively small benchmark revision for March 2003, as well as comparisons to universe data for Fourth Quarter 2003, the model appears to be performing well during the recent period. Additional information about the birth/death model used in the payroll survey estimates is on the BLS Internet site at http://www.bls.gov/web/cesbd.htm.

Job changing - Employment estimates from the payroll survey are a count of jobs, unlike the household survey which provides a count of employed persons. If a person changes jobs within a payroll survey reference period, which is defined as the pay period including the 12th of the month, both jobs will be counted by the payroll survey estimates. If the rate of job-to-job movement changes substantially over time, it could impact trends produced from the payroll survey. While there is no method to directly measure effects from job changing, BLS is researching this issue using job change rates from the household survey. The initial findings of this research are provided in the report "Effects of Job Changing on Payroll Survey Employment Trends" at http://www.bls.gov/ces/cesjobch.pdf.

Population controls in the household survey – Population controls determine the weights used in the household survey to adjust the sample results to the overall level of the U.S. population. The population

controls are developed by the U.S. Census Bureau. They are derived from decennial census information and, between census years, from administrative and other data. There are limitations to the population control estimates due primarily to the difficulties associated with estimating the net international migration component. The population controls contributed significantly to the discrepancy between payroll and household survey employment in the 1980s and 1990s when the household survey showed less growth than the payroll survey.

The upward trend in household employment since the end of the 2001 recession has been largely a function of the estimated growth in population. That is to say, the household survey has not shown an increase in the proportion of the population that is employed. In fact, the employment-population ratio has declined since 2001: it was 64.3 percent at the start of the recession (March 2001) and 63.0 percent at the trough. The ratio declined further in 2002 and 2003. In recent months it has edged up, reaching 62.5 percent in July. (See additional information on the recent household survey population control adjustments below.)

Worker classification in the household survey – As was illustrated in Box 3 above, adjusting for the measurable differences in the surveys' employment definitions resolves only a portion of the discrepancy. This adjustment process is imperfect, however, because precise data are not available in many cases to make the best possible adjustment. For example, some independent contractors are not reported as self employed in the household survey, but rather as wage and salary workers. This type of reporting issue limits BLS' ability to fully reconcile the two employment measures.

"Off-the-books" employment – Workers who are paid "off-the-books" are not reported in the payroll survey. The household survey could possibly include some of these workers, but BLS cannot determine the extent to which they might be reflected in household survey employment.

Summary

- BLS has estimated the measurable definitional differences between the household and payroll surveys and found they provide a partial explanation for the employment trend differences. There are a number of definitional differences between the surveys that cannot be readily measured or quantified. These differences may contribute to divergences in the surveys' trends, but their effects are either unknown or can only be conjectured. In addition, although BLS has devoted considerable attention to this issue, there may be other contributing factors that have not been identified.

- A summary of some of BLS' research was presented to the Federal Economic Statistics Advisory Committee (FESAC) in October 2003. The paper is available on the BLS Internet site at http://www.bls.gov/bls/fesacp2101703.pdf.

- BLS is continuing to investigate possible causes of recent divergences in employment growth between the payroll and household surveys. BLS also has implemented improvements that addressed past limitations. The redesign of the payroll survey, for example, led to the use of a probability sample, more frequent updating of the survey sample frame, and the development of a more effective means to estimate business births and deaths. With regard to the household survey population controls, the Census Bureau remains engaged in efforts to improve the intercensal population estimates. In particular, they have begun utilizing information from the large American Community Survey (ACS) to improve the estimates of net international migration.

- Both the payroll and household surveys are needed for a complete picture of the labor market. The payroll survey provides a highly reliable gauge of monthly change in nonfarm wage and salary employment. The survey has a large probability sample, and is benchmarked annually to a universe count of jobs derived from the unemployment insurance tax system. The payroll survey offers industry and geographic information at very detailed levels. The household survey provides a broader picture of employment including agriculture and the self employed, as well as detailed information on the demographic composition of the employed and the unemployed.

Population control adjustments to the household survey

January 2004 adjustment – As part of its annual review of intercensal population estimates, the U.S. Census Bureau determined that a *downward* adjustment should be made to the household survey population controls. This adjustment stemmed from revised estimates of net international migration for 2000 through 2003. In keeping with usual practice, the new controls were used in the survey starting with data for January 2004. Estimates for December 2003 and earlier months were *not* revised to reflect the new (lower) population controls.

A comparison of December 2003 data based on the old and new controls indicated that the population decrease caused declines in the labor force (-437,000), employment (-409,000), and unemployment (-27,000). The total unemployment rate, labor force participation rate, and employment-population ratio, however, were not affected. Additional details on the January 2004 population adjustments are provided in the table below.

January 2004 household survey population control adjustment effect

Employment status of the population, December 2003

(Numbers in thousands)

	December 2003 as published	December 2003 based on adjusted population controls	Difference[1]
Civilian noninstitutional population	222,509	221,949	-560
Civilian labor force	146,501	146,065	-437
Participation rate	65.8	65.8	0.0
Employed	138,556	138,147	-409
Employment-population ratio	62.3	62.2	0.0
Unemployed	7,945	7,918	-27
Unemployment rate	5.4	5.4	0.0
Not in labor force	76,007	75,884	-123

[1] Differences are calculated from unrounded estimates.

Previous population control adjustments – This latest population control adjustment follows two previous *increases* in the controls. With the release of January 2003 household data last year, BLS introduced two separate adjustments that increased the survey population controls.

1) Beginning in January 2000, household estimates reflect an increase in population resulting from the switch to the Census 2000 population controls.
2) In January 2003, household estimates reflect new, higher population controls. The upward adjustment resulted from higher estimates of net international migration in the population for 2000 through 2002.

Both of these adjustments in population controls resulted in an increase in the employment estimates from the household survey. The impact on employment of the January 2000 adjustment was about 1.6 million. The impact of the January 2003 adjustment was about 576,000.

Interpreting household data with the population control adjustments – The level shifts in household survey employment resulting from these population adjustments make it difficult for data users to compare changes in employment over time periods that include the "bumps." As a convenience to its data users, BLS created a research series that smoothes the level shifts in employment resulting from the January 2000, 2003, and 2004 population control adjustments. This household employment research series was used in Charts 1 and 2 and Box 2 above to provide a clearer picture for analysis. The full series, 1990-2003, is shown in the table below.

Household Survey Employment Smoothed for Population Controls, Seasonally Adjusted, January 1990-December 2003

(In thousands)

	January	February	March	April	May	June	July	August	September	October	November	December
1990	119,093	119,082	119,238	118,898	119,209	119,052	118,891	118,894	118,628	118,651	118,432	118,379
1991	118,089	117,915	117,823	118,293	117,634	117,845	117,785	117,712	118,169	118,052	118,033	117,740
1992	118,265	118,050	118,454	118,748	118,709	118,764	119,071	119,195	119,101	119,020	119,280	119,413
1993	119,503	119,715	119,995	119,938	120,594	120,781	120,970	121,373	121,081	121,363	121,722	122,031
1994	122,547	122,679	122,534	122,908	123,497	123,277	123,362	124,013	124,372	124,811	125,230	125,448
1995	125,402	125,681	125,720	125,722	125,207	125,321	125,629	125,677	125,972	126,241	126,052	125,963
1996	126,013	126,542	126,779	126,924	127,189	127,562	127,922	128,161	128,540	128,909	128,801	128,904
1997	129,358	129,370	129,981	130,247	130,584	130,544	130,970	131,172	131,194	131,368	131,859	131,898
1998	131,958	132,053	132,072	132,484	132,614	132,545	132,643	132,718	133,333	133,359	133,655	133,994
1999	134,436	134,276	134,381	134,402	134,775	134,855	134,905	135,097	135,227	135,529	135,862	136,092
2000	136,569	136,614	136,691	137,294	136,649	136,968	136,569	136,761	136,976	137,200	137,399	137,723
2001	137,889	137,687	137,852	137,396	137,191	136,978	137,234	136,464	137,027	136,612	136,406	136,258
2002	135,902	136,557	136,308	136,305	136,723	136,578	136,710	137,051	137,586	137,335	136,807	136,729
2003	137,134	136,997	136,971	137,240	137,158	137,317	137,240	137,320	137,263	137,704	138,133	138,070

NOTE: This series reflects seasonally adjusted household survey employment that has been revised from January 1990-December 2003 to smooth out the effects of population control revisions introduced in January 2000, 2003, and 2004.

Source: Bureau of Labor Statistics, Division of Labor Force Statistics, February 6, 2004

Box 3 used a variation of the smoothed household survey employment research series that was adjusted to be more similar in concept and definition to payroll employment. That series, which begins in January 1994, is provided below.

Household Survey Employment Smoothed for Population Controls and Adjusted to a Payroll Concept, Seasonally Adjusted
January 1994 - July 2004

(In thousands)

	January	February	March	April	May	June	July	August	September	October	November	December
1994	113,747	113,312	113,901	114,425	114,649	114,664	114,832	115,277	115,836	116,114	116,456	116,716
1995	116,832	117,161	117,109	117,174	117,270	117,474	117,804	117,703	117,765	117,811	117,756	117,929
1996	116,808	118,281	118,655	118,258	118,933	119,395	119,637	120,199	120,498	120,823	121,231	120,807
1997	120,720	121,225	121,609	122,335	122,421	122,877	123,305	123,314	123,353	123,620	123,926	123,980
1998	123,993	124,131	124,337	124,191	124,586	124,563	124,497	124,946	125,348	125,368	125,908	126,473
1999	126,762	126,741	126,811	126,802	126,893	126,941	127,064	127,288	127,410	127,877	128,321	128,431
2000	128,850	128,947	128,963	130,066	129,220	129,381	129,468	129,519	129,633	130,150	130,126	130,514
2001	130,216	130,230	130,213	129,848	130,091	129,833	130,257	129,649	129,816	129,112	129,007	129,025
2002	128,836	129,748	129,442	129,604	129,511	129,629	129,388	130,337	130,545	129,861	129,273	129,683
2003	129,752	129,952	129,783	130,056	129,887	129,927	129,559	129,792	129,625	130,036	130,209	130,206
2004	130,699	130,553	130,935	131,018	131,300	131,605	132,039					

NOTE: This series represents not seasonally adjusted household survey employment that has been revised from January 1990-December 2003 to smooth out the effects of population control revisions introduced in January 2000, 2003, and 2004. The data from 1994 forward were then adjusted to an employment concept more similar to the payroll survey by subtracting from total employment agriculture and related employment, the self employed, unpaid family and private household workers, and workers on unpaid absences and then adding nonagricultural wage and salary multiple jobholders. The resulting employment series was then seasonally adjusted.

Source: Bureau of Labor Statistics, Division of Labor Force Statistics, August 6, 2004.

Benchmark revisions to the payroll survey

Benchmark revisions are a standard part of the payroll survey estimation process. The benchmark adjustment represents a once-a-year re-anchoring of sample-based employment estimates to full employment counts available through unemployment insurance (UI) tax records filed by nearly all employers with State Employment Security Agencies.

The incorporation of March 2003 benchmarks published on February 6, 2004, led to a revision of all not seasonally adjusted data for the period subsequent to the last benchmark; that is, for April 2002 forward. Seasonally adjusted employment, hours, earnings series were revised from January 1999 forward.

March 2003 Benchmark Effects on the Nonfarm Payroll Series
At the total nonfarm level, the March 2003 benchmark revision was a downward adjustment of 122,000 or -0.1 percent. Over the past 10 years, benchmark revisions have averaged 0.3 percent with a range from near zero to $\pm$0.7 percent.

Following standard BLS methodology, estimates were recalculated for the year preceding and the year following the March 2003 benchmark reference month. The March 2003 UI-based benchmark level replaced the March 2003 sample-based employment estimate. The difference between the benchmark level and the estimate was wedged back to the previous benchmark level; 1/12 of the difference was added to the April 2002 employment level, 2/12 to May 2002 and so forth, through February 2003, which received 11/12 of the difference.

Estimates for April 2003 forward were recalculated by applying over-the-month changes from the sample, along with recomputed net birth/death factors, and seasonal adjustment factors, to the new benchmark level.

Revisions for November 2003 result from the effects of the benchmark process described above and the routine incorporation of additional sample receipts into the final estimates.

The net impact of the benchmarking process for April 2002 through November 2003 is shown in the table below.

Total nonfarm employment, seasonally adjusted, in thousands

	Employment Levels				Over-the-month changes		
	Employment levels as previously published	Employment levels as revised	Difference		Over-the-month changes as previously published	Over-the-month changes as revised	Difference
2002							
April	130,415	130,379	-36		-66	-68	-2
May	130,411	130,381	-30		-4	2	6
June	130,383	130,406	23		-28	25	53
July	130,204	130,295	91		-179	-111	68
August	130,224	130,306	82		20	11	-9
September	130,289	130,259	-30		65	-47	-112
October	130,408	130,342	-66		119	83	-36
November	130,409	130,305	-104		1	-37	-38
December	130,198	130,096	-102		-211	-209	2
2003							
January	130,356	130,190	-166		158	94	-64
February	130,235	130,031	-204		-121	-159	-38
March	130,084	129,921	-163		-151	-110	41
April	130,062	129,901	-161		-22	-20	2
May	129,986	129,873	-113		-76	-28	48
June	129,903	129,859	-44		-83	-14	69
July	129,846	129,814	-32		-57	-45	12
August	129,881	129,789	-92		35	-25	-60
September	129,980	129,856	-124		99	67	-32
October	130,080	129,944	-136		100	88	-12
November	130,123	130,027	-96		43	83	40