

Annual Benchmark Report for Services: Fourth Quarter 2003 to Fourth Quarter 2011

INTRODUCTION

The U.S. Census Bureau produces the *Annual Benchmark Report for Services* to provide revised national estimates of quarterly revenue and expenses for select service industries. (See the **Coverage** section below for more information on the industries included in the Quarterly Services Survey.) The quarterly estimates shown in this report have been revised in a manner that adjusts them to annual revenue and expense estimates from the Service Annual Survey. For more information about the revision procedure, see the **Revisions to Previously Published Quarterly Estimates** section.

We develop the estimates in this report using data from the Quarterly Services Survey (QSS) and the Service Annual Survey (SAS). For each survey, we mail survey questionnaires to a probability sample of firms located in the United States and having paid employees. Therefore, the quarterly revenue estimates produced from QSS do not include revenue from non-employer firms (i.e., firms without paid employees).

Additional information on QSS and SAS can be found on the Census Bureau website at: <http://www.census.gov/services/index.html>.

COVERAGE

The estimates in this report are summarized by industry classification based on the 2002 North American Industry Classification System (NAICS).

NAICS groups establishments into industries based on the activities in which they are primarily engaged. This system, developed jointly by the statistical agencies of Canada, Mexico, and the United States, allows for comparisons of business activity across North America.

Estimates are presented for select industries in the following NAICS sectors (2-digit NAICS codes) and subsectors (3-digit NAICS codes):

2002 NAICS Code	Kind of Business	First Publication Quarter
51	Information	2003, Q4
54	Professional, scientific, and technical services	
56	Administrative and support and waste management and remediation services	
622	Hospitals	2004, Q4
623	Nursing and residential care facilities	
484, 492, 493	Transportation (pt) and warehousing	2009, Q1
532	Rental and leasing services	
621	Ambulatory health care services	
624	Social assistance	
71	Arts, entertainment, and recreation	
81	Other services (except public administration)	
52	Finance and insurance	2009, Q3
22	Utilities	2010, Q1
481, 483, 485, 486, 487, 488	Selected industries in transportation	
531	Real Estate	
533	Lessors of nonfinancial intangible assets (except copyrighted works)	
61	Educational services	

For the Information sector, NAICS 2002 includes substantial revisions from NAICS 1997. Consequently, estimates are shown for only twenty two quarters for the affected industries for this sector. The correspondence table for the Information sector from NAICS 1997 to NAICS 2002 is provided at the following website:

<http://www.census.gov/epcd/naics02/N02N9751.HTM>

Detailed information about NAICS can be found on the Census Bureau Web site at:

<http://www.census.gov/eos/www/naics>

REVISIONS TO PREVIOUSLY PUBLISHED QUARTERLY ESTIMATES

The Census Bureau revises the previously published quarterly estimates to:

- Reflect historical corrections to data for the current QSS and SAS samples.
- Introduce results of the 2010 Service Annual Survey (SAS).
- Link the previously published estimates from the prior QSS sample to estimates from the current QSS sample.
- Incorporate updates to the seasonal adjustment models and parameters to reflect the revised estimates.

The remainder of this section describes the process used to produce the revised estimates.

Quarterly Revenue Estimates

First, corrections are made to data obtained from the current QSS sample for the second quarter of 2006 through the third quarter of 2011. For industries starting after the second quarter of 2006, corrections are made to data from the first quarter available through the third quarter of 2011. Corrections are made to replace previously reported data with more accurate data received at a later date or to replace data that had been previously imputed with reported data obtained from the company.

Next, the revenue estimates for the fourth quarter of 2003 through the second quarter of 2006 from the prior sample are linked to the estimates starting with the third quarter of 2006 from the current sample. The linkage is performed at each detailed NAICS level (including separate breakouts by tax status for Sector 62) by multiplying the Horvitz-Thompson estimates from the prior sample by a geometric mean. The geometric mean is computed as the square root of the product of two ratios. The numerators of the ratios are the Horvitz-Thompson revenue estimates for second and third quarter 2006 from the current sample. The denominators of the ratios are the Horvitz-Thompson estimates for second and third quarter 2006 from the prior sample.

After performing the above linkage, the resulting revenue estimates for the fourth quarter of 2003 through the fourth quarter of 2011 are input to the benchmarking program. The benchmarking revises the estimates for a given detailed NAICS level in a manner that:

- For Sectors 51, 54, and 56, constrains the sum of the four quarterly revenue estimates for each year to equal the corresponding census-adjusted, annual revenue estimates for employers obtained from the Service Annual Survey (SAS) for 2004 through 2010. See the [SAS Technical Documentation](#) for a description of how the SAS estimates are derived.
- For NAICS 622 and NAICS 623, constrains the sum of the four quarterly revenue estimates for each year to equal the corresponding census-adjusted, annual revenue estimate for employers obtained from SAS for 2005 through 2010. Because data for these sub-sectors were not collected in QSS prior to the fourth quarter of 2004, SAS estimates for these sub-sectors from 2004 and prior years are not used in the benchmarking procedure.
- For NAICS 484, 492, 493, 532, 621, 624, and sectors 71 and 81, constrains the sum of the four quarterly revenue and expense (where collected) estimates for 2010 from QSS to equal the corresponding census-adjusted, annual revenue estimate for employers obtained from SAS. Because data for this sector were not collected in QSS prior to the first quarter of 2009, SAS estimates for this sector from 2008 and prior years are not used in the benchmarking procedure.

- For Sector 52 constrains the sum of the four quarterly revenue and expense (where collected) estimates for 2010 from QSS to equal the corresponding annual revenue estimate for employers obtained from SAS. Because data for this sector were not collected in QSS prior to the third quarter of 2009, SAS estimates for this sector from 2009 and prior years are not used in the benchmarking procedure.
- For NAICS 22, 481, 483, 485, 486, 487, 488, 531, 533 and 61 constrains the sum of the four quarterly revenue and expense (where collected) estimates for 2010 from QSS to equal the corresponding annual revenue estimate for employers obtained from SAS. Because data for this sector were not collected in QSS prior to the first quarter of 2010, SAS estimates for this sector from 2009 and prior years are not used in the benchmarking procedure.
- Minimizes the sum of the squared differences between the quarter-to-quarter changes of the input and revised quarterly revenue estimates.

A mathematical result of the benchmarking methodology is that all revised estimates following the end of the last benchmark year (2010) are derived by multiplying the corresponding input estimates by the ratio of the benchmarked-to-input estimate for the last quarter of the last benchmark year. Therefore, for a given detailed NAICS level, a ratio of the benchmarked-to-input estimate for fourth quarter of 2010 is computed. Quarterly revenue estimates after the fourth quarter of 2010 are multiplied by this constant ratio, which is called a carry-forward factor, to derive published quarterly revenue and expense estimates. The carry-forward factor remains the same until the next benchmarking operation.

Likewise, a carry-backward factor is used to derive published quarterly revenue estimates for quarters that precede the earliest annual constraint. The carry-backward factor for a given detailed NAICS level is the ratio of the benchmarked-to-input estimate for the first quarter of the first benchmark year (i.e., first quarter of 2004 for sectors 51, 54, and 56; first quarter of 2005 for sub-sectors 622 and 623; first quarter of 2010 for sector 52). Quarterly revenue estimates for the fourth quarter of 2003 for sectors 51, 54, and 56, the fourth quarter of 2004 for NAICS 622 and 623, and the third and fourth quarters of 2009 for sector 52 are multiplied by these constant ratios to derive published quarterly revenue estimates.

Source of Revenue and Other Estimates

Similar to revenue, the Horvitz-Thompson estimates for other data items from the prior sample are linked to the current sample estimates starting with third quarter of 2006, using a geometric mean involving the item of interest. After applying the geometric mean, a further adjustment may be performed to revise the quarterly estimates from the prior and current samples to ensure appropriate items sum to the quarterly total revenue estimate.

For source of revenue data items, the estimate for a given quarter is multiplied by a ratio, where the numerator is the revised revenue estimate for the quarter, and the denominator is the revenue estimate for the quarter that was input to the benchmarking program. This procedure ensures the estimated proportion of revenue by source is preserved after the revenue estimates are revised.

For expenses, the estimates are benchmarked using a procedure similar to that for revenue, where the sum of the four estimates of quarterly expenses for each year equals the corresponding census-adjusted, annual estimate of expenses from SAS.

For inpatient days and discharges, no further adjustment is made after the application of the geometric mean.

Revised estimates for aggregate industry levels are obtained by summing the revised estimates for the appropriate detailed industries comprising the aggregate.

Seasonally Adjusted Estimates

New seasonal factors are computed using the revised estimates as input to the Census Bureau's X-13ARIMA-SEATS software. The new factors are used to produce seasonally adjusted quarterly revenue estimates for all available quarters for select industries.

The X-13ARIMA-SEATS software improves upon the X-12-ARIMA seasonal adjustment software by providing enhanced diagnostics as well as incorporating an enhanced version of the Bank of Spain's SEATS (Signal Extraction in ARIMA Time Series) software, which uses an ARIMA model-based procedure instead of the X-11 filter-based approach to estimate seasonal factors. The X-13ARIMA-SEATS and X-12-ARIMA software produce identical results when using X-13ARIMA-SEATS with the X-11 filter-based adjustments. The X-13ARIMA-SEATS software will be available from the Census Bureau's Internet site in the coming months.

Note that the QSS estimates continue to be adjusted using the X-11 filter-based adjustment procedure.

For a list of Frequently Asked Questions about the seasonally adjusted estimates, see <http://www.census.gov/services/qss/qssseasfaq.html>.

ADDITIONAL INFORMATION

Survey Questionnaires

The Quarterly Services Survey questionnaires can be found on the Census Bureau Web site at: www.census.gov/services.

Dollar Values

All dollar values presented are expressed in current dollars; that is, the estimates are not adjusted to a constant dollar series. Consequently, when comparing estimates to prior years, users also should consider price level changes.

Confidentiality

Title 13 of the United States Code authorizes the Census Bureau to conduct censuses and surveys. Section 9 of the same Title requires that any information collected from the public under the authority of Title 13 be maintained as confidential. Section 214 Title 13 and Sections 3559 and 3571 of Title 18 of the United States Code provide for the imposition of penalties of up to 5 years in prison and up to \$250,000 in fines for wrongful disclosure of confidential census information.