Transitional Employment Cost Indexes for seasonal adjustment

As part of its conversion to the 2002 North American Industry Classification System and the 2000 Standard Occupational Classification System, the Bureau of Labor Statistics estimated transitional historical indexes to implement seasonal adjustment

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As part of the National Compensation Survey (NCS) of the Bureau of Labor Statistics (BLS), the Employment Cost Index (ECI) provides quarterly measures that represent the change in employers' labor costs per employee hour worked, exclusive of shifts in employment among industries and occupations.[1] The ECI program publishes indexes and 3- and 12-month percent change estimates for total compensation, wages and salaries, and total benefits. Since 1975, the ECI has been computed from survey information on a sample of establishments and jobs weighted to represent the universe of establishments and occupations in the U.S. economy. The ECI is a principal Federal economic indicator that has many uses, both public and private, including formulating monetary policy, indexing hospital charges for Medicare reimbursement, adjusting Federal Government pay, and adjusting wages in long-term contracts.

After more than a quarter of a century, the ECI program has switched to new industry and occupational classifications, as required by Office of Management and Budget mandates stating that all Federal statistical agencies which produce industry or occupation statistics shall adopt the North American Industry Classification System (NAICS)[2] and the Standard Occupational Classification System (SOC).[3] Before the conversion to NAICS and SOC, the ECI program had been using the Standard Industrial Classification (SIC)[4] system and the BLS Occupational Classification System (OCS).[5] Among the changes to the ECI made in response to the mandates were changes for seasonal adjustment purposes.[6]

The focus of this article is the construction of the transitional time series that were used to derive seasonal factors for seasonal adjustment of the NAICS and SOC-based ECI, published beginning in April 2006 with the release of the March 2006 ECI estimates.[7] These historical transitional series are independently calculated estimates that include data classified by NAICS and SOC with the use of both field coding and national office recoding. As part of the conversion of the ECI to NAICS and SOC, special computations outside the ECI quarterly production system were needed to create 10-year data spans for seasonal adjustment. Ten years is the specific period of historical indexes used in ECI seasonal factor estimation.[8] The sections that

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follow summarize the seasonal adjustment methodology, examine differences between the classification systems, and discuss the methodology, data, and computations related to the construction of the transitional ECI series. The article also presents selected transitional estimates (not seasonally adjusted) classified by NAICS and SOC and compares those estimates with their counterparts from SIC and OCS, respectively. The comparisons use absolute difference meas-ures to quantify differences.

The article complements an earlier one by E. Raphael Branch and Lowell Mason[9] on seasonal adjustment of the ECI and the conversion to NAICS and SOC. It also follows an earlier article by Harriet G. Weinstein and Mark A. Loewenstein[10] that compared both NAICS with SIC and SOC with OCS sample employment and cost levels of the Employer Costs for Employee Compensation (ECEC) data series, which BLS converted to NAICS and SOC in 2004. That article compared ECEC data at a single point in time, whereas the approach presented here compares transitional ECI estimates over a 10-year period.

Seasonal adjustment methodology

Over a given period, rates of change in the cost of compensation in certain industries, as measured by the ECI, reflect events that follow a regular pattern. These events include natural fluctuations of economic activity that occur at specific times of the year, such as heightened activity in the construction or leisure and hospitality industry during warm weather. Such recurring patterns in economic time series are referred to as *seasonal effects*. Removing these effects from economic time series, a procedure referred to as seasonal adjustment, makes it possible for analysts to observe the combined trend and other random movements in those series. Many public and private analysts, economists, and statistical agencies use seasonally adjusted data for economic research and analysis to gain a better understanding of changes in the economy.

Two methods are employed for seasonal adjustment of the ECI: direct and indirect seasonal adjustment. In direct seasonal adjustment, an original (not seasonally adjusted) index is divided by the seasonal factor for the series. In indirect seasonal adjustment, seasonally adjusted index components of an aggregate series are averaged by taking a weighted sum.[11]

Seasonal factors for directly adjusted ECI series are estimated by applying seasonal adjustment techniques to 10 years[12] of historical indexes for a series, using the X-12-ARIMA[13] (*A*uto *R*egressive *I*ntegrated *M*oving *A*verage) seasonal adjustment program.[14] The estimated seasonal factors are used as projected seasonal factors for the coming year, under the assumption that there will be no substantial change in seasonality between estimates based on data spans that include the most current year of data and estimates that would be obtained if actual data for the coming year were known. This assumption allows the seasonal factor estimates used in the production of the ECI to be based on actual data rather than projections.

ECI seasonal factors, seasonally adjusted indexes, and seasonally adjusted 3-month percent changes are subject to revision for 5 years. Revisions are conducted annually after the December ECI production quarter is completed. This timing allows for a complete year of the most current indexes to be available for the revision.

Differences between NAICS and SIC

NAICS and SIC differ in both the concept and reference period of the industrial structure of the U.S. economy. NAICS classifies establishments into industries according to similarities in the production processes they use to produce goods and services.[15] The 2002 NAICS reflects the industrial structure of the U.S. economy as it existed during the development of the classification system. NAICS development began in 1992, and the 1997 NAICS manual was published in 1998. A subsequent revision for 2002 was designed to address the continually changing economy. In this revision, 14 of 20 sector classifications are the same as in the 1997 NAICS.[16] By contrast, the SIC system groups establishments by the type of economic activity in which the establishment is primarily engaged, based on supply and demand characteristics of industries. Originally developed in the 1930s, the SIC system was revised periodically to reflect the U.S. economy's changing industrial composition and organization. The last revision was in 1987.

In spite of the different concepts upon which the two systems are based, two-thirds of the four-digit SIC classifications can be derived from NAICS. Many of the remaining third are breaks in time series.[17] Weinstein and Loewenstein observed both similarities and "breaks in series" when they compared NAICS with SIC using employment, wage cost, and total compensation cost estimates from 2004 ECEC data.[18] Weinstein and Loewenstein reported many ECEC series with more than 90 percent of employees common to both NAICS and SIC, including many with 98 percent or more of their employees in both classifications. At the same time, a variety of other NAICS and SIC series had substantially fewer employees in common, and new classifications were included in NAICS

that did not exist in SIC. Weinstein and Loewenstein also indicated that higher level industrial and occupational categories had virtually the same employee populations in both classification systems and that differences were more prevalent among detailed categories. Also, wage comparison ratios showed many series ratios close to 1.0, meaning that there was essentially no difference in the estimates. The results based on ECEC had implications for the conversion of the ECI to NAICS and SOC, because the ECEC and ECI samples are essentially the same and rates of change, as measured in the ECI, were expected to be closer to the NAICS and SOC rates than cost levels were.[19]

Difference between SOC and OCS

The SOC and BLS OCS occupational classification systems also differ in concept, structure, and reference periods pertaining to the U.S. economic structure. The ECI now uses the 2000 SOC system, which is designed to represent the occupational structure of the United States as it existed at that time.[20] The SOC system covers all occupations in which work is performed for pay or profit. At the most detailed level, each occupational category includes workers who perform similar job tasks at similar skill levels. The SOC system represents a major change relative to the BLS occupational classification structure previously used for the ECI. The SOC system includes a concept of "job families," in which people who work together are classified together, regardless of their skill levels. As a result, many workers who were classified separately in the OCS system are now included in the same SOC group,[21] and certain workers who were in the same group in the OCS system are now classified into different or new SOC groups. Therefore, the aggregations created in SOC differ from those in OCS.

By contrast, the BLS OCS classifications, which are based on Census Bureau occupational classifications, are designed to represent the economy as of 1990.[22] As with the SOC, the basic concept of OCS classification is primarily by work performed; but the classifications of occupations are separated by skill levels. Because of the differences between the two classification approaches, researchers anticipated that analyzing occupational data across time would be much more challenging with SOC than analyzing industry data would be with NAICS.[23] In an earlier article, Albert E. Schwenk and William J. Wiatrowski discussed overlapping employment coverage between SOC and OCS groups in 2002 ECI data. The overlap ranged from 66.3 percent to 99.3 percent of workers in a group.[24] In another article, Schwenk and Loewenstein, finding inconsistencies between SOC and OCS, did not compare natural resources and production occupations between the two systems. Nor did they compare the two systems' transportation and material-moving occupations.[25] Weinstein and Loewenstein's breaks in series mentioned earlier represent similar results for aggregate groups in ECEC data.[26]

Transition methodology

From a time-series perspective, differences between classification systems could have substantial implications for seasonal adjustment, for which a consistent time series is essential for accurate analyses and forecasts.[27] In response to the significant changes found in NAICS compared with SIC, the BLS, recognizing the needs of users of time-series data, generally approached the problem by restructuring historical series. For instance, the BLS Quarterly Census of Employment and Wages (QCEW) program restructured its employment and wage estimates back to 1990, the Current Employment Statistics (CES) program restructured its employment estimates back to 1939, and the Productivity program restructured its output-per-hour indexes and related series back to 1987.

Using the new NAICS and SOC classifications, BLS economists in the Office of Compensation and Working Conditions computed transitional Employment Cost Indexes (not seasonally adjusted) for December 1994 through December 2005.[28] The choice to compute transitional indexes was a highly desirable one, because it was consistent with the approach taken by other BLS programs and other Federal agencies to address the data comparability concerns of seasonal adjustment analysts. The main concern of these researchers was that, due to the conceptual and definitional changes brought about by the new classification systems, comparability issues could affect the accuracy of seasonal factor estimation, even when no comparability adjustments appeared necessary.[29] It was not appropriate to mix indexes based on SIC and OCS with those based on NAICS and SOC, because a change in classification systems within the 10-year data span might lead to a change in the underlying seasonal behavior of a series. Although X-12-ARIMA is robust and can readily adapt to minor changes in the computation of a series, the X-11 routine that is part of X-12-ARIMA takes time to adapt to major changes. (X-11 is a seasonal adjustment method that uses moving averages, referred to as filters, to smooth an economic series.[30])

Computing the NAICS and SOC estimates for the entire data span has two major advantages. First, changes in the

seasonal pattern brought about by the new industry and occupation definitions are fully embodied in the series. The seasonal adjustment routine within X-12-ARIMA is more likely to give smoother estimates of trend, seasonal, and irregular components. Because the X-11 filters are using data by NAICS and SOC over the entire data span, the seasonal factor estimates generally are not biased by effects associated with the change in classification systems. Second, computing NAICS and SOC estimates for the entire data span provided historical data for NAICS and SOC series that did not exist under the SIC and OCS classification systems. These new series could then be seasonally adjusted as appropriate with the first publication of NAICS and SOC data—the March 2006 estimates. This approach was preferable to simply waiting until enough historical data for the new NAICS and SOC series had accumulated to perform seasonal factor estimation on those series.

Data considerations

In anticipation of seasonal adjustment, the BLS began dual coding NCS data in March 2000; that is, BLS field economists were asked to code new establishment and occupation samples, using both the NAICS and SOC classifications and the SIC and OCS classifications. The NAICS structure is a six-digit hierarchical coding system that identifies particular industries and their placement in the classification structure. The first two digits represent *sectors*—general categories of various economic activities. The entire 2002 NAICS structure contains 20 sectors. Although the BLS originally planned to publish estimates at the two-digit NAICS level, economists in the national office coded establishments at the six-digit level wherever feasible, in order to afford the best possible classification of industries.[31]

Dual coding was implemented with successive sample replacement groups; therefore, not all the data for 2000 and 2001 were dual coded during data collection. Beginning with 2002 data, every establishment and occupation in the ECI sample at any point during 2001–05 was dual coded by staff collecting the data. However, not every establishment or occupation in the ECI sample during 1994–2001 was dual coded in that way. Of roughly 17,200 establishment-occupation combinations in the ECI sample from December 1994 to December 2001, only about 37 percent were dual coded at the time of data collection. This left approximately 63 percent of the establishments and occupations in the sample during 1994–2001 to be recoded in the national office.

For the first half of the data span for 2006 seasonal factor estimation (March 1996 through December 2000), two sources facilitated the national-office recoding of ECI data from SIC to NAICS: (1) the reconstruction file developed in the BLS Office of Employment and Unemployment Statistics to recode establishments in the CES survey and (2) the BLS Longitudinal Data Base (LDB) files for 1995 and March 2001.[32] When ECI data could not be recoded with the use of these sources (about 600 cases), BLS staff recoded the establishments by assigning NAICS codes in accordance with definitions in the NAICS manual. In most of these cases, there was a one-to-one correspondence between the NAICS and SIC codes at the three-digit level at least, so no judgment was involved when BLS economists assigned the NAICS codes. However, in about 200 cases, the SIC mapped into two or more two-digit NAICS codes. In these cases, the appropriate NAICS code was determined by the name of the establishment and the titles of the NAICS categories.

Occupational quotes that were not coded during data collection were recoded to appropriate intermediate (two-digit) aggregation SOC groups[33] by means of a crosswalk that matched the SOC with the OCS. The recoding from OCS to the two-digit aggregation level of SOC was feasible, given that the ECI occupational estimates are published at that same level, and was even easier than NAICS recoding, because the SOC groups are at a more aggregate level.

Computing the index

The basic computations for the transitional indexes are the same as those for the regularly published ECI. The ECI is a Laspeyres index, and the standard formula for an index number with fixed weights applies.[34] The discussion that follows pertains to ECI wages and salaries indexes; the calculation for benefit cost indexes is essentially the same.[35]

An Employment Cost Index is a weighted average of the cumulative average wage changes from a specified base-period wage. Currently, Employment Cost Indexes are based at 100 for December 2005. A formula for an Employment Cost Index I_t at quarter t is presented next. The formula assumes that the index series is based at 100 for $t = 0$. With this base, to obtain an index for an estimation cell at any quarter t, the wage bill or cost weight sum for the cell is divided by the wage bill for that cell for quarter $t - 1$, the previous quarter; that is,

$$I_t = I_{(t-1)} \frac{\sum_i W_{ti}}{\sum_i W_{(t-1)i}},$$

where $I_{(t\text{-}1)}$ is the previous quarter's index; W_{ti} is the wage bill, or cost weight, for quarter t and estimation cell i; and $W_{(t\text{-}1)i}$ is the previous quarter's wage bill for the same cell i. A wage bill is a weighted average hourly wage of workers in the cell, times the number of workers represented by the cell. In general, a cell is defined by private or government sector, industry, and occupational group.

For a current quarter t index,

$$W_{ti} = W_{(t-1)i} R_{ti},$$

where R_{ti} is the ratio of the current quarter's weighted average wage in a cell to the previous quarter's weighted average wage in a cell.[36]

Operationally, several steps took place in the process of computing NAICS-SOC-based Employment Cost Indexes for the 1996–2005 periods:

1) Define industry and occupation cells. In all, 58 industry categories were defined for private industry and 13 industry for State and local governments. For each industry category, nine occupational categories were defined.
2) Determine 2002 employment in each industry and occupation cell.[37] Employment counts were obtained mainly from the BLS QCEW file of quarterly reports to State employment security agencies from every employer that is subject to State Unemployment Insurance laws and is in the BLS Occupational Employment Statistics program.
3) Compute base-period (December 1994) wage and total benefit cost weights for each industry and occupation cell. The base-period wage cost weight for each cell was equal to 2002 employment, times the average December 1994 wage, and similarly for the base-period total benefit cost weight. Extending the series back to 1994 provided an opportunity to test seasonal adjustment of NAICS-SOC data before 2005 data became available and also permitted additional testing of NAICS-SOC data to increase the level of confidence in the accuracy of the data.
4) Compute the current quarter's wage and total benefit cost weights for each industry and occupation cell, for each quarter, through December 2005.
5) For each series of interest for each quarter, sum both the current and previous quarters' cost weights across the component cells.
6) Calculate indexes with December 1994 as the base (= 100), and then, for each subsequent quarter, move the index forward by setting it equal to the previous quarter's index times the ratio of the current quarter's cost weight to the previous quarter's cost weight.
7) Rebase all indexes to December 2005 = 100 by dividing each index by the December 2005 index value and multiplying by 100.[38]

Transitional Estimates

Table 1 shows selected transitional Employment Cost Indexes, not seasonally adjusted, that were developed specifically for seasonal adjustment of the ECI classified by NAICS and SOC. Ten-year historical index data spans from 1996 to 2005 and from 1997 to 2006 were used to estimate seasonal factors by quarter,[39] as part of the direct seasonal adjustment method employed for the 2006 and 2007 published seasonally adjusted Employment Cost Indexes, respectively. The transitional indexes and 3-month percent changes in the table are provided for informational purposes only, to show the entire data spans that were used in estimating seasonal factors, as well as to provide additional context for the published NAICS and SOC ECI estimates.

The data in the table are transitional because they are a combination of independently calculated estimates (from December 1994 to December 2005) and production-system-calculated estimates (from March 2006 to December 2006), which have a couple of limitations arising from the method by which they were derived. First, the 10-year data spans are a mixture of field-collection-coded and specially recoded data, where the latter data are obtained by means of a recoding procedure that differs from the field collection procedure used for regularly published ECI data.[40] Second, the imputation of missing data based on the SIC and OCS sample has been retained; no imputations were made on the basis of data reclassified by NAICS and SOC. Notwithstanding these limitations, BLS economists considered the transitional estimates to be sufficient for seasonal adjustment.

The early years of the transitional series provide a longer historical perspective for the seasonally adjusted ECI classified by NAICS and SOC than do the transitional data that are published with the official ECI estimates, which begin with March 2001. These earlier-reference-period data have not been published in the official historical listing due to the substantial amount of national-office coding that was required and due to their restricted use for seasonal adjustment.

Official ECI estimates are available in the Employment Cost Index news releases and in historical listings. The of-

Table 1. Transitional Employment Cost Indexes and 3-month percent changes, by occupation and industry,[1] private-industry workers,[2] December 1994–December 2006, not seasonally adjusted

Occupational group, industry, and year	Indexes (December 2005 = 100)				Percent changes for 3 months ended—			
	March	June	September	December	March	June	September	December
Wages and salaries[3]								
Occupation								
Management, business, and financial:								
1994	—	—	—	67.9	—	—	—	—
1995	68.7	69.0	69.5	70.1	1.2	.4	.7	.9
1996	70.8	71.4	72.5	72.7	1.0	.8	1.5	.3
1997	74.0	74.5	75.3	76.7	1.8	.7	1.1	1.9
1998	77.8	78.4	79.6	79.4	1.4	.8	1.5	–.3
1999	80.3	81.8	83.2	83.9	1.1	1.9	1.7	.8
2000	84.3	85.1	85.7	86.3	.5	.9	.7	.7
2001	87.3	88.3	89.1	89.8	1.2	1.1	.9	.8
2002	90.8	92.2	92.4	92.1	1.1	1.5	.2	–.3
2003	94.8	95.5	96.4	96.7	2.9	.7	.9	.3
2004	96.8	97.5	98.1	98.5	.1	.7	.6	.4
2005	99.2	99.7	99.5	100.0	.7	.5	–.2	.5
2006	101.3	102.2	102.8	103.1	1.3	.9	.6	.3
Professional and related:								
1994	—	—	—	70.1	—	—	—	—
1995	70.5	71.0	71.5	71.9	.6	.7	.7	.6
1996	72.7	73.4	73.9	74.1	1.1	1.0	.7	.3
1997	74.7	75.5	76.1	76.7	.8	1.1	.8	.8
1998	77.3	77.9	78.8	79.3	.8	.8	1.2	.6
1999	80.0	80.7	81.4	82.1	.9	.9	.9	.9
2000	82.8	83.9	85.1	85.8	.9	1.3	1.4	.8
2001	86.9	87.8	88.7	89.3	1.3	1.0	1.0	.7
2002	90.1	90.5	91.0	91.4	.9	.4	.6	.4
2003	92.1	92.7	93.6	94.2	.8	.7	1.0	.6
2004	95.3	95.7	96.7	97.2	1.2	.4	1.0	.5
2005	98.2	98.8	99.6	100.0	1.0	.6	.8	.4
2006	100.9	101.8	103.1	104.0	.9	.9	1.3	.9
Sales and related:								
1994	—	—	—	67.1	—	—	—	—
1995	67.2	68.5	69.5	69.4	.1	1.9	1.5	–.1
1996	70.6	71.8	71.5	72.7	1.7	1.7	–.4	1.7
1997	73.8	74.3	75.5	76.6	1.5	.7	1.6	1.5
1998	77.4	78.5	81.1	83.9	1.0	1.4	3.3	3.5
1999	80.3	82.3	83.4	83.9	–4.3	2.5	1.3	.6
2000	86.4	86.8	87.6	86.5	3.0	.5	.9	–1.3
2001	86.8	88.0	87.9	88.6	.5	1.3	.0	.8
2002	89.2	91.0	91.0	90.9	.6	2.1	.0	–.2
2003	91.5	92.5	94.3	93.8	.7	1.1	1.9	–.5
2004	94.4	95.7	97.4	96.6	.6	1.4	1.8	–.8
2005	97.3	97.8	99.2	100.0	.7	.5	1.4	.8
2006	99.8	101.3	102.0	102.6	–.2	1.5	.7	.6
Office and administrative support:								
1994	—	—	—	69.2	—	—	—	—
1995	69.9	70.2	70.6	71.1	1.0	.4	.6	.7
1996	71.9	72.4	73.1	73.4	1.1	.7	1.0	.4
1997	74.3	75.0	75.8	76.3	1.2	.9	1.1	.7
1998	77.1	78.0	78.6	79.2	1.0	1.2	.8	.8
1999	80.2	80.8	81.5	82.1	1.3	.7	.9	.7
2000	83.3	84.3	85.3	85.8	1.5	1.2	1.2	.6
2001	87.0	87.7	88.8	89.4	1.4	.8	1.3	.7
2002	90.7	91.3	91.8	92.4	1.5	.7	.5	.7
2003	93.1	93.9	94.4	94.7	.8	.9	.5	.3
2004	95.6	96.4	97.1	97.6	1.0	.8	.7	.5
2005	98.2	99.0	99.4	100.0	.6	.8	.4	.6
2006	100.9	101.9	102.6	103.3	.9	1.0	.7	.7

See footnotes at end of table.

Table 1. Continued—Transitional Employment Cost Indexes and 3-month percent changes, by occupation and industry,[1] private-industry workers,[2] December 1994–December 2006, not seasonally adjusted

Occupational group, industry, and year	Indexes (December 2005 = 100)				Percent changes for 3 months ended—			
	March	June	September	December	March	June	September	December
Construction and extraction; farming, fishing, and forestry:								
1994	—	—	—	72.2	—	—	—	—
1995	72.3	73.2	73.8	74.1	.1	1.2	.8	.4
1996	74.6	75.6	75.7	76.4	.7	1.3	.1	.9
1997	76.5	76.9	77.6	78.0	.1	.5	.9	.5
1998	78.6	79.4	80.1	80.4	.8	1.0	.9	.4
1999	81.1	81.9	82.5	82.8	.9	1.0	.7	.4
2000	84.0	85.2	86.4	86.9	1.4	1.4	1.4	.6
2001	87.8	88.9	89.8	90.0	1.0	1.3	1.0	.2
2002	90.6	91.3	91.9	92.4	.7	.8	.7	.5
2003	92.7	93.7	94.6	94.9	.3	1.1	1.0	.3
2004	95.8	96.6	96.9	97.5	.9	.8	.3	.6
2005	97.8	98.5	99.3	100.0	.3	.7	.8	.7
2006	100.7	102.0	103.0	103.7	.7	1.3	1.0	.7
Installation, maintenance, and repair:								
1994	—	—	—	70.5	—	—	—	—
1995	71.3	72.0	72.5	73.1	1.1	1.0	.7	.8
1996	74.0	74.8	74.6	75.3	1.2	1.1	–.3	.9
1997	75.8	77.0	77.3	77.7	.7	1.6	.4	.5
1998	78.4	79.1	79.9	80.5	.9	.9	1.0	.8
1999	81.6	82.2	83.1	83.6	1.4	.7	1.1	.6
2000	84.7	85.6	86.3	86.4	1.3	1.1	.8	.1
2001	87.4	87.9	90.1	90.1	1.2	.6	2.5	.0
2002	90.4	92.2	92.9	92.9	.3	2.0	.8	.0
2003	93.8	94.6	95.1	95.5	1.0	.9	.5	.4
2004	95.9	96.8	97.3	97.4	.4	.9	.5	.1
2005	97.8	99.1	99.5	100.0	.4	1.3	.4	.5
2006	100.7	101.6	102.6	103.0	.7	.9	1.0	.4
Transportation and material moving:								
1994	—	—	—	73.3	—	—	—	—
1995	74.2	74.8	75.3	75.4	1.2	.8	.7	.1
1996	76.8	77.4	77.7	78.0	1.9	.8	.4	.4
1997	78.9	79.3	80.2	80.7	1.2	.5	1.1	.6
1998	81.4	81.9	82.7	83.0	.9	.6	1.0	.4
1999	83.1	84.0	84.5	85.1	.1	1.1	.6	.7
2000	85.6	86.4	87.3	88.1	.6	.9	1.0	.9
2001	89.0	90.0	90.8	91.7	1.0	1.1	.9	1.0
2002	92.7	93.1	93.7	94.0	1.1	.4	.6	.3
2003	94.7	95.3	95.6	95.9	.7	.6	.3	.3
2004	96.4	97.1	97.9	98.3	.5	.7	.8	.4
2005	98.5	99.0	99.7	100.0	.2	.5	.7	.3
2006	100.4	101.2	102.0	102.6	.4	.8	.8	.6
Industry								
Construction:								
1994	—	—	—	70.4	—	—	—	—
1995	70.6	71.1	71.7	72.1	.3	.7	.8	.6
1996	72.7	73.4	73.9	74.1	.8	1.0	.7	.3
1997	74.8	75.7	76.2	76.5	.9	1.2	.7	.4
1998	77.2	78.5	79.0	79.3	.9	1.7	.6	.4
1999	80.2	81.0	81.5	81.9	1.1	1.0	.6	.5
2000	83.5	84.8	85.8	86.4	2.0	1.6	1.2	.7
2001	87.3	88.2	88.9	89.6	1.0	1.0	.8	.8
2002	89.9	90.7	91.3	92.1	.3	.9	.7	.9
2003	92.3	93.4	94.2	94.5	.2	1.2	.9	.3
2004	95.4	95.9	97.0	96.9	1.0	.5	1.1	–.1
2005	97.3	98.3	99.4	100.0	.4	1.0	1.1	.6
2006	100.6	102.0	102.9	103.7	.6	1.4	.9	.8

See footnotes at end of table.

Table 1. Continued—Transitional Employment Cost Indexes and 3-month percent changes, by occupation and industry,[1] private-industry workers,[2] December 1994–December 2006, not seasonally adjusted

Occupational group, industry, and year	Indexes (December 2005 = 100)				Percent changes for 3 months ended—			
	March	June	September	December	March	June	September	December
Retail trade:								
1994	—	—	—	71.3	—	—	—	—
1995	71.8	72.5	73.3	72.8	.7	1.0	1.1	–.7
1996	74.4	74.8	75.6	76.1	2.2	.5	1.1	.7
1997	76.8	77.8	78.5	78.5	.9	1.3	.9	.0
1998	79.4	80.1	81.2	80.5	1.1	.9	1.4	–.9
1999	81.6	83.1	83.5	83.9	1.4	1.8	.5	.5
2000	85.7	86.3	87.2	87.5	2.1	.7	1.0	.3
2001	88.7	89.3	90.0	91.6	1.4	.7	.8	1.8
2002	91.5	93.2	93.2	93.0	–.1	1.9	.0	–.2
2003	93.2	93.8	95.3	95.3	.2	.6	1.6	.0
2004	95.8	96.7	96.9	97.4	.5	.9	.2	.5
2005	98.0	98.8	99.6	100.0	.6	.8	.8	.4
2006	100.5	100.9	101.9	102.8	.5	.4	1.0	.9
Benefits[4]								
Occupation								
Service occupations:								
1994	—	—	—	67.9	—	—	—	—
1995	68.0	68.5	68.6	68.6	.1	.7	.1	.0
1996	68.3	68.6	68.7	69.4	–.4	.4	.1	1.0
1997	69.4	70.0	71.1	71.6	.0	.9	1.6	.7
1998	72.1	72.1	72.5	72.4	.7	.0	–.6	.1
1999	73.3	74.1	74.3	75.0	1.2	1.1	.3	.9
2000	75.2	76.1	76.9	78.3	.3	1.2	1.1	1.8
2001	79.7	80.5	81.3	82.5	1.8	1.0	1.0	1.5
2002	83.7	84.4	85.9	86.5	1.5	.8	1.8	.7
2003	88.8	89.4	90.7	91.7	2.7	.7	1.5	1.1
2004	94.6	95.9	96.7	97.0	3.2	1.4	.8	.3
2005	98.3	98.9	99.5	100.0	1.3	.6	.6	.5
2006	101.5	102.2	103.0	103.6	1.5	.7	.8	.6

[1] Occupational groups are defined in *Standard Occupational Classification Manual, United States, 2000* (Executive Office of the President, Office of Management and Budget, 2000), with the exception that construction and extraction is combined with farming, fishing, and forestry. Industry groups are defined in *North American Industry Classification System, United States, 2002* (Executive Office of the President, Office of Management and Budget, 2002).

[2] Includes workers in the private nonfarm economy, except those in private households.

[3] For the Employment Cost Index (ECI), wages and salaries are defined as the hourly straight-time wage rate or, for workers not paid on an hourly basis, straight-time earnings, divided by corresponding hours. Straight-time earnings are total earnings before payroll deductions, excluding premium pay for overtime and for work on weekends and holidays, shift differentials, and nonproduction bonuses such as lump-sum payments provided in lieu of wage increases. The ECI includes production bonuses, incentive earnings, commission payments, and cost-of-living adjustments.

[4] Includes paid leave—vacations, holidays, sick leave, and other leave; supplemental pay—premium pay for work in addition to the regular work schedule (such as overtime, weekends, and holidays), shift differentials, and nonproduction bonuses (such as referral bonuses and attendance bonuses); insurance benefits—life, health, short-term disability, and long-term disability; retirement and savings benefits—defined benefit and defined contribution plans; and legally required benefits—Social Security, Medicare, Federal and State Unemployment Insurance, and Workers' Compensation.

NOTE: Transitional Employment Cost Indexes were developed for seasonal adjustment of the ECI as classified by NAICS and SOC. Ten-year historical index time spans from 1996 to 2005 and from 1997 to 2006 were used to estimate seasonal factors by quarter for the 2006 and 2007 Employment Cost Index, respectively. Transitional data for 1994 through 2000 and 3-month percent changes in this table are informational only. Official ECI estimates are available in the Employment Cost Index news releases and historical listings. Dash indicates data not available.

ficial estimates for all reference periods from the beginning of the ECI through 2005 are the originally published estimates based on SIC and OCS, with an index base of June 1989 = 100.[41]

Comparisons

It is desirable to know how the transitional ECI estimates differ when classified by NAICS compared with SIC and when classified by SOC compared with OCS, particularly because of the movement of establishments and occupations among classifications. The intent of such a comparison is twofold: to bring to light the outcome of the data reconstruction methods relative to the existing estimates and to demonstrate that the estimates are reasonably consistent with expectations based on similarity or dif-

ference in classifications. In this section, the difference between Employment Cost Indexes and 3-month percent changes of the two classification systems is measured with two absolute difference measures: the mean absolute difference and the maximum absolute difference.[42] Together, the two statistics summarize the extent of the differences between estimates grouped by the two classifications. Put another way, they describe how the reclassification of establishments quantitatively changed the occupational and industrial estimates. The absolute difference measures were chosen for this analysis because they describe the size of the differences without regard to their direction. The analysis is performed over the 10-year period from 1996 to 2005, a period that was selected because it is the data span used for the 2006 seasonal adjustment estimation, the first year of ECI estimates classified by NAICS and SOC. In addition to these statistics, selected series classified by the two systems are presented graphically. For the most salient private-industry series, 3-month percent changes for the 10-year data span are plotted in order to display how the ECI quarterly rates of change differ over time between the two classification systems.

Analysis

Table 2 shows mean and maximum absolute difference statistics for selected transitional ECI estimates over the 1996–2005 period. Results are reported for index and 3-month percent change estimates, both seasonally adjusted and not seasonally adjusted. NAICS and SOC classifications that are completely new are not in the table, because there are no SIC and OCS indexes with which to compare them. Series not listed in the table include subcategories of the information industry; subcategories of natural resources occupations; production occupations; and transportation and material moving occupations. Also not in the table are series with standard errors and numbers of observations that do not meet publication criteria.

In table 2, the absolute mean and maximum differences in indexes and 3-month percent changes appear to be relatively small, but quarter-to-quarter charts show the extent of variation in classification system estimates over time. The differences, however small nominally, capture not only structural economic and time differences embodied in the classifications, but differences in ECI methodology as well. (There also may be differences due to rounding.) Seasonally adjusted estimates show relatively few differences in absolute mean differences in indexes and 3-month percent changes, compared with mean differences in the estimates that are not seasonally adjusted. These few differences reflect relatively small differences in unadjusted estimates and seasonal factors between the two classifications. The maximum-difference data show that when the data are seasonally adjusted, the differences between the two classification systems tend to be either the same or less than when the data are not seasonally adjusted.

In the analysis that follows, the original (not seasonally adjusted) transitional series will be the main focus because they represent the data spans used for seasonal factor estimation. For both private industry and State and local governments, in no case does the difference between seasonally adjusted and not seasonally adjusted mean and maximum absolute differences exceed 0.1 percentage point.

Occupation. Among private occupational series, professional and related occupations show the largest mean and maximum absolute difference between OCS and SOC *indexes*, and office and administrative occupations show the smallest. Sales and related occupations have the largest mean and maximum absolute differences for *3-month percent changes*. To illustrate the underlying data for the latter occupation group, the top panel of chart 1 shows 3-month percent changes in the OCS and SOC ECI's for wages and salaries of sales and related workers, not seasonally adjusted. The chart demonstrates that rates of change for the two series follow a similar pattern over time, but include a variety of differences. In particular, the March 1999 decline in the SOC estimate was more than a percentage point more than the decline in the OCS estimate. The bottom panel of chart 1 shows similar results on a seasonally adjusted basis.

Industry. The transportation and warehousing industry shows the largest mean absolute difference, while the hospital industry shows the smallest, between NAICS and SIC *indexes*. (The hospital industry sample is virtually the same on the basis of both SIC and NAICS.) Retail trade shows the largest maximum absolute differences in indexes. Transportation and warehousing shows the largest mean and maximum absolute differences for *3-month changes*. The top panel of chart 2 compares 3-month percent changes for the NAICS transportation and warehousing industry with those for the SIC transportation series, not seasonally adjusted. The two series occasionally mirror each other, but differ substantially in several instances; for example, the March 1997 difference is approximately a percentage point, and the March 2005 difference is more than half a percentage point. The bottom panel of chart

Table 2. Mean and maximum absolute difference between transitional NAICS-SOC[1] and SIC-OCS[2] Employment Cost Indexes and 3-month percent changes for wages and salaries, 1996–2005

Series	Absolute difference in Indexes				Absolute difference in 3-month percent change			
	Not seasonally adjusted		Seasonally adjusted		Not seasonally adjusted		Seasonally adjusted	
	Mean	Maximum	Mean	Maximum	Mean	Maximum	Mean	Maximum
Private								
Occupation group:								
Management, business and financial	0.9	1.7	0.9	1.7	0.2	0.6	0.2	0.5
Professional and related	1.3	2.0	1.3	2.0	.1	.6	.2	.5
Sales and related	.7	1.3	—	—	.3	1.6	—	—
Office and administrative support	.1	.4	.1	.4	.1	.3	.1	.3
Service occupations	.4	.9	—	—	.1	.4	—	—
Industry group:								
Construction	.5	.9	.5	.9	.1	.4	.1	.4
Durable goods	.1	.3	.1	.3	.1	.4	.1	.3
Nondurable goods	.2	.7	.3	.6	.2	.7	.2	.6
Wholesale trade	.6	1.4	—	—	.2	.6	—	—
Retail trade	.6	1.7	.6	1.6	.2	.7	.2	.7
Transportation and warehousing	.8	1.4	.8	1.3	.2	1.0	.2	1.0
Utilities	.2	.6	.2	.6	.1	.5	.1	.3
Insurance	.4	.9	—	—	.1	.4	—	—
Junior colleges, colleges, universities, and professional schools	.3	.7	.3	.7	.1	.4	.1	.3
Hospitals	0	.2	.0	.2	.0	.1	.1	.3
State and local governments								
Occupation group:								
Management, business and financial	.1	.4	.1	.4	.1	.5	.1	.2
Professional and related	.1	.2	.1	.2	.1	.2	.1	.2
Office and administrative support	.4	.7	.4	.7	.1	.4	.1	.3
Service occupations	.4	.7	.4	.6	.1	.2	.1	.2
Industry group:								
Elementary and secondary schools	.1	.1	.1	.1	.1	.1	.0	.1
Junior colleges, colleges, universities, and professional schools	.3	.7	.3	.7	.1	.4	.1	.3
Hospitals.	.2	.4	.2	.4	.0	.1	.1	.3
Public administration	.2	.4	.2	.4	.1	.3	.1	.3

[1] The acronym "NAICS" refers to the North American Industry Classification System; see *North American Industry Classification System, United States, 2002* (Executive Office of the President, Office of Management and Budget, United States, 2002). The acronym "SOC" denotes the Standard Occupational Classification system; see *Standard Occupational Classification Manual* (Executive Office of the President, Office of Management and Budget, United States, 2000), with the exception that construction and extraction is combined with farming, fishing, and forestry.

[2] The acronym "SIC" designates the Standard Industrial Classification System; see *Standard Industrial Classification System* (Executive Office of the President, Office of Management and Budget, 1987). The acronym "OCS" refers to the Occupational Classification System; see 1990 *OCSM, Occupational Classification System Manual for the Employment Cost Index Survey Program* (Bureau of Labor Statistics, 1990).

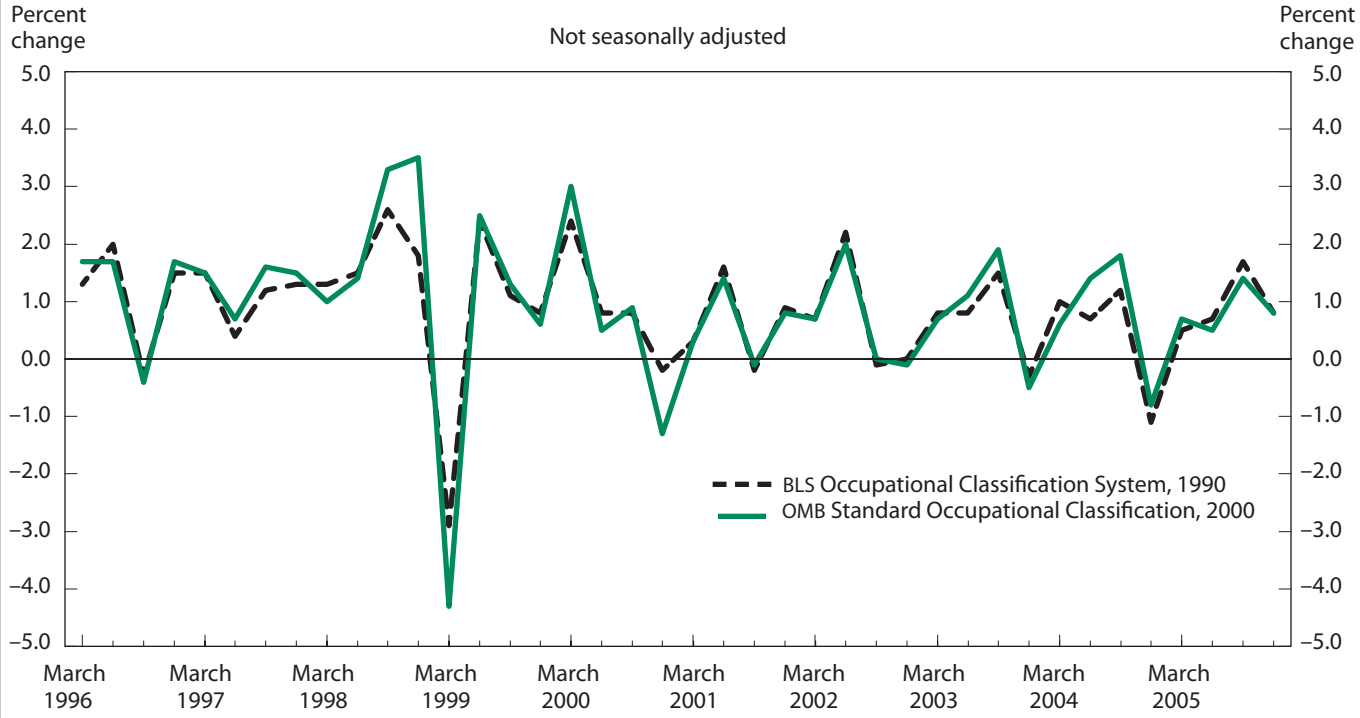
NOTE: Dashes indicate that no seasonality was found for this series in 2006.

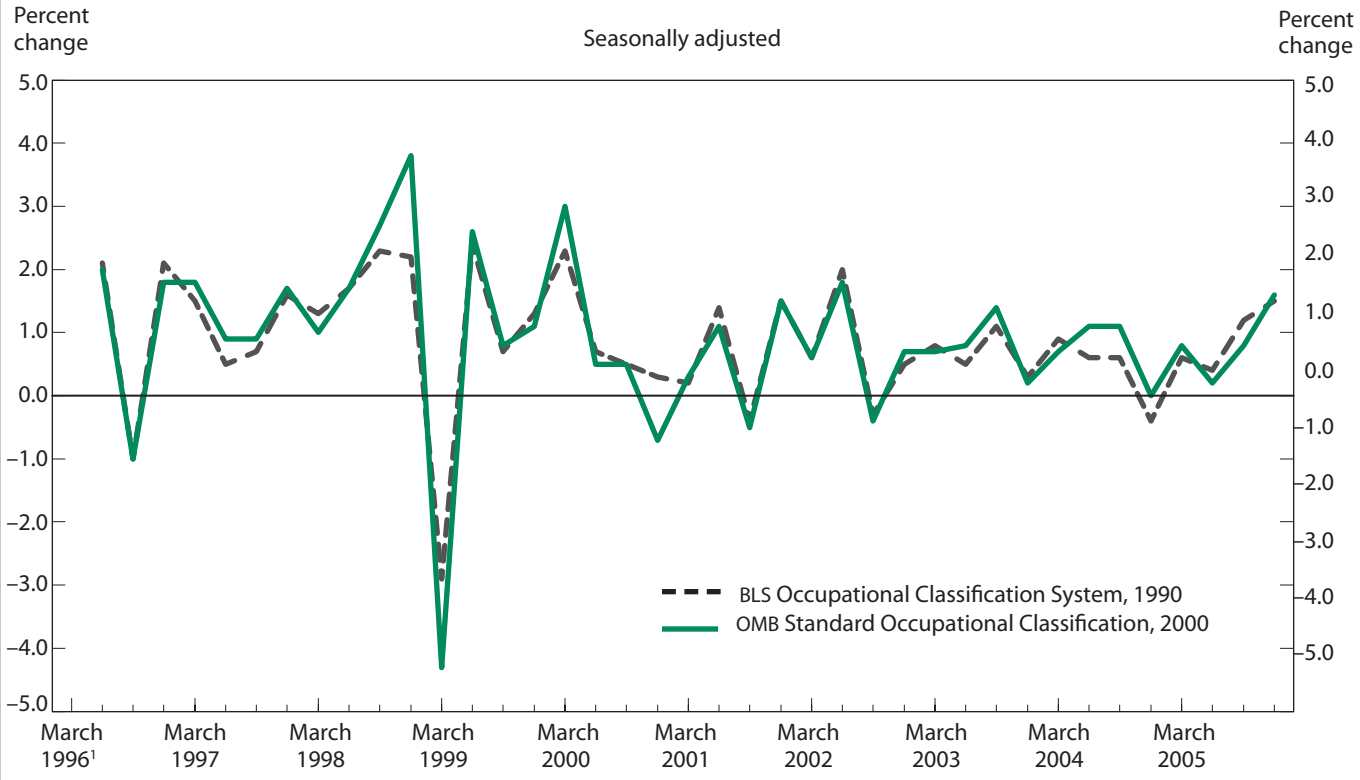
2 shows a similar pattern in the seasonally adjusted transportation and warehousing series.

The top panel of chart 3 shows 3-month percent changes for NAICS and SIC retail trade industry wages and salaries, not seasonally adjusted. Here again, the two series follow a similar pattern, but with clear differences in many quarters. For example, the December 2001 and June 2002 NAICS 3-month percent changes are at least half a percentage point greater than the SIC estimate. The bottom panel of chart 3 shows that, on a seasonally adjusted basis, these differences are lessened, except for 1997, during which the SIC series appears to have been smoothed more than the NAICS series.

THIS ARTICLE HAS PRESENTED TRANSITIONAL INDEXES and 3-month percent changes for selected series used for seasonal factor estimation as part of the seasonal adjustment methodology of the ECI when it was converted to NAICS and SOC with the March 2006 estimates and their revision in 2007. The transitional estimates were compared with SIC and OCS estimates, and the differences were quantified and observed to be, for the most part, small. Quantification of the

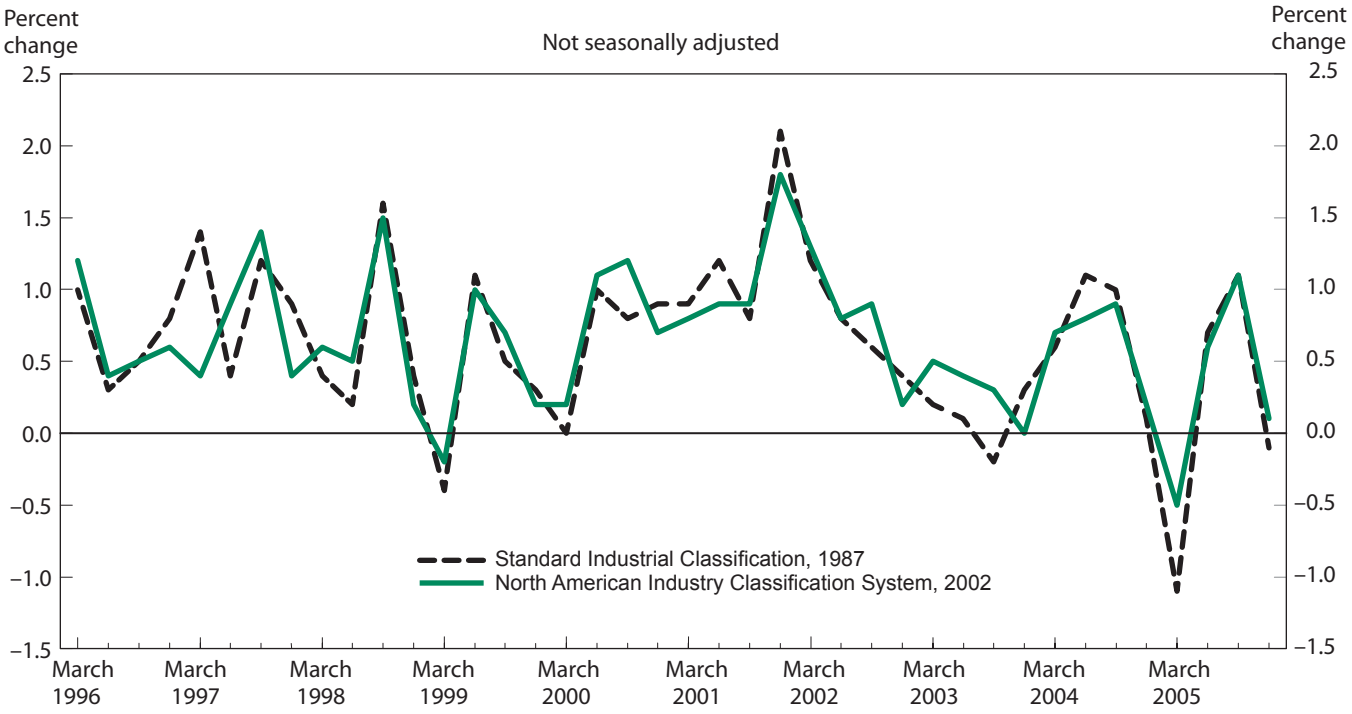
Chart 1. **Three-month percent change in transitional Employment Cost Index for SOC sales and related workers' wages and salaries compared with OCS, 1996–2005**

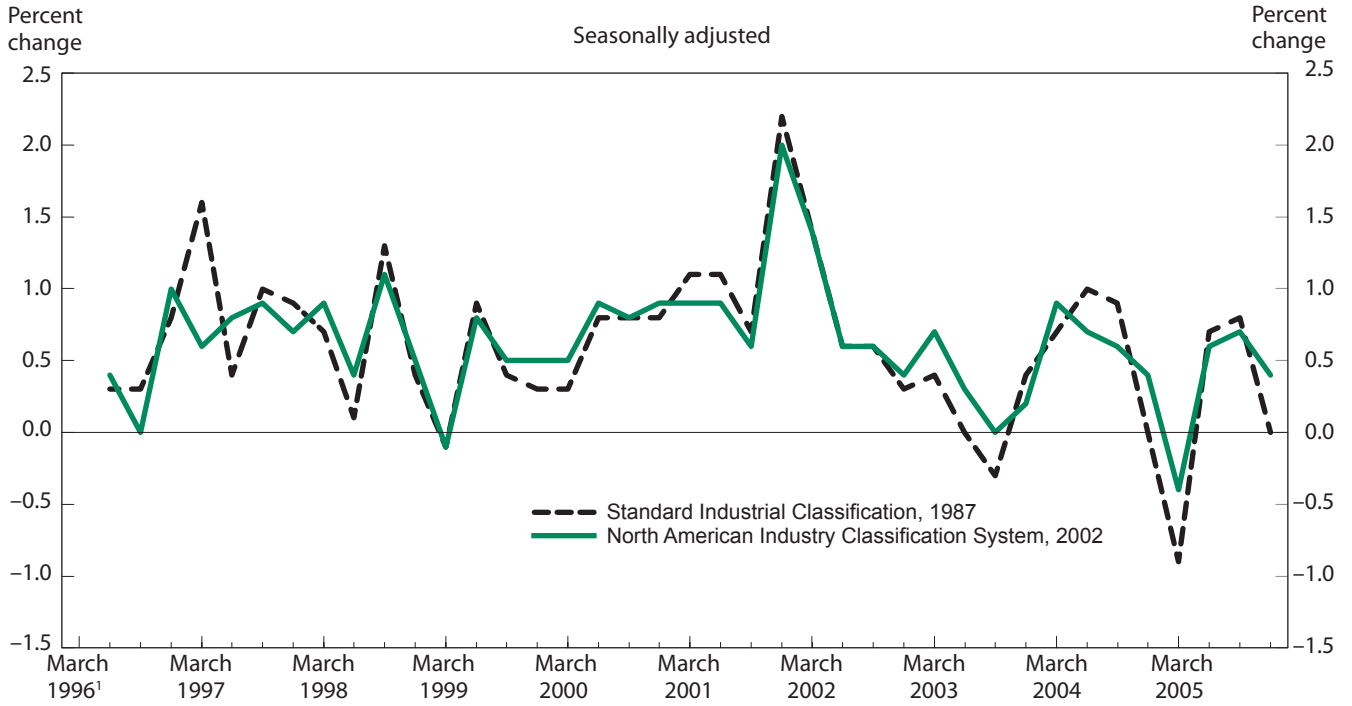




[1]Due to the design of the ECI seasonal adjustment computation system, seasonally adusted percent changes are not available for March 1996.

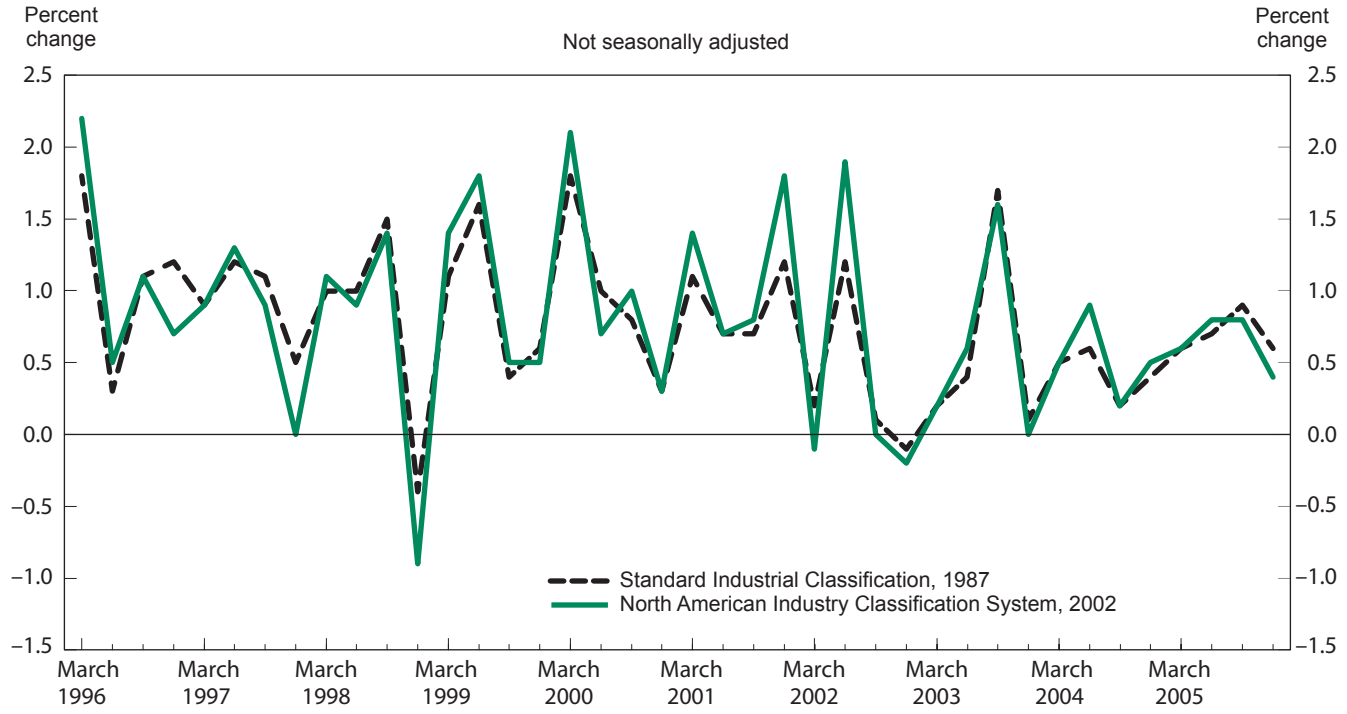
Chart 2. **Three-month percent change in transitional Employment Cost Index for NAICS transportation and warehousing workers' wages and salaries compared with SIC, 1996–2005**

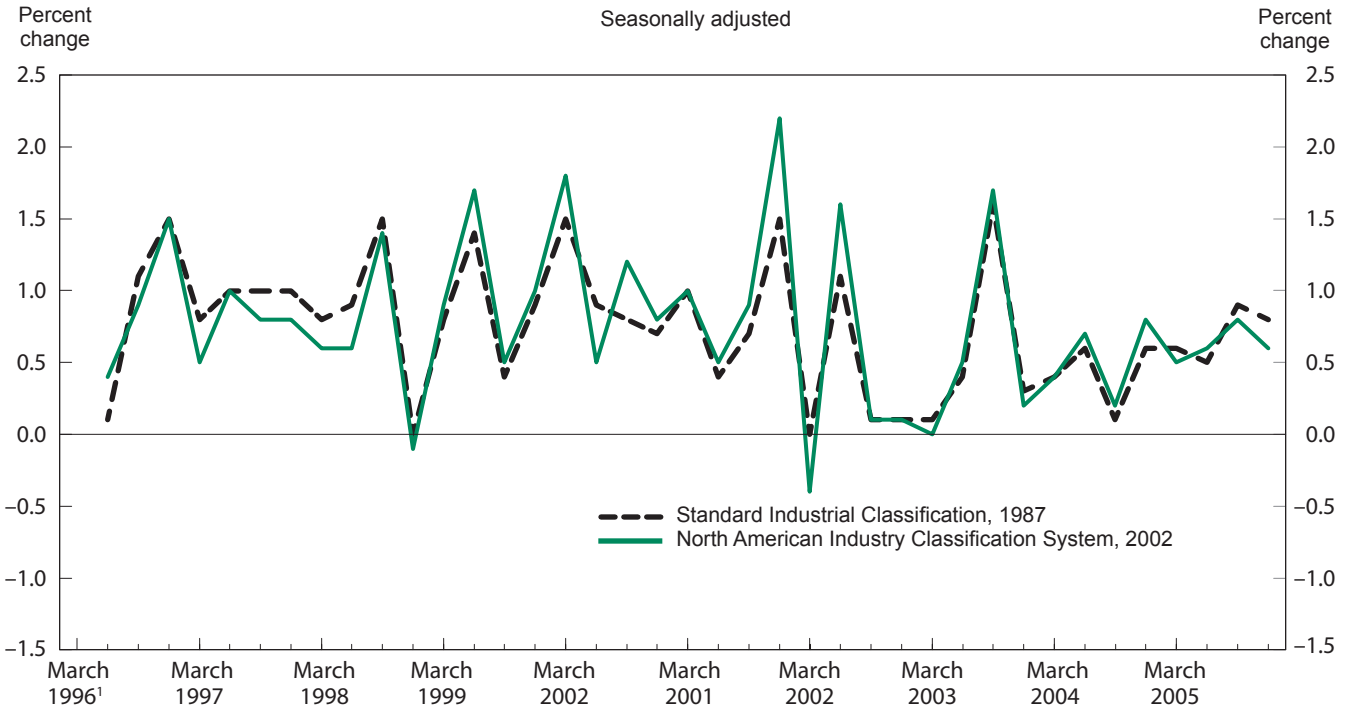




[1]Due to the design of the ECI seasonal adjustment computation system, seasonally adusted percent changes are not available for March 1996.

Chart 3. **Three-month percent change in transitional Employment Cost Index for NAICS retail trade indexes for wages and salaries compared with SIC, 1996–2005**





[1]Due to the design of the ECI seasonal adjustment computation system, seasonally adusted percent changes are not available for March 1996.

differences between NAICS and SIC and between SOC and OCS clarifies the need for a consistently classified series over time for seasonal factor estimation. Users may find the transitional indexes useful for time-series analysis if they desire consistent historical estimates.

As the ECI continues to be produced on a quarterly basis, the transitional portion of the 10-year data spans used for seasonal adjustment of the ECI will diminish, and by the end of 2011 (the last year of the data span for the 2012 seasonal adjustment revision), the entire 10-year data span will comprise estimates based completely on NAICS and SOC data coded by BLS field economists. Also, NAICS and SOC are changed periodically; for instance, NAICS 2007 is now available and SOC 2010 is underway.[43] The BLS already has begun incorporating NAICS updates into the NCS. □

Notes

[1] The ECI is a Laspeyres index calculated with the use of fixed employment weights from the 2002 BLS Occupational Employment Statistics (OES) program. The ECI fixed weights control for employment shifts among occupations and industries. (See *BLS Handbook of Methods* (Bureau of Labor Statistics, last modified Apr. 25, 2007), chapter 8, pp. 1, 4–6, on the Internet at **www.bls.gov/opub/hom/pdf/homch8.pdf**; see also Stephanie L. Costo, "Introducing 2002 weights for the Employment Cost Index," *Monthly Labor Review*, April 2006, pp. 28–32, on the Internet at **www.bls.gov/opub/mlr/2006/04/art5full.pdf**.)

[2] See *North American Industry Classification System: United States, 2002* (Executive Office of the President, Office of Management and Budget, 2002); on the Internet at **www.census.gov/epcd/naics02**.

[3] See *Standard Occupational Classification Manual: 2000* (Executive Office of the President, Office of Management and Budget, 2000); on the Internet at **www.bls.gov/soc**. See also *Federal Register* Notice 62 FR 36337-36409, July 7, 1997.

[4] See *Standard Industrial Classification System, 1987* (Executive Office of the President, Office of Management and Budget, 1987).

[5] *1990 OCSM, Occupational Classification System Manual for the Employment Cost Index Survey Program* (Bureau of Labor Statistics, December 1993); on the Internet at **www.bls.gov/news.release/archives/eci_04282006.pdf**.

[6] For more information on changes to the ECI, see Richard E. Caroll, "Changes affecting the Employment Cost Index: an overview," *Monthly Labor Review*, April 2006, pp. 3–5; on the Internet at **www.bls.gov/opub/mlr/2006/04/art1full.pdf**.

[7] See "Employment Cost Index—March 2006, BLS news release (Bureau of Labor Statistics, Apr. 28, 2006), on the Internet at **www.bls.gov/ncs/ect/home.htm#news**.

[8] In addition to their role in seasonal adjustment, transitional ECI estimates provided data for evaluating the impact of the switch to NAICS and SOC on ECI estimates, for assessing whether the new estimates under NAICS and SOC would meet publication criteria, and for checking first estimates from the new production system that was being designed to compute ECI estimates by NAICS and SOC.

[9] E. Raphael Branch and Lowell Mason, "Seasonal adjustment in the ECI and the conversion to NAICS and SOC," *Monthly Labor Review*, April 2006, pp. 12–21; on the Internet at **www.bls.gov/opub/mlr/2006/04/art3full.pdf**.

[10] Harriet G. Weinstein and Mark A. Loewenstein, "Comparing Current and Former Industry and Occupation ECEC Series," *Compensation and Working Conditions Online*, Aug. 25, 2004, on the Internet at **www.bls.gov/opub/cwc/cm20040823ar01p1.htm**.

[11] For more details, see Branch and Mason, "Seasonal adjustment in the ECI," pp. 13–15.

[12] The 10-year data span used to estimate seasonal factors for the ECI is the fixed data span adopted in 2002 on the basis of an analysis of Standard Industrial Classification-based ECI data. Sliding-spans comparisons showed that 10-year data spans gave better estimates than an 8-year alternative; that is, the 10-year spans produced a more consistent selection of models, better quality control statistics, generally smaller maximum percent differences in seasonal factors, and more. Results of the analysis are reported in E. Raphael Branch, James Buszuwski, and Mark Loewenstein," "Seasonal Adjustment Time Span Analysis," unpublished manuscript, Oct. 28, 2002, available on request from the BLS Office of Compensation and Working Conditions, Branch of Estimation and Validation. At the time of annual revision, the earliest year is dropped and the most recent year is added to form the new time span. (For more details, see Branch and Mason, "Seasonal adjustment in the ECI," pp. 12–13, 15, 20–21.)

[13] For more information on X-12-ARIMA, see David F. Findley, Brian C. Monsell, William R. Bell, Mark C. Otto, and Bor-Chung Chen, "New Capabilities and Methods of the X-12-ARIMA Seasonal Adjustment Program," *Journal of Business and Economic Statistics*, April 1998, pp. 127–77; on the Internet at **www.census.gov/ts/papers/jbes98.pdf**. The X-12-ARIMA seasonal adjustment program was developed by the Time Series Staff of the Statistical Research Division of the U.S. Census Bureau.

[14] This program was developed by the Time Series Staff of the Statistical Research Division of the U.S. Census Bureau.

[15] *North American Industry Classification System*, p. 18.

[16] The construction and wholesale trade classifications changed substantially, a number of retail classifications changed, and the organization of the information sector changed. Minor boundary adjustments affect administrative and support services and mining. For details, see *North American Industry Classification System—Revisions for 2002*, on the Internet at **www.census.gov/epcd/naics02**.

[17] See *North American Industry Classification System: United States, 1997* (Executive Office of the President, Office of Management and Budget, 1998), p. 23. Detailed comparisons between the 2002 NAICS and the 1987 SIC are on the Internet at **www.bls.gov/bls/naics.htm**.

[18] Weinstein and Loewenstein, "Comparing ECEC Series," pp. 5–12.

[19] Albert E. Schwenk and Mark A. Loewenstein, "Wage and Compensation Comparisons across SOC/OCSM Occupational Categories and to NAICS/SIC Industry Categories," unpublished manuscript, January 2002, p. 1. In a study similar to the more recent one by Weinstein and Loewenstein that used the ECEC sample (see note 10), Schwenk and Loewenstein used the ECI sample to conduct preliminary research on average wage and average compensation costs. (Schwenk and Loewenstein's report is available on request from the BLS Office of Compensation and Working Conditions, Branch of Estimation and Validation.)

[20] *Standard Occupational Classification Manual: 2000*, p. ix.

[21] Scopp, Thomas S., "The Relationship between the 1990 Census and Census 2000 Industry and Occupation Classification Systems," Technical Paper No. 65

(U.S. Census Bureau, Oct. 30, 2003), p. 8.

[22] *1990 OCSM*, p. A-2. In 1992, the occupational weights in the ECI were updated to reflect the 1990 census. There was no change in the categories at the time of the updating.

[23] For more details on the major changes to the occupational classifications, see Scopp, "1990 Census and Census 2000."

[24] Albert E. Schwenk and William J. Wiatrowski, "Using the Employment Cost Index to adjust Medicare payments," *Monthly Labor Review,* October 2002, pp. 20–27; on the Internet at **www.bls.gov/opub/mlr/2002/10/art3full.pdf**.

[25] Schwenk and Loewenstein, "Wage and Compensation Comparisons," pp. 4–6. In this study, natural resources and transportation and material-moving categories are covered as "blue-collar occupations," a BLS occupational aggregation.

[26] Weinstein and Loewenstein, "Comparing ECEC series," p. 12. In this study, the authors identify as breaks in series the category of natural resources, construction, and maintenance, as well as selected lower level categories such as the category of transportation and material moving occupations.

[27] For a detailed discussion of the issues surrounding continuity and consistency in time series, see "The Impact of Classification Revisions on Time Series," Issues paper No. 5 (Bureau of Economic Analysis, Economic Classification Policy Committee, July 1993), on the Internet at **www.census.gov/epcd/naics/issues5**.

[28] Although the indexes were computed back to December 1994, only the period from March 1996 to December 2005 was used for the March 2006 estimates. Each successive year, the ECI seasonal adjustment 10-year data span is created by dropping the earliest year of the data span for the previous revision and adding a year of the most recent indexes. Having a full year of data for 1995 made it possible to perform tests on the data prior to the March 2006 quarterly production run.

[29] Bureau of Economic Analysis, "The Impact of Classification Revisions."

[30] For more information on X-11, see Julius Shiskin, Allan H. Young, and John C. Musgrave, "The X-11 Variant of the Census Method II Seasonal Adjustment Program," Technical Paper No. 15 (U.S. Census Bureau, 1967).

[31] For more details on the NAICS classification structure, see *North American Industry Classification System: United States, 2002*.

[32] Details of the CES reconstruction methodology are discussed in Teresa L. Morisi, "Recent changes in the National Current Employment Statistics survey," *Monthly Labor Review*, June 2003, pp. 3–13 (see especially p. 11); on the Internet at **www.bls.gov/opub/mlr/2003/06/art1full.pdf**. Details of the recoding of the ECI to NAICS and SOC are discussed in Albert E. Schwenk, "Determining NAICS and SOC codes for ECI sample since 1994," internal BLS manuscript.

[33] *Standard Occupational Classification Manual*, p. xvi. For the ECI, the construction and extraction industry was combined with farming, fishing, and forestry.

[34] The Laspeyres formula is modified to accommodate the following changing employer characteristics: region, metropolitan or nonmetropolitan area, establishment size, and collective bargaining status. The weights are updated approximately every 10 years, a compromise between having a pure Laspeyres index and changing weights each quarter. For a detailed discussion of this compromise and the Laspeyres index as it relates to the ECI, see Albert E. Schwenk, "Introducing new weights for the Employment Cost Index," *Monthly Labor Review*, June 1985, pp. 22–27; on the Internet at **www.bls.gov/opub/mlr/1985/06/art3full.pdf**. For more details on the current ECI computations, see *BLS Handbook of Methods*, chapter 8, "National Compensation Measures," pp. 4–5.

[35] The same computation applies to compensation indexes; however, these indexes were not candidates for direct seasonal adjustment under the NAICS and SOC transition methodology.

[36] *BLS Handbook of Methods*, chapter 8.

[37] Costo, "Introducing 2002 weights."

[38] For further details on rebasing the ECI, see Caroll, "Changes affecting the Employment Cost Index," pp. 3–4.

[39] In actual computations, the indexes used in estimating seasonal factors are retained to five decimal places. Seasonal factors for published direct-adjusted series are available on the Internet at **www.bls.gov/ncs/ect/ectsfact.htm**.

[40] This limitation precluded all transitional estimates for years before 2001 from being published as part of the ECI historical listings.

[41] Official historical ECI estimates for periods from December 1993 through December 2005 are classified by SIC and OCS for an index base period of June 1989. These estimates are available in ECI news releases archived on the Internet at **stats.bls.gov/schedule/archives/eci_nr.htm**. The official ECI historical listing of SIC and OCS data (with base period June 1989) is not on the Internet, but is available from the BLS on request. These SIC- and OCS-classified historical data have been rebased to December 2005, the same base period as estimates classified by NAICS and SOC; the rebased data are available on the Internet at **www.bls.gov/web/echistry.pdf**. The official data classified by NAICS and SOC begin with the March 2006 estimates. The historical listing containing those estimates also contains the transitional 2001–05 data classified by NAICS and SOC, to provide context for the 2006 and later estimates. The transitional 2001–05 data are available on the Internet at **www.bls.gov/web/echistrynaics.pdf**.

[42] *Absolute difference* statistics measure distance from zero, which, in this instance, tells how different the indexes and 3-month percent changes from the two classifications are from each other. A zero absolute difference indicates no difference between the indexes or 3-month percent changes, and a value greater than zero gives a numeric difference without regard to direction. The absolute difference is calculated by subtracting SIC or OCS indexes or 3-month percent changes from their NAICS or SOC counterparts, respectively, and then dropping the numeric sign. The *mean absolute difference* is an unweighted average of the absolute difference between estimates of the two classifications over the 10-year data span. The mean absolute difference is the sum of the absolute differences, divided by the number of observations—in this case, 10 years of estimates. The mean of the differences is used because it takes into account all the observations in the data span. The *maximum value* is the largest value among all the observations in a sample; in this case, the sample is a selected period of historical estimates. The *maximum absolute difference* is used because it is the largest absolute difference between estimates from the two classification systems over the 10-year data span. The minimum difference is zero for all the series observed; therefore, maximum absolute differences in this analysis also represent the range of individual absolute differences over the 10-year period. The mean and the maximum differences were calculated with the PROC MEANS procedure of the Statistical Analysis System (SAS), version 8.2.

[43] For more details on the 2007 NAICS and 2010 SOC, see *Federal Register*, vol. 71, no. 94, parts V and VI, respectively, May 16, 2006, at **www.census.gov/epcd/naics07/naics07fr3.pdf** and **www.bls.gov/soc/soc_may06.pdf**.