

# **BLS National Establishment Estimates Revised to Incorporate March 2006 Benchmarks**

Michele Eickman

Economist

With the release of data for January 2007, the Bureau of Labor Statistics (BLS) introduced its annual revision of national estimates of employment, hours, and earnings from the Current Employment Statistics (CES) monthly survey of nonfarm establishments. Each year, the CES survey realigns its sample-based estimates to reflect more currently available universe counts of employment—a process known as benchmarking. Comprehensive counts of employment, or benchmarks, are derived primarily from the unemployment insurance (UI) tax reports that nearly all employers are required to file with State Workforce Agencies.

## **Summary of the benchmark revisions**

The March 2006 benchmark level for total nonfarm employment is 134,868,000, a figure that is 752,000 above the NAICS sample-based estimate for March 2006, an adjustment of 0.6 percent. [Table 1](#) shows the total nonfarm percentage benchmark revisions for the past 10 years. This year's revision is large by recent historical standards. BLS has researched many potential sources for this larger than usual revision, reviewing potential error sources in both the CES estimates and the UI-based universe counts. These are described in the next section.

[Table 2](#) shows the nonfarm employment benchmarks for March 2006, not seasonally adjusted, by industry. No individual supersector dominated in terms of the size of the revision. The largest upward revision occurred in professional and business services with a revision of 230,000, or 1.3 percent. Construction estimates were raised by 189,000, or 2.6 percent, followed by the trade, transportation, and utilities supersector with an upward revision of 158,000 or 0.6 percent. Education and health services estimates were revised upward by 96,000 or 0.5 percent.

Other supersectors had upward revisions of a smaller magnitude. Estimates in leisure and hospitality were revised by 42,000, or 0.3 percent, while estimates were revised by 35,000 in financial activities and 27,000 in other services, or 0.4 and 0.5 percent, respectively. Within leisure and hospitality, the accommodations and food services industry was revised 37,000, or 0.3 percent. Within the financial activities supersector, direct life insurance carriers was revised by 44,700, or 12.2 percent, while professional and similar organizations, a part of other services, was revised by 17,800, or 3.6 percent.

Mining estimates were raised by 8,000, or 1.2 percent, and government estimates were revised upward by 3,000, or less than 0.05 percent.

Manufacturing had a small revision of -21,000, or -0.1 percent, with nondurable goods accounting for the magnitude with a revision of -23,000, or -0.4 percent. A downward revision was also made in information (-15,000, or -0.5 percent).

### **Summary of research into possible sources of the March 2006 benchmark revision**

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Michele Eickman is an economist in the Division of Current Employment Statistics, Office of Employment and Unemployment Statistics, Bureau of Labor

The net difference between CES estimates and QCEW-based benchmark, observed as the CES benchmark revision, results from many sources and disaggregating it into components is complex. BLS examined potential error sources in both the CES estimates and the QCEW-based employment benchmark. Both series are subject to non-response and imputation error, and reporting error. Additionally for the CES estimates, sampling error and the business birth/death modeling errors are a factor.

### **Profiling the CES-QCEW divergence**

BLS began its search for causes by studying the profile of the CES-QCEW divergences: 1) by industry; and 2) over the benchmark year. Insights from these analyses follow.

#### 1) CES benchmark revisions by industry

The large revision at total nonfarm is mostly attributable to larger than usual revisions in construction and professional and business services, and a substantial revision in trade, transportation, and utilities.

Percentage benchmark revisions by super sector

	2004	2005	2006	2006 bmk revision
Total Nonfarm	0.2	-0.1	0.6	752
Natural resources and mining	0.7	-0.3	1.2	8
Construction	0.6	0.5	2.6	189
Manufacturing	-0.4	-0.3	-0.1	-21
Trade, transportation, utilities	0.2	0.3	0.6	158
Information	-1.0	-2.1	-0.5	-15
Financial activities	0.1	-0.8	0.4	35

Professional and business services	-0.2	-0.4	1.3	230
Education and health services	0.2	0.0	0.5	96
Leisure and hospitality	1.2	0.4	0.3	42
Other services	0.5	-1.3	0.5	27
Government	0.1	0.0	0.0	3

## 2) CES-QCEW tracking over the benchmark year

CES estimates and QCEW employment counts generally track within a relatively predictable range from quarter to quarter. The series have somewhat different seasonal patterns, and therefore it is more informative to compare them on an over-the-year change basis when examining trend differences. From the last benchmark month, March 2005, through December 2005, CES and QCEW total private employment were tracking within a normal  $\pm 0.3\%$  range. Throughout this period, CES was tracking consistently below the QCEW but not by a large magnitude. The magnitude of difference more than doubled in the first quarter of 2006, as illustrated by the table below.

Over the Year Change by Month, Total Private (CES scope),  
Apr 05-Mar 06, not seasonally adjusted; CES estimates are pre-March 06 benchmark revision

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
CES	1891	1701	1862	1863	2013	1861	1610	1856	1794	1863	1858	1920
QCEW	2193	2052	1989	2044	2160	2308	1810	2031	2029	2335	2323	2681
QCEW-CES	302	351	127	181	147	447	200	175	235	472	465	761

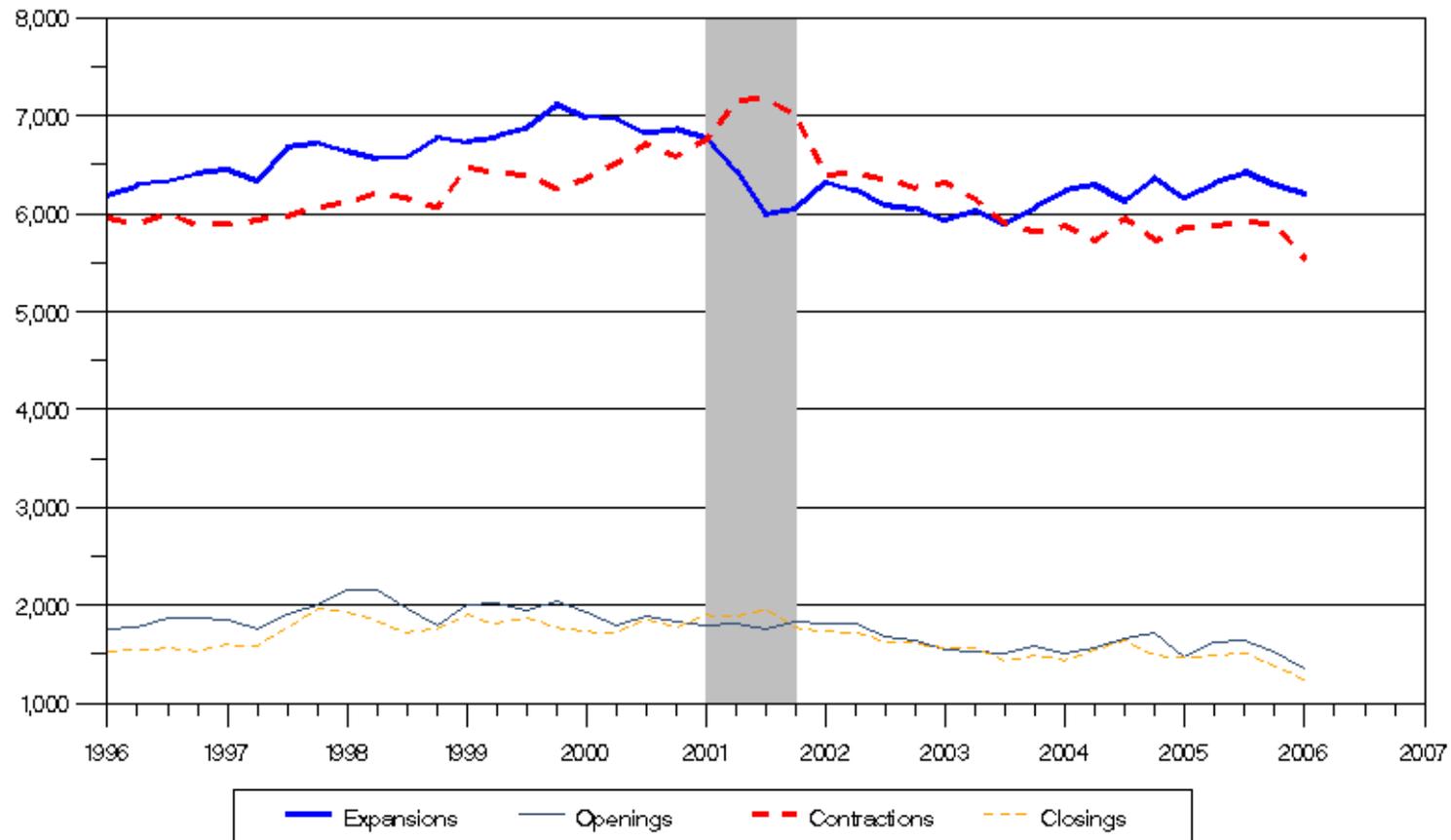
### **Business Employment Dynamics (BED)**

To gain insight into the nature of the first quarter 2006 divergences, BLS examined its Business Employment Dynamics (BED) data. The BED series disaggregate the QCEW employment data into gross job gains from business expansions and openings, and gross job losses from business contractions and closings. These series reveal which of the underlying flows are driving the net QCEW change.

The BED series indicated that it was not gross job gains driving the employment strength in first quarter 2006 but rather a slowdown in gross job losses from contractions and closings. The BED chart and table below illustrate the first quarter decline in gross job losses. In addition, the BED data by industry show sharp fall-offs in contractions in most of the industries with large CES benchmark revisions, including Construction and Professional and Business Services. There is a notable drop in overall closings in fourth quarter 05 as well as first quarter 06.

Components of private sector gross job gains and job losses, seasonally adjusted  
 March 1996 – March 2006  
 Total private

Thousands



Note: Shaded area represents recession period.

Three-month private sector gross job gains and losses,  
seasonally adjusted

Category	3 months ended				
	Mar. 2005	June 2005	Sept. 2005	Dec. 2005	Mar. 2006
	Levels (in thousands)				
Gross job gains.....	7,635	7,932	8,055	7,818	7,556
At expanding establishments.....	6,171	6,311	6,423	6,293	6,205
At opening establishments.....	1,464	1,621	1,632	1,525	1,351
Gross job losses.....	7,310	7,358	7,427	7,267	6,772
At contracting establishments...	5,852	5,873	5,915	5,888	5,536
At closing establishments.....	1,458	1,485	1,512	1,379	1,236
Net employment change (1).....	325	574	628	551	784
	Rates (percent)				
Gross job gains.....	6.9	7.2	7.3	7.1	6.7
At expanding establishments.....	5.6	5.7	5.8	5.7	5.5
At opening establishments.....	1.3	1.5	1.5	1.4	1.2
Gross job losses.....	6.6	6.6	6.8	6.5	6.0
At contracting establishments...	5.3	5.3	5.4	5.3	4.9

At closing establishments.....		1.3		1.3		1.4		1.2		1.1
Net employment change(1).....		0.3		0.6		0.5		0.6		0.7

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 1 The net employment change is the difference between total gross job gains and total gross job losses.

**Possible causes of the CES-QCEW difference**

Numerous statistical error sources exist in both the CES and QCEW and are potential contributors to the larger than usual March 2006 benchmark revision as noted above. BLS research to date has looked at both:

- Whether the change in the QCEW from March 2005 to March 2006 was impacted by noneconomic data reporting or processing changes, and
- If the QCEW March 2005 to March 2006 change is taken as correct, why the CES estimation process failed to measure it within usual historical ranges.

A description of key aspects of the research and validation completed to date follows.

**QCEW imputations**

Every quarter the QCEW program imputes employment for UI accounts where reports were not received or were received but contained only wage information and no employment data. Typically about 10% of the worksites and 5% of the QCEW total employment is imputed. BLS reviewed key aspects of the QCEW imputation process to see if it could be a factor in the divergent CES/QCEW over-the-year employment trends. The review included: the functioning of processing systems and edit checks, instances

of long term imputations (more than two quarters), and the number and trend of imputed accounts versus historical norms. After extensive examination, no problems or changes to the QCEW imputations were found that could help explain the large CES benchmark revision.

### **Possible change in Payroll Processing Firm reporting for the QCEW**

A substantial percentage of firms do not file their own Quarterly Contributions Report (QCR) with State UI agencies but rely on payroll processing firms (PPFs). The PPFs also derive the employment counts that are reported on the QCR, and then become the basis for the QCEW employment series. Using the QCEW microdata file, BLS examined a number of tabulations to see whether there might be obvious issues with PPF reporting. The review was limited because of time constraints and the fact that most QCEW firm records do not carry the agent code that indicates whether the report is filed by a PPF. While BLS is planning a more extensive quality control review of PPF-supplied data, the limited review done for the March 2006 benchmark did not reveal any issues that could be a factor in the larger than normal benchmark revision.

In addition to the QCEW review work described above, BLS examined major aspects of the CES survey process and estimation methods. In addition to directly reviewing estimation components, BLS also completed a series of estimate simulations designed to vary one component of the estimation process at a time in order to observe possible effects on the estimates. Results are described below.

### **CES nonresponse**

A review of response rates for the March 2005-06 benchmark year indicates rates mostly in the normal historical range. However August, October, and November 2005 had slightly lower than usual rates. The major reason for this is a combination of post-Katrina effects in the Gulf Coast area and the introduction of a more extensive CES collection form which included fields for additional payroll and hours data. There is no indication that these slightly below normal response rates for a few months are a major contributor to the benchmark revision magnitude. Experimental estimates done with a simulated 100% response rate (using QCEW reported data to fill in for CES non-respondents) did not substantially shrink the observed benchmark revision.

### **Reporting differences between CES and QCEW**

Both the CES survey and the QCEW program use the same pay period including the 12<sup>th</sup> of the month reference period for employment. However individual firms sometimes report different counts to the two programs. This can contribute to differences in the aggregate employment series measured by the two programs and therefore to the benchmark revision. Estimate simulations where QCEW responses were substituted for CES responses did not indicate any substantial difference in benchmark revision results overall. However for some industries with large benchmark revisions, most notably construction and professional and business services, substituting QCEW for CES responses did shrink the revision substantially.

### **CES data edit and review effects**

During the estimation process CES sample data are edited for potential errors and atypical reports. In order to examine possible problematic effects from this process, estimate simulations were produced omitting these treatments. These experiments did not reveal any problems with the data editing and review process.

### **Changes to the CES and QCEW measurement processes following Hurricane Katrina**

Both the CES and QCEW used modified procedures in the aftermath of Hurricane Katrina, for parts of the Gulf Coast region. Both programs modified procedures for imputing for non-respondents; CES additionally changed other aspects of its estimation methods. The end result of these changes were that CES estimates showed a sharper employment drop over the benchmark year than the drop eventually reported by the QCEW. These differences are mostly concentrated in September and October, the two months where CES used modified estimation procedures. Without the special procedures, both programs would have understated the employment loss following Katrina. Under the assumption that the final QCEW (including its special imputation procedures) is entirely accurate, the CES national estimates *overstated* the employment loss by approximately 60,000. (If CES had not used special procedures the national estimates would have *understated* the QCEW-reported loss by about 90,000.) Thus the special procedures overall improved the CES result as compared to using standard estimation procedures. However because this year's benchmark is in an upward direction, the sharper drop measured by the CES is a contributor to the net benchmark revision. The 60,000 difference is primarily a product of two factors. CES imputed zeros for non-respondents in heavily damaged areas (as did QCEW); however a number of the

CES non-respondents were later to be found still in business by QCEW. This accounts for about half of the difference in job loss shown by the two programs. The other half of the 60,000 difference resulted from respondents reporting zero employment to CES but positive employment to the QCEW. CES also re-weighted sample units in the heavily damaged areas; this had a very small effect on the estimates. In sum the measurable impact on the benchmark revision of the post-Katrina measurement problems is about 60,000.

### **CES birth/death modeling**

CES uses a two-step method to estimate net business birth/death employment. Step 1 uses business deaths to impute for births that can not be picked up in the sample on a real time basis. Step 2 is an ARIMA-based model intended to estimate the residual net birth/death employment not accounted for by Step 1. Only the Step 2 error is directly measurable. Error from this component is measured by comparing the actual residual from March 2005-06 once it becomes available, with the model-based estimate. The error for the 2006 benchmark year at approximately 300,000 was larger as compared with the most recent two years, each of which measured an error of approximately 100,000. For 2006 these larger errors were concentrated in July and October, months where the actual birth/death residual measured from the QCEW differed substantially from prior years, and consequently was not forecast accurately by the model.

### **Conclusions regarding the March 2006 benchmark**

BLS has researched potential sources identified for the large CES benchmark revision to the extent possible since the preliminary magnitude of the revision was announced in October 2006. A small portion of the benchmark revision can be traced to CES estimation of employment for September-October 2005 for the areas impacted by Hurricane Katrina. A larger portion of the benchmark is linked to error in the CES model-based estimation process for birth employment. The largest portion of the revision likely results from an accumulation of differences from several other error sources.

#### **Plans for further research and modification to methods**

Research into the March 2006 CES benchmark revision sources was limited by the short period of time available between computation of the first quarter 2006 QCEW employment level and publication of the CES benchmark revision. BLS plans to conduct more research and implement several improvements to CES and QCEW procedures to facilitate the more rapid identification and analysis of discrepancies between the two employment measures. These plans are described below.

#### **-- Response Analysis Survey (RAS) for Payroll Processing Firms and Payroll Software Developers**

These companies exert a substantial influence on the QCEW employment series because many thousands of individual firms' employment counts are directly derived and/or reported by these firms. The RAS will be geared towards understanding the sources and methods used to develop the QCEW employment counts.

**-- CES/QCEW Response Analysis Survey for a sample of individual companies**

Prior to the March 2006 benchmark issue, BLS was already planning a Response Analysis Survey (RAS) to better understand the source of reporting discrepancies between the CES and QCEW at the individual firm level, and their potential contribution to differences in the series. A small pilot RAS of about 200 firms will be completed in early 2007, and a larger RAS of 5,000 firms is planned for 2008.

**-- Integration of CES/QCEW microdata editing**

BLS will pursue editing individual CES sample reports against their QCEW counterparts on a regular basis; this should help to uncover any systemic reporting problems in either program.

**-- Phase-in of new CES sample units more quickly**

Presently CES solicits new sample units each month, but only brings new sample into live estimation once a year. Bringing in the sample sooner would make better use of this valuable information and should contribute to more accurate estimates. There are logistical and operational issues that BLS is working to resolve in order to make this feasible.

**-- Research improvements to CES net birth/death modeling**

BLS will research possible improvements to the CES net birth/death model, although this will always remain a difficult aspect of the CES methodology. Because there is no current information available on business births, models based in part on historical information will continue to be used. The basic modeling method currently used is simple and has been in use since the first industry estimates were converted to the CES redesign methodology in 2000. Several additional years of real time experience with the model are now available and can be used as a basis for additional evaluation and research testing.

#### **-- Quarterly benchmarking**

Some type of quarterly adjustment of the CES estimates to the QCEW employment counts may help prevent the two data sources from diverging substantially. BLS is exploring the feasibility of more frequent benchmarking.

#### **Changes to the CES published series**

Each year, in addition to the benchmarking process, the CES program conducts a review of the adequacy of its sample for estimation and publication cells and makes warranted adjustments. This year, deletion of several published series resulted from the annual review of sample employment and universe coverage.

Industry series discontinued for production workers, average weekly hours, average hourly earnings, average weekly earnings, and average overtime hours estimates are shown on Exhibits 1 and 2.

#### **Exhibit 1. Discontinued publication of production worker, hours, and earnings series**

<b>Industry title</b>	<b>NAICS code</b>	<b>CES industry code</b>
Other pressed and blown glass and glassware	327211,2	31327212
Fluid power valves and hose fittings	332912	31332912
Photographic and photocopying equipment	333315	31333315
Miscellaneous commercial and service industry machinery	333311,2,4,9	31333319
Motor vehicle seating and interior trim	33636	31336360
Flour milling, malt, starch, and vegetable oil	31121,2	32311220
Miscellaneous paperboard containers	322213,4,5	32322215
Coated and laminated package materials and paper	322221,2	32322222
Miscellaneous coated and treated paper and paper bags	322223,4,5,6	32322226
Tires	32621	32326210
Department stores	4521	42452100
Department stores, except discount	452111	42452111
Discount department stores	452112	42452112
Other general merchandise stores	4529	42452900
Warehouse clubs and supercenters	45291	42452910
All other general merchandise stores	45299	42452990

**Exhibit 2. Discontinued publication of average overtime series**

<b>Industry title</b>	<b>NAICS code</b>	<b>CES industry code</b>
Lighting fixtures	33512	31335120
Switchgear and switchboard apparatus	335313	31335313
Truck trailers	336212	31336212

### **Inclusion of tips and reconstruction of earnings in full-service restaurants and cafeterias**

In September 2005, BLS began collecting payroll and hours information for all employees, in addition to production and nonsupervisory worker payroll and hours information from survey respondents. The all employee payroll was defined to include tips; at the same time, respondents were also requested to begin including tips in the nonsupervisory worker payrolls. This request to include tips in the nonsupervisory worker payrolls did not result in substantial changes to reported payroll for most respondents; many had already been including tips. For two industries, full-service restaurants (70-722100) and cafeterias (70-722212), this change in reporting instructions did make a notable difference and published earnings estimates were adjusted to remove the effect of the shift in earnings levels. Effective with the March 2006 benchmark release, earnings data for these series were reconstructed to reflect the new level that accounts for the inclusion of tips in the historical earnings data.

*Reconstruction of average hourly earnings data from January 1990 (the first month of publication for these two series) to present*

Reconstruction of the two basic series back to January 1990 was completed as follows:

- Revised September and October 2005 Average Hourly Earnings estimates were derived from the weighted sample average of the responding sample.
- Revised estimates for August 2005 were calculated by subtracting the average monthly growth for the series over the July 2004 to July 2005 annual period and the normal seasonal movement for the month from the reconstructed September 2005 estimate.
- Revised estimates for July 2005 were calculated by subtracting the average monthly growth for the series over the July 2004 to July 2005 annual period and the normal seasonal movement for the month from the reconstructed August 2005 estimate.
- Estimates for months prior to July 2005 were calculated by applying the previously published over-the-month percentage change back from the recalculated July 2005 average hourly earnings level
- For estimates from November 2005 forward, the standard weighted-link-and-taper estimation was run using the collected sample
- Average Hourly Earnings estimates for higher level industry series (leisure and hospitality, private service-providing, and total private) were recomputed using the newly reconstructed series for full-service restaurants and cafeterias as inputs.

### *Reconstruction of average hourly earnings data prior to January 1990*

Prior to 1990, average hourly earnings are published only at the higher industry level, leisure and hospitality, and not for cafeterias and full-service restaurants.

Reconstruction of leisure and hospitality (70-000000) and higher level series prior to 1990 was completed as follows:

- The ratio between the reconstructed average hourly earnings series for leisure and hospitality and the previously published average hourly earnings for the series was calculated for January through March 1990.
- The average ratio for the three months (January through March) was calculated.
- The average ratio calculated in step 2 was applied to all previously published leisure and hospitality average hourly earnings estimates going back to January 1964.
- Total private and private service-providing average hourly earnings series were recomputed using the reconstructed leisure and hospitality series.

### **Revisions to earnings series**

At the total private level, average hourly earnings increased by 5 cents over the previously published estimate for March 2006.

Estimates for private service-providing and leisure and hospitality increased as well, 5 cents and 20 cents, respectively. Full-service

restaurants estimates rose from \$8.63 to \$9.13, an increase of 50 cents. The cafeteria series had a smaller revision of 9 cents from the previous estimate. These revisions are a combined result of both the routine benchmark processing and the reconstruction of the tip-impacted series. Routine benchmark effects on earnings series are described below in the section “effect of benchmark revisions on other data types”.

**Exhibit 3. Effect of March 2006 benchmark revisions and reconstruction on average hourly earnings estimates, selected industries**

Industry title	Previous Estimate	Revised Estimate	Difference
Total private	\$16.51	\$16.56	\$.05
Private service-providing	16.19	16.24	.05
Leisure and hospitality	9.43	9.63	.20
Full-service restaurants	8.63	9.13	.50
Cafeterias	8.01	8.10	.09

**Small domain model**

The employment estimator for five industries has been changed from the standard CES weighted-link-relative technique to the CES Small Domain Model (SDM). Relatively small sample sizes in these industries limit the reliability of the weighted-link-relative estimator. There was no change in the estimation of nonsupervisory workers, average weekly hours, and average weekly and hourly earnings. BLS has been using the CES SDM for several years for some State and metropolitan area employment series which have small samples.

#### **Exhibit 4. Series estimated using a Small Domain Model**

Industry title	CES Industry Code	Employment, 2005 annual average, in thousands
Direct health and medical insurance carriers	55524114	427.4
Tax preparation services	60541213	97.3
Other technical consulting services	60541690	89.6
Remediation services	60562910	69.8
Recreational and vacation camps	70721214	27.8

The CES Small Domain Model (SDM) is a Weighted Least Squares model with two employment inputs: (1) an estimate based on available CES sample for that series, and (2) an ARIMA projection based on 10 years of historical QCEW data.

#### **Revisions in the postbenchmark period**

Postbenchmark-period estimates from April 2006 to October 2006 were calculated for each month on the basis of new benchmark levels and new model-based estimates for the net birth/death employment.

[Text table A](#) shows the net birth/death model figures for the supersectors over the postbenchmark period. From April 2006 to December 2006, the cumulative net birth/death model added 1,002,000 compared with 906,000 in the previously published April-to-December estimates.

[Table 3](#) presents revised total nonfarm employment data on a seasonally adjusted basis for January through October 2006. The revised data for April 2006 forward incorporate the effect of applying the rate of change measured by the sample to the new benchmark level, as well as updated net birth /death model adjustments, and new seasonal adjustment factors.

### **Why benchmarks differ from estimates**

A benchmark revision is the difference between the benchmark employment level of a particular series for a given March and its corresponding sample-based estimate. The overall accuracy of the establishment survey is usually gauged by the size of this difference. The benchmark revision often is regarded as a proxy for total survey error, but this approach does not take into account error in the universe data. The employment counts obtained from quarterly unemployment insurance tax forms are administrative data that reflect employer recordkeeping practices and differing State laws and procedures. The benchmark revision can be more precisely interpreted as the difference between two independently derived employment counts, each subject to its own error sources.

Like all sample surveys, the establishment survey is susceptible to two sources of error: sampling error and nonsampling error. Sampling error is present any time a sample is used to make inferences about a population. The magnitude of the sampling error, or variance, relates directly to the sample size and the percentage of the universe covered by the sample. The CES monthly survey captures slightly under one-third of the universe, which is exceptionally high by usual sampling standards. This coverage ensures a small sampling error at the total nonfarm employment level.

Both the universe counts and the establishment survey estimates are subject to nonsampling errors common to all surveys: coverage, response, and processing errors. The error structures for both the CES monthly survey and the UI universe are complex. Still, the two programs generally produce consistent total employment figures, each validating the other. Over the last decade, annual benchmark revisions at the total nonfarm level have averaged 0.2 percent, with an absolute range from less than 0.05 percent to 0.6 percent. (See [table 1](#).)

### **Effects of benchmark revisions on other data types**

The routine benchmarking process results in revisions to the series for women workers and production or nonsupervisory workers. There are no benchmark employment levels for these series; they are revised by preserving ratios of employment for the particular data type to all-employee employment prior to benchmarking and then applying these ratios to the revised all-employee figures. The latter figures are calculated at the basic cell level and then are aggregated to produce the summary estimates.

Average weekly hours and average hourly earnings are not benchmarked; instead they are estimated solely from reports supplied by survey respondents at the basic estimating cell level.

The aggregate industry levels of the hours and earnings series are derived as a weighted average. The production or nonsupervisory worker employment estimates for the basic cells are used as weights for the hours and earnings estimates for broader industry groupings. Adjustments of the all-employee estimates to new benchmarks may alter the weights, which in turn, may change the estimates for hours and earnings of production or nonsupervisory workers at higher levels of aggregation.

Generally, new employment benchmarks have little effect on hours and earnings estimates for major groupings. To influence the hours and earnings estimates of a broader group, employment revisions have to be relatively large and must affect industries which have hours or earnings averages that are substantially different from those of other industries in their group. [Table 4](#) gives information on the levels of specific hour and earnings series resulting from the March 2006 benchmark. At the total private level, there was no change in average weekly hours from the previously published level, while average hourly earnings was increased from its previously published level by 5 cents. As described earlier, this revision is affected by the inclusion of tips in certain industries as described above.

## **Methods**

*Benchmark adjustment procedure.* Establishment survey benchmarking is done on an annual basis for a population derived primarily from the administrative files of employees covered by unemployment insurance (UI). The time required to complete the revision process—from the full collection of the UI population data to publication of the revised industry estimates—is about 10 months. The benchmark adjustment procedure replaces the March sample-based employment estimates with UI-based population counts for March. The benchmark therefore determines the final employment levels, while sample movements capture month-to-month trends.

Benchmarks are established for each basic estimating cell and are aggregated to develop published levels. On a not seasonally adjusted basis, the sample-based estimates for the year preceding and the year following the benchmark also are then subject to

revision. Employment estimates for the months between the most recent March benchmark and the previous year's benchmark are adjusted with the use of a “wedge-back” procedure in which the difference between the benchmark level and the previously published March estimate for each estimating cell is computed. This difference, or error, is then linearly distributed across the 11 months of estimates subsequent to the previous benchmark; eleven-twelfths of the March difference is added to the February estimates, ten-twelfths to the January estimates, ending with the previous April estimates, which receive one-twelfth of the March difference. The wedge-back procedure assumes that the total estimation error has accumulated at a steady rate since the last benchmark. Applying previously derived over-the-month sample changes to the revised March level yields revised estimates for the months following the March benchmark. New net birth/death model estimates also are calculated and applied during postbenchmark estimation, and a new sample is introduced from the annual update.

*Benchmark source material.* The principal source of benchmark data for private industries is the Quarterly Census of Employment and Wages (QCEW), also known as the ES-202. The QCEW contains employment data provided to State Workforce Agencies by employers covered by State UI laws. BLS uses several other sources to establish benchmarks for the remaining industries that are partially covered or exempt from mandatory UI coverage, accounting for 3 percent of the nonfarm employment total.

Data on employees covered under Social Security laws are published by the U.S. Census Bureau in County Business Patterns and are used to augment UI data on nonoffice insurance sales workers, child day care workers, religious organizations, and private schools and hospitals. Benchmarks for State and local government hospitals and educational institutions are based on the Annual Census of

Governments conducted by the U.S. Census Bureau. Benchmark data from these sources are available only on a lagged basis.

Extrapolation to a current level is accomplished by assuming and applying the employment trends from the UI-covered part of the population in these industries to the noncovered part. Universe data for interstate railroads are obtained from the Railroad Retirement Board.

*Business birth and death estimation.* Regular updating of the CES sample frame with information from the UI universe files helps to keep the CES survey current with respect to employment resulting from business births and business deaths. Even the timeliest UI universe files available, however, always will be a minimum of 9 months out of date. The CES survey thus cannot rely on regular frame maintenance alone to provide estimates for business birth and death employment contributions. BLS has researched both sample-based and model-based approaches to measuring birth units that have not yet appeared on the UI universe frame. Because the research demonstrated that sampling for births was not feasible over the very short CES production timeframes, the Bureau is utilizing a model-based approach for this component.

Earlier research indicated that, while both the business birth and death portions of total employment are generally significant, the net contribution is relatively small and stable. To account for this net birth/death portion of total employment, BLS is utilizing an estimation procedure with two components. The first component uses business deaths to impute employment for business births. This component is incorporated into the sample-based link relative estimate procedure by simply not reflecting sample units going out of

business, but instead imputing the same trend to them as seen in the other firms in the sample. The second component is an ARIMA (Auto-Regressive Integrated Moving Average) time-series model designed to estimate the residual net birth/death employment not accounted for by the imputation. The historical time series used to create and test the ARIMA model was derived from the UI universe microlevel database and it reflects the actual residual net of births and deaths over the past 5 years. The ARIMA model component is reviewed on a quarterly basis. The net birth/death model component figures are unique to each month and include negative adjustments in some months. Furthermore, these figures may exhibit a seasonal pattern that also is observed in the historical UI universe data series.

The most significant potential drawback to this, or any model-based approach, is that time-series modeling assumes a predictable continuation of historical patterns and relationships, and therefore, is likely to have some difficulty producing reliable estimates at economic turning points or during periods when there are sudden changes in trend. BLS will continue researching alternative model-based techniques for the net birth/death component; it is likely to remain the most problematic part of the estimation process.

#### **Availability of revised data**

LABSTAT, the BLS public database on the Internet, contains all historical employment, hours, and earnings data, both unadjusted and seasonally adjusted, that have been revised as a result of this benchmark. The data can be accessed at <https://www.bls.gov/ces/> the

Current Employment Statistics program homepage. Employment, hours, and earnings estimates also are published monthly in *Employment and Earnings*.

### **Seasonal adjustment procedure**

BLS uses X-12-ARIMA software developed by the U.S. Census Bureau to seasonally adjust national employment, hours, and earnings series derived from the CES program. BLS computes seasonal factors concurrently with the monthly estimate production. Individual series are seasonally adjusted with either a multiplicative or an additive model (Exhibit 5), and seasonal adjustment factors are directly applied to the component levels. For employment, individual three-digit NAICS series are seasonally adjusted, and higher-level aggregates are formed by the summation of these components series. Seasonally adjusted totals for hours and earnings are obtained by taking weighted averages of the seasonally adjusted data for the component series.

### **Special model adjustments**

*Variable survey intervals.* Beginning with the release of the 1995 benchmark, BLS refined the seasonal adjustment procedures to control for survey interval variations, sometimes referred to as the 4- versus 5-week effect. Although the CES survey is referenced to a consistent concept—the pay period that includes the 12th of each month—inconsistencies arise because there are sometimes 4 and sometimes 5 weeks between the weeks that include the 12th in a given pair of months. In highly seasonal industries, these variations can be an important determinant of the magnitude of seasonal hires or layoffs that have occurred at the time the survey is taken, thereby complicating seasonal adjustment.

Standard seasonal adjustment methodology relies heavily on the experience of the most recent 3 years to determine the expected seasonal change in employment for each month of the current year. Prior to the implementation of the adjustment, the procedure did not distinguish between 4- and 5-week survey intervals, and the accuracy of the seasonal expectation depended in large measure on how well the current year's survey interval corresponded with those from the previous 3 years. All else being the same, the greatest potential for distortion occurred when the current month being estimated had a 5-week interval, but the 3 years preceding it were all 4-week intervals, or, conversely, when the current month had a 4-week interval, but the 3 years preceding it were all 5-week intervals.

BLS has adopted REGARIMA (regression with autocorrelated errors) modeling to identify the estimated size and significance of the calendar effect on each published series. REGARIMA combines standard regression analysis, which measures correlation among two or more variables, with ARIMA modeling, which describes and predicts the behavior of data series based on their own past history. For many economic time series, including nonfarm payroll employment, observations are autocorrelated over time, that is, each month's value is significantly dependent on the observations that precede it. These series, thus, usually can be fit with the use of ARIMA models. If autocorrelated time series are modeled through regression analysis alone, however, the measured relationships among other variables of interest may be distorted due to the influence of the autocorrelation. Thus, the REGARIMA technique is appropriate to measuring relationships among variables of interest in series that exhibit autocorrelation, such as nonfarm payroll employment.

In this application, the correlations of interest are those between employment levels in individual calendar months and the lengths of the survey intervals for those months. The REGARIMA models evaluate the variation in employment levels that is attributable to

11 separate survey interval variables, one specified for each month except March, which is excluded because there is almost always 4 weeks between the February and March surveys. Models for individual basic series were fitted with the most recent 10 years of data available, the standard time span used for CES seasonal adjustment.

The REGARIMA procedure yields regression coefficients for each of the 11 months specified in the model. These coefficients provide estimates of the strength of the relationship between employment levels and the number of weeks between surveys for the 11 months that are modeled. The X-12-ARIMA software also produces diagnostic statistics that permit assessment of the statistical significance of the regression coefficients, and all series are reviewed for adequacy with respect to the model.

Because the 11 coefficients derived from the REGARIMA models provide an estimate of the magnitude of variation in employment levels associated with the length of the survey interval, these coefficients are used to adjust the CES data to remove the calendar effect. These “filtered” series then are seasonally adjusted with the standard X-12-ARIMA software.

For a few series, REGARIMA models do not fit well; these series are seasonally adjusted with the X-12 software, but without the interval-effect adjustment. Several additional special effects modeled through the REGARIMA process are described next.

*Construction series.* Beginning with the 1996 benchmark revision, BLS utilized special treatment to adjust construction industry series. In the application of the interval-effect modeling process to the construction series, there initially was difficulty in identifying and measuring the effect accurately because of the strong influence of variable weather patterns on employment movements in the industry. Further research enabled BLS to apply interval-effect modeling to the construction industry by disaggregating the

construction series into its finer industry and geographic estimating cells and tightening outlier designation parameters. This procedure allowed a more precise identification of weather-related outliers that had masked the interval effect and clouded the seasonal adjustment patterns in general. With these outliers removed, interval-effect modeling became feasible. The result is a seasonally adjusted series for construction that is improved because it is controlled for two potential distortions; unusual weather events and the 4- versus 5-week effect.

*Floating holidays.* BLS also continues the practice of making special adjustments for average weekly hours and average weekly overtime hours series to account for the presence or absence of religious holidays in the April survey reference period and the occurrence of Labor Day in the September reference period, back to the starting date of each series.

*Local government series.* A special adjustment also is made in November each year to account for variations in employment due to the presence or absence of poll workers in the local government, excluding educational services, series.

*Refinements in seasonal adjustment for hours and earnings.* With the release of the 1997 benchmark, BLS implemented refinements to the seasonal adjustment process for the hours and earnings series to correct for distortions related to the method of accounting for the varying length of payroll periods across months. There is a significant correlation between over-the-month changes in both the average weekly hours and the average hourly earnings series and the number of weekdays in a month, resulting in noneconomic

fluctuations in these two series. Both series show more growth in “short” months (months with 20 or 21 weekdays) than in “long” months (months with 22 or 23 weekdays). The effect is stronger for the hours series than for the earning series.

This calendar effect is traceable to response and processing errors associated with converting payroll and hours information from sample respondents with semimonthly or monthly pay periods to a weekly equivalent. The response error comes from sample respondents reporting a fixed number of total hours for workers regardless of the length of the reference month, while the CES conversion process assumes that the hours reported will be varied. A constant level of hours reported most likely occurs when employees are salaried rather than paid by the hour, because employers are less likely to keep actual detailed records of hours worked for such employees. This causes artificial peaks in the hours series in shorter months that are reversed in longer months.

The processing error occurs when respondents with salaried workers report hours correctly (varying them according to the length of the month), which dictates that different conversion factors be applied to payroll and hours. The CES processing system uses the hours-conversion factor for both fields, resulting in peaks in the hourly earnings series in short months and troughs in long months.

REGARIMA modeling is used to identify, measure, and remove the length-of-pay-period effect for seasonally adjusted average weekly hours and average hourly earnings series. The length-of-pay-period variable proves significant for explaining movements in average weekly hours in all the service-providing industries, except retail trade. For average hourly earnings, the length-of-pay-period variable is significant in wholesale trade, in financial activities, in professional and business services, and in other services. All average weekly hours series in the service-producing industries, except retail trade, have been adjusted from January 1990 forward. The average hourly earnings series for wholesale trade, financial activities, professional and business services, and other services have

been adjusted from January 1990 forward as well. For this reason, calculations of over-the-year change in the establishment hours and earnings series should use seasonally adjusted data.

The series to which the length-of-pay-period adjustment is applied are not subject to the 4- versus 5-week adjustment, because the modeling cannot support the number of variables that would be required in the regression equation to make both adjustments. (See Exhibit 5 for series that have the calendar-effect modeling described in this section.)

**Exhibit 5. Model specifications**

<b>Seasonal Adjustment - AE</b>				
<b>NAICS Tabcode</b>	<b>Tabcode title</b>	<b>Mode</b>	<b>4/5 week adj</b>	<b>Other adj</b>
10113310	Logging	MULT	X	
10211000	Oil and gas extraction	MULT	X	
10212000	Mining, except oil and gas	-	X	Indirect <sup>1</sup>
10212100	Coal mining	MULT	X	
10213000	Support activities for mining	ADD	X	
20236100	Residential building	-	X	Indirect
20236200	Nonresidential building	-	X	Indirect

20237000	Heavy and civil engineering construction	ADD	X	
20238000	Specialty trade contractors	-	X	Indirect
20238001	Residential specialty trade contractors	MULT	X	Raked <sup>2</sup>
20238002	Nonresidential specialty trade contractors	ADD	X	Raked
31321000	Wood products	ADD	X	
31327000	Nonmetallic mineral products	ADD	X	
31331000	Primary metals	MULT	X	
31332000	Fabricated metal products	MULT	X	
31333000	Machinery	MULT	X	
31334000	Computer and electronic products	-	X	Indirect
31334100	Computer and peripheral equipment	MULT	X	
31334200	Communications equipment	MULT	X	
31334400	Semiconductors and electronic components	MULT	X	
31334500	Electronic instruments	MULT	X	
31335000	Electrical equipment and appliances	MULT	X	
31336000	Transportation equipment	ADD		
31336001	Motor vehicles and	ADD		

parts				
31337000	Furniture and related products	MULT	X	
31339000	Miscellaneous manufacturing	MULT	X	
32311000	Food manufacturing	MULT	X	
32312000	Beverages and tobacco products	ADD	X	
32313000	Textile mills	MULT	X	
32314000	Textile product mills	ADD	X	
32315000	Apparel	MULT	X	
32316000	Leather and allied products	MULT	X	
32322000	Paper and paper products	MULT	X	
32323000	Printing and related support activities	MULT	X	
32324000	Petroleum and coal products	MULT	X	
32325000	Chemicals	MULT	X	
32326000	Plastics and rubber products	MULT	X	
41423000	Durable goods	MULT	X	
41424000	Nondurable goods	MULT	X	
41425000	Electronic markets and agents and brokers	MULT	X	
42441000	Motor vehicle and parts dealers	-	X	Indirect
42441100	Automobile dealers	MULT	X	
42442000	Furniture and home furnishings stores	MULT	X	
42443000	Electronics and	MULT	X	

	appliance stores			
42444000	Building material and garden supply stores	MULT	X	
42445000	Food and beverage stores	MULT	X	
42446000	Health and personal care stores	MULT	X	
42447000	Gasoline stations	MULT	X	
42448000	Clothing and clothing accessories stores	MULT	X	
42451000	Sporting goods, hobby, book, and music stores	MULT	X	
42452000	General merchandise stores	-	X	Indirect
42452100	Department stores	MULT	X	
42453000	Miscellaneous store retailers	MULT	X	
42454000	Nonstore retailers	MULT	X	
43481000	Air transportation	MULT	X	
43482000	Rail transportation	ADD	X	
43483000	Water transportation	MULT	X	
43484000	Truck transportation	ADD	X	
43485000	Transit and ground passenger transportation	ADD		
43486000	Pipeline transportation	MULT	X	
43487000	Scenic and sightseeing transportation	MULT	X	

43488000	Support activities for transportation	MULT	X	
43492000	Couriers and messengers	MULT	X	
43493000	Warehousing and storage	MULT	X	
44221000	Utilities	MULT	X	
50511000	Publishing industries, except Internet	MULT	X	
50512000	Motion picture and sound recording industries	MULT	X	
50515000	Broadcasting, except Internet	MULT	X	
50516000	Internet publishing and broadcasting	MULT	X	
50517000	Telecommunications	MULT	X	
50518000	ISPs, search portals, and data processing	MULT	X	
50519000	Other information services	MULT	X	
55521000	Monetary authorities - central bank	MULT	X	
55522000	Credit intermediation and related activities	-	X	Indirect
55522100	Depository credit intermediation	MULT	X	
55522110	Commercial banking	MULT	X	
55523000	Securities, commodity contracts, investments	MULT	X	

55524000	Insurance carriers and related activities	MULT	X	
55525000	Funds, trusts, and other financial vehicles	MULT	X	
55531000	Real estate	MULT	X	
55532000	Rental and leasing services	MULT	X	
55533000	Lessors of nonfinancial intangible assets	MULT	X	
60541000	Professional and technical services	-	X	Indirect
60541100	Legal services	MULT	X	
60541200	Accounting and bookkeeping services	ADD	X	
60541300	Architectural and engineering services	MULT	X	
60541500	Computer systems design and related services	MULT	X	
60541600	Management and technical consulting services	ADD	X	
60551000	Management of companies and enterprises	MULT	X	
60561000	Administrative and support services	-	X	Indirect
60561300	Employment services	MULT	X	
60561320	Temporary help	MULT	X	

services				
60561400	Business support services	ADD	X	
60561700	Services to buildings and dwellings	MULT	X	
60562000	Waste management and remediation services	MULT	X	
65611000	Educational services	MULT	X	
65621000	Ambulatory health care services	-	X	Indirect
65621100	Offices of physicians	MULT	X	
65621400	Outpatient care centers	MULT	X	
65621600	Home health care services	ADD	X	
65622000	Hospitals	MULT	X	
65623000	Nursing and residential care facilities	-	X	Indirect
65623100	Nursing care facilities	MULT	X	
65624000	Social assistance	-	X	Indirect
65624400	Child day care services	ADD	X	
70711000	Performing arts and spectator sports	MULT	X	
70712000	Museums, historical sites, zoos, and parks	MULT	X	
70713000	Amusements, gambling, and recreation	ADD	X	
70721000	Accommodations	MULT	X	

70722000	Food services and drinking places	ADD	X	
80811000	Repair and maintenance	MULT	X	
80812000	Personal and laundry services	MULT	X	
80813000	Membership associations and organizations	ADD		
90911000	Federal, except U.S. Postal Service	MULT	X	
90919120	U.S. Postal Service	MULT	X	
90921611	State government education	ADD	X	
90922000	State government, excluding education	MULT	X	
90931611	Local government education	ADD	X	
90932000	Local government, excluding education	MULT	X	Election adjustment <sup>3</sup>

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**Seasonal Adjustment - WW**

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<b>NAICS Tabcode</b>		<b>Mode</b>	<b>4/5 week adj</b>	<b>Other adj</b>
10000000	Natural resources and mining	MULT	X	
10210000	Mining	MULT	X	
20000000	Construction	MULT	X	
31000000	Durable goods	MULT	X	

32000000	Nondurable goods	MULT	X	
41420000	Wholesale trade	MULT	X	
42000000	Retail trade	MULT	X	
43000000	Transportation and warehousing	ADD	X	
44220000	Utilities	MULT	X	
50000000	Information	MULT	X	
55520000	Finance and insurance	MULT	X	
55530000	Real estate and rental and leasing	MULT	X	
60540000	Professional and technical services	MULT	X	
60550000	Management of companies and enterprises	ADD	X	
60560000	Administrative and waste services	MULT	X	
65610000	Educational services	MULT	X	
65620000	Health care and social assistance	MULT	X	
70710000	Arts, entertainment, and recreation	MULT	X	
70720000	Accommodations and food services	ADD	X	
80000000	Other services	MULT	X	
90910000	Federal	MULT	X	
90920000	State government	MULT	X	
90930000	Local government	MULT	X	Election adjustment

<b>Seasonal Adjustment - PW</b>			
<b>NAICS Tabcode</b>		<b>Mode</b>	<b>4/5 week adj</b>
	<b>Other adj</b>		
10000000	Natural resources and mining	ADD	X
20000000	Construction	ADD	X
31321000	Wood products	ADD	X
31327000	Nonmetallic mineral products	ADD	X
31331000	Primary metals	MULT	X
31332000	Fabricated metal products	MULT	X
31333000	Machinery	MULT	X
31334000	Computer and electronic products	MULT	X
31335000	Electrical equipment and appliances	MULT	X
31336000	Transportation equipment	MULT	
31336001	Motor vehicles and parts	MULT	
31337000	Furniture and related products	MULT	X
31339000	Miscellaneous manufacturing	MULT	X
32311000	Food manufacturing	MULT	X
32312000	Beverages and tobacco products	ADD	X
32313000	Textile mills	MULT	X

32314000	Textile product mills	ADD	X
32315000	Apparel	MULT	X
32316000	Leather and allied products	MULT	X
32322000	Paper and paper products	MULT	X
32323000	Printing and related support activities	MULT	X
32324000	Petroleum and coal products	MULT	X
32325000	Chemicals	ADD	X
32326000	Plastics and rubber products	MULT	X
41420000	Wholesale trade	MULT	X
42000000	Retail trade	MULT	X
43000000	Transportation and warehousing	MULT	X
44220000	Utilities	MULT	X
50000000	Information	MULT	X
55000000	Financial activities	ADD	X
60000000	Professional and business services	MULT	X
65000000	Education and health services	MULT	X
70000000	Leisure and hospitality	MULT	X
80000000	Other services	ADD	X

**Seasonal Adjustment - AWH**

<b>NAICS Tabcode</b>	<b>Mode</b>	<b>4/5 week adj</b>	<b>10/11 day adj</b>	<b>Easter/ Labor Day</b>
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				adj
10000000	Natural resources and mining	MULT	X	X
20000000	Construction	ADD	X	X
31321000	Wood products	MULT	X	X
31327000	Nonmetallic mineral products	MULT	X	X
31331000	Primary metals	MULT	X	X
31332000	Fabricated metal products	MULT	X	X
31333000	Machinery	MULT	X	X
31334000	Computer and electronic products	MULT	X	X
31335000	Electrical equipment and appliances	MULT	X	X
31336000	Transportation equipment	MULT	X	X
31336001	Motor vehicles and parts	MULT	X	X
31337000	Furniture and related products	MULT	X	X
31339000	Miscellaneous manufacturing	MULT	X	X
32311000	Food manufacturing	MULT	X	X
32312000	Beverages and tobacco products	MULT	X	X
32313000	Textile mills	ADD	X	X
32314000	Textile product mills	MULT	X	X
32315000	Apparel	MULT	X	X
32316000	Leather and allied products	MULT	X	X

32322000	Paper and paper products	MULT	X	X
32323000	Printing and related support activities	MULT	X	X
32324000	Petroleum and coal products	MULT	X	X
32325000	Chemicals	MULT	X	
32326000	Plastics and rubber products	MULT	X	X
41420000	Wholesale trade	MULT		X
42000000	Retail trade	MULT		X
43000000	Transportation and warehousing	MULT		X
44220000	Utilities	MULT	X	
50000000	Information	MULT		X
55000000	Financial activities	MULT		X
60000000	Professional and business services	MULT		X
65000000	Education and health services	MULT		X
70000000	Leisure and hospitality	MULT		X
80000000	Other services	MULT		X

<b>Seasonal Adjustment - AHE</b>				
<b>NAICS Tabcode</b>		<b>Mode</b>	<b>4/5 week adj</b>	<b>10/11 day adj</b>
10000000	Natural resources and mining	MULT	X	
20000000	Construction	MULT	X	
31000000	Durable goods	ADD	X	
32000000	Nondurable goods	MULT	X	
41420000	Wholesale trade	ADD		X
42000000	Retail trade	MULT	X	
43000000	Transportation and warehousing	MULT	X	
44220000	Utilities	MULT	X	
50000000	Information	MULT	X	
55000000	Financial activities	MULT		X
60000000	Professional and business services	MULT		X
65000000	Education and health services	MULT	X	
70000000	Leisure and hospitality	ADD	X	
80000000	Other services	MULT		X

<b>Seasonal Adjustment Comparison - AOT</b>					
<b>NAICS Tabcode</b>		<b>Mode</b>	<b>4/5 week adj</b>	<b>10/11 day adj</b>	<b>Easter/ Labor Day adj</b>
31000000	Durable goods	MULT	X		X
32000000	Nondurable goods	MULT	X		X

<sup>1</sup> Seasonal adjustment occurs at the lowest available industry level.

<sup>2</sup> Residential and nonresidential specialty trade estimates are raked to the specialty trade estimates to ensure consistency.

<sup>3</sup> Special adjustment for the presence/absence of poll workers in local government

**Table 1. Percent differences between nonfarm employment benchmarks and estimates by industry supersector, March 1997-2006 <sup>(1)</sup>**

Industry	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<b>Total</b>	0.4	-2	0.2	0.4	-0.1	-0.2	-0.1	0.2	-0.1	0.6
<b>Total Private</b>	0.5	0.1	0.2	0.3	-0.2	-0.4	-0.2	0.2	-0.2	0.7
<b>Natural Resources &amp; Mining</b>							0.9	0.7	-0.3	1.2
<b>Construction</b>							-0.8	0.6	0.5	2.6
<b>Manufacturing</b>							-1.1	-0.4	-0.3	-0.1
<b>Trade, Transportation, &amp; Utilities</b>							-2	0.2	0.3	0.6
<b>Information</b>							-2.6	-1	-2.1	-0.5
<b>Financial Activities</b>							0.2	0.1	-0.8	0.4
<b>Professional &amp; Business Services</b>							-0.7	-0.2	-0.4	1.3
<b>Education &amp; Health Services</b>							0.3	0.2	-2	0.5
<b>Leisure &amp; Hospitality</b>							0.5	1.2	0.4	0.3
<b>Other Services</b>							1.4	0.5	-1.3	0.5
<b>Government</b>	-0.4	-0.2	0.1	0.6	0.3	1	0.3	0.1	-2	-2

(1) Differences are based on comparisons of final published March estimates and benchmark levels, as originally published.

(2) Less than 0.05 percent.

**Table 2. Nonfarm employment benchmarks by industry, March 2006**

(Numbers in thousands)

Industry	Benchmark	Estimate	Difference	
			Amount	Percent
<b>Total nonfarm</b>	134,868	134,116	752	0.6
<b>Total private</b>	112,561	111,812	749	0.7
<b>Goods-producing</b>	22,132	21,956	176	0.8
<b>Service-providing</b>	112,736	112,160	576	0.5
<b>Private service-providing</b>	90,429	89,856	573	0.6
<b>Natural resources and mining</b>	654	646	8	1.2
Logging	62	59	3	4.8

<b>Mining</b>	592	588	4	0.7
Oil and gas extraction	130	131	-1	-0.8
Mining, except oil and gas	213	211	2	0.9
Coal mining	78	78	0	(1)
Support activities for mining	249	246	3	1.2
<b>Construction</b>	7,337	7,148	189	2.6
Construction of buildings	1,751	1,696	55	3.1
Heavy and civil engineering construction	899	904	-5	-0.6
Specialty trade contractors	4,688	4,548	140	3.0
<b>Manufacturing</b>	14,141	14,162	-21	-0.1
<b>Durable goods</b>	8,969	8,967	2	(1)
Wood products	563	550	13	2.3
Nonmetallic mineral products	503	496	7	1.4
Primary metals	464	473	-9	-1.9

Fabricated metal products	1,540	1,531	9	0.6
Machinery	1,177	1,172	5	0.4
Computer and electronic products	1,306	1,319	-13	-1.0
Computer and peripheral equipment	198	203	-5	-2.5
Communications equipment	145	149	-4	-2.8
Semiconductors and electronic components	455	452	3	0.7
Electronic instruments	435	444	-9	-2.1
Electrical equipment and appliances	433	440	-7	-1.6
Transportation equipment	1,772	1,776	-4	-0.2
Furniture and related products	564	557	7	1.2
Miscellaneous manufacturing	648	654	-6	-0.9
<b>Nondurable goods</b>	<b>5,172</b>	<b>5,195</b>	<b>-23</b>	<b>-0.4</b>
Food manufacturing	1,451	1,434	17	1.2
Beverages and tobacco products	189	189	0	(1)
Textile mills	203	204	-1	-0.5
Textile product mills	163	171	-8	-4.9
Apparel	244	253	-9	-3.7

Leather and allied products	38	37	1	2.7
Paper and paper products	473	474	-1	-0.2
Printing and related support activities	637	642	-5	-0.8
Petroleum and coal products	109	111	-2	-1.8
Chemicals	865	887	-22	-2.5
Plastics and rubber products	801	792	9	1.1
<b>Trade, transportation, and utilities</b>	<b>25,928</b>	<b>25,770</b>	<b>158</b>	<b>0.6</b>
<b>Wholesale trade</b>	<b>5,844</b>	<b>5,797</b>	<b>47</b>	<b>0.8</b>
Electronic markets and agents and brokers	772	748	24	3.1
<b>Retail trade</b>	<b>15,145</b>	<b>15,067</b>	<b>78</b>	<b>0.5</b>
Motor vehicle and parts dealers	1,898	1,899	-1	-0.1
Automobile dealers	1,242	1,240	2	0.2
Furniture and home furnishings stores	580	586	-6	-1.0
Electronics and appliance stores	541	532	9	1.7
Building material and garden supply stores	1,302	1,290	12	0.9

Food and beverage stores	2,789	2,776	13	0.5
Health and personal care stores	950	955	-5	-0.5
Gasoline stations	855	855	0	(1)
Clothing and clothing accessories stores	1,384	1,383	1	0.1
Sporting goods, hobby, book, and music stores	636	620	16	2.5
General merchandise stores	2,915	2,866	49	1.7
Department stores	1,531	1,555	-24	-1.6
Miscellaneous store retailers	873	883	-10	-1.1
Nonstore retailers	421	422	-1	-0.2
<b>Transportation and warehousing</b>	<b>4,394</b>	<b>4,349</b>	<b>45</b>	<b>1.0</b>
Air transportation	483	485	-2	-0.4
Rail transportation	224	226	-2	-0.9
Water transportation	60	60	0	(1)
Truck transportation	1,398	1,383	15	1.1
Transit and ground passenger transportation	411	409	2	0.5
Pipeline transportation	38	38	0	(1)
Scenic and sightseeing transportation	21	25	-4	-18.8

Support activities for transportation	565	560	5	0.9
Couriers and messengers	571	572	-1	-0.2
Warehousing and storage	623	592	31	5.0
<b>Utilities</b>	546	557	-11	-2.0
<b>Information</b>	3,048	3,063	-15	-0.5
Publishing industries, except Internet	903	902	1	0.1
Motion picture and sound recording industries	377	383	-6	-1.6
Broadcasting, except Internet	328	324	4	1.2
Internet publishing and broadcasting	34	30	4	11.9
Telecommunications	972	993	-21	-2.2
ISPs, search portals, and data processing	385	382	3	0.8
Other information services	51	49	2	3.9
<b>Financial activities</b>	8,282	8,247	35	0.4
<b>Finance and insurance</b>	6,153	6,119	34	0.6

Monetary authorities - central bank	21	21	0	(1)
Credit intermediation and related activities	2,921	2,911	10	0.3
Depository credit intermediation	1,792	1,808	-16	-0.9
Commercial banking	1,311	1,317	-6	-0.5
Securities, commodity contracts, investments	809	800	9	1.1
Insurance carriers and related activities	2,311	2,299	12	0.5
Funds, trusts, and other financial vehicles	92	89	3	3.3
<b>Real estate and rental and leasing</b>	2,129	2,128	1	(1)
Real estate	1,471	1,467	4	0.3
Rental and leasing services	631	633	-2	-0.3
Lessors of nonfinancial intangible assets	27	28	-1	-3.7
<b>Professional and business services</b>	17,225	16,995	230	1.3
<b>Professional and technical services</b>	7,369	7,241	128	1.7
Legal services	1,168	1,155	13	1.1
Accounting and bookkeeping services	996	967	29	2.9

Architectural and engineering services	1,349	1,337	12	0.9
Computer systems design and related services	1,252	1,233	19	1.5
Management and technical consulting services	900	871	29	3.2
<b>Management of companies and enterprises</b>	1,788	1,764	24	1.3
<b>Administrative and waste services</b>	8,068	7,990	78	1.0
Administrative and support services	7,727	7,660	67	0.9
Employment services	3,514	3,505	9	0.3
Temporary help services	2,519	2,485	34	1.3
Business support services	786	765	21	2.7
Services to buildings and dwellings	1,674	1,649	25	1.5
Waste management and remediation services	341	330	11	3.2
<b>Education and health services</b>	17,862	17,766	96	0.5
<b>Educational services</b>	3,052	2,998	54	1.8

<b>Health care and social assistance</b>	14,810	14,768	42	0.3
Ambulatory health care services	5,235	5,224	11	0.2
Offices of physicians	2,127	2,151	-24	-1.1
Outpatient care centers	488	489	-1	-0.2
Home health care services	856	834	22	2.6
Hospitals	4,390	4,395	-5	-0.1
Nursing and residential care facilities	2,869	2,872	-3	-0.1
Nursing care facilities	1,571	1,577	-6	-0.4
Social assistance	2,317	2,277	40	1.7
Child day care services	826	809	17	2.1
<b>Leisure and hospitality</b>	12,674	12,632	42	0.3
<b>Arts, entertainment, and recreation</b>	1,747	1,742	5	0.3
Performing arts and spectator sports	366	343	23	6.3
Museums, historical sites, zoos, and parks	113	113	0	(1)
Amusements, gambling, and recreation	1,268	1,286	-18	-1.4

<b>Accommodations and food services</b>	10,926	10,889	37	0.3
Accommodations	1,767	1,746	21	1.2
Food services and drinking places	9,160	9,144	16	0.2
<b>Other services</b>	5,410	5,383	27	0.5
Repair and maintenance	1,246	1,247	-1	-0.1
Personal and laundry services	1,276	1,265	11	0.9
Membership associations and organizations	2,887	2,872	15	0.5
<b>Government</b>	22,307	22,304	3	(1)
<b>Federal</b>	2,715	2,692	23	0.8
Federal, except U.S. Postal Service	1,947	1,927	20	1.0
U.S. Postal Service	768	765	3	0.4
<b>State government</b>	5,202	5,168	34	0.7
State government education	2,432	2,399	33	1.4

State government, excluding education	2,771	2,769	2	0.1
<b>Local government</b>	14,390	14,444	-54	-0.4
Local government education	8,255	8,281	-26	-0.3
Local government, excluding education	6,134	6,164	-30	-0.5

(1) Less than 0.05 percent.

**Table 3. Differences in seasonally adjusted levels and over-the-month changes, total nonfarm employment, January 2006-October 2006**

(In thousands)

	Levels		Over-the-month changes		
	As previously published	As revised	As previously published	As revised	Difference
2006:					
January	134,530	135,110	154	206	52
February	134,730	135,410	200	300	100
March	134,905	135,659	175	249	74
April	135,017	135,803	112	144	32
May	135,117	135,906	100	103	3
June	135,251	136,030	134	124	-10
July	135,374	136,252	123	222	99
August	135,604	136,438	230	186	-44
September	135,807	136,636	203	198	-5
October	135,893	136,745	86	109	23

**Table 4. Hours and earnings estimates, selected industries, March 2006**

<b>Industry</b>	<b>Average Weekly Hours</b>	<b>Average Hourly Earnings</b>
<b>Total private</b>	33.6	\$16.56
<b>Goods-producing</b>	40.2	17.73
<b>Natural resources and mining</b>	44.7	19.57
<b>Construction</b>	38.4	19.53
<b>Manufacturing</b>	41.0	16.69
<b>Durable goods</b>	41.4	17.52
<b>Wood products</b>	40.0	13.14
<b>Nonmetallic mineral products</b>	42.4	16.60
<b>Primary metals</b>	43.5	19.21
<b>Fabricated metal products</b>	41.4	16.08
<b>Machinery</b>	42.2	16.99
<b>Computer and electronic products</b>	40.6	18.58
<b>Electrical equipment and appliances</b>	41.0	15.42
<b>Transportation equipment</b>	42.9	22.31

<b>Furniture and related products</b>	38.4	13.52
<b>Miscellaneous manufacturing</b>	38.8	14.30
<b>Nondurable goods</b>	40.3	15.27
<b>Food manufacturing</b>	39.3	13.04
<b>Beverages and tobacco products</b>	40.1	18.12
<b>Textile mills</b>	40.6	12.40
<b>Textile product mills</b>	39.8	11.79
<b>Apparel</b>	36.3	10.62
<b>Leather and allied products</b>	39.8	11.11
<b>Paper and paper products</b>	42.0	17.81
<b>Printing and related support activities</b>	39.1	15.77
<b>Petroleum and coal products</b>	44.3	24.58
<b>Chemicals</b>	42.8	19.66
<b>Plastics and rubber products</b>	40.7	14.84
<b>Private service-providing</b>	32.1	16.24
<b>Trade, transportation, and utilities</b>	33.0	15.23

<b>Wholesale trade</b>	37.6	18.60
<b>Retail trade</b>	30.1	12.49
<b>Transportation and warehousing</b>	36.4	17.05
<b>Utilities</b>	40.7	27.55
<b>Information</b>	36.2	22.85
<b>Financial activities</b>	35.3	18.47
<b>Professional and business services</b>	34.3	18.83
<b>Education and health services</b>	32.3	17.21
<b>Leisure and hospitality</b>	25.3	9.63
<b>Other services</b>	30.7	14.69

**Text Table A. Net Birth/Death Estimates, Post-Benchmark 2006**

(In thousands)

	Natural Resources & Mining	Construction	Manufacturing	Trade, Transportation, & Utilities	Information	Financial Activities	Professional & Business Services	Education & Health Services	Leisure & Hospitality	Other Services	Monthly Amount Contributed	
2006	April	1	36	-1	23	7	19	62	31	85	8	271
	May	1	37	4	24	4	4	33	13	74	7	201
	June	1	25	5	17	-2	4	28	-4	85	7	166
	July	1	4	-12	-15	-2	3	-8	-4	64	-10	21
	August	1	15	2	21	3	9	22	16	28	5	122
	September	1	9	1	16	-1	3	10	11	-40	3	13
	October	1	16	-4	27	3	25	30	33	-22	-1	108
	November	0	-2	2	17	2	8	7	7	-7	2	36
	December	0	-7	3	19	2	17	3	7	16	4	64
Cumulative Total	7	133	0	149	16	92	187	110	283	25	1002	