Revisions to the Current Employment Statistics National Estimates Effective May 2003

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With the release of estimates for May 2003, national employment, hours, and earnings data produced from the Current Employment Statistics (CES) program incorporate several important changes that affect data analysis and comparison. These changes include:

- Conversion to the 2002 North American Industry Classification System (NAICS),
- Completion of the CES sample redesign to a probability-based sample,
- Incorporation of March 2002 benchmarks, and
- Introduction of concurrent seasonal adjustment.

Conversion to the 2002 NAICS

With the release of the May 2003 data, all CES national series have been converted from industry coding based on the 1987 Standard Industrial Classification (SIC) system to industry coding based on the 2002 version of the North American Industry Classification System (NAICS). The SIC code structure was first developed in the 1930s, when the economy was dominated by the manufacturing sector. Through the years there was little change to the original structure, and there was a mixture of ways to categorize the economic activity of establishments. Some establishments were categorized into industries based on demand groupings and others were categorized based on supply groupings.

NAICS classifies establishments into industries based solely on their supply function. That is, establishments are classified based on the activity in which they are primarily engaged. NAICS was developed in cooperation with the United States' North American Free Trade Agreement (NAFTA) partners, Canada and Mexico, in an effort to standardize their economic data series. NAICS was first released in 1997 and will be reviewed and updated every five years by all three North American countries. This CES benchmark release is based on the 2002 version of NAICS.

NAICS doubles the amount of top-level industry groupings, known as sectors. There are 20 broad sectors, compared with only 10 major industry divisions under SIC. In addition to these sectors, BLS and its U.S. NAICS partners (the Bureau of Economic Analysis and the U.S. Census

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Bureau) have further aggregated industry classifications into 11 supersectors. Above the supersectors, are two more aggregations, the commonly known domains of goods-producing and service-providing.

The numbering system differs in NAICS from that of the SIC, to allow finer detail. The greatest detail is at the six-digit level, and the highest level of detail is the above-mentioned supersector level, as seen in the example presented in exhibit 1. The five-digit detail, or the NAICS industry detail, allows for international comparison with the NAFTA partners. Further national detail is allowed at the six-digit level.

With the implementation of NAICS came several notable classification changes that affect the CES. First, auxiliary establishments, which are engaged primarily in performing management or support activities for other establishments of the "parent" company are now given an industry code denoting their main activity, without regard to the code assigned to the parent company. Auxiliary establishments are now classified within sector 55, management of companies and enterprises, which is part of the professional and business services supersector.

Second, although the logging industry was reclassified from the SIC manufacturing sector to the NAICS agriculture, forestry, fishing and hunting sector, the CES program will continue to treat it as part of the nonfarm sector. To keep the logging industry in scope, the CES program will include it in the natural resources and mining supersector.

Third, NAICS manufacturing recognizes some new high-tech industries, such as semiconductor machinery manufacturing and fiber optic cable manufacturing; there is also a new subsector for computer and electronic product

Exhibit 1. **An example of the NAICS numbering hierarchy used by the Current Employment Statistics program**

Level	Hierarchy for NAICS code 31-334511
Supersector	31 (Manufacturing)
Sector (two-digit)	33 (Durable goods manufacturing)
Subsector (three-digit)	334 (Computer and electronic products)
Industry group (four-digit) ...	3345 (Electronic instruments)
NAICS industry (five-digit) ..	33451 (Electronic instruments)
U.S. industry (six-digit)	334511 (Search, detection, and navigation instruments)

manufacturing. Also, the publishing industry has been moved out of manufacturing and into the new information sector. The new information sector, also a BLS supersector, is composed of seven subsectors, containing 34 industries that produce, disseminate, or process information and cultural products. Twenty of these industries are new, including Internet service providers, sound recording studios, and cable program distributors.

Fourth, NAICS 2002 includes two new industries in wholesale trade: business to business electronic markets and wholesale trade agents and brokers.

In order to avoid time series breaks, all national CES series were reconstructed back to at least 1990. At the supersector and higher levels, the reconstruction extends back to 1939, the previously existing start date of total nonfarm and most major industry division level series. For finer levels of detail, the series that are nearly identical between SIC and NAICS were reconstructed back to the previously existing start dates. For each NAICS series that is not closely related to one SIC series, the start date is 1990.

The reconstruction methodology is based on the first quarter 2001 unemployment insurance (UI) microdata, which were coded on both an SIC and NAICS basis. SIC-to-NAICS ratios were established from this dual coded file; the ratios were used to map employment from the SIC series to the corresponding NAICS counterparts. For example, the March 2001 employment ratios for NAICS subsector 325 indicate that 95 percent of it is formed from SIC 28, 3 percent of it comes from SIC 30, and 2 percent is from SIC 38. These ratios were applied to the SIC series and the results summed to derive the NAICS series. The supersector employment interchangeability, or distribution of employment between SIC divisions and NAICS supersectors, can be seen in exhibit 2.

A comparable procedure is used for the hours and earnings series. Those NAICS series are produced from a weighted average of the SIC component series, the weights being the NAICS/SIC ratios. An example of the hours and earnings reconstruction is illustrated in exhibit 3.

New hours and earnings levels were recomputed using data from the NAICS-based probability sample. The new levels for average weekly hours and average hourly earnings series were computed from the new probability sample averages for March 2001-02. The over-the-month changes computed using the reconstruction methodology were then applied. With this methodology, the overall CES seasonal patterns are preserved, as are the CES time series properties. In other words, there are no outliers or level shifts.

While this ratio method was the basic technique used in the reconstruction, another method was tested and used for a small number of series as well. This alternative method uses a longitudinal UI database (LDB) which stores firm-level information on business births, deaths, and employment levels over a 10-year time span. The LDB aggregation method takes the 1990-2000 LDB file that has been recoded for NAICS and aggregates the micro-level

records to derive macro totals by industry and geographic area. This procedure is computationally simple and uses actual firm-level data that capture real economic trends (to the extent that firms did not change their industry classification over time). On the other hand, the LDB has not been edited or maintained as a macro series, unlike published CES totals. Nor has it ever accepted corrections that are made to the data submitted to the ES-202 reports. Nevertheless, for a small number of series, this method proved to be the most accurate one. Both methods have their basis in the single quarter of UI microdata that was dual coded with both SIC and NAICS.

Changes in CES scope. The industry support activities for animal production or NAICS 11-1152 (previously part of animal services, except veterinary or SIC 075) is no longer considered in-scope for the CES program. As indicated earlier, logging, or NAICS 11-113310, is now within the natural resources and mining supersector; under the SIC system, this industry was within manufacturing. These changes along with some in the Federal Government series, as described below, slightly affect the total nonfarm employment level. There will be no series breaks as a result of the changes, as the entire total nonfarm history has been reconstructed.

Publishing industries. The publishing industries have moved from the manufacturing division under SIC to the information supersector under NAICS. Therefore, the CES program no longer collects payroll and hours of production workers in these industries, but rather the payroll and hours of nonsupervisory workers. Because of this change, data series for nonsupervisory workers, average weekly hours, and average hourly earnings for the following industries begin publication in January 2003: Publishing industries, except Internet (NAICS 50-511000); newspaper, book, and directory publishers (NAICS 50-511100); newspaper publishers (NAICS 50-511110); periodical publishers (NAICS 50-511120); book publishers (NAICS 50-511130); and directory and mailing list publishers (NAICS 50-511140).

Changes to Federal Government series

The CES series for Federal Government employment has been revised slightly in scope and definition due to a change in source data and estimation methods. The former national series was an end-of-month count of Federal employees produced by the U.S. Office of Personnel Management, and it excluded some workers, mostly employees of U.S. Department of Defense-owned establishments such as military base commissaries. Beginning with the collection of data for May 2003, however, the CES national series will include these workers, and the series employment level will shift upward as a consequence. Additionally, Federal Government employment will now be estimated from a sample of Federal establishments, will be benchmarked

Exhibit 2. **SIC-to-NAICS employment ratios[1]**

(Numbers in thousands)

NAICS supersector	Category	SIC division							
		Mining	Construction	Manu-facturing	Trans-portation and public utilities	Wholesale trade	Retail trade	Finance, insurance, and real estate	Services
Natural resources and mining	Employment .. Percent	515.9 87.3	(2)	75,136 12.7	(2)	(2)	(2)	(2)	(2)
Construction	Employment .. Percent	16.9 .3	6,288.7 97.2	(2)	(2)	(2)	(2)	86.3 1.3	78.9 1.2
Manufacturing	Employment .. Percent	(2)	(2)	16,502.5 98.2	(2)	31.4 0.2	147.9 0.9	(2)	128.7 .8
Trade, transportation, and utilities	Employment .. Percent	(2)	1.0 .0	70.8 .3	4,360.0 17.1	6,592.5 25.8	14,381.3 56.3	(2)	125.3 .5
Information	Employment .. Percent	(2)	(2)	751.9 20.3	1,670.3 45.2	(2)	1.2 .0	9.2 .2	1,262.7 34.2
Financial activities	Employment .. Percent	(2)	(2)	(2)	37.9 .5	(2)	25.1 .3	6,881.8 90.4	671.4 8.8
Professional and business services	Employment .. Percent	15.7 .1	66.3 .4	613.0 3.7	657.8 4.0	155.5 .9	373.5 2.3	431.6 2.6	14,172.8 86.0
Education and health services	Employment .. Percent	(2)	(2)	4.4 .0	101.2 .7	(2)	(2)	(2)	14,602.0 99.3
Leisure and hospitality	Employment .. Percent	(2)	(2)	(2)	24.1 .2	(2)	8,147.2 70.3	8.4 .1	3,402.2 29.4
Other services	Employment .. Percent	(2)	(2)	12.8 .3	5.1 .1	(2)	6.2 .2	103.3 2.8	3,614.0 96.5

[1] Data are derived from March 2001 unemployment insurance data.
[2] Less than 1,000.

Exhibit 3. **Hours and earnings reconstruction example using NAICS code 31-333414—HVAC and commercial refrigration equipment** [1]

	1987 SIC structure				2002 NAICS structure		
1987 SIC code	Ratio [2]	Production workers	Aggregate hours	Aggregate payrolls	Production workers	Aggregate hours	Aggregate payrolls
3433	0.22	12,453	537,969	$5,379,690	2,740	118,353	$1,183,532
3569	.75	65,891	2,754,230	34,427,875	49,418	2,065,673	25,820,906
3634	.13	12,365	580,292	9,864,964	1,607	75,438	1,282,445
				Sum [3]	53,765	2,259,464	28,286,883

[1] Data are derived from March 2001 unemployment insurance data.
[2] The ratio represents the percent of employment in the SIC industry that went into a specific NAICS industry.
[3] New NAICS data where:

Production workers = sum of production workers = 53,765
Average weekly hours = aggregate hours/production workers
= 2,259,464/53,765 = 42.0
Average hourly earnings = aggregate payrolls/aggregate hours
= $28,286,883/2,259,464 = $12.52

annually to counts from UI tax records, and will reflect employee counts as of the pay period including the 12th of the month, consistent with other CES industry series. The historical time series for Federal Government employment has been revised to reflect these changes.

Completion of the CES sample redesign

Beginning with benchmark revisions in March 2000, BLS has been phasing in a probability-based sample design to replace an older quota-based sample design. The CES estimates had been based on a quota sample since the inception of the program over 70 years ago. Although quota samples are known to be at risk for potentially significant biases, the large sample size and annual benchmarking to full population counts made the risk of bias less severe. However, following a review by the American Statistical Association in 1995, BLS embarked on a sample redesign effort to convert to a probability sample for the CES program. Probability sampling is the internationally recognized standard for sample surveys. Unlike quota sampling, probability sampling ensures a proper representation of the universe of nonfarm business establishments through randomized selection techniques.

The new CES sample design. The new design is a stratified, simple random sample of worksites, clustered by UI account number. The UI account number is a major identifier on the previously discussed BLS LDB file, which serves as both the sample frame and the benchmark source for the CES employment estimates. The sample strata, or subpopulations, are defined by State, industry, and establishment employment size, yielding a State-based design. The sampling rate for each stratum is determined through a method known as optimum allocation, which distributes a fixed number of sample units across a set of strata to minimize the overall variance, or sampling error, on the primary estimate of interest. The total nonfarm employment level is the primary estimate of interest, and the new design gives top priority to measuring it as precisely as possible, or, in other words, minimizing the statistical error around the statewide total nonfarm employment estimates.

For the CES redesign, the number of sample units drawn initially was fixed at the approximate size of the existing CES sample for each State—the sample size assumed to be supportable by current program resources. However, after a few years of experience, BLS recognized that the sample size needed to be reduced to support the more costly data collection and followup techniques needed to sustain viable response ratios. Therefore, the overall sample size was reduced by approximately 20 percent with the March 2001 sample update. Even with the sample size reduction, the CES program can support the publication of considerable industry and geographic detail within a State, and provide highly reliable national CES estimates at the total nonfarm and detailed industry levels.

The sampling frame and the CES sample are updated twice a year with new quarters of UI-based universe data. This frame maintenance helps to keep the sample up to date by adding new firm births and deleting business deaths. In addition, the new design specifies an annual update process that includes sampling frame maintenance and the redrawing of the entire sample for the first quarter of each year. Frame maintenance provides for the updating of industry, size class, and metropolitan area designations and for the merging of semiannual birth samples into the overall frame. A high degree of overlap is expected at each annual update because each UI account is ordered on the frame with a permanent random number (PRN). This technique assigns random numbers to all UI accounts on the universe frame at the time they first appear and then orders the frame by PRN. The allocation for each sampling cell is fulfilled by working down the ordered PRN list until the full complement of needed units is drawn. Because the random numbers are permanent, and thus remain in essentially the same order on the frame, this technique minimizes cancellation of existing sample units and the need to solicit replacement units.

Estimation formulas. An improved estimator also has been developed for the CES survey to support the new sample design. The primary difference from the former CES estimator is the application of a weight to each sample unit in the estimation process. The weights are derived from population sampling fractions and are a standard feature of probability sample estimators. A sampled unit's weight is the inverse of its probability of selection. The new estimator for the all-employee series is a ratio estimator, known as the weighted link relative.

In order to prevent series breaks in the hours and earnings estimates during the redesign phase-in, the initial implementation of the redesign utilized the weighted link relative estimator for these data types, and the first month's redesign estimate linked from the final month's estimate produced under the quota-sample design. That was different from the usual CES procedure of initializing new hours and earnings series with the sample average value for the first month and then applying a ''link and taper'' methodology. That methodology accounts for the over-the-month change in the sampled units, but also includes a tapering feature used to keep the estimates close to the overall sample average over time. The taper is considered to be a level correction. However, following this procedure could have resulted in series breaks in hours and earnings series for each major industry division as it was introduced, and at the total private level as well. With the completion of the CES shift to NAICS, hours and earnings are again estimated by the ''link and taper'' methodology.

Another methodological change introduced with the sample redesign is a net birth/death model used to estimate the residual portion of birth employment not accounted for

through improved sampling techniques. Net birth/death modeling replaces bias adjustment. Net birth/death modeling is more fully described later in this article. Finally, it is now possible to publish sampling errors and confidence intervals, standard survey accuracy measures that were not directly applicable to the nonprobability design used in prior years. The overall accuracy of the employment estimates is still best measured by the annual benchmark revisions, because those revisions cover the total estimation error associated with the CES employment series.

NAICS probability-based estimation began in April 2001 for all but four supersectors. The NAICS probability-based estimates began in April 2002 for professional and business services, education and health services, leisure and hospitality, and other services.

Summary of the benchmark revisions

The March 2002 benchmark level for total nonfarm employment is 129,672,000; this figure is 203,000 below the NAICS sample-based estimate for March 2002, an adjustment of 0.2 percent. The published over-the-year change for March 2001 to March 2002 has been revised downward by 313,000 or 0.2 percent. The difference between these two measures is accounted for by the previously mentioned changes in the scope of the CES series for Federal Government and the animal services industry under SIC. Table 1 shows the total nonfarm percent differences of benchmark revisions for the past ten years. Table 2 shows the nonfarm employment benchmarks by industry for March 2002.

Revisions in the post-benchmark period

Post-benchmark period estimates from April 2002 to March 2003 were calculated for each month based on new benchmark levels, new net birth/death figures, and a slightly new sample composition resulting from the annual sample update (beginning with October). The post-benchmark period estimates for this benchmark year, due to the NAICS conversion, are first-time NAICS probability estimates on the new benchmark level rather than recomputed estimates. (See table 3.)

Text table A shows the net birth/death model figures for the supersectors over the post-benchmark period. From April

2002 to March 2003, the cumulative net birth/death model added 469,000.

Why benchmarks differ from estimates

A benchmark revision is the difference between the benchmark level 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 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 sample size and the percentage of the universe covered by that sample. The CES monthly survey captures slightly under one-third of the universe, exceptionally high by usual sampling standards. This coverage insures 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 0.3 percent, with an absolute range from less than 0.05 percent to 0.7 percent.

Benchmark revisions effects for other series

The routine benchmarking process results in revisions in the series on women workers and production or non-supervisory workers. There are no benchmark employment levels for these series; they are revised by preserving ratios

Table 1. **Percent differences between nonfarm employment benchmarks and estimates, March 1993-2002[1]**

Industry	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 [2]
Total nonfarm	0.2	0.7	0.5	([3])	0.4	([3])	0.2	0.4	-0.1	-0.2
Total private	.3	.7	.5	0.1	.5	0.1	.2	.3	-.2	-.4

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

[2] Beginning with the March 2002 benchmark, there is a small change in the scope of the CES survey. Employment in support activities for animal production, or NAICS 11-1152, is no longer

included. In addition, Federal employment is estimated using a sample and benchmarked annually to ES-202 universe counts, rather than relying on monthly U.S. Office of Personnel Management employment counts.

[3] Less than 0.05 percent.

Table 2. **Nonfarm employment benchmarks by industry sector and selected industry detail, March 2002**

(In thousands)

Industry	Benchmark
Total nonfarm	129,672
Total private	107,836
Goods-producing	22,365
Natural resources and mining	574
Logging	67
Mining	507
Oil and gas extraction	122
Mining, except oil and gas	209
Coal mining	76
Support activities for mining	176
Construction	6,416
Construction of buildings	1,519
Heavy and civil engineering construction	862
Specialty trade contractors	4,036
Manufacturing	15,375
Durable goods	9,585
Wood products	551
Nonmetallic mineral products	511
Primary metals	514
Fabricated metal products	1,557
Machinery	1,253
Computer and electronic products	1,553
Computer and peripheral equipment	258
Communications equipment	197
Semiconductors and electronic components	544
Electronic instruments	456
Electrical equipment and appliances	507
Transportation equipment	1,840
Furniture and related products	610
Miscellaneous manufacturing	690
Nondurable goods	5,790
Food manufacturing	1,510
Beverages and tobacco products	204
Textile mills	297
Textile product mills	195
Apparel	366
Leather and allied products	51
Paper and paper products	550
Printing and related support activities	718
Petroleum and coal products	116
Chemicals	933
Plastics and rubber products	852
Service-providing	107,307
Private service-providing	85,471
Trade, transportation, and utilities	25,219
Wholesale trade	5,634
Electronic markets and agents and brokers	620
Retail trade	14,810
Motor vehicle and parts dealers	1,860
Automobile dealers	1,246
Furniture and home furnishings stores	530
Electronics and appliance stores	529
Building material and garden supply stores	1,143
Food and beverage stores	2,862
Health and personal care stores	935
Gasoline stations	894
Clothing and clothing accessories stores	1,273
Sporting goods , hobby, book, and music stores	651
General merchandise stores	2,745
Department stores	1,658
Miscellaneous store retailers	945
Nonstore retailers	444

(In thousands)

Industry	Benchmark
Transportation and warehousing	4,178
Air transportation	553
Rail transportation	220
Water transportation	52
Truck transportation	1,319
Transit and ground passenger transportation	391
Pipeline transportation	42
Scenic and sightseeing transportation	21
Support activities for transportation	517
Couriers and messengers	558
Warehousing and storage	506
Utilities	597
Information	3,448
Publishing industries, except Internet	972
Motion picture and sound recording industries	384
Broadcasting, except Internet	336
Internet publishing and broadcasting	35
Telecommunications	1,221
ISPs, search portals, and data processing	454
Other information services	47
Financial activities	7,793
Finance and insurance	5,794
Monetary authorities - central bank	23
Credit intermediation and related activities	2,657
Depository credit intermediation	1,727
Commercial banking	1,276
Securities, commodity contracts, investments	799
Insurance carriers and related activities	2,229
Funds, trusts, and other financial vehicles	87
Real estate and rental and leasing	1,999
Real estate	1,331
Rental and leasing services	640
Lessors of nonfinancial intangible assets	27
Professional and business services	15,845
Professional and technical services	6,755
Legal services	1,101
Accounting and bookkeeping services	955
Architectural and engineering services	1,233
Computer systems design and related services	1,167
Management and technical consulting services	723
Management of companies and enterprises	1,708
Administrative and waste services	7,381
Administrative and support services	7,068
Employment services	3,125
Temporary help services	2,096
Business support services	775
Services to buildings and dwellings	1,503
Waste management and remediation services	314
Education and health services	16,197
Educational services	2,758
Health care and social assistance	13,439
Ambulatory health care services	4,579
Offices of physicians	1,956
Outpatient care centers	409
Home health care services	663
Hospitals	4,121
Nursing and residential care facilities	2,727
Nursing care facilities	1,567
Social assistance	2,012
Child day care services	748

Table 2. **Nonfarm employment benchmarks by industry sector and selected industry detail, March 2002—Continued**

(In thousands)

Industry	Benchmark
Leisure and hospitality	11,622
Arts, entertainment, and recreation	1,652
Performing arts and spectator sports	352
Museums, historical sites, zoos, and parks	109
Amusements, gambling, and recreation	1,191
Accommodations and food services	9,970
Accommodations	1,717
Food services and drinking places	8,254
Other services	5,347
Repair and maintenance	1,245
Personal and laundry services	1,247
Membership associations and organizations	2,855
Government	21,836
Federal government	2,738
Federal government, except U.S. Postal Service	1,887
U.S. Postal Service	851
State government	5,147
State government education	2,364
State government, excluding education	2,784
Local government	13,951
Local government education	7,987
Local government, excluding education	5,964

Table 3. **Revisions in nonfarm employment, seasonally adjusted, January 2002-April 2003**

(In thousands)

Year and month	Levels		Over-the-month changes		
	As previously published	As revised	As previously published	As revised	Difference
2002:					
January	130,871	130,578	-19	-83	-64
February	130,706	130,510	-165	-68	97
March	130,701	130,481	-5	-29	-24
April	130,680	130,415	-21	-66	-45
May	130,702	130,411	22	-4	-26
June	130,736	130,383	34	-28	-62
July	130,790	130,204	54	-179	-233
August	130,913	130,224	123	20	-103
September	130,829	130,289	-84	65	149
October	130,898	130,408	69	119	50
November	130,817	130,409	-81	1	82
December	130,670	130,198	-147	-211	-64
2003:					
January	130,873	130,356	203	158	-45
February	130,520	130,235	-353	-121	232
March	130,396	130,084	-124	-151	-27
April[p]	130,348	130,084	-48	0	48

p=preliminary.

Text table A. **Net birth/death estimates for private nonfarm industries, post-benchmark 2002**

(In thousands)

Year and month	Natural re-sources and mining	Con-struction	Manu-facturing	Trade, trans-portation, and utilities	Infor-mation	Financial activities	Profes-sional and business services	Educa-tion and health services	Leisure and hos-pitality	Other services	Total monthly amount con-tributed
2002:											
April	-1	22	-2	-31	0	0	20	6	29	1	44
May	1	37	6	21	4	6	23	5	67	6	176
June	1	29	5	20	2	5	17	-6	78	5	156
July	0	-6	-22	-24	-1	-5	-16	-13	37	-11	-61
August............................	0	15	6	21	4	6	22	10	18	4	106
September	0	11	3	18	1	3	8	13	-36	2	23
October	1	9	-3	30	5	11	19	29	-34	1	68
November	0	-7	3	24	4	5	7	8	-20	1	25
December	-1	-9	3	23	2	12	6	6	8	3	53
2003:											
January	-4	-77	-29	-95	-3	-25	-107	-7	-32	-12	-391
February	0	11	6	6	6	10	33	14	28	5	119
March............................	0	29	8	25	2	7	31	6	37	6	151
Cumulative total	-3	64	-16	38	26	35	63	71	180	11	469

of employment for the particular series to all employees prior to benchmarking, and then applying these ratios to the revised all-employee figures. These figures are calculated at the basic cell level and then aggregated to produce the summary estimates.

Average weekly hours and average hourly earnings are not benchmarked; they are estimated solely from reports supplied by survey respondents at the basic estimating cell level. With the completion of the redesign and the NAICS conversion, the levels were recomputed from the NAICS probability sample averages for March 2001 to 2002. The sample-based over-the-month changes were then applied to this new level to bring it forward.

The aggregate industry levels of the hours and earnings series are derived as weighted averages. 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 that 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 hours and earnings series resulting from the March 2002 benchmark and the NAICS/sample redesign introduction. At the total private level, average weekly hours decreased by 0.3 hour and average hourly earnings increased

by 14 cents from the previously published levels. These changes are primarily the result of computing new sample average levels from the probability sample.

Methods

Benchmark adjustment procedure. Establishment survey benchmarking is done on an annual basis to a population derived primarily from the administrative file 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 15 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 using a "wedge-back" procedure. In this process, the difference between the benchmark level and the previously published March estimate for each estimating cell is computed. This difference, or error, is distributed linearly across the 11 months of estimates subsequent to the previous benchmark; eleven-twelfths of the March difference is added to February estimates, ten-twelfths to January estimates, and so on, ending with the previous April estimates, which receive one-twelfth of the March difference. The wedge procedure

Table 4. **Hours and earnings estimates, selected industries, March 2002**

Industry	Average weekly hours	Average hourly earnings
Total private	33.6	$14.81
Goods-producing	39.7	16.10
Natural resources and mining	43.0	17.19
Construction	37.8	18.26
Manufacturing	40.4	15.14
Durable goods	40.8	15.86
Wood products	39.6	12.21
Nonmetallic mineral products	41.3	15.20
Primary metals	42.4	17.37
Fabricated metal products	40.6	14.55
Machinery	40.6	15.85
Computer and electronic products	39.8	16.08
Electrical equipment and appliances	39.9	13.99
Transportation equipment	42.8	20.38
Furniture and related products	39.5	12.43
Miscellaneous manufacturing	38.6	12.77
Nondurable goods	40.0	13.99
Food manufacturing	39.2	12.36
Beverages and tobacco products	39.2	17.69
Textile mills	41.4	11.67
Textile product mills	39.6	10.81
Apparel	36.7	9.04
Leather and allied products	37.1	10.83
Paper and paper products	41.7	16.58
Printing and related support activities	38.5	14.78
Petroleum and coal products	42.5	23.04
Chemicals	41.9	17.82
Plastics and rubber products	40.6	13.42
Private service-providing	32.2	14.45
Trade, transportation, and utilities	33.3	13.97
Wholesale trade	37.7	16.83
Retail trade	30.5	11.64
Transportation and warehousing	36.5	15.62
Utilities	40.4	23.85
Information	36.3	19.90
Financial activities	35.3	15.86
Professional and business services	34.0	16.66
Education and health services	32.2	15.02
Leisure and hospitality	25.5	8.50
Other services	31.9	13.60

assumes that the total estimation error 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 levels also are calculated and applied during post-benchmark estimation and new sample is introduced from the annual update.

Benchmark source material. The principal source of benchmark data for private industries is the ES-202 report. This report contains employment data provided to State employment security agencies by employers covered by State UI laws. BLS uses several other sources to establish benchmarks for the remaining industries 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, published by the U.S. Census Bureau in *County Business Patterns*, are used to augment UI data for 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 Census Bureau. Benchmark data from these sources are available only on a 1- or 2-year 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 from business births and business deaths. The timeliest UI universe files available, however, always will be a minimum of 9 months out of date. The CES survey thus can not 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. The research demonstrated that sampling for births was not feasible in the very short CES production timeframes. Therefore BLS 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 is incorporated into the sample-based link relative estimate procedure by simply not reflecting sample units going out of business, but imputing to them the same trend as 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 imputations. The historical time series used to create and test the ARIMA model was derived from the UI universe micro-level database, and 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 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 as 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 revised as a result of this benchmark, both unadjusted and seasonally adjusted data. The data can be accessed at **http:// www.bls.gov/ces/**, the Current Employment Statistics homepage. The series code under NAICS for CES to be used in the LABSTAT database queries is slightly different. The prefix for the NAICS series will be "CE" and the industry code will expand by two digits to accommodate the longer NAICS code. The old SIC database with the prefix "EE" will be available indefinitely with data ending with April 2003 and will not be updated. Employment, hours, and earnings estimates 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. Individual series are seasonally adjusted using either a multiplicative or an additive model. For employment, seasonal adjustment factors are directly applied to the component levels. Individual 3-digit NAICS levels are seasonally adjusted, and higher-level aggregates are formed by the summation of these components. Seasonally adjusted totals for hours and earnings are obtained by taking weighted averages of the seasonally adjusted data for the component series.

Beginning in June 2003 with the May first preliminary estimates, BLS will compute seasonal factors concurrently with the monthly estimate production. Previously, the factors were forecasted twice a year. Concurrent seasonal adjustment

is expected to provide a more accurate seasonal adjustment, and smaller revisions from the first preliminary estimates to the final benchmarked estimates, than the semiannual updates. As a result of the adoption of concurrent seasonal adjustment, the CES program has discontinued the publication of projected seasonal factors.

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 including the 12th of each month—inconsistencies arise because there are sometimes 4 and sometimes 5 weeks between the week including 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 auto-correlated errors) modeling to identify the estimated size and significance of the calendar effect for 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 a data series based on its 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 successfully fit using ARIMA models. If autocorrelated time series are modeled through regression analysis alone, 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 attributable to 11 separate survey interval variables, one specified for each month, except March. March 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 yielded 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 modeled months. The X-12 ARIMA software also produces diagnostic statistics that permit the assessment of the statistical significance of the regression coefficients, and all series are reviewed for model adequacy.

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 were used to adjust the CES data to remove the calendar effect. These "filtered" series then were seasonally adjusted using the standard X-12 ARIMA software previously used.

For a few series, REGARIMA models did not fit well; these series were seasonally adjusted with the X-12 software but without the interval-effect adjustment. For all employees, the series are transportation equipment, transit and ground passenger transportation, social assistance, and membership associations and organizations. The series for women workers, production and nonsupervisory workers, average weekly hours, average weekly overtime hours, and average hourly earnings also are adjusted with X-12 ARIMA including interval-effect modeling. As with the all-employee data, there were a few series which could not successfully be fitted to ARIMA/REGARIMA models and these do not include the interval-effect adjustment. These series are transportation equipment for women workers; wholesale trade, retail trade, transportation and warehousing, information, financial activities, professional and business services, education and health services, leisure and hospitality, and other services for average weekly hours; and wholesale trade, financial activities, professional and business services, and other services for average hourly earnings. All production or nonsupervisory worker and average overtime hours series were successfully fitted to the models and include the interval-effect adjustment.

Construction series. BLS also continues its special treatment in seasonally adjusting the construction industry series, which began with the 1996 benchmark revision. In the application of the interval-effect modeling process to the construction series, there initially was difficulty in accurately identifying and measuring the effect because of the strong influence of variable weather patterns on

employment movements in the industry. Further research allowed BLS to incorporate interval-effect modeling for the construction industry by disaggregating the construction series into its finer industry and geographic estimating cells and tightening outlier designation parameters. This 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 is continuing the practice of making special adjustments for average weekly hours and average weekly overtime 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 1939, or when the series begins.

Local government series. A special adjustment also is made in November each year for poll workers in the local government, excluding education series; this adjustment is incorporated as part of the X-12 modeling process from 1988 forward. An X-11 ARIMA-based procedure is used for earlier years.

Refinements in hours and earnings seasonal adjustment. 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 (AWH) and the average hourly earnings (AHE) series and the number of weekdays in a month, resulting in noneconomic fluctuations in these two series. Both AWH and AHE show more growth in "short" months (20 or 21 weekdays) than in "long" months (22 or 23 weekdays). Much of the previously unexplained volatility in these series is attributable to this calendar effect. The effect is stronger for the AWH than for the AHE series.

The 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 reporting will be variable. A constant level of hours reporting most likely occurs when employees are salaried rather than paid by the hour, as employers are less likely to keep actual detailed hours records for such employees. This causes artificial peaks in the AWH series in shorter months that are reversed in longer months.

The processing error occurs when respondents with salaried workers report hours correctly (vary 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 AHE series in short months and reversals in long months. Currently, the CES processing system can accommodate only one conversion factor per reporter.

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 AWH movements in all the service-providing industries, except retail trade. For AHE, the length-of-pay-period variable is significant for wholesale trade; financial activities; professional and business services; and other services. All AWH series in the service-providing industries, except retail trade, have been adjusted from January 1990 forward. The AHE 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. Because the 4- versus 5-week model shows only marginal significance in the service-providing industries, its replacement with the length-of-pay-period adjustment in those industries, with the exception of retail trade, is a viable tradeoff. The 4- versus 5-week adjustment is most significant in manufacturing hours and earnings series; it will continue to be applied there and in other divisions not affected by the length-of-pay-period variable.

Additive and multiplicative models. Prior to this benchmark release, all CES series were adjusted using multiplicative seasonal adjustment models. Although the X-12 ARIMA seasonal adjustment program provides for either an additive or a multiplicative adjustment depending on which model best fits the individual series, the previous CES processing system was unable to utilize additive seasonal adjustments. A new processing system, being introduced simultaneously with the conversion to NAICS, is able to utilize both additive and multiplicative adjustments. See exhibit 4 for a list of which series are adjusted with additive seasonal adjustment models and which series are adjusted with multiplicative models. Exhibit 4 also designates which series are subject to the calendar-effects modeling described earlier.

Industry	Mode of adjustment	Special adjustments			
		4/5 week	10/11 day	Easter/ Labor Day	Other
		All employees			
Logging	Multiplicative	X			
Oil and gas extraction	Multiplicative	X			
Mining, except oil and gas	Multiplicative	X			
Coal mining	Multiplicative	X			
Support activities for mining	Multiplicative	X			
Construction of buildings	-	X			Indirect [1]
Heavy and civil engineering construction	Additive	X			
Specialty trade contractors	-	X			Indirect [1]
Wood products	Additive	X			
Nonmetallic mineral products	Additive	X			
Primary metals	Multiplicative	X			
Fabricated metal products	Multiplicative	X			
Machinery	Multiplicative	X			
Computer and electronic products	Multiplicative	X			
Computer and peripheral equipment	Additive	X			
Communications equipment	Additive	X			
Semiconductors and electronic components	Multiplicative	X			
Electronic instruments	Multiplicative	X			
Electrical equipment and appliances	Multiplicative	X			
Transportation equipment	Multiplicative				
Furniture and related products	Additive	X			
Miscellaneous manufacturing	Multiplicative	X			
Food manufacturing	Multiplicative	X			
Beverages and tobacco products	Multiplicative	X			
Textile mills	Additive	X			
Textile product mills	Additive	X			
Apparel	Multiplicative	X			
Leather and allied products	Multiplicative	X			
Paper and paper products	Multiplicative	X			
Printing and related support activities	Additive	X			
Petroleum and coal products	Additive	X			
Chemicals	Multiplicative	X			
Plastics and rubber products	Multiplicative	X			
Wholesale trade, durable goods	Multiplicative	X			
Wholesale trade, nondurable goods	Multiplicative	X			
Electronic markets and agents and brokers	Multiplicative	X			
Motor vehicle and parts dealers	Multiplicative	X			
Automobile dealers	Additive	X			
Furniture and home furnishings stores	Multiplicative	X			
Electronics and appliance stores	Multiplicative	X			
Building material and garden supply stores	Multiplicative	X			
Food and beverage stores	Multiplicative	X			
Health and personal care stores	Multiplicative	X			
Gasoline stations	Multiplicative	X			
Clothing and clothing accessories stores	Multiplicative	X			
Sporting goods, hobby, book, and music stores	Multiplicative	X			
General merchandise stores	Multiplicative	X			
Department stores	Multiplicative	X			
Miscellaneous store retailers	Additive	X			
Nonstore retailers	Multiplicative	X			
Air transportation	Multiplicative	X			
Rail transportation	Multiplicative	X			
Water transportation	Multiplicative	X			
Truck transportation	Additive	X			
Transit and ground passenger transportation	Additive				
Pipeline transportation	Additive	X			
Scenic and sightseeing transportation	Multiplicative	X			
Support activities for transportation	Additive	X			
Couriers and messengers	Multiplicative	X			
Warehousing and storage	Multiplicative	X			

See footnotes at end of exhibit.

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Industry	Mode of adjustment	Special adjustments			
		4/5 week	10/11 day	Easter/ Labor Day	Other
		All employees			
Utilities	Multiplicative	X			
Publishing industries, except Internet	Multiplicative	X			
Motion picture and sound recording industries	Multiplicative	X			
Broadcasting, except Internet	Multiplicative	X			
Internet publishing and broadcasting	Multiplicative	X			
Telecommunications	Multiplicative	X			
ISPs, search portals, and data processing	Multiplicative	X			
Other information services	Additive	X			
Monetary authorities – central bank	Additive	X			
Credit intermediation and related activities	Multiplicative	X			
Depository credit intermediation	Multiplicative	X			
Commercial banking	Multiplicative	X			
Securities, commodity contracts, investments	Multiplicative	X			
Insurance carriers and related activities	Multiplicative	X			
Funds, trusts, and other financial vehicles	Multiplicative	X			
Real estate	Multiplicative	X			
Rental and leasing services	Multiplicative	X			
Lessors of nonfinancial intangible assets	Multiplicative	X			
Professional and technical services	Multiplicative	X			
Legal services	Multiplicative	X			
Accounting and bookkeeping services	Multiplicative	X			
Architectural and engineering services	Multiplicative	X			
Computer systems design and related services	Multiplicative	X			
Management and technical consulting services	Multiplicative	X			
Management of companies and enterprises	Multiplicative	X			
Administrative and support services	Multiplicative	X			
Employment services	Multiplicative	X			
Temporary help services	Multiplicative	X			
Business support services	Multiplicative	X			
Services to buildings and dwellings	Multiplicative	X			
Waste management and remediation services	Multiplicative	X			
Educational services	Additive	X			
Ambulatory health care services	Additive	X			
Offices of physicians	Additive	X			
Outpatient care centers	Additive	X			
Home health care services	Additive	X			
Hospitals	Additive	X			
Nursing and residential care facilities	Additive	X			
Nursing care facilities	Additive	X			
Social assistance	Multiplicative				
Child day care services	Multiplicative	X			
Performing arts and spectator sports	Multiplicative	X			
Museums, historical sites, zoos, and parks	Multiplicative	X			
Amusements, gambling, and recreation	Multiplicative	X			
Accommodations	Multiplicative	X			
Food services and drinking places	Additive	X			
Repair and maintenance	Additive	X			
Personal and laundry services	Multiplicative	X			
Membership associations and organizations	Additive				
Federal Government, except U.S. Postal Service	Multiplicative	X			
U.S. Postal Service..	Multiplicative	X			
State government education	Additive	X			
State government, excluding education	Multiplicative	X			
Local government education	Additive	X			
Local government, excluding education	Additive	X			Election [2]

See footnotes at end of exhibit.

Industry	Mode of adjustment	Special adjustments			
		4/5 week	10/11 day	Easter/ Labor Day	Other
Women workers					
Natural resources and mining	Additive	X			
Mining	Additive	X			
Construction	Multiplicative	X			
Manufacturing, durable goods	Multiplicative	X			
Manufacturing, nondurable goods	Multiplicative	X			
Wholesale trade	Multiplicative	X			
Retail trade	Multiplicative	X			
Transportation and warehousing	Multiplicative	X			
Utilities	Multiplicative	X			
Information	Multiplicative	X			
Finance and insurance	Multiplicative	X			
Real estate and rental and leasing	Additive	X			
Professional and technical services	Multiplicative	X			
Management of companies and enterprises	Multiplicative	X			
Administrative and waste services	Multiplicative	X			
Educational services	Multiplicative	X			
Health care and social assistance	Multiplicative	X			
Arts, entertainment, and recreation	Multiplicative	X			
Accommodations and food services	Multiplicative	X			
Other services	Multiplicative	X			
Federal Government	Additive	X			
State government	Multiplicative	X			
Local government	Multiplicative	X			Election [2]
Production or nonsupervisory workers [3]					
Natural resources and mining	Multiplicative	X			
Construction	Additive	X			
Wood products	Additive	X			
Nonmetallic mineral products	Additive	X			
Primary metals	Multiplicative	X			
Fabricated metal products	Multiplicative	X			
Machinery	Additive	X			
Computer and electronic products	Multiplicative	X			
Electrical equipment and appliances	Multiplicative	X			
Transportation equipment	Multiplicative	X			
Furniture and related products	Additive	X			
Miscellaneous manufacturing	Multiplicative	X			
Food manufacturing	Multiplicative	X			
Beverages and tobacco products	Additive	X			
Textile mills	Additive	X			
Textile product mills	Additive	X			
Apparel	Additive	X			
Leather and allied products	Multiplicative	X			
Paper and paper products	Additive	X			
Printing and related support activities	Additive	X			
Petroleum and coal products	Additive	X			
Chemicals	Additive	X			
Plastics and rubber products	Multiplicative	X			
Wholesale trade	Multiplicative	X			
Retail trade	Multiplicative	X			
Transportation and warehousing	Additive	X			
Utilities	Multiplicative	X			
Information	Multiplicative	X			
Financial activities	Additive	X			
Professional and business services	Multiplicative	X			
Education and health services	Multiplicative	X			
Leisure and hospitality	Multiplicative	X			
Other services	Additive	X			

See footnotes at end of exhibit.

Industry	Mode of adjustment	Special adjustments			
		4/5 week	10/11 day	Easter/ Labor Day	Other
		Average weekly hours [3]			
Natural resources and mining	Multiplicative	X		X	
Construction	Additive	X		X	
Wood products	Additive	X		X	
Nonmetallic mineral products	Additive	X		X	
Primary metals	Multiplicative	X		X	
Fabricated metal products	Multiplicative	X		X	
Machinery	Multiplicative	X		X	
Computer and electronic products	Multiplicative	X		X	
Electrical equipment and appliances	Multiplicative	X		X	
Transportation equipment	Multiplicative	X		X	
Furniture and related products	Additive	X		X	
Miscellaneous manufacturing	Additive	X		X	
Food manufacturing	Additive	X		X	
Beverages and tobacco products	Multiplicative	X		X	
Textile mills	Additive	X		X	
Textile product mills	Additive	X		X	
Apparel	Additive	X		X	
Leather and allied products	Additive	X		X	
Paper and paper products	Multiplicative	X		X	
Printing and related support activities	Additive	X		X	
Petroleum and coal products	Multiplicative	X		X	
Chemicals	Multiplicative	X			
Plastics and rubber products	Multiplicative	X		X	
Wholesale trade	Multiplicative		X	X	
Retail trade	Multiplicative		X		
Transportation and warehousing	Multiplicative		X	X	
Utilities	Multiplicative	X			
Information	Multiplicative		X		
Financial activities	Multiplicative		X		
Professional and business services	Multiplicative		X	X	
Education and health services	Multiplicative		X		
Leisure and hospitality	Additive		X		
Other services	Multiplicative		X	X	
		Average overtime hours [4]			
Manufacturing, durable goods	Additive	X		X	
Manufacturing, nondurable goods	Additive	X		X	
		Average hourly earnings [3]			
Natural resources and mining	Additive	X			
Construction	Additive	X			
Manufacturing, durable goods	Additive	X			
Manufacturing, nondurable goods	Multiplicative	X			
Wholesale trade	Multiplicative		X		
Retail trade	Multiplicative	X			
Transportation and warehousing	Additive	X			
Utilities	Multiplicative	X			
Information	Multiplicative	X			
Financial activities	Multiplicative		X		
Professional and business services	Multiplicative		X		
Education and health services	Multiplicative	X			
Leisure and hospitality	Additive	X			
Other services	Multiplicative		X		

[1] Seasonal adjustment occurs at the finest industry detail available.

[2] Special adjustment for the presence/absence of poll workers in local government.

[3] Data relate to production workers in natural resources and mining and manufacturing; construction workers in construction; and nonsupervisory workers in private service-providing industries.

[4] Data relate to production workers in manufacturing.