EXPLANATION OF REVISIONS

Not adjusted estimates of monthly sales are revised for January 2003 through February or March 2015[1] (if an advance sales estimate is computed), as well as end-of-month inventory estimates for January 1998 through February 2015. Not adjusted estimates of quarterly retail e-commerce sales are revised for fourth quarter 1999 through fourth quarter 2014.

Revised quarterly retail e-commerce sales estimates will be available in the 1st Quarter 2015 Quarterly E-commerce Sales Report scheduled to be released on May 15, 2015.

Revisions to not adjusted estimates were made in two parts:

First, revisions were made to prior Monthly Retail Trade (MRTS) estimates to reflect historical corrections. Then, revisions were made when benchmarking the Monthly Retail Trade estimates to the 2013 Annual Retail Trade (ARTS) estimates. Revisions to seasonally adjusted estimates were made based on the revised not adjusted estimates and revised seasonal adjustment factors

Reasons for Revisions

We revised the not adjusted estimates to:

- Reflect corrections to data for the current MRTS and ARTS samples. Corrections are made to replace previously reported data with more accurate data received at a later date or to replace imputed data with reported data obtained from the company.

- Introduce the results from the 2013 ARTS, which has been benchmarked using the preliminary results of the 2012 Economic Census. ARTS estimates also reflect a revision to the 2007 Economic Census affecting NAICS 443112 (Radio, Television, and Other Electronics Stores).

- Link the previously published estimates from the prior MRTS sample to estimates from the current MRTS sample.

We revise the seasonally adjusted estimates to:

- Reflect revisions to the not adjusted estimates.

- Incorporate changes to the seasonal adjustment factors based on the annual review of the seasonal adjustment models.

Benchmarking to 2013 ARTS estimates

There are several reasons for benchmarking estimates from the Monthly Retail Trade Survey to the Annual Retail Trade Survey:

- **Timing**. The respondents have more time to prepare their annual and census reports than they do for their monthly reports. The annual and census responses are requested at a time when many firms have already compiled audited book figures for their own use. The timing of the annual survey is such that we are also able to obtain independent verification of the reported data from such sources as a company's annual report. On the other hand, respondents to the monthly survey have just a few weeks to provide reports of their sales and end-of-month inventories. Sometimes these reports are based on incomplete or unaudited records and may include estimates made by respondents to represent their understanding of their business.

- **Sampling.** As described in more detail in the Technical Documentation, the estimates derived from the annual survey are based on a sample that is much larger than the samples used to produce the monthly sales and inventory estimates. MRTS estimates are benchmarked to the results from the 2013 ARTS, which have been indirectly benchmarked using the preliminary results of the 2012 Economic Census and reflect a revision to the 2007 Economic Census affecting NAICS 443112 (Radio, Television, and Other Electronics Stores).. See ARTS methodology page for more information: http://www.census.gov/retail/arts/how_surveys_are_collected.html.

- **Response.** The annual estimates are based on more reported data than are the monthly estimates. The response to the ARTS is required by law, while the MRTS is voluntary. This requirement results in a total quantity response rate (TQRR) of 92.4 percent for sales and 92.8 percent for inventories in ARTS and a rate of approximately 75.3 percent for sales and 70.0 percent for inventories for MRTS. An imputation process accounts for the sales and inventories data that fail edits or are missing because of nonresponse. For MRTS, this process assumes that non-responding firms have similar month-to-month changes to the responding firms of a similar size in the same industry. However, the ARTS imputation process relies heavily on administrative data and relationships of these data for each individual firm, which could result in different data being tabulated for the MRTS and ARTS for non-responding firms.

Estimates of Monthly Sales

For each detailed NAICS code, the monthly retail and food service sales estimates for January 1992 (the beginning of the series) through February 2013 are linked to the estimates derived from the current sample. The linkage

is performed at each detailed NAICS level by multiplying the sample-based estimates prior to March 2013 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 sales estimates for February and March 2013 from the current sample. The denominators of the ratios are the Horvitz-Thompson estimates for February and March 2013 from the prior sample.

After performing the above linkage, the resulting sales estimates for December 2007 through February 2015 are input to the benchmarking program. The estimates for a given detailed NAICS code are revised in a manner that—

- For 2008 through 2013, constrains the sum of the 12 monthly sales estimates to equal the corresponding annual sales estimate from ARTS.

- Minimizes the sum of the squared differences between the month-to-month changes of the input and revised estimates for December 2007 through February 2015.

- Uses the previously published December 2007 sales estimate as a constraint, linking the revised estimates to the previously published sales estimates and resulting in no revision to the December 2007 estimate.

Additionally for NAICS 443112, after performing the above linkage, the resulting sales estimates for December 2002 through February 2015 are input to the benchmarking program. The estimates are revised in a manner that—

- For 2003 through 2013, constrains the sum of the 12 monthly sales estimates to equal the corresponding annual sales estimate from ARTS.

- Minimizes the sum of the squared differences between the month-to-month changes of the input and revised estimates for December 2002 through February 2015.

- Uses the previously published December 2002 sales estimate as a constraint, linking the revised estimates to the previously published sales estimates and resulting in no revision to the December 2002 estimate.

A mathematical result of the benchmarking methodology is that, for a given NAICS code, all published monthly sales estimates after December 2013 are derived by multiplying the Horvitz-Thompson estimates by the ratio of the benchmarked-to-input estimate for December 2013. This ratio, which is called a carry-forward factor, remains the same and is used to derive published monthly sales estimates until the next benchmarking operation.

If a March 2015 advance sales estimate is computed for an industry, the estimate may also be revised based on historical corrections made to data for February or March 2015. For more information on how advance estimates are computed, see the Census Bureau Web site at http://www.census.gov/retail/marts/how_surveys_are_collected.html.

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

Estimates of End-of-Month Inventories

For each detailed NAICS code, the end-of-month inventory estimates for January 1992 (the beginning of the series) through February 2013 are linked to the estimates derived from the current sample. The linkage is performed using a procedure similar to the one used for sales, except the geometric mean is based on end-of-month inventory.

After performing the above linkage, the resulting end-of-month inventory estimates for December 2004 through February 2015 are input to the benchmarking program. The estimates for a given detailed NAICS code are revised in a manner that—

- For 2004 through 2013, constrains the December end-of-month inventory estimates from MRTS to equal the end-of-year inventory estimates derived from ARTS.

- Minimizes the sum of squared differences between the month-to-month changes of the input and revised estimates for December 2004 through February 2015.

- Uses the previously published December 2004 estimate as a constraint, linking the revised estimates to the previously published estimates and resulting in no revision to the December 2004 estimate.

Additionally for NAICS 443112, after performing the above linkage, the resulting sales estimates for December 1997 through February 2015 are input to the benchmarking program. The estimates are revised in a manner that—

- For 1997 through 2013, constrains the December end-of-month inventory estimates from MRTS to equal the end-of-year inventory estimates derived from ARTS.

- Minimizes the sum of squared differences between the month-to-month changes of the input and revised estimates for December 1997 through February 2015.

- Uses the previously published December 1997 estimate as a constraint, linking the revised estimates to the previously published estimates and resulting in no revision to the December 1997 estimate.

For a given detailed NAICS code, end-of-month inventory estimates subsequent to December 2013 are derived by multiplying the input estimates by the ratio of the benchmarked-to-input estimate for December 2013. This ratio is the carry-forward factor for inventory, and it remains the same until the next benchmarking operation.

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

Estimates of Quarterly E-commerce Sales

For select detail NAICS codes (usually at the 3-digit NAICS level), quarterly retail e-commerce sales estimates for fourth quarter 1999 through fourth quarter 2012 are linked to the estimates derived from the current sample. The linkage is performed at these select detail levels by multiplying the sample-based estimates prior to first quarter 2013 by a ratio. The numerators of the ratios are the Horvitz-Thompson e-commerce sales estimates for first quarter 2013 from the current sample. The denominators of the ratios are the Horvitz-Thompson e-commerce sales estimates for first quarter 2013 from the prior sample. Monthly e-commerce estimates are also linked at these select detail levels using a procedure similar to the one used for sales, except the geometric mean is based on monthly e-commerce sales estimates.

After performing the above linkage, the resulting e-commerce sales estimates for fourth quarter 1999 through fourth quarter 2014 are input to the benchmarking program. The estimates for the select detailed NAICS code are revised in a manner that—

- For 2000 through 2013, constrains the sum of the 4 quarterly e-commerce sales estimates to equal the corresponding annual sales estimate from ARTS.

- Minimizes the sum of squared differences between the quarter-to-quarter changes of the input and revised estimates for fourth quarter 1999 through fourth quarter 2014.

Similarly, the monthly e-commerce sales estimates at these select detail levels for October 1999 through February 2013 are input into the benchmarking program. These estimates for the select detail levels are revised in a manner that—

- For fourth quarter 1999 through fourth quarter 2014, constrains the sum of the 3 months in a given quarter to equal the corresponding quarterly e-

commerce sales estimate which has been benchmarked to ARTS.

- Minimizes the sum of squared differences between the month-to-month changes of the input and revised estimates for October 1999 through February 2015.

For select detailed NAICS levels, monthly e-commerce sales estimates subsequent to February 2015 will be derived by multiplying the input estimates by the ratio of the benchmarked-to-input estimate for fourth quarter 2013. This ratio is the carry-forward factor for e-commerce sales, and it remains the same until the next benchmarking operation.

The revised estimates for the total retail quarterly e-commerce sales are computed by summing the revised estimates for the appropriate detailed industries comprising the aggregate.

<u>Seasonally Adjusted Estimates</u>

New seasonal, trading-day, and holiday factors are computed and used to adjust sales for January 2005 through February or March 2015 (if an advance sales estimate is computed). For NAICS levels impacted by the not seasonally adjusted revision to NAICS 443112, factors were computed and used to adjust sales for January 2000 through February 2015. For inventories, new seasonal factors are computed and used to adjust inventories for January 2002 through February 2015. For NAICS levels impacted by the not seasonally adjusted revision to NAICS 443112, factors were computed and used to adjust inventory for January 1995 through February 2015. For quarterly e-commerce sales, new seasonal factors are computed and used to adjust e-commerce sales for fourth quarter 1999 through fourth quarter 2014. For sales, inventories, and e-commerce sales, the new seasonal factors are computed using the revised unadjusted estimates as input to the Census Bureau's X-13ARIMA-SEATS software and using the X-11 filter-based adjustment procedure.

REVISIONS OF SALES AND INVENTORIES

The following table shows a comparison of the revised sales and inventories to the previously published estimates for 2014:

[2014 Retail and Food Services Sales and Retail Inventories Comparison of the Revised Estimates to the Previously Published Estimates](#)

ADDITIONAL INFORMATION

Survey Questionnaires

The ARTS questionnaires can be found on the Census Bureau Web site at http://www.census.gov/retail/arts/get_forms.html. The MRTS questionnaires can be found on the Census Bureau's Web site at http://www.census.gov/retail/mrts/get_forms.html.

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1 Advance sales estimates are computed for selected kinds of business and are based on a small subsample selected from the larger MRTS sample.

Related Links:

Advance Monthly Retail Trade & Food Services
Monthly Retail Trade Survey
Annual Retail Trade Survey
E-Stats – Measuring the Electronic Economy

Source: Retail Indicators Branch, U.S. Census Bureau
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